



UNIVERSITY OF PITTSBURGH
SCHOOL OF MEDICINE
Department of Obstetrics, Gynecology
and Reproductive Sciences

ANNUAL REPORT – ACADEMIC YEAR 2020

**DEPARTMENT OF OBSTETRICS,
GYNECOLOGY,
AND REPRODUCTIVE SCIENCES**

UNIVERSITY OF PITTSBURGH
SCHOOL OF MEDICINE

ANNUAL REPORT
Academic Year 2020
July 1, 2019 – June 30, 2020

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MISSION STATEMENT

The mission of the Department of Obstetrics, Gynecology and Reproductive Sciences is to improve the lives of women through:

- The provision of the highest quality of clinical care for women with complications in pregnancy; gynecologic problems, gynecologic malignancies, infectious disease consultation, infertility and endocrine disorders, genetics consultation and diagnostic ultrasound services.
- The conduct of clinical and basic science research devoted to investigation of the full spectrum of diseases associated with the health of women and infants and the ability to successfully translate these clinical and basic scientific findings into new clinical applications.
- To provide the highest level of education and training to medical students, interns, residents, postgraduate physicians, faculty, private practitioners, and other healthcare providers that is an open-ended continuum with integration of all the subspecialties and to create a highly satisfied professional environment for faculty, staff, and students.

CHAIR'S ADDRESS



Robert P. Edwards, MD

I am happy to report the refinement of UPMC and the Women's Health Service Line across the state of Pennsylvania. We continue to improve our value-driven clinical care and pathway models, as well as our outcomes reporting system and the development of our physician metrics around cost and quality. Now we are preparing for an alternative payment system in Women's Health. We have returned to the US News & World Report, ranking 24th in Women's Health.

In addition, we are exploring new ways to use simulation to educate and refresh the skills of our providers from the level of medical students to residents and fellows and to our more senior surgeons who have been out of training for many years. We are investing heavily in population genetics and genomics toward providing genetic services across the Women's Health Service Line. We are adapting our clinical care to the challenges of the nationwide pandemic.

Expanding Clinical Care

We are actively involved in expanding UPMC quality initiatives across this region and we look forward to working with our colleagues in central and eastern Pennsylvania and surround state partners to further improve the health of women across the commonwealth.

In addition to our expanding clinical role we are renewing our commitment to academic medicine including reinvigorating our career development track and identifying new and promising young medical students and fellows who will be the academic leaders of tomorrow.

We are also exploring new ways to provide care in rural Pennsylvania and looking at advanced practice provider models and specialized training for role of physicians on the challenges of dealing with an under resourced local environment. The department continues to emphasize the impact our community faculty provide to the quality of care in the state, including the overall patient experience.

Excelling in Research

Our research programs continue to receive national recognition. We are building our spoke and hub model with academic excellence in the core of our department. We have numerous career development junior faculty tracks which we are pursuing to expanding our workforce. New clinical research initiatives around endometriosis and family caregiver support highlight our research portfolio.

We continue to look at the applications of telemedicine and patient home monitoring and telecommunications that will improve patient engagement while studying these initiatives and putting our experiences in developing these cutting-edge technologies into the literature. We are becoming recognized for our excellence in physician metrics and embracing new technologies to deliver care to patients. Our telemedicine services and advanced analytics allow us to target specialty care wherever needed.

Best regards,

A handwritten signature in black ink, appearing to read "Robert P. Edwards". The signature is fluid and cursive, with a long horizontal stroke at the end.

Robert P. Edwards, MD
Milton Lawrence McCall Professor and Chair
Department of Obstetrics, Gynecology and Reproductive Sciences

RECRUITMENTS

<u>FACULTY MEMBER</u>	<u>HIRED</u>
Lauren Yu, MD	7/1/2019
Sharlay Butler, MD	7/1/2019
Yasaswi Kislovskiy, MD	7/1/2019
Samantha Deans, MD	7/1/2019
Laura Nywening, MD	7/1/2019
Kelsey Dressen, MD	7/22/2019
Sarah Napoe, MD	8/1/2019
Charity Hansford, CNM	8/1/2019
Lauren Giugule, MD	9/1/2019
Stefanie Young, CNM	9/1/2019
Alisse Hauspurg-Janicki, MD	9/1/2019
Courtney Fleissner, MD	9/1/2019
Jamie Lesnock, MD	9/1/2019
Christopher Harvey, MD	9/1/2019
Charise Shively Fashho, MD	9/1/2019
Stephanie Smith-Sham, MD	10/1/2019
Gamal Saleh, MD	1/1/2020
Sharon Roscia, CNM	2/1/2020
Shikha Sharma, MD	2/1/2020
Sarah Benckart, CNM	3/1/2020
Madison Rice, CNM	4/1/2020
Chrisina Pisani-Conway, MD	4/1/2020
Holly Kifer, CNM	5/1/2020
Helana Pietragallo, MD	5/1/2020
Robin Torres, MD	5/1/2020

DEPARTURES

<u>FACULTY MEMBER</u>	<u>DEPARTURE</u>
Judith Brands, PhD	7/19/2019
Sharon Baer, DO	7/31/2019
Laura Matthews, CNM	7/31/2019
Christine Wilson, MD	8/31/2019
John Sunycz, MD	8/31/2019
Timothy Canavan, MD	9/30/2019
Judith Albert, MD	12/31/2019
Janet Segall, MD	12/31/2019
Judith Volkar, MD	12/31/2019
Stephen Hasley, MD	2/14/2020
Roseanne Gichuru, MD	6/30/2020
Christine Foley, MD	6/30/2020
Laura Newcomb, MD	6/30/2020
Kavita Vinekar, MD	6/30/2020
Kitila Smith, MD	6/30/2020
Carolyn Kubik, MD	6/30/2020
Lauren Yu, MD	6/30/2020
Faina Linkov, PhD	6/30/2020

Department Professional Members

PROFESSORS

Steve Caritis, MD
John Chaillet, MD
Robert Edwards, MD
James Roberts, MD
Richard Guido, MD
Tony Zeleznik, PhD
Sharon Hillier, PhD
Gerald Schatten, PhD
Harold Wiesenfeld, MD, CM
Kathleen McIntyre-Seltman, MD
Halina Zyczynski, MD

Richard Beigi, MD, MSc
Kyle Orwig, PhD
Pam Moalli, MD, PhD
Isabelle Wilkins, MD
Yoel Sadovsky, MD
Devereux Saller, MD
Joseph Sanfilippo, MD
Hyagriv Simhan, MD
Gabriella Gosman, MD
John Comerici, MD
Francesmary Modugno, PhD

ASSOCIATE PROFESSORS

Yaacov Barak, PhD
Arundhathi Jeyabalan, MD
Suketu Mansuria, MD
Daniel Bellissimo, PhD
Michael Bonidie, MD
Janet Catov, PhD
Timothy Canavan, MD
Tianjiao Chu, PhD
Dave Peters, PhD
Judy Chang, MD, MPH
Beatrice Chen, MD
Stephen Emery, MD
Beatrice Chen, MD
Francesca Facco, MD
Beatrice Chen, MD

Carl Hubel, PhD
Jie Hu, MD, PhD
Faina Linkov, PhD
Mellissa Mann, PhD
Phuong Mai, MD
Anda Vlad, PhD
William Walker, PhD
Nicole Donnellan, MD
Alexander Olawaiye, MD
Robert Powers, PhD
Paniti Sukumvanich, MD
Margaret Watt-Morse, MD
Judith Yanowitz, PhD
Katherine Himes MD, MS
Alexander Yatsenko, MD, PhD

ASSISTANT PROFESSORS

Sharon Achilles, MD, PhD
Mary Ackenbom, MD
Stacy Beck, MD
Jessica Berger, MD
Katherine Bunge, MD
Serena Chan, MD
Sami Makaroun, MD
Noedahn Copley-Woods, MD
Madeleine Courtney-Brooks, MD

Judith Albert, MD
Michelle Boisen, MD
Melanie Babcock, PhD
Michael Bashford, MD
Jacob Larkin, MD
Daniel Lattanzi, MD
Megan Bradley, MD
Marie Menke, MD
Bonnie Coyne, MD

Kristiina Parviainen-Yang, MD
Erin Rheinhart, MD
Maisa Feghali, MD
Sara Sakamoto, MD
Robert Gedekoh, MD
John Harris, MD
Stephen Hasley, MD
Paniti Sukumvanich, MD
Heather Hohmann, MD
Jean Francois Mouillet, PhD
Sarah Napoe, MD
Rebecca Waltner-Towes, MD
Colleen Krajewski, MD
Maureen Hamel, MD
Dennis Krivinko, MD
Jennifer Makin, MD
Jennifer Rowland, MD
Carolyn Kubik, MD

Lauren Giugule, MD
Alisse Hauspurg-Janicki, MD
Noah Rindos, MD
Miguel Brieno-Enriquez, PhD
Catherine Chappell, MD
Katherine Scruggs, MD
David Streitman, MD
Jamie Lesnock, MD
Sarah Taylor, MD
Glenn Updike, MD
Judith Volkart, MD
Elizabeth Krans, MD
Rosemary Froehlich, MD
Brian Orr, MD
Allison Serra, MD
Christina Pisani-Conway, MD
Meredith Snook, MD
Helana Pietragallo, MD

RESEARCH ASSOCIATE PROFESSORS

Bernard Moncla, PhD

Calvin Simerly, PhD

RESEARCH ASSISTANT PROFESSORS

Judith Brands, PhD
Leslie Meyn, PhD
Lara Lemon, PhD, PharmD
Tali Shalom Barak, PhD
Yi Sheng, PhD

Robin Gandley, PhD
Hanna Pulaski, PhD
Sandra Cascio, PhD
Shoumei Bai, PhD
Samia Lopa, PhD

RESEARCH INSTRUCTORS

Carlos Castro, DVM
Mainpal Rana, PhD

Rui Liang, MD

VISITING INSTRUCTORS

Sharlay Butler, MD
Samantha Deans, MD

Yasaswi Kislovskiy, MD
Lauren Yu, MD

Department Professional Members

CLINICAL FACULTY

Ira Abramowitz, MD
Diane Adams, DO
Janice Agnew, CNM
Judith Albert, MD
Ralph Aldinger, DO
Amy Anderson, MD
Saima Ashraf, MD
David Badway, MD
Sharon Baer, DO
Linda Barnhart, DO
Francis Bassani, MD
Tiffany Beck, MD
Catherine Beecher, MD
Sarah Benckart, CNM
Hanna Berry, CNM
Sandra Blaser, CNM
Draion Burch, DO
Katie Caldwell, CNM
Stacey Jill Carlitz, DO
Kathleen Carroll, MD
Donald Carson, MD
Margaret Chory, MD
Alice Cline, CNM
Robert Collins, MD
Sandra Cooper, CNM
Melissa Deicas, CNM
Julianne De Martino, MD
Preeta Divekar, MD
Kelsey Dressen, MD
April Dunmyre DO
Michael England, MD
Eric Fackler, MD
Charise Shively Fashho, MD
John Fisch, MD
Courtney Fleissner, MD
Rocco Fulciniti, MD
James Garver, MD
Ronni Getz, CNM
Lawrence Glad, MD
Katharine Goetz, MD
Roseanne Gichuru, MD
Charity Hansford, CNM
Christopher Harvey, MD
Renata Hoca, MD
Mary Hollis, CNM
Amy Imro, MD
Amanda Kane, CNM
David Earl Kauffman, MD
Andrew Kellerman, MD
Holly Kifer, CNM
Constantine Kralios, MD
Carol Krupski, MD

Carolyn Kubik, MD
Anupama Kotha, MD
Teh-Min Lee, MD
Christine Burke London, CNM
Michael Lupinetti, MD
Tawsufe Majid, MD
Spyridon Marinis, MD
Lindsay Mastrine, DO
Bart Matson, DO
Shannon McCabe, CNM
William McGrail, Jr., MD
Julie McKechnie, CNM
Deborah McKee, CNM
Hilary Miaczynski, CNM
Meghan Minnock, DO
Murhaf Naddour, MD
Christine Nagy, MD
Stephanie Nicholas, MD
Anand Noticewala, MD
Laura Nywening, MD
Kathleen Ober, MD
Ashley O'Keefe, MD
Marina Opida, MD
Mary Peterson, MD
Dean Pollack, MD
Carla Picardo, MD
Rachel Poerschke, CNM
George Poutous, MD
Raj Rathod, MD
Christine Rause, MSN, CRNP
Nicole Rawson, CNM
Gretchen Reinhart, MD
Madison Rice, CNM
Sharon Roscia, CNM
Ira M Rock, MD
Zenaida Rosado, MD
Sandra Rygg, MD
Gamal Saleh, MD
Honroe Satcho, MD
Susan Schmidt, CNM
Lydia Schmittell, CNM
Samuel Seiaivitch, MD
Elizabeth Seiders, MD
Anne Shaheen, MD
Shikha Sharma, MD
Evan Shikora, MD
Pamela Shirey, CNM
Charise Shively-Fashho, MD
Rachel Sieman, CNM
Suzanne Shores, CNM
Robert Simmonds, MD
Stephanie Smith-Sham, MD

Deborah Sommer, MD
Kenneth Spisso, MD
Jacoby Spittler, DO
John Sunyecz, MD
Barbara Sustang Talamo, MD
Lee Ann Swanson, MD
Harati Tatineni, MD
Robert Thomas, MD
Robin Torres, MD
Samantha Vilano, MD
Tanya Walter, CNM
Nicole Waltrip, MD
Timothy Weibel, MD
Colleen Wells, DO
Deborah Whiteside, MD
Christine Wilson, CNM
Elizabeth Wirth, MD
Jamie Wright, MD
Michele Wright, DO
Laura Wunderly, CNM
Amaris Yandel, MD
Ekaterina Yatsuba, MD
Stefanie Young, CNM

DIVISION OF GYNECOLOGIC SPECIALTIES



Harold C. Wiesenfeld, MD, CM
Division Director

OVERVIEW

The Gynecologic Specialties Division continues its growth and development to support our missions to provide outstanding care to women with gynecologic disorders, advance the science of reproductive medicine and gynecology, and to educate future leaders in Obstetrics and Gynecology.

Divisional highlights of the past academic year (July 2019-June 2020):

- Research including 45 scientific publications and abstracts at national meetings, and funding from government, foundation, and industry sources totaling \$2.8 million.
- Teaching of medical students, residents and fellows.
- Clinical care as both primary providers of obstetrics and gynecology services and referral specialists within our areas of sub-specialty.
 - Division members performed 14,582 office visits in the clinical offices of the University of Pittsburgh Physicians
 - 5222 gynecologic surgical procedures were performed
 - Total charges of \$13,047,752

RESEARCH PROGRAM

Our Division continues to be extremely productive in research with funding from government, foundation, and industry sources totaling \$ 2.8 million. Division members authored 33 peer-reviewed publications and presented several oral or poster abstracts at national meetings.

Dr. Sharon Achilles is principal investigator and co-investigator for multiple research grants awarded by federal, foundation, and industry sponsors. She is the site co-investigator for the Contraceptive Clinical Trials Network (NIH/NICHD) and the Microbicide Clinical Trials Network (NIH/NIAID) and she is the site principal investigator for the Abortion Clinical Trials Network (Society of Family Planning). She is also an advisor to both the World Health Organization (WHO)

and the Centers for Disease Control and Prevention (CDC) with respect to hormonal contraception in women at high risk of HIV acquisition.

Dr. Judy Chang serves as the Program Director for the Clinical Scientist Training Program (CSTP) with the University of Pittsburgh's Institute for Clinical Research Education (ICRE) and as an Assistant Dean of Medical Student Research and the Longitudinal Research Program. She is also the Director of the Mock Grant Review Programs for the ICRE and for the Leading Emerging and Diverse Scientist to Success (LEADS) Program. She is in her second term as the Vice President of Research for the Academy on Communication in Healthcare (ACH) and serves on ACH Research Committee and the planning committees for the 2019 International Conference on Communication in Healthcare and the 2020 ACH Research Forum. She is a co-awardee (PI Dr. Abdeslam Soudi of Linguistics) of one of the Chancellor's Pitt Seed Award intending to expand inter- and cross-disciplinary scholarly collaborations across the University of Pittsburgh Campus and through this worked as a member of the organizing committee for the 2019 Humanities at Work Conference.

Dr. Beatrice Chen is a clinician researcher who is involved in clinical trials on new contraceptive technologies and HIV prevention, funded by government, foundations, and industry. She is a site Principal Investigator and co-investigator on projects within the NIAID Microbicide Trials Network and the NICHD Contraceptive Clinical Trials Network.

Dr. Nicole Donnellan plays an active role in clinical, translational and medical education research. She has investigated patient perspectives on surgical decision-making, occult risk of leiomyosarcoma with fibroids and vaginal cuff dehiscence. She continues to focus her medical education research on the role of coaching to enhance surgical trainee performance in the OR. In addition, she has also established a large prospective registry of endometriosis tissue and collaborates with MWRI investigators regarding the role of the immune system in the pathophysiology of this common and often debilitating disease.

Dr. John Harris is a general obstetrician-gynecologist in the Gynecologic Specialties division. His research at the Magee-Womens Research Institute examines on the impact of the health care system on the health and health care of women with obesity has received funding from the Agency for Healthcare Research and Quality, the National Institute on Aging and the National Institute of Child Health and Human Development. He directs the UPMC Magee-Womens Hospital Center for Women with Disabilities and is Co-Director of Magee-Womens Hospital Ob/Gyn Residency Research.

Dr. Richard Guido has directed groundbreaking clinical research in cervical cancer screening, HPV, and colposcopy. Dr. Guido is also the PI on the Adnexal Cytology Study an intramural NCI-funded study to begin looking for a new early marker for ovarian cancer. His current research activities also include studies and novel therapies for uterine fibroids. He is the director of the Fibroid Treatment Center. He is past President of ASCCP and is actively involved in developing the next round of management guidelines for abnormal cervical cancer screening tests.

Dr. Harold Wiesenfeld leads several clinical trials on reproductive tract infections in women. He is the Principal Investigator of a Centers for Disease Control and Prevention-funded study examining novel approaches to increasing chlamydia screening in primary care settings. He recently completed a study funded by the Centers for Disease Control and Prevention evaluating

the role of *Chlamydia trachomatis* in infertility among U.S. women, and was the Project and Core Leader on a NIH- funded U-19 grant entitled “The UPMC Sexually Transmitted Infections Cooperative Research Center” evaluating the pathogenesis and treatment of acute PID. He has recently completed, as principal investigator, a NIH-funded R01 grant on subclinical PID comparing the impact on fertility of two antibiotic regimens for subclinical PID. Dr. Wiesenfeld is site Principal Investigator of the NIH-funded Sexually Transmitted Infections Clinical Trials Group and is the site PI of an NIH-funded project evaluating rapid screening of Herpes Simplex Virus in pregnancy to reduce neonatal herpes simplex infections.

Study Sections/Advisory Committee Memberships (2019 - 2020)

1. Dr. Achilles
 - National Medical Committee, Planned Parenthood Federation of America
 - Faculty Advisor for Magee-Womens Research Institute’s CTSC
 - Advisor to the World Health Organization (WHO) regarding hormonal contraception and HIV acquisition risk and Voting Member of the Guidelines Development Group
 - Advisor to the Centers for Disease Control and Prevention (CDC) regarding update to the US Medical Eligibility for Contraceptive Use, 2016: Use of hormonal contraception among women at high risk for HIV infection
 - USAID Project Advisory Committee member for Multipurpose Prevention Technology implant development project
 - Board of Directors – Fellowship in Family Planning (founding member)
 - Nominating Committee Chair for Fellowship in Family Planning Board of Directors
 - Reviewer, NIH/NICHD Special Emphasis Panel/Scientific Review Group (U54 Contraception Research Centers Program)
2. Dr. Chan
 - Education Committee, North American Society for Pediatric & Adolescent Gynecology (NASPAG)
 - Children’s Hospital of Pittsburgh Transitional Care Task Force
 - Children’s Hospital of Pittsburgh Point-of-care US Standards Committee
3. Dr. Chang
 - Academy for Communication in Healthcare (ACH) Executive Board Member: Vice-President of Research (nominated as President-Elect for 2020)
 - ACH Research Committee
 - Planning Committee for the International Conference on Communication in Healthcare 2019
 - Planning Committee for the ACH Research Forum 2020
 - Advisory Board member for the Kentucky Conference on Health Communication/District of Columbia Conference on Health Communication
 - Planning Committee for the 2019 Humanities at Work Conference
 - Poster judge, University of Pittsburgh School of Medicine Medical Scientist Training Program Research Day
 - Consultant, Adagio Health Prenatal Smoking Cessation Campaign
 - Consultant, Adagio Health Opioid Use During Pregnancy Patient Education Material Development

4. Dr. Chen
 - Scientific Abstract Working Group: Society of Family Planning Annual Meeting
 - Forum Planning Committee and Scientific Abstract Review Committee, North American Forum on Family Planning
 - Committee Member, University of Pittsburgh Institutional Review Board
 - ACOG eModule Advisory Committee Member
 - Merck Contraception Global Advisory Board
5. Dr. Donnellan
 - Social Media Committee, Society of Gynecologic Surgeons
 - ACOG Benign Hysterectomy Episode Grouper Working Group Member
 - MWH Endometriosis Center of Excellence Working Group
6. Dr. Guido
 - Chair, Institutional Review Board, University of Pittsburgh
 - Past President ASCCP
 - Chair, ASCCP Research Committee
 - ASCCP Consensus Guideline Mobile App Developer
7. Dr. Krajewski
 - Board Member, National Campaign to Prevent Teen and Unplanned Pregnancy
8. Dr. Lance
 - Emmi Solutions Medical Advisory Board
9. Dr. Lee
 - American Association of Gynecologic Laparoscopists (AAGL) CME Advisory Committee
 - AAGL Abstract Committee member
 - Executive Committee of Society of Gynecologic Surgeons
10. Dr. Mansuria
 - Member, Education Committee of AAGL
 - Physician Champion for the Patient and Family Centered Care (PFCC) initiative for laparoscopic hysterectomy and same day discharge
 - UPMC Payer Provider Programs Working Group for laparoscopic hysterectomy
 - UPMC Surgeon Reporting Task Force Member
11. Dr. McIntyre-Seltman
 - Advisory Dean, University of Pittsburgh School of Medicine
12. Dr. Peterson
 - Education Committee, North American Menopause Society
 - Scientific Committee, North American Menopause Society
13. Dr. Rindos
 - ACOG National Young Physician at Large
 - ACOG Western PA Young Fellow Representative
 - FMIGS-YAN Co-founder and ex-officio board member
14. Dr. Scruggs
 - Education Committee, North American Menopause Society
15. Dr. Volkar
 - ACOG Committee Coding and Healthcare Economics
 - ACOG Representative to AMA CPT Advisory Committee
 - Co-chair ACOG Benign Hysterectomy Episode Grouper Committee
 - North American Menopause Society Abstract Committee

16. Dr. Wiesenfeld

- Consultant, 2015 STD Treatment Guidelines, Centers for Disease Control and Prevention
- Executive Committee- Sexually Transmitted Infections Clinical Trials Group- NIH
- Executive Committee – AIDS Free Pittsburgh

Editorships

1. Dr. Achilles
 - Editorial Board: *Contraception*
2. Dr. Guido
 - Editorial Board: *Journal of Lower Genital Tract Diseases*
3. Dr. Lee
 - Editorial Board: *Journal of American Association of Gynecologic Laparoscopists*
4. Dr. Mansuria
 - Editor-in-Chief: *SurgeryU* (the online journal for the American Association of Gynecologic Laparoscopists)
 - Editorial Board: *Journal of Minimally Invasive Gynecologic Surgery*
5. Dr. Wiesenfeld
 - Editorial Board: *Sexually Transmitted Diseases*
 - Associate Editor: *Infectious Diseases in Obstetrics and Gynecology*

TEACHING ACTIVITIES

Our Division members maintain a position in academic medicine because of their continued commitment to teaching. All surgically active division members rotate as the Resident Service Attending. We are the primary providers of gynecologic and obstetric teaching in resident continuity clinics.

The Outpatient Clinic at Magee-Womens Hospital of UPMC, continues to update clinical programming and expand services. Continuity Clinics are a major provider of OB/GYN care in the Western Pennsylvania region, and all members of the Division participate in staffing these clinics. Our faculty devote their clinical time to staffing the Continuity Clinics and are dedicated to providing the highest quality of care to patients in the Outpatient Clinic while providing an excellent learning experience for residents and medical students. In addition to Continuity Clinics, the Division runs specialty clinics in colposcopy (2 sessions weekly), family planning (2 sessions weekly), urgent care (9 sessions weekly), vulvar disease (1 session weekly) and perioperative management (2 sessions weekly).

Our division teaching conferences include:

- Gynecology Conference—Monday morning 0715-0815: a two-segment conference with alternating weeks:

- A 30 minute evidenced-base 3rd year resident presentation with assigned topics based on a weekly curriculum followed by a 30 minute clinical presentation of patients and treatment decisions by the Senior resident on the University Gynecology service.
- A 45 minute lectures by a Family Planning fellow, a Minimally Invasive Surgery fellow or a Reproductive Infectious Disease fellow followed by a 15 minute clinical presentation of patients and treatment decisions by the Senior resident on the University Gynecology service.
- Colposcopy Conference—Monday morning 0815-0900: weekly review of colposcopic pattern recognition and cytology-histology-colposcopy correlation.
- Teaching rounds: the attending on service provides teaching rounds every Monday, Wednesday and Friday morning at 0630. Monday am is focused on cases or issues from the weekend or left over from the prior week. Wednesday and Friday am sessions focus on the topic of the week.

Residency Rotations

	PGY
University Gynecology	4 th , 3 rd , 2 nd , 1 st
Family Planning	4 th
Special Clinics (colposcopy and pre-op clinics)*	4 th
Minimally Invasive Surgery	4 th
Gynecology Consultation	2 nd
Urgent Care Gynecology	1 st
Ambulatory Gynecology	4 th , 1 st

* also attends private office hours in Midlife Health Center for teaching related to the care of menopausal patients

Medical Student Education

Medical Student education is also a priority. All division members participate as faculty preceptors for Problem Based Learning sessions during the 3rd year Clerkship in Obstetrics and Gynecology which is directed by Dr. Heather Hohmann. Our faculty, led by Dr. Hohmann, ensure a high-quality learning experience to medical students assigned to the Outpatient Clinic. Students also rotate in the faculty practice (University of Pittsburgh Physicians) working one on one with faculty. Many of the faculty participate in courses throughout the main medical school curricula and special programs such as the Clinical Scholars Training Program.

Medical Student Education leadership

2nd year Reproductive Biology Course: Nicole Donnellan, MD, course co-director

4th year Obstetrics and Gynecology electives: Richard Guido, MD, director

→ Electives offered within our division: research, Independent private practice, University Gynecology, Minimally Invasive Surgery, Family Planning

4th year Reproductive Infectious Disease ILS Course: Harold Wiesenfeld, MD, CM, course director

4th year Pelvic Anatomy ILS Course: Suketu Mansuria, MD, course director

4th year Women's Health Elective: Kathleen McIntyre-Seltman, MD, clerkship co-director

4th year Family Planning Elective: Beatrice Chen, MD, director

4th year Minimally Invasive Gynecologic Surgery Elective: Ted Lee, MD, director

4th year Ambulatory Gynecology Elective: Harold Wiesenfeld, MD, director

Dr. Judy Chang is an Associate Dean of medical student research recognizing her many years of dedication and commitment to medical student research.

Dr. McIntyre-Seltman is an elected member of the University of Pittsburgh Academy of Master Educators, and an Advisory Dean in the Student Affairs Department of the Medical School, overseeing advancement of medical students throughout their curriculum.

Professional Affiliations

1. Dr. Achilles

- Member, European Society of Contraception and Reproductive Health
- Member, American Society for Reproductive Immunology
- Member, Society of Family Planning
- Member, National Abortion Federation
- Member, American Sexually Transmitted Diseases Association
- Member, Association of Reproductive Health Professionals
- Member, International Union Against Sexually Transmitted Infections
- Fellow, American College of Obstetricians and Gynecologists (ACOG)
- Member, Infectious Disease Society of Obstetrics & Gynecology (IDSOG)
- Member, National Peace Corps Society
- Mentor, National Research Mentoring Network

2. Dr. Chan

- Fellow, ACOG
- Member, North American Society for Pediatric & Adolescent Gynecology
- Member, American Society for Reproductive Medicine
- Member, American Association of Gynecologic Laparoscopists

3. Dr. Chang

- Fellow, ACOG
- Member, American Professors of Obstetrics & Gynecology
- Member, Academy Health
- Member, American Public Health Association
- Member, American Academy on Communication in Health Care
- Member, Society of Gynecologic Investigation
- Member, American Balint Association

4. Dr. Chen

- Fellow, ACOG
- Fellow, Society of Family Planning
- Member, Association of Reproductive Health Professionals

- Member, National Abortion Federation
5. **Dr. Donnellan**
 - Fellow, ACOG
 - Member, American Association of Gynecologic Laparoscopists
 - Member, Association of Professors of Obstetrics and Gynecology
 - Member, Society of Gynecologic Surgeons
 - Member, ACOG Benign Hysterectomy Episode Grouper Working Group Member
 - MWH Endometriosis Center of Excellence Working Group
 6. **Dr. Guido**
 - Fellow, ACOG
 - Member, Association of American Gynecologic Laparoscopists
 - Fellow, American Society for Colposcopy & Cervical Pathology
 7. **Dr. Harris**
 - The Obesity Society
 - Academy Health
 - Gerontological Society of America
 8. **Dr. Hohmann**
 - Fellow, ACOG
 - Member, APGO
 9. **Dr. Imro**
 - Fellow, ACOG
 - Member, North American Menopause Society
 10. **Dr. Krajewski**
 - Member, ARSM
 - Member, National Abortion Federation
 - Fellow, ACOG
 11. **Dr. Lee**
 - Fellow, ACOG
 - Member, American Association of Gynecologic Laparoscopists
 - Member, American Urogynecologic Society
 12. **Dr. Mansuria**
 - Fellow, ACOG
 - Member, American Association of Gynecologic Laparoscopists
 - Member, Society of Laparoendoscopic Surgeons
 13. **Dr. McIntyre-Seltman**
 - Fellow, ACOG
 - Member, Alpha-Omega-Alpha (AOA) Medical Honor Society
 - American Society for Colposcopy and Cervical Pathology
 - Association of Professors of Gynecology and Obstetrics
 14. **Dr. Rindos**
 - Fellow, ACOG
 - Member, AAGL
 - Member, Gold Humanism Honor Society
 15. **Dr. Scruggs**
 - Fellow, ACOG

- ABOG Board Examiner
- Member of North American Menopause Society
- 16. **Dr. Peterson**
 - Fellow, ACOG
 - Member, North American Menopause Society
 - Member, NAMS Education Committee
 - Member, North American Menopause Society Education Committee
- 17. **Dr. Updike**
 - Fellow, ACOG
 - Member, American Society for Colposcopy and Cervical Pathology
 - Member, National Vulvodynia Association
- 18. **Dr. Volkar**
 - Fellow, ACOG
 - Member, North American Menopause Society
 - Member International Society for the Study of Women's Sexual Health
 - Member American Association for Physician Leadership
 - Member AMA
- 19. **Dr. Wiesenfeld**
 - Fellow, ACOG
 - Member, Infectious Diseases Society for Obstetrics and Gynecology (IDSOG)
 - Member, American STD Association
 - Member, Infectious Diseases Society of America
 - Member, Royal College of Physicians and Surgeons of Canada

FELLOWSHIPS

The Division offers fellowships in Family Planning, Minimally Invasive Surgery and Reproductive Infectious Diseases. Our faculty also contributes to the teaching of fellows and junior faculty in other University departments, including the Women's Health fellows from the Department of Medicine. Additionally, Dr. Chang serves as a core faculty member of the Center for Research in Health Care where she has co-developed and co-teaches a fellow/junior faculty level course on Qualitative Research Methods.

The ***Family Planning Fellowship*** is a two-year program designed to include training in family planning clinical care, experience in gynecologic surgery and related family planning procedures, participation in the design and performance of clinical trials and international field work. During the two years, the fellow is encouraged to complete course work at the Graduate School of Public Health at the University of Pittsburgh to satisfy the requirements of a Master's Degree in Public Health. Course work can involve a multidisciplinary approach or a departmental curriculum including biostatistics, epidemiology and health care administration. The program is intended to foster the pursuit of an academic career by overall emphasis on and preparation for clinical research and teaching. Fellows are specifically trained in contraceptive counseling, contraceptive implant insertion and removal, IUD insertion and removal, and the fitting of diaphragms. Additionally, fellows gain expertise in treating complications of hormonal

contraception. Although these procedures may have been learned during residency, a concentrated experience will enable the fellow to be proficient with unusual or complicated cases. Fellows receive specialized training and become very experienced in performing first trimester procedures including manual vacuum aspiration and medical abortions. Fellows will have similar experience with second trimester abortions by dilation and evacuation (D&E). The fellows are an active participant in ongoing trials as well as be expected to design and conduct his/her own research trial. Fellows also gain experience in grant writing, budgeting, contracts, and other administrative aspects of clinical research. Fellows are also expected to spend time working in the developing world on advances in contraception and access to care. This international experience is designed to further the fellow's understanding of issues related to the impact of high fertility rates and poor access to reproductive health services for contraception and pregnancy care. Three-year programs are available for individuals with an additional interest in Reproductive Genetics or Reproductive Infectious Disease.

The ***Minimally Invasive Surgery Fellowship*** is a two-year intense academic training program which focuses on minimally invasive surgery. The program is designed to provide extensive training in endoscopic surgery from the gynecologic and general surgical perspectives. During the two years, the fellow is encouraged to complete course work at the Graduate School of Public Health at the University of Pittsburgh to satisfy the requirements of a Master's Degree in Public Health. Course work can involve a multidisciplinary approach or a departmental curriculum including biostatistics, epidemiology and health care administration. A research project is an integral part of the program with the expectation that it is submitted at a national level and published in a peer-reviewed journal. Other activities include active participation in resident and student teaching programs and private patient sessions.

The ***Reproductive Infectious Diseases Fellowship*** is a two-year program designed to train obstetrician gynecologists in the clinical care of women with complex infections of the reproductive tract. The fellows receive intensive training on both inpatient units and outpatient settings, mastering the management of common and less-common reproductive tract infections including complex vaginitis, pelvic inflammatory disease, pelvic infections following surgery, hospital-acquired infections, and obstetrical infections. Trainees gain experience in the management of HIV-positive women in collaboration with members of the Division of Infectious Diseases in the Department of Medicine. The fellowship includes training on antimicrobial management and pharmacology. A large proportion of the fellowship is devoted to training in clinical and translational research, with the goal of designing and completing a research project during the fellowship. Fellows are required to complete postgraduate coursework in research design and methods, statistics, and many fellows successfully complete a Master's degree in Public Health or Clinical Research.

CLINICAL PROGRAMS

The main clinical location is located at Magee-Womens Hospital with an office suite on the zero level that focuses on general and specialty gynecologic services and an office on the 5th floor that focuses on midlife health. We also have satellite clinical offices across the region. Dr. Chang primarily sees patients in the Montefiore General Internal Medicine offices. Dr. Guido directs the Fibroid Treatment Center, a collaborative program with Department of Radiology. In addition to gynecologic care, Drs. Wiesenfeld, Harris, Makin and Updike also have a busy obstetric practice. The Midlife Health Center, under the direction of Dr. Mary Beth Peterson, provides comprehensive care to women approaching or within the menopausal transition. Dr. Peterson and her associates Drs. Katherine Scruggs, Amy Imro, and Judith Volkar provide state-of-the-art care to women and offer advanced diagnostic and treatment options with the goal of optimizing women's health in the menopausal transition and beyond. Established in July 2019, the Endometriosis and Chronic Pelvic Pain center is a multidisciplinary clinic that affords patients care by expert gynecologic surgery, womens health physical therapists and behavioral health therapists. Sites include the UPP Gynecology specialties office, the new Lemieux center and Erie. Residents, fellows, medical students and other students of the health sciences are integrated into our offices for subspecialty education.

The Division continues to maintain surgical volumes as we serve as a referral service for women with complex gynecologic disorders. There were 14,582 patient visits to members of the Division in the University of Pittsburgh Physician offices. Our division members performed 5222 surgical procedures in the operating room. We continue to have an open access schedule into our office to maximize the availability of our specialists for new and return problem visits. A new patient with a problem can see a physician in our practice within 3 business days.

We continue to provide specialty and subspecialty consultations for gynecologic services to primary care physicians, specialists and other clinicians in the greater Western Pennsylvania region and beyond. Members of the division are nationally and internationally recognized for their expertise in gynecologic specialties.

Outreach/contracted care:

Veteran's Administration Hospital Women's Health Services: Dr. Colleen Krajewski and Dr. Kathy Scruggs

Planned Parenthood of Western Pennsylvania: Dr. Beatrice Chen (Medical Director), Dr. Sharon Achilles (Laboratory Director), Dr. Colleen Krajewski

Allegheny County Health Department: Dr. Harold Wiesenfeld—Director, STD Program

Magee-Womens Hospital Outpatient Clinical Services: Dr. Jennifer Rowland (UNO practice provider)

Magee-Womens Hospital Women with Disabilities Clinic: Dr. John Harris

Magee-Womens Hospital Mt. Oliver Clinic: Dr. Heather Hohmann, Dr. Margaret Watt-Morse

General Internal Medicine Comprehensive Women's Health Clinic (Montefiore): Dr. Judy Chang

Specialties:

Sharon Achilles, MD, PhD	Family Planning, Reproductive Infectious Diseases
Serena Chan, MD	Adolescent Gynecology
Judy Chang, MD, MPH	Domestic Violence, Health Services Research
Beatrice Chen, MD, MPH	Family Planning
Nicole Donnellan, MD	Minimally Invasive Surgery
Robert Gedekoh, MD	Ambulatory obstetrics and gynecology
Richard Guido, MD	Minimally Invasive Surgery, Cervical Dysplasia, Pediatric Gynecology
John Harris, MD	Population Health, Health Services Research
Heather Hohmann, MD, MPH	Ambulatory obstetrics and gynecology; Family Planning
Amy Imro, MD	Menopause and Midlife Health
Colleen Krajewski MD, MPH	Family Planning
Jennifer Makin, MD	Global Health
Ted Lee, MD	Minimally Invasive Surgery, Pelvic Pain management
Suketu Mansuria, MD	Minimally Invasive Surgery
Kathy McIntyre-Seltman, MD	Cervical Dysplasia, Vulvar Disease
Mary Beth Peterson, MD	Menopause and Midlife Health
Katherine Scruggs, MD	Menopause and Midlife Health
Glenn Updike, MD	Vulvar Disease, Community Medicine
Judy Volkar, MD	Menopause and Midlife Health
Harold Wiesenfeld, MD, CM	Reproductive Infectious Diseases, Vulvar Disease

Faculty

Harold Wiesenfeld, MD, CM - Director
Sharon Achilles, MD, PhD
Serena Chan, MD
Judy Chang, MD, MPH
Beatrice Chen, MD, MPH
Nicole Donnellan, MD
Robert Gedekoh, MD
Richard Guido, MD
John Harris, MD
Heather Hohmann, MD, MPH
Amy Imro, MD
Colleen Krajewski, MD, MPH
Jennifer Makin, MD
Ted Lee, MD
Suketu Mansuria, MD
Kathy McIntyre-Seltman, MD
Mary Beth Peterson, MD
Katherine Scruggs, MD
Glenn Updike, MD
Judy Volkar, MD
Margaret Watt-Morse, MD
Harold Wiesenfeld, MD, CM
Kim Barcaskey, CRNP
Kim Berkhoudt, CRNP

Cindy Kennedy, MSN, RN (Division Administrator)

Fellows Family Planning

Samantha Deans, MD
Kavita Vinekar, MD

Minimally Invasive Surgery

Christine Foley, MD
Laura Newcomb, MD
Shana Miles, MD

WEBSITE: <http://obgyn.medicine.pitt.edu/gynecology>

Publications – Division of Obstetrical Specialties

Young Holt B, Kiarie J, Kopf GS, Nanda K, Hemmerling A, **Achilles SL**. Bridging the gap: advancing multipurpose prevention technologies from the lab into the hands of women†. *Biol Reprod*. 2020 Aug 4;103(2):286-288. doi: 10.1093/biolre/ioaa085. PMID: 32657337; PMCID: PMC7401373

Tarleton J, Chen BA, Meyn LA, Hendrix CW, Marzinke MA, **Achilles SL**. Pharmacokinetic and Pharmacodynamic Impacts of Depot Medroxyprogesterone Acetate Use on HIV Pre-exposure Prophylaxis in Women. *J Acquir Immune Defic Syndr*. 2020 Oct 1;85(2):182-188. doi: 10.1097/QAI.0000000000002421. PMID: 32568766

Achilles SL, Meyn LA, Mhlanga FG, Matubu AT, Stoner KA, Beamer MA, Chirenje ZM, Hillier SL. Zim CHIC: A cohort study of immune changes in the female genital tract associated with initiation and use of contraceptives. *Am J Reprod Immunol*. 2020 Sep;84(3):e13287. doi: 10.1111/aji.13287. Epub 2020 Jun 25. PMID: 32533883; PMCID: PMC7507197

Haddad LB, Swaims-Kohlmeier A, Mehta CC, Haaland RE, Brown NL, Sheth AN, Chien H, Titanji K, **Achilles SL**, Lupo D, Hart CE, Ofotokun I. Impact of etonogestrel implant use on T-cell and cytokine profiles in the female genital tract and blood. *PLoS One*. 2020 Mar 26;15(3):e0230473. doi: 10.1371/journal.pone.0230473. PMID: 32214321; PMCID: PMC7098611

Stoner KA, Beamer MA, Avolia HA, Meyn LA, Hillier SL, **Achilles SL**. Optimization of processing female genital tissue samples for lymphocyte analysis by flow cytometry. *Am J Reprod Immunol*. 2020 May;83(5):e13227. doi: 10.1111/aji.13227. Epub 2020 Feb 13. PMID: 31991032; PMCID: PMC7176536

O'Connor-Terry C, Burton D, Gowda T, Laing A, **Chang JC**. Challenges of Seeking Reproductive Health Care in People Experiencing Intimate Partner Violence. *J Interpers Violence*. 2020 Sep 24;886260520959627. doi: 10.1177/0886260520959627. Epub ahead of print. PMID: 32969311.

Morrison PK, Pallatino C, Fusco RA, Kenkre T, **Chang J**, Krans EE. Pregnant Victims of Intimate Partner Homicide in the National Violent Death Reporting System Database, 2003-2014: A Descriptive Analysis. *J Interpers Violence*. 2020 Jul 26;886260520943726. doi: 10.1177/0886260520943726. Epub ahead of print. PMID: 32713241.

Demirci JR, Suffoletto B, Doman J, Glasser M, **Chang JC**, Sereika SM, Bogen DL. The Development and Evaluation of a Text Message Program to Prevent Perceived Insufficient Milk Among First-Time Mothers: Retrospective Analysis of a Randomized Controlled Trial. *JMIR Mhealth Uhealth*. 2020 Apr 29;8(4):e17328. doi: 10.2196/17328. PMID: 32347815; PMCID: PMC7221632.

Chernoff E, Silverstein G, Delos Trinos JPCR, Veldkamp P, **Chang JC**, Belizario VY. Health and Education Officials' Perspectives on the Impact of Typhoon Haiyan on Mass Drug Administration for Soil-Transmitted Helminth Infections in the Philippines. *Disaster Med Public Health Prep*. 2020 Apr 13:1-5. doi: 10.1017/dmp.2020.34. Epub ahead of print. PMID: 32279688.

Donley G, **Chen BA**, Borrero S. The legal and medical necessity of abortion care amid the COVID-19 pandemic. *J Law Biosci*. 2020 Apr 29;7(1):lsaa013. doi: 10.1093/jlb/lsaa013. PMID: 32728460; PMCID: PMC7197550.

Judge-Golden CP, Wiesenfeld HC, **Chen BA**, Borrero S. Adherence to Recommended Practices for Provision of Long-Acting Reversible Contraception Among Providers in a Large U.S. Health Care System. *J Womens Health (Larchmt)*. 2020 Jul 13. doi: 10.1089/jwh.2019.8169. Epub ahead of print. PMID: 32667847.

Tarleton J, **Chen BA**, Meyn LA, Hendrix CW, Marzinke MA, Achilles SL. Pharmacokinetic and Pharmacodynamic Impacts of Depot Medroxyprogesterone Acetate Use on HIV Pre-exposure Prophylaxis in Women. *J Acquir Immune Defic Syndr*. 2020 Oct 1;85(2):182-188. doi: 10.1097/QAI.0000000000002421. PMID: 32568766.

Chen BA, Eisenberg DL, Schreiber CA, Turok DK, Olariu AI, Creinin MD. Bleeding changes after levonorgestrel 52-mg intrauterine system insertion for contraception in women with self-reported heavy menstrual bleeding. *Am J Obstet Gynecol*. 2020 Apr;222(4S):S888.e1-S888.e6. doi: 10.1016/j.ajog.2019.11.1288. Epub 2019 Dec 19. PMID: 31866516.

Rindos NB, Fulcher IR, **Donnellan NM**. Pain and Quality of Life after Laparoscopic Excision of Endometriosis. *J Minim Invasive Gynecol*. 2020 Apr 6:S1553-4650(20)30166-7. doi: 10.1016/j.jmig.2020.03.013. Epub ahead of print. PMID: 32272239.

Peters A, Siripong N, Wang L, **Donnellan NM**. Enhanced recovery after surgery outcomes in minimally invasive nonhysterectomy gynecologic procedures. *Am J Obstet Gynecol*. 2020 Aug;223(2):234.e1-234.e8. doi: 10.1016/j.ajog.2020.02.008. Epub 2020 Feb 20. PMID: 32087147; PMCID: PMC7395891.

Foley C, **Donnellan N**, Harris J. Tissue Extraction in Gynecologic Surgery: Past, Present, and Future. *Clin Obstet Gynecol*. 2020 Jun;63(2):305-319. doi: 10.1097/GRF.0000000000000511. PMID: 31850944.

Clarke MA, Massad LS, Khan MJ, Smith KM, **Guido RS**, Mayeaux EJ Jr, Darragh TM, Huh WK, Johnson AL, Gold MA, Schiffman M, Wentzensen N. Challenges Associated With Cervical Cancer Screening and Management in Obese Women: A Provider Perspective. *J Low Genit Tract Dis*. 2020 Apr;24(2):184-191. doi: 10.1097/LGT.0000000000000506. PMID: 32243314.

Perkins RB, Fuzzell LN, Lake P, McIntyre M, Nayar R, Saraiya M, Loukissas J, Felder T, **Guido RS**, Vadaparampil ST. Incorporating Stakeholder Feedback in Guidelines Development for the Management of Abnormal Cervical Cancer Screening Tests. *J Low Genit Tract Dis*. 2020 Apr;24(2):167-177. doi: 10.1097/LGT.0000000000000524. PMID: 32243312; PMCID: PMC7147423.

Demarco M, Egemen D, Raine-Bennett TR, Cheung LC, Befano B, Poitras NE, Lorey TS, Chen X, Gage JC, Castle PE, Wentzensen N, Perkins RB, **Guido RS**, Schiffman M. A Study of Partial Human Papillomavirus Genotyping in Support of the 2019 ASCCP Risk-Based Management Consensus Guidelines. *J Low Genit Tract Dis*. 2020 Apr;24(2):144-147. doi: 10.1097/LGT.0000000000000530. PMID: 32243309; PMCID: PMC7141756.

Egemen D, Cheung LC, Chen X, Demarco M, Perkins RB, Kinney W, Poitras N, Befano B, Locke A, **Guido RS**, Wiser AL, Gage JC, Katki HA, Wentzensen N, Castle PE, Schiffman M, Lorey TS. Risk Estimates Supporting the 2019 ASCCP Risk-Based Management Consensus Guidelines. *J Low Genit Tract Dis*. 2020 Apr;24(2):132-143. doi: 10.1097/LGT.0000000000000529. PMID: 32243308; PMCID: PMC7147417.

Perkins RB, **Guido RS**, Castle PE, Chelmow D, Einstein MH, Garcia F, Huh WK, Kim JJ, Moscicki AB, Nayar R, Saraiya M, Sawaya GF, Wentzensen N, Schiffman M; 2019 ASCCP Risk-Based Management

Consensus Guidelines Committee. 2019 ASCCP Risk-Based Management Consensus Guidelines for Abnormal Cervical Cancer Screening Tests and Cancer Precursors. *J Low Genit Tract Dis.* 2020 Apr;24(2):102-131. doi: 10.1097/LGT.0000000000000525. PMID: 32243307; PMCID: PMC7147428.

Cheung LC, Egemen D, Chen X, Katki HA, Demarco M, Wiser AL, Perkins RB, **Guido RS**, Wentzensen N, Schiffman M. 2019 ASCCP Risk-Based Management Consensus Guidelines: Methods for Risk Estimation, Recommended Management, and Validation. *J Low Genit Tract Dis.* 2020 Apr;24(2):90-101. doi: 10.1097/LGT.0000000000000528. PMID: 32243306; PMCID: PMC7147416.

Schiffman M, Wentzensen N, Perkins RB, **Guido RS**. An Introduction to the 2019 ASCCP Risk-Based Management Consensus Guidelines. *J Low Genit Tract Dis.* 2020 Apr;24(2):87-89. doi: 10.1097/LGT.0000000000000531. PMID: 32243305; PMCID: PMC7147413.

Lim SE, **Krajewski CM**. A mystery shopper study identifying practice-level barriers to adolescent IUD access in western Pennsylvania. *Contraception.* 2020 Feb;101(2):130-131. doi: 10.1016/j.contraception.2019.10.011. Epub 2019 Nov 28. PMID: 31786202.

Paraíso MFR, Brown J, Abrão MS, Dionisi H, Rosenfield RB, **Lee TTM**, Lemos N. Surgical and Clinica I Reactivation for Elective Procedures during the COVID-19 Era: A Global Perspective. *J Minim Invasive Gynecol.* 2020 Jul-Aug;27(5):1188-1195. doi: 10.1016/j.jmig.2020.05.012. Epub 2020 May 22. PMID: 32446972; PMCID: PMC7242200.

Orellana T, Peters A, **Lee TTM**. Cesarean Section Scar Incretia Following First Trimester Surgical Abortion: A Rare Phenomenon Requiring Hysterectomy. *J Minim Invasive Gynecol.* 2020 May-Jun;27(4):800-802. doi: 10.1016/j.jmig.2019.08.022. Epub 2019 Aug 28. PMID: 31472284.

Peters A, Rindos NB, **Lee TTM**. Tigers in the Sidewall: Surgical Approaches to Excision of Lateral Deep Infiltrating Endometriosis. *J Minim Invasive Gynecol.* 2020 Feb;27(2):259. doi: 10.1016/j.jmig.2019.06.019. Epub 2019 Jul 17. PMID: 31325590.

Melnyk A, Rindos NB, El Khoudary SR, **Lee TTM**. Comparison of Laparoscopic Hysterectomy in Patients with Endometriosis with and without an Obliterated Cul-de-sac. *J Minim Invasive Gynecol.* 2020 May-Jun;27(4):892-900. doi: 10.1016/j.jmig.2019.07.001. Epub 2019 Jul 4. PMID: 31279776.

Miles S, **Mansuria S**, Foley CE. Laparoscopic Approach to Myoma Torsion. *J Minim Invasive Gynecol.* 2020 Jun 26:S1553-4650(20)30317-4. doi: 10.1016/j.jmig.2020.06.016. Epub ahead of print. PMID: 32599165.

Foley CE, **Mansuria S**. Infected Endometrioma of the Abdominal Wall: A Rare Cause of Cellulitis. *J Minim Invasive Gynecol.* 2020 Apr 10:S1553-4650(20)30181-3. doi: 10.1016/j.jmig.2020.04.007. Epub ahead of print. PMID: 32283328.

Newcomb LK, Toal CT, Rindos NB, Wang L, **Mansuria SM**. Risk-reducing Bilateral Salpingo-oophorectomy: Assessing the Incidence of Occult Ovarian Cancer and Surgeon Adherence to Recommended Practices. *J Minim Invasive Gynecol.* 2020 Jan 9:S1553-4650(20)30037-6. doi: 10.1016/j.jmig.2020.01.004. Epub ahead of print. PMID: 31927044.

Miles S, **Mansuria S**. Intraoperative Diagnosis of Detached Necrotic Myoma. J Minim Invasive Gynecol. 2020 Sep-Oct;27(6):1244-1246. doi: 10.1016/j.jmig.2019.11.014. Epub 2019 Nov 28. PMID: 31786388.

Newcomb LK, **Mansuria SM**. Identification of an Intraperitoneal Ureter after Ureterolysis. J Minim Invasive Gynecol. 2020 Sep-Oct;27(6):1247-1248. doi: 10.1016/j.jmig.2019.11.015. Epub 2019 Nov 28. PMID: 31786387.

Foley CE, **Mansuria S**. Ureteral Anomalies in Gynecologic Surgery. J Minim Invasive Gynecol. 2020 Mar-Apr;27(3):566-567. doi: 10.1016/j.jmig.2019.07.022. Epub 2019 Jul 27. PMID: 31362116.

Rindos NB, Fulcher IR, Donnellan NM. Pain and Quality of Life after Laparoscopic Excision of Endometriosis. J Minim Invasive Gynecol. 2020 Apr 6:S1553-4650(20)30166-7. doi: 10.1016/j.jmig.2020.03.013. Epub ahead of print. PMID: 32272239.

Newcomb LK, Toal CT, **Rindos NB**, Wang L, Mansuria SM. Risk-reducing Bilateral Salpingo-oophorectomy: Assessing the Incidence of Occult Ovarian Cancer and Surgeon Adherence to Recommended Practices. J Minim Invasive Gynecol. 2020 Jan 9:S1553-4650(20)30037-6. doi: 10.1016/j.jmig.2020.01.004 Epub ahead of print. PMID: 31927044.

Garrett AA, Foley CE, **Rindos N**. Laparoscopic Hysterectomy and Resection of Vaginal Septum in a Patient with Bicornis Uterus. J Minim Invasive Gynecol. 2020 Jul-Aug;27(5):1003-1004. doi: 10.1016/j.jmig.2019.10.021. Epub 2019 Nov 2. PMID: 31683026.

Foley CE, Rhinehart E, **Rindos N**. The Role of Transillumination in a Laparoscopic Resection of a Cesarean Scar Niche. J Minim Invasive Gynecol. 2020 Jul-Aug;27(5):997-998. doi: 10.1016/j.jmig.2019.10.003. Epub 2019 Oct 14. PMID: 31622678.

Peters A, **Rindos NB**, Lee TTM. Tigers in the Sidewall: Surgical Approaches to Excision of Lateral Deep Infiltrating Endometriosis. J Minim Invasive Gynecol. 2020 Feb;27(2):259. doi: 10.1016/j.jmig.2019.06.019. Epub 2019 Jul 17. PMID: 31325590.

Melnyk A, **Rindos NB**, El Khoudary SR, Lee TTM. Comparison of Laparoscopic Hysterectomy in Patients with Endometriosis with and without an Obliterated Cul-de-sac. J Minim Invasive Gynecol. 2020 May-Jun;27(4):892-900. doi: 10.1016/j.jmig.2019.07.001. Epub 2019 Jul 4. PMID: 31279776.

Judge-Golden CP, **Wiesenfeld HC**, Chen BA, Borrero S. Adherence to Recommended Practices for Provision of Long-Acting Reversible Contraception Among Providers in a Large U.S. Health Care System. J Womens Health (Larchmt). 2020 Jul 13. doi: 10.1089/jwh.2019.8169. Epub ahead of print. PMID: 32667847.

Lane K, Miller E, Kisloff L, **Wiesenfeld HC**. Many Parents Would Accept Sexually Transmitted Infection Screening for Their Adolescent at a Pediatric Office Visit. J Adolesc Health. 2020 May; 66(5):626-628. doi: 10.1016/j.jadohealth.2019.12.019. PMID: 32331625.

Bachmann LH, Kirkcaldy RD, Geisler WM, **Wiesenfeld HC**, Manhart LE, Taylor SN, Seña AC, McNeil CJ, Newman L, Myler N, Fuchs R, Bowden KE; the MAGNUM Laboratory Working Group. Prevalence of Mycoplasma genitalium infection, antimicrobial resistance mutations and symptom

resolution following treatment of urethritis. Clin Infect Dis. 2020 Mar 18:ciaa293. doi: 10.1093/cid/ciaa293. Epub ahead of print. PMID: 32185385.

Wiesenfeld HC, Meyn LA, Darville T, Macio IS, Hillier SL. A Randomized Controlled Trial of Ceftriaxone and Doxycycline, with or Without Metronidazole, for the Treatment of Acute Pelvic Inflammatory Disease. Clin Infect Dis. 2020 Feb 13:ciaa101. doi: 10.1093/cid/ciaa101. Epub ahead of print. PMID: 32052831.

Wynn A, Bristow CC, Cristillo AD, Murphy SM, van den Broek N, Muzny C, Kallapur S, Cohen C, Ingalls RR, **Wiesenfeld H**, Litch JA, Morris SR, Klausner JD. Sexually Transmitted Infections in Pregnancy and Reproductive Health: Proceedings of the STAR Sexually Transmitted Infection Clinical Trial Group Programmatic Meeting. Sex Transm Dis. 2020 Jan;47(1):5-11. doi: 10.1097/OLQ.0000000000001075. PMID: 31658242.

DIVISION OF GYNECOLOGIC ONCOLOGY



Madeleine Courtney-Brooks, MD
Division Director

OVERVIEW

The Division of Gynecologic Oncology continues its missions to provide compassionate and comprehensive care to women with gynecologic malignancies, enhance the field through basic science, translational and clinical research, and train the next generation of healthcare providers by mentoring medical students, advanced practice providers, residents and fellows in all aspects of patient and family centered care. During the academic year of 2019-2020, there was robust clinical activity, growth of our research agenda and continued refinements of our educational commitment.

Our core clinical group consists of ten full time gynecologic oncologists, two medical oncologists, three PhDs and a support staff of approximately 40 individuals. We are based at Magee-Womens Hospital of UPMC and provide outreach services throughout southwestern Pennsylvania. Offices and surgical services are offered at Magee Womens Hospital of UPMC, UPMC Passavant Hospital, UPMC Hamot, UPMC Altoona and UPMC Susquehanna. We also offer outpatient appointments at sites throughout western Pennsylvania including at UPMC facilities in Bethel Park, Butler, Cranberry, Johnstown, Shadyside, Uniontown, Farrell and Irwin, Pennsylvania. We continue to adjust our vision to align with the region's health care environment, continued emphasis on increasing our presence in the South Hills region of Pittsburgh and solidifying our presence in the Northern corridor and the central portion of the state.

The research agenda is multi-dimensional and includes, molecular profiling of gynecologic cancers, targeted therapy for treatment of these cancers in the upfront, maintenance and recurrent setting, outcomes and safety directed studies and use of immunotherapy in the treatment of gynecologic malignancies.

Basic science and translation research in women's cancer is enhanced through our collaborative efforts with scientists in the Women's Cancer Research Center, the Magee Womens Research Institute, and the Hillman Cancer Center. Our faculty work closely with the medical oncology group at the Hillman Cancer Center to provide access to cutting edge phase I trials. Within the last year and in conjunction with our colleagues at UPMC Hillman Cancer Center, gynecologic cancer patients now have access to some phase I clinical trials at

Magee Womens Hospital. Phase II and III clinical trials are active throughout the UPMC Cancer Center network from both the NRG Oncology Cooperative Group as well as industry supported and investigator-initiated trials. Division members are active on committees within the NRG and have raised our national presence.

The Women's Cancer Research Center under the guidance of Dr. Adrian Lee and Steffi Oesterreich has broadened the research efforts in both gynecologic and breast malignancies. Two senior clinician scientists, Drs. Ronald Buckanovich and Lan Coffman, joined our division in 2016, having joint appointments in the divisions of gynecologic oncology and medical oncology and have added a strong basic science research component to the division.

The division has also recently added a new faculty member, Dr. Haider Mahdi, joining us from the Cleveland Clinic. He brings years of clinical expertise in gynecologic oncology care as well as research experience and funding in the areas of immunotherapy and the tumor microenvironment in gynecologic cancers.

The division remains focused on its academic mission to include the education of the next generation of health care providers. To that end, the division has been active in both didactic and bedside teaching of medical students, residents and fellows. Members of our faculty provide minimally invasive surgery simulation training for the residency program. Our fellowship program is approved by the American Board of Obstetrics and Gynecology. Our educational efforts have been recognized with several of the faculty receiving teaching awards. Emphasis on our educational mission is considered necessary for academic promotion.

RESEARCH PROGRAM

The research program was extremely productive with a wide variety of clinical, translational and basic science studies. The research activities of the division are multifaceted and well funded. The division produced 32 scientific publications and numerous presentations at regional and national meetings.

The division has received a grant for a Specialized Programs of Research Excellence (SPORE) award for ovarian cancer in 2014. This SPORE promotes collaborative, interdisciplinary translational cancer research and the grant involves both basic and clinical/applied scientists and support projects that will result in new and diverse approaches to the prevention, early detection, diagnosis and treatment of this disease. Dr. Edwards serves as Co-PI for this exciting project and coordinates the program with his counterpart at the University of the State of New York, Buffalo. There is a special emphasis on immunologic approaches to this disease entity.

The division faculty has expanded collaborations with our colleagues at the Magee-Womens Research Institute (MWRI) and the University of Pittsburgh Cancer Institute (UPCI). Drs. Buckanovich and Coffman are both physician scientists actively conducting laboratory based and translational research and maintaining a specialized clinical practice focused on the medical treatment of ovarian cancer. Their addition has greatly enhanced the mentorship efforts within the division for our residents, fellows and junior faculty. Dr. Mahdi, who is a recent addition to the division will added a component of research diversity focusing of immunotherapy in the treatment of gynecologic malignancies.

The division is a principle member of the Gynecologic Oncology Group division of NRG Oncology, a national non-profit organization dedicated to clinical and translational research in the field of gynecologic cancers. Dr.

Alexander Olaiwaye serves as the Principle Investigator for these trials within our network. The mission of the GOG division is to enhance the treatment of gynecologic cancer through research encompassing surgery, chemotherapeutic intervention, radiation therapy, pathology, immunology, outcomes research, and gynecologic nursing. The organization receives support from the National Cancer Institute. The Gynecologic Oncology Group has a long history of establishing treatment standards for ovarian and endometrial cancer. Currently, over 3,300 patients are registered per year on its research trials. In the academic year 2019-2020 the division had an average of ~20 clinical trials open and available for patient accrual. The disease sites include ovarian, uterine, cervical, vaginal and vulvar carcinomas and gestational trophoblastic disease.

An active tissue procurement program exists on site at Magee Womens Hospital. This has been matched with an active informatics base and serves as a resource for investigators with the University of Pittsburgh Medical Center.

Research interests of our faculty are listed below:

Dr. Jessica Berger's research interests include the impact of chemotherapy on reproductive health and fertility-preservation options for reproductive age women undergoing gynecologic cancer treatment. She is also interested in clinical outcomes research in vulvar cancer patients.

Dr. Michelle Boisen is a clinician educator who was instrumental in the creation and implementation of Enhanced Recovery After Surgery (ERAS) protocols for Gynecologic Oncology patients throughout the system. She also participated in the ASCO Quality Training Program and in collaboration with colleagues in the school of nursing and has recently presented data regarding integrating family caregiver support into a gynecologic oncology practice. This work has been published as an ASCO Quality Training Program Project.

Dr. Ronald Buckanovich's research focuses on the study of cancer stem-like cells (CSCs) which may be responsible for ovarian cancer metastasis, chemotherapy resistance and ultimately disease recurrence. His laboratory is now studying the factors which regulate these CSCs including regulators of asymmetric division and quiescence. His laboratory has identified two novel compounds which directly target cancer stem cells; one which blocks the ability of these cells to metastasize, and a second which selectively kills the cancer stem-like cells. Both of these drugs are now being developed for first in human clinical trials

Dr. Lan Coffman's research focuses on understanding and targeting the cancer supporting stromal tissues which are critical to the survival, growth and spread of ovarian cancer. Specifically, Dr. Coffman's lab studies a critical non-malignant component of the ovarian cancer microenvironment, the carcinoma-associated mesenchymal stem cell (CA-MSC). CA-MSCs are stromal progenitor cells which significantly increase cancer growth, enrich the cancer stem cell pool and increase chemotherapy resistance. The lab studies how CA-MSCs are formed and develop tumor supporting properties. The lab also focuses on identifying important tumor cell:CA-MSC interactions which mediate CA-MSC's pro-tumorigenic functions and have potential for translation into new therapeutic targets. Additionally, the lab studies how CA-MSCs impact the development of ovarian cancer metastasis and the metastatic microenvironment. The ultimate goal of this research is to translate novel laboratory findings into powerful therapeutic approaches for the prevention and treatment of ovarian cancer. In addition, her investigator initiated Phase I trial evaluating the use of ribociclib in conjunction with platinum and

taxane based chemotherapy in platinum sensitive ovarian cancer has now completed accrual and was recently submitted in abstract form for presentation.

Dr. John Commerci's research interests include optimizing use of healthcare resources and efficiency within large healthcare systems. Recent projects include an examination of super-utilization of healthcare resources among gynecologic oncology patients.

Dr. Madeleine Courtney-Brooks' research includes optimizing care for elderly gynecologic oncology patients and quality improvement projects examining optimization of the peri-operative care of gynecologic oncology patients. In the past several years, she has helped design and implement Enhanced Recovery After Surgery (ERAS) programs for gynecologic oncology patients undergoing both minimally invasive and open surgeries. Multiple studies examining the impact of these initiatives are now underway.

Dr. Robert Edwards research interests include cervical and ovarian malignancies and three specific targets of his research are vaccine therapies for cervical and ovarian cancer, combining biologic and immunologic therapies with traditional therapies in the treatment of women's cancer and intraperitoneal therapy. He has an active translational science lab and is also the PI of several investigator initiated clinical trials including one examining systemic immune checkpoint blockade and intraperitoneal chemo-immunotherapy in recurrent ovarian cancer.

Dr. Francesmary Modugno is a molecular epidemiologist whose research focuses on the relationship between host factors and the molecular mechanisms underlying risk and survival in ovarian, endometrial and breast cancers. The goal of her work is to 1) identify individuals at an increased risk for these cancers, and among women with these cancers, identify those at an increased risk for recurrence or poor prognosis; 2) identify targets for prevention/screening efforts for both primary prevention and prevention of recurrence; and 3) provide feedback to basic scientists to further elucidate the underlying molecular mechanisms of disease.

Dr. Alexander Olawaiye has multiple clinical research interests and is currently investigating novel therapies for advanced ovarian, endometrial and cervical cancers. He serves as the site PI for our national cooperative clinical trials and serves as the primary investigator for several industry sponsored trials as well. He is active in numerous national and international organizations including the Society for Gynecologic Oncology and the International Federation of Gynecology and Obstetrics. In addition to his research interests, Dr. Olawaiye has also been appointment as the Vice Chair of Diversity within the Department of Obstetrics and Gynecology.

Dr. Paniti Sukumvanich's research interests focus on outcomes-based research utilizing large national databases to examine the role of surgery and chemotherapy in various types of gynecologic cancers. Other areas of interest include the role of chemotherapy in low-grade ovarian cancers, sequencing of radiation and surgery in endometrial cancer as well as finding factors that may improve quality of care in gynecologic oncology patients. He also has a special interest in development of an electronic database infrastructure for clinical research in gynecologic oncology.

Dr. Sarah Taylor's interests center on the development and implantation of early phase gynecologic oncology clinical trials. She is responsible for multiple investigator initiated clinical trials including a Phase IIA trial of delayed initiation of olaparib maintenance therapy in platinum sensitive recurrent ovarian cancer. She has also been instrumental in the initiation of phase I trials at Magee Womens Hospital. Finally, in conjunction with

members of the department of bioinformatics has a number of ongoing projects making use of UPMC system wide dashboard.

Dr. Anda Vlad's research explores mechanisms of disease pathogenesis and immune surveillance in ovarian cancer and precursor lesions, and tests novel preventive and therapeutic approaches using a combination of highly versatile preclinical models and clinical specimens. Her investigations have focused on have focused on immuno-oncology using either vaccines (MUC1), immune biologics (Interleukin-2) or immune checkpoint blockade (anti-PD-L1). Results from our phase II trial of intraperitoneal IL-2 in patients with platinum-resistant or platinum-refractory ovarian cancer show positive correlation between IFN γ - secreting CD8 T cells at early time points and survival. Our work provides important evidence for IP IL-2 in platinum-resistant ovarian cancer and identifies several immune correlates of survival. Via collaborations with clinicians at Magee-Womens Hospital of UPMC, the lab is working on identifying mechanisms of early ovarian carcinogenesis from cancer precursor lesions.

TEACHING ACTIVITIES

Each member of our division is dedicated to the education of health care providers. Teaching for the division includes the following group of individuals:

- Gynecologic Oncology fellows
- Residents in Obstetrics, Gynecology and Women's Health Sciences
- University of Pittsburgh and Chatham College Physician Assistant and Nurse Practitioner Programs
- Medical students of the University of Pittsburgh
- Visiting Medical Oncology Fellows

Teaching activities occur in didactic lecture setting, in small problem-based learning groups, in outpatient offices, the inpatient wards, and in the operating room. Education centers around the pathophysiology, diagnosis and therapeutic interventions of gynecologic malignancies. The faculty members emphasize preoperative and postoperative management as well as surgical technique. Special attention is taken to expose the trainees to the nuances of patient-physician communication with an emphasis on discussing the delivery of difficult and unexpected news.

Formal educational events include:

Tumor Board - weekly multi-disciplinary conference focusing on patient management issues and current trends in gynecologic oncology. Individuals within the subspecialties of gynecologic oncology, medical oncology, radiation oncology, radiology, and pathology attend. Clinical dilemmas, controversial, and unusual patient cases are selected by the oncology team and discussed by the participants. Radiographic and pathologic findings are correlated with the clinical findings. The attendees discuss plans of management and correlate this with published recommendations, available pathways from the National Comprehensive Cancer Network and review available evidence to support the chosen approach. This conference allows for discussion of different approaches to the diagnostic dilemmas and challenging management questions encountered in gynecologic

oncology. Representatives from our clinical trials program are in attendance and each presented case is assessed for availability of possible clinical trials.

Didactic Lecture Series - weekly lecture series covering topics in the field. Presentations are given by the attending staff and colleagues in other subspecialties to enhance the educational experience of the attendees. The lecture series has been designed to meet the needs of both the residency and fellowship program expectations. The Guideline to Learning in Gynecologic Oncology, published by the American Board of Obstetrics and Gynecology, serves as a reference for core knowledge for our fellows in the field. The Gynecology and Gynecologic Oncology Prolog series published by the American College of Obstetrics and Gynecology and the Council on Resident Education in Obstetrics and Gynecology (CREOG) tests serve as a frame of reference for expected knowledge for our residents.

Journal Club – Held every six to eight weeks to discuss timely and controversial topics in the field of Gynecologic Oncology. An attending physician and the senior fellow moderate the session. A PowerPoint® presentation comparing the outcomes of the studies presented provides a quick reference for all attendees.

Gynecologic Oncology Patient Safety Conference - Occurs every six to eight weeks on Friday morning. All available residents, fellows and attendings participate as adverse and challenging outcomes are discussed. Patient safety initiatives are among the outcomes of this session.

VitalTalk© Workshop – held every few years as needed to ensure all of the faculty, fellows in gynecologic oncology and advanced practice providers who had not previously participated, completed a 2-day intensive practice-based communication skills training workshop in the VitalTalk© model. It was developed and facilitated by a team of palliative care and gynecologic oncology providers from across the country and is the first of its kind focused on gynecology oncology providers to our knowledge. The content focused on skill development in giving serious news, responding to emotion, handling conflict, and discussing goals of care with patients and families.

<u>Residency Rotations</u>	<u>PGY</u>
Magee Gynecologic Oncology Service	4 th , 3 rd , 2 nd , 1 st
Passavant Gynecologic Oncology Service	2 nd
Ambulatory Gynecology	2 nd – as needed based on res. interest
Career Development	4 th – as needed based on res. interest

Fellowship Program

The division has an American Board of Obstetrics and Gynecology (ABOG) as well as an ACGME approved fellowship in gynecologic oncology. The program is 3 years in duration. The program admits two candidates per year with a yearly total complement of 6 individuals. Fellows have research training to include participation in the core Clinical Research Training Program. Fellows will gain exposure to NIH-funded trials through the NRG Oncology Group (GOG), the SPORC initiatives and many other ongoing clinical and basic research projects.

Clinical training is enhanced by active multidisciplinary collaboration with the Departments of Obstetrics and Gynecology, General Surgery, Radiology, Critical Care Medicine, Internal Medicine, Radiation Oncology, Supportive and Palliative Care and Surgical Oncology. The fellowship underwent an ACGME site review in the fall of 2018 and was granted continue accreditation for four years.

Recent additions to our education program include Chemotherapy School, Surgery School and a Stump the Professor program. Dr. Sukumvanich has been instrumental in the development of both the Chemotherapy and Surgery School. Chemotherapy school has been added to the didactic lecture series whereby a faculty member presents a specific disease site and reviews the chemotherapy options for both primary and recurrent disease. Sentinel studies are cited, and the program is recorded for review.

Surgery School uses a combination of didactic lectures and cadaver dissections to emphasis surgical anatomy and technique. Senior faculty are involved in the program at the Wiser Simulation Center.

The Stump the Professor series has been developed by the Junior Faculty and involve case presentations disseminated by email and then discussed before our weekly tumor board. During the discussion, the faculty discuss their individual approaches to the situation with the goal of the session to prepare our fellows for their oral boards.

CLINICAL PROGRAM

The clinical division is now composed of 10 gynecologic oncologists and two medical oncologists. This rapid expansion has allowed us to improve access to care for women of Western Pennsylvania for treatment of gynecologic malignancies. The faculty is energized and dedicated to its mission. In the academic year 2019-2020, approximately 1,300 new patients were seen with greater than 9,000 return patient visits. In the most recent fiscal year, UPMC accounts for roughly 57% of the gynecologic oncology inpatient market share in Allegheny County and 56% of the inpatient market share in the surrounding 29 counties.

Our main clinical locations are located at Magee Womens Hospital of UPMC and UPMC Passavant Hospital. At each location we have a bustling outpatient office, regular operating room schedule and inpatient service, and a consistent presence in the infusion center. In addition to the above we also provide consultation services at additional hospitals in Oakland including – UPMC Presby/Montefiore, UPMC Shadyside and UPMC Mercy. Our division provides regular surgical coverage and outpatient services at UPMC Hamot, UPMC Altoona and UPMC Susquehanna. Finally, we provide regular outreach outpatient appointments at the following locations: Bethel Park, Butler, Cranberry, Horizon, Irwin, Johnston, and Uniontown.

Faculty members strive to innovate in the management of patients afflicted with gynecologic cancers. The application of minimally invasive surgical techniques has been embraced by all the members of the division. Traditional laparoscopy and robotic assisted surgery is now widely used for the majority of patients with endometrial cancer. These approaches are now being applied to patients with early stage ovarian cancer. Sentinel mapping pioneered in melanoma has replaced traditional inguino-femoral node dissection for vulvar cancer and is also employed in the majority of patients with apparent uterine limited endometrial cancer.

FACULTY LISTING

Madeleine Courtney-Brooks, MD, MPH

Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Gynecologic Oncology

Director, Division of Gynecologic Oncology

Director of Gynecologic Oncology Service at UPMC Passavant

Jessica Berger, MD

Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Gynecologic Oncology

Michelle Boisen, MD

Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Gynecologic Oncology

Ronald C. Buckanovich MD, PhD

Professor of Medicine, Director of the Ovarian Cancer Center of Excellence, Co-Director of the Womens Cancer Research Center, Department of Medicine, Division of Hematology/Oncology and Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Gynecologic Oncology

Lan Coffman MD, PhD

Assistant Professor, Department of Medicine, Division of Hematology/Oncology, Assistant Professor of Obstetrics, Gynecology and Reproductive Science, Division of Gynecologic Oncology

John T. Comerci, MD, MHCDS

Associate Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Gynecologic Oncology.

Vice Chair, Women's Health Service Line Specialty Services & Referral Physician Relations

Robert P. Edwards, MD

Milton McCall Professor and Chairman, Department of Obstetrics, Gynecology, and Reproductive Sciences

Alexander Olawaiye, MD

Associate Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Gynecologic Oncology

Vice Chair for Diversity and Inclusion

Principle Investigator for GOG division of the NRG Oncology Group

Brian Orr, MD

Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Gynecologic Oncology

Paniti Sukumvanich, MD

Associate Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Gynecologic Oncology

Director of the Gynecologic Oncology Fellowship

Sarah Taylor, MD

Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Gynecologic Oncology

Kristin K. Zorn, MD

Adjunct Assistant Professor, Department of Obstetrics and Gynecology, Division of Gynecologic Oncology, University of Arkansas

RESEARCH:

Faina Linkov, PhD

Associate Professor, Department of Obstetrics, Gynecology and Reproductive Sciences

Secondary appointment in the Graduate School of Public Health in the Department of Epidemiology

Francesmary Modugno, PhD, MPH

Professor, Department of Obstetrics, Gynecology and Reproductive Sciences

Gynecologic Cancer Biospecimen and Data Bank Site Co-Leader, RPCI/UPCI Ovarian Cancer SPORE

Anda M. Vlad, MD, PhD

Associate Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Department of Immunology, University of Pittsburgh, School of Medicine

Director, MWRI Flow Cytometry Core

Director, MWRI Summer Undergraduate Research Program

Current Gynecologic Oncology Fellowship Trainees:

Daniel Chan, MD

Chelsea Chandler, MD

Michael Cohen, MD

Alyssa Wield, MD

Alison Garrett, MD

Taylor Orellana, MD

Publications – Division of Gynecologic Oncology

1. Adambekov S, Lopa S, **Edwards RP**, Lemon L, Wang S, **Taylor SE**, **Orr B**, Linkov F. Survival and recurrence after intraperitoneal chemotherapy use: Retrospective review of ovarian cancer hospital registry data. *Cancer Med*. 2020 Oct;9(20):7388-7397. doi: 10.1002/cam4.3340. Epub 2020 Aug 19. PMID: 32813321; PMCID: PMC7571805.
2. Bai S, Zhu W, **Coffman L**, Vlad A, Schwartz LE, Elishaev E, Drapkin R, **Buckanovich RJ**. CD105 Is Expressed in Ovarian Cancer Precursor Lesions and Is Required for Metastasis to the Ovary. *Cancers (Basel)*. 2019 Nov 2;11(11):1710. doi: 10.3390/cancers11111710. PMID: 31684072; PMCID: PMC6896092.
3. **Berger JL**. Front-line ovarian cancer maintenance therapy: PARP inhibitors for all? *BJOG*. 2020 Aug 8. doi: 10.1111/1471-0528.16450. Epub ahead of print. PMID: 32770700.

4. Brown JR, **Chan DK**, Shank JJ, Griffith KA, Fan H, Szulawski R, Yang K, Reynolds RK, Johnston C, McLean K, Uppal S, Liu JR, Cabrera L, Taylor SE, Orr BC, Modugno F, Mehta P, Bregenzer M, Mehta G, Shen H, **Coffman LG, Buckanovich RJ**. Phase II clinical trial of metformin as a cancer stem cell-targeting agent in ovarian cancer. *JCI Insight*. 2020 Jun 4;5(11):e133247. doi: 10.1172/jci.insight.133247. PMID: 32369446; PMCID: PMC7308054.
5. **Buckanovich RJ**, Rustin G, Uppal S, **Olawaiye AB, Kelley JL, Berger JL**, Landen CN. No Role for Maintenance Bevacizumab for Up-Front Stage IIIC (R0) Ovarian Cancer. *J Clin Oncol*. 2019 Oct 10;37(29):2707-2708. doi: 10.1200/JCO.19.01650. Epub 2019 Aug 26. PMID: 31449471.
6. Campbell GB, **Boisen MM, Hand LC**, Lee YJ, **Lersch N**, Roberge MC, Suchonic B, Thomas TH, Donovan HS. Integrating Family Caregiver Support Into a Gynecologic Oncology Practice: An ASCO Quality Training Program Project. *JCO Oncol Pract*. 2020 Mar;16(3):e264-e270. doi: 10.1200/JOP.19.00409. Epub 2019 Sep 7. PMID: 31496394.
7. Cole AJ, Fayomi AP, Anyaeche VI, Bai S, **Buckanovich RJ**. An evolving paradigm of cancer stem cell hierarchies: therapeutic implications. *Theranostics*. 2020 Feb 10;10(7):3083-3098. doi: 10.7150/thno.41647. PMID: 32194856; PMCID: PMC7053211.
8. Cole AJ, Iyengar M, Panesso-Gómez S, O'Hayer P, **Chan D**, Delgoffe GM, Aird KM, Yoon E, Bai S, **Buckanovich RJ**. NFATC4 promotes quiescence and chemotherapy resistance in ovarian cancer. *JCI Insight*. 2020 Apr 9;5(7):e131486. doi: 10.1172/jci.insight.131486. PMID: 32182216; PMCID: PMC7205258.
9. Gaulin NB, **Lesnock JL**, Tian C, Osei-Bonsu K, Jacobs A, Richard SD, Krivak TC, Miller EM, Shriver CD, Casablanca Y, Maxwell GL, Darcy KM. Survival disparities in vulvar cancer patients in Commission on Cancer®-accredited facilities. *Gynecol Oncol*. 2020 Apr;157(1):136-145. doi: 10.1016/j.ygyno.2019.11.025. Epub 2020 Jan 15. PMID: 31954540.
10. Glubb DM, Thompson DJ,, **Edwards RP**, et al. Cross-cancer genome-wide association study of endometrial cancer and epithelial ovarian cancer identifies genetic risk regions associated with risk of both cancers. *Cancer Epidemiol Biomarkers Prev*. 2020 Nov 3;cebp.0739.2020. doi: 10.1158/1055-9965.EPI-20-0739. Epub ahead of print. PMID: 33144283.
11. Grundy MK, **Buckanovich RJ**, Bernstein KA. Regulation and pharmacological targeting of RAD51 in cancer. *NAR Cancer*. 2020 Sep;2(3):zcaa024. doi: 10.1093/narcan/zcaa024. Epub 2020 Sep 25. PMID: 33015624; PMCID: PMC7520849.
12. Heayn M, Skvarca LB, Zhu L, **Edwards RP, Olawaiye AB, Modugno F**, Elishaev E, Bhargava R. Impact of Ki-67 Labeling Index on Prognostic Significance of the Chemotherapy Response Score in Women With Tubo-ovarian Cancer Treated With Neoadjuvant Chemotherapy. *Int J Gynecol Pathol*. 2020 Sep 4. doi: 10.1097/PGP.0000000000000706. Epub ahead of print. PMID: 32897953.
13. Holleran JL, Parise RA, Guo J, Kiesel BF, **Taylor SE**, Ivy SP, Chu E, Beumer JH. Quantitation of iohexol, a glomerular filtration marker, in human plasma by LC-MS/MS. *J Pharm Biomed Anal*. 2020 Sep 10;189:113464. doi: 10.1016/j.jpba.2020.113464. Epub 2020 Jul 7. PMID: 32659569; PMCID: PMC7484441.
14. Horne ZD, Teterichko SR, Glaser SM, Wegner RE, Hasan S, Crafton SM, Miller EM, Krivak TC, Viswanathan A, **Olawaiye AB, Sukumvanich P**, Beriwal S. Race-driven survival differential in women diagnosed with endometrial cancers in the USA. *Int J Gynecol Cancer*. 2020 Aug 25;ijgc-2020-001560. doi: 10.1136/ijgc-2020-001560. Epub ahead of print. PMID: 32847996.
15. Iheagwara UK, Vargo JA, **Boisen MM, Taylor SE, Berger JL, Commerci JT, Orr BC, Sukumvanich P, Olawaiye AB, Kelley JL, Edwards RP, Courtney-Brooks MB**, Beriwal S. Regional Control and Chemoradiotherapy Dose Response for Clinically Involved Lymph Nodes in Patients with Locally Advanced Endometrial Cancers Who are Not Candidates for Upfront Surgical Staging Extrafascial Hysterectomy. *Clin Oncol (R Coll Radiol)*. 2020 Sep 10:S0936-6555(20)30358-7. doi: 10.1016/j.clon.2020.08.009. Epub ahead of print. PMID: 32919862.
16. Keller A, Rodríguez-López JL, Patel AK, Vargo JA, Kim H, Houser CJ, **Sukumvanich P, Berger JL, Boisen MM, Edwards RP, Taylor SE, Courtney-Brooks MB, Orr BC, Olawaiye AB**, Beriwal S. Early outcomes after definitive chemoradiation therapy with Vienna/Venezia hybrid high-dose rate brachytherapy applicators for

- cervical cancer: A single-institution experience. *Brachytherapy*. 2020 Sep 17:S1538-4721(20)30181-1. doi: 10.1016/j.brachy.2020.08.006. Epub ahead of print. PMID: 32952053.
17. Knobloch TJ, Peng J, Hade EM, Cohn DE, Ruffin MT 4th, Schiano MA, Calhoun BC, McBee WC Jr, **Lesnock JL**, Gallion HH, Pollock J, Lu B, Oghumu S, Zhang Z, Sears MT, Ogbemudia BE, Perrault JT, Weghorst LC, Strawser E, DeGraffinreid CR, Paskett ED, Weghorst CM. Inherited alterations of TGF beta signaling components in Appalachian cervical cancers. *Cancer Causes Control*. 2019 Oct;30(10):1087-1100. doi: 10.1007/s10552-019-01221-y. Epub 2019 Aug 21. PMID: 31435875; PMCID: PMC6768402.
 18. Konstantinopoulos PA, Cheng SC, Wahner Hendrickson AE, Penson RT, Schumer ST, Doyle LA, Lee EK, Kohn EC, Duska LR, Crispens MA, **Olawaiye AB**, Winer IS, Barroilhet LM, Fu S, McHale MT, Schilder RJ, Färkkilä A, Chowdhury D, Curtis J, Quinn RS, Bowes B, D'Andrea AD, Shapiro GI, Matulonis UA. Berzosertib plus gemcitabine versus gemcitabine alone in platinum-resistant high-grade serous ovarian cancer: a multicentre, open-label, randomised, phase 2 trial. *Lancet Oncol*. 2020 Jul;21(7):957-968. doi: 10.1016/S1470-2045(20)30180-7. Epub 2020 Jun 15. PMID: 32553118.
 19. Lu N, Adambekov S, **Edwards RP**, Ramanathan RC, Bovbjerg DH, Linkov F. Relationships Between a History of Abuse, Changes in Body Mass Index, Physical Health, and Self-Reported Depression in Female Bariatric Surgery Patients. *Bariatr Surg Pract Patient Care*. 2019 Sep 1;14(3):113-119. doi: 10.1089/bari.2018.0051. Epub 2019 Sep 24. PMID: 31572626; PMCID: PMC6763960.
 20. Mai PL, Miller A, Gail MH, Skates S, Lu K, Sherman ME, Ioffe OB, Rodriguez G, Cohn DE, Boggess J, Rutherford T, Kauff ND, Rader JS, Phillips KA, DiSilvestro PA, **Olawaiye AB**, Ridgway MR, Greene MH, Piedmonte M, Walker JL. Risk-Reducing Salpingo-Oophorectomy and Breast Cancer Risk Reduction in the Gynecologic Oncology Group Protocol-0199 (GOG-0199). *JNCI Cancer Spectr*. 2019 Oct 10;4(1):pkz075. doi: 10.1093/jncics/pkz075. PMID: 32337492; PMCID: PMC7050151.
 21. Pifer PM, Bhargava R, Patel AK, Ling DC, Vargo JA, **Orr BC**, **Sukumvanich P**, **Courtney-Brooks MB**, **Boisen MM**, **Berger JL**, **Taylor S**, **Olawaiye AB**, **Comerci JT**, **Lesnock JL**, **Edwards RP**, Beriwal S. Is the risk of substantial LVSI in stage I endometrial cancer similar to PORTEC in the North American population? - A single-institution study. *Gynecol Oncol*. 2020 Oct;159(1):23-29. doi: 10.1016/j.ygyno.2020.07.024. Epub 2020 Jul 25. PMID: 32718729.
 22. Raghavan S, Snyder CS, Wang A, McLean K, Zamarin D, **Buckanovich RJ**, Mehta G. Carcinoma-Associated Mesenchymal Stem Cells Promote Chemoresistance in Ovarian Cancer Stem Cells via PDGF Signaling. *Cancers (Basel)*. 2020 Jul 27;12(8):2063. doi: 10.3390/cancers12082063. PMID: 32726910; PMCID: PMC7464970.
 23. Rauh LA, Sullivan MW, Camacho F, Janke MJ, Duska LR, **Chandler C**, **Sukumvanich P**, **Courtney-Brooks M**, Lefkowitz C. Validation of the surprise question in gynecologic oncology: A one-question screen to promote palliative care integration and advance care planning. *Gynecol Oncol*. 2020 Jun;157(3):754-758. doi: 10.1016/j.ygyno.2020.03.007. Epub 2020 Mar 12. PMID: 32171568.
 24. Richman AH, Vargo JA, Ling DC, **Sukumvanich P**, **Berger JL**, **Boisen MM**, **Edwards R**, **Taylor SE**, **Courtney-Brooks MB**, **Olawaiye A**, **Orr BC**, Beriwal S. Dose-escalated intensity modulated radiation therapy in patients with locally-advanced vulvar cancer - does it increase response rate? *Gynecol Oncol*. 2020 Sep 24:S0090-8258(20)33912-3. doi: 10.1016/j.ygyno.2020.09.019. Epub ahead of print. PMID: 32981696.
 25. **Ross MS**, **Chandler CK**, Matsuo K, Vargo JA, Elishaev E, Siripong N, **Berger JL**, **Kelley JL 3rd**, **Taylor SE**. Cancer antigen 125 is associated with disease status in uterine carcinosarcoma. *Rare Tumors*. 2019 Nov 7;11:2036361319884159. doi: 10.1177/2036361319884159. PMID: 31741727; PMCID: PMC6843728.
 26. **Olawaiye AB**, Leath CA 3rd. Contemporary management of uterine clear cell carcinoma: A Society of Gynecologic Oncology (SGO) review and recommendation. *Gynecol Oncol*. 2019 Nov;155(2):365-373. doi: 10.1016/j.ygyno.2019.08.031. Epub 2019 Sep 26. PMID: 31500893.
 27. Samanta S, Tamura S, Dubeau L, Mhawech-Fauceglia P, Miyagi Y, Kato H, Lieberman R, **Buckanovich RJ**, Lin YG, Neamati N. Clinicopathological significance of endoplasmic reticulum stress proteins in ovarian

- carcinoma. *Sci Rep*. 2020 Feb 7;10(1):2160. doi: 10.1038/s41598-020-59116-x. PMID: 32034256; PMCID: PMC7005787.
28. Schink JC, Filiaci V, Huang HQ, Tidy J, Winter M, Carter J, Anderson N, Moxley K, Yabuno A, **Taylor SE**, Kushnir C, Horowitz N, Miller DS. An international randomized phase III trial of pulse actinomycin-D versus multi-day methotrexate for the treatment of low risk gestational trophoblastic neoplasia; NRG/GOG 275. *Gynecol Oncol*. 2020 Aug;158(2):354-360. doi: 10.1016/j.ygyno.2020.05.013. Epub 2020 May 24. PMID: 32460997; PMCID: PMC7432963.
 29. Stenzel AE, Abrams SI, Joseph JM, Goode EL, Tario JD Jr, Wallace PK, Kaur D, Adamson AK, Buas MF, Lugade AA, Laslavic A, **Taylor SE**, **Orr B**, **Edwards RP**, Elishaev E, Odunsi K, Mongiovi JM, Etter JL, Winham SJ, Kaufmann SH, **Modugno F**, Moysich KB. Circulating CD14⁺ HLA-DR^{lo/-} monocytic cells as a biomarker for epithelial ovarian cancer progression. *Am J Reprod Immunol*. 2020 Sep 9:e13343. doi: 10.1111/aji.13343. Epub ahead of print. PMID: 32905653.
 30. **Taylor SE**, Chu T, Elvin JA, **Edwards RP**, Zorn KK. Phase II study of everolimus and bevacizumab in recurrent ovarian, peritoneal, and fallopian tube cancer. *Gynecol Oncol*. 2020 Jan;156(1):32-37. doi: 10.1016/j.ygyno.2019.10.029. Epub 2019 Nov 15. PMID: 31739991.
 31. Uppal S, Gehrig PA, Peng K, Bixel KL, Matsuo K, Vetter MH, Davidson BA, Cisa MP, Lees BF, Brunette LL, Tucker K, Stuart Staley A, Gotlieb WH, Holloway RW, Essel KG, Holman LL, Goldfeld E, **Olawaiye A**, Rose SL. Recurrence Rates in Patients With Cervical Cancer Treated With Abdominal Versus Minimally Invasive Radical Hysterectomy: A Multi-Institutional Retrospective Review Study. *J Clin Oncol*. 2020 Apr 1;38(10):1030-1040. doi: 10.1200/JCO.19.03012. Epub 2020 Feb 7. PMID: 32031867.
 32. Vetter MH, Smrz S, Gehrig PA, Peng K, Matsuo K, Davidson BA, Cisa MP, Lees BF, Brunette LL, Tucker K, Stuart Staley A, Gotlieb WH, Holloway RW, Essel KG, Holman LL, Goldfeld E, **Olawaiye A**, Rose S, Uppal S, Bixel K. Pathologic and clinical tumor size discordance in early-stage cervical cancer: Does it matter? *Gynecol Oncol*. 2020 Nov;159(2):354-358. doi: 10.1016/j.ygyno.2020.08.004. Epub 2020 Sep 2. PMID: 32888724.

DIVISION OF MATERNAL FETAL MEDICINE



Arun Jeybalan, MD, MS
Division Director

OVERVIEW

The Maternal-Fetal Medicine (MFM) Division has continued its tradition of high-level scholarly and academic contributions and productivity. MFM faculty have authored more than 60 publications in the past year and a half with 15 as first- or senior-author. Our publications include important, high-impact papers on perinatal issues as diverse as the impact of sleep-disordered breathing in pregnancy, risk factor assessment for preeclampsia, postpartum preeclampsia, diabetes in pregnancy, medication safety and efficacy in pregnancy, gestational weight gain and pregnancy outcomes, innovative technologies to monitor blood pressure in pregnancy, recurrent pregnancy loss, and stress contributors to preterm birth. The Division continues to be successful in securing federal and foundation research grants, with NIH -funded projects on preeclampsia, preterm birth prevention, developmental origins of health and disease, and pharmacology in pregnancy representing the key funded areas in our portfolio. We continue our participation in prestigious federally-funded multi-center consortia, such as the MFM Units Network, the Obstetric Pharmacology Centers, and the ECHO collaborative.

From a clinical perspective, the division continues its long tradition of excellence in inpatient high-risk antepartum care and outpatient consultative services. We have expanded our offering of MFM services through an innovative telemedicine program, bringing outpatient MFM consultation to communities that would otherwise not have access to this degree of subspecialty service. We render inpatient and outpatient tele-MFM services throughout the region and were able to continue and even expand this care uninterrupted through the COVID pandemic.

The MFM Division continues its excellence and commitment to education of the next generation of health care providers. Both didactic and bedside teaching is provided at all levels – medical students, residents, fellows as well as undergraduate and post-graduate students. We also provide high risk pregnancy education and support to other clinicians across the spectrum of specialties as well as advanced practice providers, nurses and staff.

RESEARCH PROGRAM

As outlined above, the MFM Division has a diverse portfolio of clinical, translation and basic research and has been successful in securing funding for various projects. While the majority of studies are NIH-funded, investigators have also received support from other sources including the American Heart Association, Melinda and Bill Gates Foundation, and R.K. Mellon Foundation. The Division fosters a robust collaborative research program through multi-center studies as well as partnerships across disciplines within and outside of the University of Pittsburgh. Our portfolio has also extended to international collaborations through the Global Pregnancy Collaboration (CoLab) coordinating a clinical trial in Brazil for the risk assessment for adverse outcomes in preeclampsia as well as establishing a bio-repository to facilitate collaborations between high and low/middle income countries.

Importantly, many of the ongoing projects address high impact societal issues such as opioid use disorder in pregnancy and the pharmacology of buprenorphine in pregnancy, optimization of gestational diabetes treatment by phenotyping sub-groups, pregnancy as a window for long term cardiovascular and metabolic disease, interventions for sleep-disordered breathing, and chronic hypertension in pregnancy, to name a few. Three ongoing grant-funded projects (2 RO1s and a UH3 award) address developmental origins of offspring phenotypes. This is a series of multi-center projects investigating how pre-pregnancy and pregnancy experiences and environmental exposures transduce biologically to the fetus and influence the development of offspring brain and neurocognitive development, as well as the predisposition to chronic diseases and aging.

We are one of 12 university based clinical centers participating in the Maternal-Fetal Medicine Units Network coordinated by the Pregnancy and Perinatology Branch of NICHD. The MFMU Network continues its tradition of important and influential clinical research in pregnancy. More than 50 randomized clinical trials, cohort studies, and registries have been completed or are in progress. As a member of this network, we are in the midst of a diverse range of ongoing trials on preterm birth prevention among twins and singletons with short cervix, tranexamic acid for the prevention of hemorrhage at Cesarean, novel treatments such as pravastatin to prevent preeclampsia, and optimization of opioid prescription after cesarean delivery. We are particularly excited about the high impact of these studies including the recent change in clinical care as result of the randomized trial of induction of labor vs expectant management among low risk nulliparas (the ARRIVE trial), which showed that induction of labor reduces the risk of Cesarean as well as improving several key outcomes for maternal and newborn health (published in NEJM). **Dr Simhan** is the site PI with **Dr. Facco** serving as site co-PI. In addition, Magee is also one of three centers participating in the Obstetric Pharmacology Research Centers Network to better understand the safety and efficacy of medications during pregnancy (site PI: **Dr. Caritis**).

Two of our junior faculty are K-grant awardees with innovative projects focused on phenotyping gestational diabetes profile to tailor therapy and mechanisms leading to cardiovascular disease after preeclampsia. The MFM division continues to contribute to the academic research mission by serving as manuscript reviewers and NIH study section participants. Faculty-mentored research projects have led to resident and fellow presentations at national conferences and publications.

The MFM division also plays a key role in building research infrastructure and optimizing participation of pregnant women through leadership roles as Medical Director of the Magee Clinical and Translational Center and Obstetric Specimen Procurement Unit on Labor and Delivery (**Dr. Jeyabalan**). MFM leadership also played a key role in the safe re-opening of clinical research within MWH.

Moving into the future, in addition to continuing our robust portfolio of research in preterm birth, preeclampsia, pharmacology, and placental function, the Division anticipates growth and development in the areas of fetal

therapy and the developmental origins of adult diseases, and pregnancy as a window into women's health over the life course. We have been funded by NHLBI to study how pregnancy exposures and experiences can predispose women to later life cardiovascular disease and diabetes. We also received funding from NIMH to study how a woman's own personal exposure to traumatic events in her childhood can influence the development of the structure and function of her child's brain. These areas are scientifically cutting edge and hold great promise for improving public health over the next 10+ years.

Please refer to Individual MFM faculty list for summary of funding and research interests.

CLINICAL PROGRAMS

The Division of Maternal-Fetal Medicine is proud to offer state of the art care from national and international experts in the research and clinical management of high risk pregnancies. Our clinical services span the entirety of high risk pregnancy care including women with underlying chronic medical conditions, mothers with unexpected pregnancy complications, and fetal abnormalities such as growth problems, birth defects, or babies that need fetal intervention/surgery during pregnancy. The MFM team offers a multi-disciplinary, collaborative, and patient-centered approach along with general obstetricians and other specialists working together towards the goal of a healthy mother and baby/babies.

Our primary outpatient clinical site is on the zero level of MWH. The core clinical team include 19 clinical faculty, 9 MFM fellows, 5 advanced practice providers, 5 certified diabetes educators, 7 nurses and 9 additional support staff. We continue to have an open access schedule to maximize the availability of our specialists for new and return visits. A new patient can see a physician in our practice within 3 business days or more urgently if indicated. **Dr. Arun Jeyabalan** serves as the Medical Director of MFM services. We also provide direct supervision of residents caring for high risk pregnant women in the Magee Outpatient Clinic. Over the past year, we have performed approximately 12,900 direct outpatient visits including consultations, co-management of complicated pregnancies, and continuity care for obstetric patients. This has been a steady increase over the years despite the COVID pandemic from approximately 4,500 office visits in 2005 and 8,000 visits in 2011. Approximately, 3,000 of these visits were new consultations. Our physicians continue to receive superior patient ratings. In addition, we have provided over 2,500 telemedicine consults and visits over the past year alone reaching a population that would otherwise not have access to subspecialty MFM care. In addition, our certified diabetes educators conducted over 1,000 visits for gestational and pre-gestational diabetes over the past year. We have implemented remote blood sugar reporting to facilitate optimization of glycemic control and improve outcomes.

On the inpatient side, we provide 24/7 Maternal-Fetal Medicine services including Labor and Delivery coverage, supervision of the busy high-risk antepartum inpatient service as well as the 6-bed OB ICU. We have received approximately 900 maternal transports in the past 18 months with a significant proportion resulting in preterm births requiring Neonatal Intensive Care Admission at MWH. We are dedicated to obstetric safety at MWH and serve as first responders to obstetric codes, "Condition O" system. In addition, our group plays a major role in providing guidelines and policies for obstetric care at multiple sites across the UPMC system. **Dr. Jacob Larkin** is the Medical Director of Inpatient Obstetric Services and **Dr. Simhan** plays a key role in expanding MFM reach across the Women's Health Service Line. We have implemented remote blood pressure monitoring for women who have delivered with a hypertensive disorder of pregnancy, aiming to optimize blood pressure control, minimize readmission, and ensure handoff to appropriate cardiovascular disease risk prevention.

Major clinical initiatives over the past year have been expanding our inpatient and outpatient consultative services to provide high level and quality of care for women at outlying facilities. Our catchment area extends to Eastern Ohio, West Virginia, Erie, and continues to grow in the eastward direction. We have accomplished this largely through our telemedicine consultation services which have been very well-received by physicians and patients alike, thereby improving access to high risk obstetric care. We have added in-person MFM consultations at UPMC Altoona and UPMC Hamot over the past year. In addition, we provide immediate 24/7 guidance to referring physicians by phone through the UPMC Med Call system and our MFM office. Since the closure of UPMC Mercy Hospital Labor and Delivery, MFM has played a key role in multi-disciplinary care coordination for pregnant trauma patients who are transported to UPMC Presbyterian Hospital. The Postpartum Hypertension “Bridges” clinic is a new, multi-disciplinary clinical initiative with women’s cardiology caring for women after a pregnancy complicated by preeclampsia, addressing the high risk of later life cardiovascular disease, and bridging preconception counseling and long-term care.

The Center for Advanced Fetal Diagnosis is a multi-disciplinary program for women with pregnancies complicated by fetal anomalies. **Dr. Sami Makaroun** serves as the medical director. Working closely with the OB Ultrasound and Genetics divisions, over 372 new patients have been seen for a total of 550 outpatient visits. Neonatology and Pediatric Surgical specialty consultations for post-natal management are also coordinated through this Center.

Over the next few years, we anticipate further expansion of our outpatient and inpatient MFM telemedicine service across Pennsylvania and beyond. In addition, we plan to expand innovative approaches and harness wireless technologies to institute remote monitoring programs to safely expand care for the high risk pregnant woman.

EDUCATIONAL/TEACHING ACTIVITIES

Our Division members are committed to the academic mission of excellence in education. We are actively involved in direct teaching and mentorship at multiple levels of trainees including fellows, residents, medical students, and undergraduate observers. We are the primary providers of high risk obstetric teaching in resident clinics.

Fellowship Program

The Maternal-Fetal Medicine fellowship is a three-year ACGME- and ABOG-accredited program designed to provide a rich mix of hands-on clinical experience and quality investigative exposure. **Dr. Katherine Himes and Dr. Steve Caritis are the Fellowship Program Director and Associate Fellowship Program Director**, respectively for this highly sought after MFM fellowship. We are currently approved to accept three fellows per year. We have a demonstrated track record in training expert sub-specialists who can care for and provide consultation to women with complicated pregnancies. We provide the tools and background to achieve a successful career in academic medicine and leadership skills for the next step in their career. Our fellows are provided a formal faculty mentoring program and opportunities through our division and the Magee-Womens Research Institute for research in basic science, clinical trials, as well as in qualitative and education arenas. Our fellows have clinical opportunities in Genetics, Center for Advanced Fetal Diagnosis, Center for Innovative Fetal Intervention and Critical Care Medicine as well as electives in Infectious Diseases and Fetal Echocardiography to name a few. Formal biostatistics and research methodology training is provided through the University of Pittsburgh Institute for Clinical Research Education (ICRE) program and fellows have the opportunity to pursue a Certificate or

Masters in Clinical Research or Education. All MFM faculty are closely involved in the clinical and research aspects of MFM fellowship training.

Our residents and fellows are highly productive with 13 abstracts presented at national and international meetings as well as 12 publications in the past academic year. Two of our fellows received Magee Medical Staff Grants for quality improvement projects on postpartum hemorrhage after vaginal delivery and early identification of postpartum preeclampsia with universal blood pressure assessment.

Residency

Residents also work closely with MFM faculty and are involved in all aspects of high risk obstetric care. Teaching activities occur in the didactic setting, outpatient office setting, inpatient units, and in the operating room. Members of our Division play key leadership roles in resident education:

Dr. Kristiina Parviainen serves as the Residency Program Director for Obstetrics and Gynecology. This is one of the largest OB/GYN residency programs which includes a total of 36 residents (9 residents per year, 4-year residency). She also leads the residency interview process, provides career-development mentorship during and beyond the residency years.

Dr. Sara Sakamoto is the Director of the Obstetric Simulation program providing novel and innovative approaches for practical resident and fellow education. Her team works closely with the WISER center. Specialized drills such as for cardiac arrest in pregnancy have been beneficial for residents and nursing staff. Her team is in the process of developing other obstetric drills for other obstetric situations such as shoulder dystocia and operative vaginal delivery.

Dr. Rosemary Froelich has newly taken responsibility as **Director for resident ultrasound education in Obstetrics.** She is developing level-specific curriculum for OB/GYN residents and fellows.

Members of the MFM division play an active role in the residency interview process as well as mentorship. MFM faculty serve as individual mentors for eight residents over their 4 years of residency. All MFM faculty participate in the Resident Core didactic session.

Resident rotations with direct MFM supervision (Note: Each rotation is 5-6 weeks):

PGY-1: Two Labor and Delivery rotations, Obstetric Night Float

PGY-2: Labor and Delivery, Antepartum – High Risk Obstetrics, Obstetric Night Float

PGY-2: Labor and Delivery, Special Clinics including High Risk Obstetrics Clinic, Obstetric Night Float

PGY-4: Labor and Delivery, Antepartum – High Risk Obstetrics, Obstetric Night Float, Special Clinics including High Risk Obstetrics Clinic

In addition, our faculty serve as research mentors with over 6 residents presenting MFM research at national research meetings in the past academic year (see above).

Medical Students

MFM faculty play a role in all levels of medical education at the University of Pittsburgh School of Medicine. The MFM division has contributed significant ECUS to the UPSOM over the past academic year.

The **Reproductive and Developmental Biology Course (MED 5222) for the second-year medical students** is a three-week course in the Organ Systems Block focusing on the normal processes of human reproduction, development and correlative pathology of the breast, prostate and reproductive organs. **Dr. Sara Sakamoto** serves as a Co-Director of this course with 5 additional MFM faculty members lecturing on an annual basis and 6 faculty participating in the Problem-Based Learning Sessions.

Dr. Allison Serra serves as the Assistant Director of the UPSOM OB/Gyn clerkship (OBGYN 5321) and co-Director of the 4th year “Boot Camp” course for graduating seniors entering residency in Obstetrics and Gynecology.

At the third-year medical student level, all MFM clinical faculty are involved in patient-centered teaching during the clinical rotation on Obstetrics and Gynecology. In addition, the majority of faculty participate in the Problem-Based Learning Sessions. Dr. Sami Makaroun gives a Case-based presentation to highlight the Maternal Adaptations to pregnancy at the beginning of each third-year clinical rotation. Our faculty also serve as members of the UPSOM curriculum committee, advisors in the “FAST” (Faculty and Students Together) program and are small group facilitators in several first and second year medical school courses.

Dr. Serra serves as the Coordinator for all 4th year medical student electives in Obstetrics and Gynecology and serves as the rotation director for the highly sought after High-Risk Pregnancy sub-internship (OBGYN 5420).

Undergraduate

Dr. Sami Makaroun coordinates Obstetrics shadowing for undergraduate and biomedical masters’ students participating in the University of Pittsburgh School of Medicine shadowing program. These students get exposure to obstetrics by shadowing a MFM faculty and their team.

Other Graduate and Post-graduate

Our faculty are frequently invited by various departments to provide education on high risk pregnancy issues including Emergency Medicine, Trauma Surgery, Critical Care Medicine, Rheumatology, Pulmonology, Nephrology, Cardiology, to name a few. Drs Himes and Jeyabalan give annual lectures at the Graduate School of Public Health, Reproductive Epidemiology (EPID 2720) course. Drs. Makaroun, Himes, Parviainen and Sakamoto lecture to the Obstetric Anesthesia Fellows on an annual basis.

Faculty list including titles and career interests (in alphabetical order):

Stacy Beck, MD Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. Her main research interests are severe maternal morbidity and mortality as well as racial disparities in adverse pregnancy outcomes. She is Co-Chairperson of the Pennsylvania Maternal Mortality Review Committee, one of the leads on the state Alliance for Innovation on Maternal Health (AIM) task force and a UPMC representative for the Pennsylvania Perinatal Quality Collaborative. She also serves as co-Chair for the UPMC Maternal Mortality Review Committee. She is actively involved in multi-disciplinary research with the Anesthesiology department studying ways to minimize post-operative opioid use after cesarean section as well as evaluating prediction models for postpartum hemorrhage. She is also collaborating with members of the Neonatology Division in a multi-center randomized trial evaluating antibiotic use in very preterm infants.

Anna Binstock, MD- Assistant Professor, Department of Obstetrics, Gynecology, and Reproductive Sciences. She joined the divisions of Maternal-Fetal Medicine and Ultrasound in July 2020 after completing her Maternal-

Fetal Medicine Fellowship at Magee-Womens Hospital. She is member of Patient Safety and Quality committees and is involved with implementation of process improvement on Labor and Delivery. She also coordinates multi-disciplinary conferences with MFM, Neonatology, and Perinatal Pathology. Her clinical and academic interests include management of postpartum hypertension, prevention of postpartum morbidity and readmissions, and the development of quality and safety protocols to improve obstetric care.

Steve Caritis MD – Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. He is the site principal investigator of a NIH U54 grant that focuses on Obstetrical Pharmacology. The NIH focus on Obstetrical Pharmacology has resulted in establishment of the Obstetrical-Fetal Pharmacology Research Centers (OPRC). Currently only three centers are funded as part of this consortium. Dr Caritis has been part of the OPRC for 15 years. He currently directs projects studying buprenorphine in pregnancy and evaluating the relationship between plasma concentrations of 17-hydroxyprogesterone caproate and risk of spontaneous preterm birth. He is also the principal investigator on an NIH-funded R01 project to determine how to best detoxify women on buprenorphine. Dr Caritis was also the Co-PI of the only T32 in Obstetrical Pharmacology in the US which focused on training MDs., PharmDs and PhDs in obstetrical pharmacology. Dr Caritis also served as the PI of NIH-funded Maternal-Fetal Medicine Units Network for 25 years. He is the associate program director for the MFM fellowship before which he served as the Program Director for over 25 years.

Dr. Facco is an Associate Professor of Obstetrics, Gynecology and Reproductive Sciences, University of Pittsburgh School of Medicine. She is an NIH-funded clinician-investigator with over 12 years of experience with clinical research in pregnant populations. She has broad experience both contributing to and leading multi-disciplinary research teams and participating in cooperative agreements for clinical research. She has a national reputation as an expert on sleep physiology in pregnancy and have specifically examined the role of poor sleep and circadian disruption as a risk factor for adverse pregnancy outcomes. She was a co-Investigator in the Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be (nuMoM2b) Network (2010-2014). She lead the analyses that described a relationship between objectively measured shortened sleep duration and late sleep timing and the risk of developing gestational diabetes and preterm birth, and a dose-related relationship between sleep apnea (assessed by apnea-hypopnea index) and the risk of gestational diabetes and hypertensive disorders of pregnancy. She currently is the co-Principal Investigator for the National Institute of Child Health and Human Development (NICHD) MFMU Network's Pittsburgh site. Through this network, she now serves as the Protocol Chair of a 6-year multicenter randomized trial of sleep apnea therapy in pregnancy (SLEEP trial).

Maisa Feghali MD, MS – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. She is a K-23 scholar funded by the National Institute for Child and Human Development. She has a secondary appointment at University of Pittsburgh School of Medicine, Clinical and Translational Science Institute. Her research interests focus on transforming diabetes care during pregnancy using individualized and novel treatment strategies. She is a co-investigator on two R01 focused on intensive glycemic control in obese women with GDM and a study exploring sedentary behavior and adverse pregnancy outcomes. She continues to expand the remote monitoring pathway she developed with Vivify Health to advance the care of women with diabetes in pregnancy. Dr. Feghali also serves as the co-Director of Resident Research and the Medical Director of the Women's Health Practice-Based Research Network. She also serves on the MWRI Steering Committee and the Magee CTRC advisory group.

Rosemary Froehlich MD – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. As a member of the divisions of Maternal-Fetal Medicine and Ultrasound, Dr. Froehlich's clinical interests and academic interests include the management of acute hypertension in pregnancy and the postpartum period, sonographic and genetic prenatal diagnosis, and fetal growth disturbances. Dr. Froehlich is dedicated to graduate medical education with active roles in both the residency and Maternal-Fetal Medicine fellowship training programs. She serves as the director of the resident ultrasound rotation and is working to enhance both didactic and hands-on ultrasound education for trainees. She is a mentor for physicians-in-training with regard to career development and research, serves on committees responsible for monitoring the progress of trainees and annually participates in the recruitment process of both training programs.

Maureen Hamel MD - Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. As a member of the divisions of Maternal-Fetal Medicine and Ultrasound, her clinical and academic interests include intrapartum management, gestational diabetes and placenta accreta spectrum disorders. As the MFM Resident Education Director, she works closely with the Residency Program Director in optimizing the obstetric training of highly skilled residents.

Alisse Hauspurg MD --Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. She joined the division of Maternal-Fetal Medicine in July 2019. She is currently a K12 Scholar in the Building Interdisciplinary Research Careers in Women's Health (BIRCWH) program funded by the NIH/Office of Research on Women's Health. She is also pursuing a Master of Science in Clinical Research at the University of Pittsburgh Institute for Clinical Research Education. Along with collaborators in the Division of Cardiology, she is the co-founder of the Bridges Postpartum Hypertension Clinic, which provides multi-disciplinary follow up care for women following a hypertensive disorder of pregnancy. She also developed a remote monitoring pathway for women with hypertension in pregnancy for the management of hypertension for the first year postpartum. Her research interests focus on studying mechanisms leading to cardiovascular disease after a hypertensive disorder of pregnancy.

Katherine Himes MD MS – Associate Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Program Director Maternal Fetal Medicine Fellowship. She is a clinician-investigator whose current research seeks to 1) inform patient provider communication to support quality decision making in obstetrics and 2) develop decisional support tools for both preference sensitive and preference insensitive decisions. She is the PI of a NIH funded R56 that is conducting a randomized controlled trial of an intervention designed to increase patient engagement in postpartum care as well as also Co-investigator on two NIH R01s that aim to develop evidence-based guidelines to inform gestational weight gain and dietary counseling. Dr. Himes was recently awarded a Magee Medical Staff grant to establish a Center for Perinatal Shared Decision Making with neonatology and serves as a fellow for the UPMC Beckwith Center for Shared Decision Making.

Arun Jeyabalan MD MS – Associate Professor, Department of Obstetrics, Gynecology and Reproductive Sciences and Clinical and Translational Sciences Institute, Division Director of Maternal-Fetal Medicine. She is a clinician-investigator with research interests that include vascular adaptations to pregnancy and hypertensive and renal disorders including preeclampsia. She serves as the Medical director for the Obstetric Specimen Procurement Unit and Clinical and Translational Research Center at Magee-Womens Hospital building clinical research infrastructure for efficient and quality clinical pregnancy research. She is a Co-Investigator of a Gates funded Grand Challenges award conducting a multi-center stepped wedge clinical trial in Brazil testing the use of clinical and bio-markers for risk stratification of preeclampsia. She is the site-PI of the Global Pregnancy Collaboration and in this role has helped develop a standardized pregnancy database, COLLECT, which is

currently being used in multiple sites including in Brazil where she is assisting co-investigators in developing a robust database and biorepository of pregnancy samples. She also is a member of the Pregnancy Adaptations Group at the MWRI and is a co-investigator on an American Heart Association Go Red Award titled “Women’s Cardiovascular Health and Microvascular Mechanisms: Novel Insights from Pregnancy”. She is currently a fellow in the prestigious Executive Leadership in Academic Leadership program (ELAM) at Drexel University.

Jacob Larkin MD – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. As Medical Director for Inpatient Obstetric Services at Magee-Womens Hospital, Dr. Larkin collaborates with nursing and administrative leadership to continually optimize operations and clinical outcomes in the Woman Care Birth Center and maternity wards. In this role, he oversees policy development and is engaged in several QI initiatives. Dr. Larkin’s research has also focused on epidemiologic outcomes analysis to identify optimal thresholds for classifying fetuses as growth-restricted or overgrown, as well as mechanistic determinants of fetal growth restriction and placental dysfunction. He is an Associate Editor for the journal *Placenta*.

Sami Makaroun, MD – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Director of the Center for Advanced Fetal Diagnostics. As Director of the Center for Advanced Fetal Diagnostics at Magee-Women’s Hospital, he seeks to optimize the multidisciplinary care necessary to provide the best outcomes for pregnant women and their babies with antenatally diagnosed congenital anomalies. He is interested in further developing institutional research in obstetric ultrasound and fetal diagnosis. Dr. Makaroun has been invited to give four talks on obstetric imaging at national meetings for the American Institute of Ultrasound in Medicine. He has active teaching roles for University of Pittsburgh medical students, Obstetrics and Gynecology residents, and Maternal Fetal Medicine fellows. In addition, he is the Faculty Shadowing Director for Obstetrics for undergraduate and biomedical masters’ students through the Office of Medical Education shadowing program.

Christina Megli, MD, PhD -- Research Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. She joined the division of Maternal-Fetal Medicine in July 2020 and is a K12 scholar on Phase 1 of the Reproductive Scientist Development Program funded by NICHD. With the RSDP, she has secondary funding for research through the Burroughs Wellcome Fund. Her research focuses on infection and immunity at the maternal fetal interface. She recently published her work on inflammasome activation in the placenta and listeria infection in *Journal of Experimental Medicine* and has a solicited review in press in *Nature Reviews Microbiology*. Additionally, she collaborated with Dr. Caritis on a manuscript on preterm birth in twins recently accepted to *American Journal of Physiology*. She was invited to present her work on inflammasome activation at the Virtual placenta interface seminar this September.

Kristiina Parviainen, MD – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. Dr. Parviainen continues to serve as the Residency Program Director for Obstetrics and Gynecology. The program, with 9 residents per year, prioritizes rigorous clinical experience and didactics with the goal of excellence in general obstetrics and gynecology and opportunities for individualized training as a foundation for a productive and fulfilling career. The Program continues to be ranked nationally as one of the top 5 training programs by Doximity and to recruit outstanding residents. Dr. Parviainen is participating in an AMA grant-funded nationwide pilot on UME to GME Transition in *Ob/Gyn: Right Resident, Right Program*; Her working group is focused on *Readiness for Intern-Year Curriculum and Assessments*. Dr. Parviainen’s academic focus is on achieving fairness and limiting bias in the residency admissions process, including national presentations of local research examining gender bias in Letters of Recommendation. As

part of the residency program's commitment to promoting diversity, equity and inclusion, the residency applicant review process was revamped, with the guiding principles of holistic review and minimizing educational systemic bias. Residency recruitment has been transitioned to 100% virtual in consideration of the Covid-19 pandemic.

Christina Pisani-Conway MD – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. She joined the divisions of Maternal-Fetal Medicine and Ultrasound in spring of 2020 and is actively involved in developing outreach specialty, imaging and teaching services. She is a clinician-educator with an interest in medical education as well as integrative medicine in obstetrical care.

Sarah Rogan, MD, PhD - Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. She joined the divisions of Maternal-Fetal Medicine and Ultrasound in the fall of 2020 after completing her Maternal-Fetal Medicine fellowship at Magee-Womens Hospital. Her research interests include preeclampsia and complications of twin pregnancies. She serves at the Maternal Fetal Medicine liaison to a hospital working group that seeks to improve the experience and outcomes of women on Labor and Delivery.

Sara Sakamoto, MD – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Director of Obstetric Simulation Education. She is a clinician-educator with an interest in medical education as well as patient safety and quality improvement. She has investigated complications of cesarean section through creation of a cesarean section database and has been instrumental in designing and implementing interventions throughout the hospital system to improve preparation for, as well as identification and management of obstetrical hemorrhage. Sara took a lead role in the multicenter PEARLE trial of a device to manage postpartum hemorrhage. She serves as the Director of Simulation for Magee-Womens Hospital where she facilitates multi-disciplinary OB crisis team training, obstetric skill development programs, and fosters utilization of simulation in multiple areas and levels of Ob/Gyn training. She has served on the Education Committee for the Society of Maternal-Fetal Medicine, is a Co-Course Director of the second-year medical student Reproductive Biology course, is an active member of the ACOG Simulations Working Group, and is an advocate for women's health issues as an Advisory Council Member of PA-ACOG.

Allison Serra MD, MPH – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. She joined the division of Maternal-Fetal Medicine and Ultrasound in the fall of 2018 and is primarily a clinician-educator with a focus on undergraduate medical education, mentoring, and advising. She teaches in several pre-clinical courses, co-directs our department's OB/Gyn clerkship (OBGYN 5341), and directs the Obstetrical Sub-Internship in Obstetrics (OBGYN 5420). She is also the co-director of the fourth year "boot camp" course for graduating seniors entering residency in Obstetrics and Gynecology. She serves as an advisor in the "FAST" (Faculty and Students Together) program and this year organized a structured departmental advising program aimed at guiding fourth year medical students through the match process. She chairs the Continuous Curriculum Quality Improvement subcommittee of the Curriculum Committee within the School of Medicine and in this role focuses on issues related to curricular success and maintenance of accreditation. Her academic interests include mentoring and advising, curriculum development, and program evaluation.

Hyagriv Simhan MD, MS. Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Executive Vice Chair of Obstetrical Services, Director of Patient Care Delivery Innovation and Technology, UPMC. He is the Principal Investigator of the MFM Units Network (described in detail of the MFM research section). He is the PI of an RO1 and UH3 award as well as Co-PI on NIH awards to study Developmental origins of offspring phenotypes. He and his team are investigating how pre-pregnancy and pregnancy experiences and environmental exposures transduce biologically to the fetus and influence the development of offspring brain

and neurocognitive development, and the predisposition to chronic diseases and aging. Through partnerships and collaborations with our data analytics colleagues at the *Donald D. Wolff, Jr. Center for Quality Improvement and Innovation at UPMC*, in UPMC Health Services Division, in UPMC Corporate Finance, and at data warehousing and WI partners at Health Catalyst, we are excited in the UPMC Women's Health Service Line to bring rigorous QI methodology, novel patient and provider engagement strategies, and smooth technological solutions to the management of gestational diabetes. This set of partnerships enables us to move forward the development and implementation of interventions to identify and treat GSM in a timely and effective fashion to improve patient outcomes, reduce health care costs, and optimize the hand-off to appropriate postpartum diabetes prevention. Additional program development includes a collaboration with Vivify Health for remote monitoring of post-partum hypertension, aiming to optimize blood pressure control, minimize readmission, and ensure handoff to appropriate cardiovascular disease risk prevention.

Maternal-Fetal Medicine Fellows

Jacqueline Atlass, MD
Lauren Carlos, MD
Tiffany Deihl, MD
Francis Hacker, MD
Mitchell Onslow, MD
Jaclyn Phillips, MD
Aalok Sanjanwala, MD
Malinda Schaefer, MD
Tiffany Wang, MD

Advanced Practice Providers

Emily Bauder, PA-C
Jillian Grove, CRNP
Mary Lee, PA-C
Gabrielle Storino, PA-C
Carrie Weaver, PA-C

Diabetes educators

Mary Beth Caputo, RD, CDE
Dianne Heidingsfelder, RD, CDE
Rachel Kingsley, RD, CDE
Carrie Zariwala, RD, CDE
Elise Wood, RD, CDE

Clinical Nurse Specialists

Jeanette Boyce, RN
Jan Buys, RN -Practice Manager
Tricia Cioffi-Droeder, RN
Diane Hurkmans, RN

Angela Rothhaar, RN

Lisa Stein, RN

Nikki Sutton, RN

Division Administrator

Jacinda (Cindy) Kennedy, MSN, RN

Director of Operations

Lynn Garver, MPA

Publications – Division of Maternal Fetal Medicine

1. Yatsenko SA, Quesada-Candela C, Saller DN, **Beck S**, Jaffe R, Kostadinov S, Yanowitz J, Rajkovic A. Cytogenetic signatures of recurrent pregnancy losses. *Prenat Diagn*. 2020 Oct 4. doi: 10.1002/pd.5838. Epub ahead of print. PMID: 33015842.
2. Shuster DL, Shireman LM, Ma X, Shen DD, Flood Nichols SK, Ahmed MS, Clark S, **Caritis S**, Venkataramanan R, Haas DM, Quinney SK, Haneline LS, Tita AT, Manuck TA, Thummel KE, Morris Brown L, Ren Z, Brown Z, Easterling TR, Hebert MF. Pharmacodynamics of Metformin in Pregnant Women With Gestational Diabetes Mellitus and Nonpregnant Women With Type 2 Diabetes Mellitus. *J Clin Pharmacol*. 2020 Apr;60(4):540-549. doi: 10.1002/jcph.1549. Epub 2019 Nov 19. PMID: 31742716; PMCID: PMC7064374.
3. Liao MZ, Flood Nichols SK, Ahmed M, Clark S, Hankins GD, **Caritis S**, Venkataramanan R, Haas D, Quinney SK, Haneline LS, Tita AT, Manuck T, Wang J, Thummel KE, Brown LM, Ren Z, Easterling TR, Hebert MF. Effects of Pregnancy on the Pharmacokinetics of Metformin. *Drug Metab Dispos*. 2020 Apr;48(4):264-271. doi: 10.1124/dmd.119.088435. Epub 2020 Jan 24. PMID: 31980499; PMCID: PMC7076518.
4. Wu X, Zhang H, Miah MK, **Caritis SN**, Venkataramanan R. Physiologically Based Pharmacokinetic Approach Can Successfully Predict Pharmacokinetics of Citalopram in Different Patient Populations. *J Clin Pharmacol*. 2020 Apr;60(4):477-488. doi: 10.1002/jcph.1541. Epub 2019 Nov 21. PMID: 31750550.
5. Costantine MM, Smith K, Thom EA, Casey BM, Peaceman AM, Varner MW, Sorokin Y, Reddy UM, Wapner RJ, Boggess K, Tita ATN, Rouse DJ, Sibai B, Iams JD, Mercer BM, Tolosa JE, **Caritis SN**, VanDorsten JP; Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Maternal-Fetal Medicine Units (MFMU) Network, Bethesda, MD. Effect of Thyroxine Therapy on Depressive Symptoms Among Women With Subclinical Hypothyroidism. *Obstet Gynecol*. 2020 Apr;135(4):812-820. doi: 10.1097/AOG.0000000000003724. PMID: 32168208; PMCID: PMC7103482.
6. Shuster DL, Shireman LM, Ma X, Shen DD, Flood Nichols SK, Ahmed MS, Clark S, **Caritis S**, Venkataramanan R, Haas DM, Quinney SK, Haneline LS, Tita AT, Manuck TA, Thummel KE, Brown LM, Ren Z, Brown Z, Easterling TR, Hebert MF. Pharmacodynamics of Glyburide, Metformin, and Glyburide/Metformin Combination Therapy in the Treatment of Gestational Diabetes Mellitus. *Clin Pharmacol Ther*. 2020 Jun;107(6):1362-1372. doi: 10.1002/cpt.1749. Epub 2020 Jan 25. PMID: 31869430.

7. Lemon LS, Bodnar LM, Garrard W, Venkataramanan R, Platt RW, Marroquin OC, **Caritis SN**. Ondansetron use in the first trimester of pregnancy and the risk of neonatal ventricular septal defect. *Int J Epidemiol*. 2020 Apr 1;49(2):648-656. doi: 10.1093/ije/dyz255. PMID: 31860078; PMCID: PMC7266534.
8. Chauhan SP, Rice MM, Grobman WA, Bailit J, Reddy UM, Wapner RJ, Varner MW, Thorp JM Jr, **Caritis SN**, Prasad M, Tita ATN, Saade GR, Sorokin Y, Rouse DJ, Tolosa JE; Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Maternal-Fetal Medicine Units (MFMU) Network. Neonatal and Maternal Composite Adverse Outcomes Among Low-Risk Nulliparous Women Compared With Multiparous Women at 39-41 Weeks of Gestation. *Obstet Gynecol*. 2020 Sep;136(3):450-457. doi: 10.1097/AOG.0000000000003951. PMID: 32769638; PMCID: PMC7483669.
9. Zhang H, Bastian JR, Zhao W, Chen H, Shaik IH, Chaphekar N, **Caritis SN**, Venkataramanan R. Pregnancy Alters CYP- and UGT-Mediated Metabolism of Buprenorphine. *Ther Drug Monit*. 2020 Apr;42(2):264-270. doi: 10.1097/FTD.0000000000000724. PMID: 31929398.
10. Son M, Lai Y, Bailit J, Reddy UM, Wapner RJ, Varner MW, Thorp JM Jr, **Caritis SN**, Prasad M, Tita ATN, Saade G, Sorokin Y, Rouse DJ, Blackwell SC, Tolosa JE; Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Maternal-Fetal Medicine Units (MFMU) Network. Association Between Time of Day and the Decision for an Intrapartum Cesarean Delivery. *Obstet Gynecol*. 2020 Mar;135(3):535-541. doi: 10.1097/AOG.0000000000003707. PMID: 32028489.
11. Battarbee AN, Sandoval G, Grobman WA, Bailit JL, Reddy UM, Wapner RJ, Varner MW, **Caritis SN**, Prasad M, Tita ATN, Saade GR, Sorokin Y, Rouse DJ, Tolosa JE; Eunice Kennedy Shriver National Institute of Child Health Human Development Maternal-Fetal Medicine Units (MFMU) Network. Antenatal Corticosteroids and Preterm Neonatal Morbidity and Mortality among Women with and without Diabetes in Pregnancy. *Am J Perinatol*. 2020 Jul 27. doi: 10.1055/s-0040-1714391. Epub ahead of print. PMID: 32717749.
12. **Caritis SN**, Venkataramanan R. Naltrexone use in pregnancy: a time for change. *Am J Obstet Gynecol*. 2020 Jan;222(1):1-2. doi: 10.1016/j.ajog.2019.08.041. PMID: 31883574.
13. Lim G, LaSorda KR, Farrell LM, McCarthy AM, **Facco F**, Wasan AD. Obstetric pain correlates with postpartum depression symptoms: a pilot prospective observational study. *BMC Pregnancy Childbirth*. 2020 Apr 22;20(1):240. doi: 10.1186/s12884-020-02943-7. PMID: 32321455; PMCID: PMC7178606.
14. Bodnar LM, **Himes KP**, Abrams B, Lash TL, Parisi SM, Eckhardt CL, Braxter BJ, Minion S, Hutcheon JA. Gestational Weight Gain and Adverse Birth Outcomes in Twin Pregnancies. *Obstet Gynecol*. 2019 Nov;134(5):1075-1086. doi: 10.1097/AOG.0000000000003504. PMID: 31599828; PMCID: PMC6814560.
15. Demirci JR, Glasser M, Fichner J, Caplan E, **Himes KP**. "It gave me so much confidence": First-time U.S. mothers' experiences with antenatal milk expression. *Matern Child Nutr*. 2019 Oct;15(4):e12824. doi: 10.1111/mcn.12824. Epub 2019 May 23. PMID: 30950165; PMCID: PMC6859991.

16. Vani K, **Facco FL**, **Himes KP**. Pregnancy after periviable birth: making the case for innovative delivery of interpregnancy care. *J Matern Fetal Neonatal Med*. 2019 Nov;32(21):3577-3580. doi: 10.1080/14767058.2018.1468432. Epub 2018 May 9. PMID: 29681199.
17. Yu YH, Bodnar LM, **Himes KP**, Brooks MM, Naimi AI. Association of Overweight and Obesity Development Between Pregnancies With Stillbirth and Infant Mortality in a Cohort of Multiparous Women. *Obstet Gynecol*. 2020 Mar;135(3):634-643. doi: 10.1097/AOG.0000000000003677. PMID: 32028483; PMCID: PMC7147965.
18. Yu YH, Filion KB, Bodnar LM, Brooks MM, Platt RW, **Himes KP**, Naimi AI. Visualization tool of variable selection in bias-variance tradeoff for inverse probability weights. *Ann Epidemiol*. 2020 Jan;41:56-59. doi: 10.1016/j.annepidem.2019.12.006. Epub 2019 Dec 13. PMID: 31982245.
19. Bodnar LM, Cartus AR, Kirkpatrick SI, **Himes KP**, Kennedy EH, **Simhan HN**, Grobman WA, Duffy JY, Silver RM, Parry S, Naimi AI. Machine learning as a strategy to account for dietary synergy: an illustration based on dietary intake and adverse pregnancy outcomes. *Am J Clin Nutr*. 2020 Jun 1;111(6):1235-1243. doi: 10.1093/ajcn/nqaa027. PMID: 32108865; PMCID: PMC7266693.
20. **Feghali MN**, Abebe KZ, Comer DM, **Caritis S**, Catov JM, Scifres CM. Response to Medical Nutritional Therapy and Need for Pharmacological Therapy in Women with Gestational Diabetes. *Am J Perinatol*. 2019 Oct;36(12):1250-1255. doi: 10.1055/s-0038-1676615. Epub 2018 Dec 21. PMID: 30577055.
21. **Hauspurg A**, Countouris ME, Catov JM. Hypertensive Disorders of Pregnancy and Future Maternal Health: How Can the Evidence Guide Postpartum Management? *Curr Hypertens Rep*. 2019 Nov 27;21(12):96. doi: 10.1007/s11906-019-0999-7. PMID: 31776692; PMCID: PMC7288250.
22. Redman EK, **Hauspurg A**, Hubel CA, Roberts JM, **Jeyabalan A**. Clinical Course, Associated Factors, and Blood Pressure Profile of Delayed-Onset Postpartum Preeclampsia. *Obstet Gynecol*. 2019 Nov;134(5):995-1001. doi: 10.1097/AOG.0000000000003508. PMID: 31599846; PMCID: PMC6922052.
23. **Hauspurg A**, Lemon LS, Quinn BA, **Binstock A**, **Larkin J**, Beigi RH, Watson AR, **Simhan HN**. A Postpartum Remote Hypertension Monitoring Protocol Implemented at the Hospital Level. *Obstet Gynecol*. 2019 Oct;134(4):685-691. doi: 10.1097/AOG.0000000000003479. PMID: 31503166; PMCID: PMC7289450.
24. Dias MAB, De Oliveira L, **Jeyabalan A**, Payne B, Redman CW, Magee L, Poston L, Chappell L, Seed P, von Dadelszen P, Roberts JM; PREPARE Research Group. PREPARE: protocol for a stepped wedge trial to evaluate whether a risk stratification model can reduce preterm deliveries among women with suspected or confirmed preterm pre-eclampsia. *BMC Pregnancy Childbirth*. 2019 Oct 7;19(1):343. doi: 10.1186/s12884-019-2445-x. PMID: 31590640; PMCID: PMC6781345.
25. Post Uiterweer ED, Koster MPH, **Jeyabalan A**, Kuc S, Siljee JE, Stewart DR, Conrad KP, Franx A. Circulating pregnancy hormone relaxin as a first trimester biomarker for preeclampsia. *Pregnancy Hypertens*. 2020 Jul 22;22:47-53. doi: 10.1016/j.preghy.2020.07.008. Epub ahead of print. PMID: 32738589.

26. Silver RM, Hunter S, Reddy UM, **Facco F**, Gibbins KJ, Grobman WA, Mercer BM, Haas DM, **Simhan HN**, Parry S, Wapner RJ, Louis J, Chung JM, Pien G, Schubert FP, Saade GR, Zee P, Redline S, Parker CB; Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be (NuMoM2b) Study. Prospective Evaluation of Maternal Sleep Position Through 30 Weeks of Gestation and Adverse Pregnancy Outcomes. *Obstet Gynecol.* 2019 Oct;134(4):667-676. doi: 10.1097/AOG.0000000000003458. PMID: 31503146; PMCID: PMC6768734.
27. Mesner O, Davis A, Casman E, **Simhan H**, Shalizi C, Keenan-Devlin L, Borders A, Krishnamurti T. Using graph learning to understand adverse pregnancy outcomes and stress pathways. *PLoS One.* 2019 Sep 30;14(9):e0223319. doi: 10.1371/journal.pone.0223319. PMID: 31568495; PMCID: PMC6768465.
28. Krishnamurti T, Davis AL, **Simhan HN**. Worrying yourself sick? Association between pre-eclampsia onset and health-related worry in pregnancy. *Pregnancy Hypertens.* 2019 Oct;18:55-57. doi: 10.1016/j.preghy.2019.09.003. Epub 2019 Sep 13. PMID: 31525710.
29. Gondwe T, Betha K, Kusneniwar GN, Bunker CH, Tang G, **Simhan H**, Reddy PS, Haggerty CL. Maternal Factors Associated with Mode of Delivery in a Population with a High Cesarean Section Rate. *J Epidemiol Glob Health.* 2019 Dec;9(4):252-258. doi: 10.2991/jegh.k.191017.001. PMID: 31854166; PMCID: PMC7310794.
30. Premkumar A, Debbink MP, Silver RM, Haas DM, **Simhan HN**, Wing DA, Parry S, Mercer BM, Iams J, Reddy UM, Saade G, Grobman WA. Association of Acculturation With Adverse Pregnancy Outcomes. *Obstet Gynecol.* 2020 Feb;135(2):301-309. doi: 10.1097/AOG.0000000000003659. PMID: 31923068; PMCID: PMC7054005.
31. Grobman WA, Sandoval G, Reddy UM, Tita ATN, Silver RM, Mallett G, Hill K, Rice MM, El-Sayed YY, Wapner RJ, Rouse DJ, Saade GR, Thorp JM Jr, Chauhan SP, Iams JD, Chien EK, Casey BM, Gibbs RS, Srinivas SK, Swamy GK, **Simhan HN**, Macones GA; Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units (MFMU) Network. Health resource utilization of labor induction versus expectant management. *Am J Obstet Gynecol.* 2020 Apr;222(4):369.e1-369.e11. doi: 10.1016/j.ajog.2020.01.002. Epub 2020 Jan 10. PMID: 31930993; PMCID: PMC7141954.
32. Dude A, Fette LM, Reddy UM, Tita ATN, Silver RM, El-Sayed YY, Wapner RJ, Rouse DJ, Saade GR, Thorp JM Jr, Chauhan SP, Iams JD, Chien EK, Casey BM, Srinivas SK, Swamy GK, **Simhan HN**; Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Maternal-Fetal Medicine Units (MFMU) Network. Maternal Sense of Control During Childbirth and Infant Feeding Method. *Obstet Gynecol.* 2020 Mar;135(3):583-590. doi: 10.1097/AOG.0000000000003697. PMID: 32028504; PMCID: PMC7036026.
33. Copel JA, Platt LD, Hobbins JC, Afshar Y, Grechukhina O, Mallampati D, Bromley B, Caughey AB, Grobman W, Han CS, Nicolaides K, Pettker C, Saade G, Sibai B, **Simhan H**, Sonek J, Werner E, Chescheir N. Gottesfeld-Hohler Memorial Foundation Risk Assessment for Early-Onset Preeclampsia in the United

States: Think Tank Summary. *Obstet Gynecol.* 2020 Jan;135(1):36-45. doi: 10.1097/AOG.0000000000003582. PMID: 31809427.

35. Krishnamurti T, **Simhan HN**, Borrero S. Competing demands in postpartum care: a national survey of U.S. providers' priorities and practice. *BMC Health Serv Res.* 2020 Apr 6;20(1):284. doi: 10.1186/s12913-020-05144-2. PMID: 32252757; PMCID: PMC7137294.
36. Leszko M, Keenan-Devlin L, Adam EK, Buss C, Grobman W, **Simhan H**, Wadhwa P, Mroczek DK, Borders A. Are personality traits associated with smoking and alcohol use prior to and during pregnancy? *PLoS One.* 2020 May 18;15(5):e0232668. doi: 10.1371/journal.pone.0232668. PMID: 32421742; PMCID: PMC7233577.
37. Dude AM, Kominiarek MA, Haas DM, Iams J, Mercer BM, Parry S, Reddy UM, Saade G, Silver RM, **Simhan H**, Wapner R, Wing D, Grobman W. Weight gain in early, mid, and late pregnancy and hypertensive disorders of pregnancy. *Pregnancy Hypertens.* 2020 Apr;20:50-55. doi: 10.1016/j.preghy.2020.03.001. Epub 2020 Mar 3. PMID: 32172170; PMCID: PMC7198322.
38. Keenan-Devlin LS, Awosemusi YF, Grobman W, **Simhan H**, Adam E, Culhane J, Miller G, Borders AEB. Early Term Delivery and Breastfeeding Outcomes. *Matern Child Health J.* 2019 Oct;23(10):1339-1347. doi: 10.1007/s10995-019-02787-4. PMID: 31218609.
39. Monk C, Webster RS, McNeil RB, Parker CB, Catov JM, Greenland P, Bairey Merz CN, Silver RM, **Simhan HN**, Ehrenthal DB, Chung JH, Haas DM, Mercer BM, Parry S, Polito L, Reddy UM, Saade GR, Grobman WA; NICHD nuMoM2b and NHLBI nuMoM2b Heart Health Study Networks. Associations of perceived prenatal stress and adverse pregnancy outcomes with perceived stress years after delivery. *Arch Womens Ment Health.* 2020 Jun;23(3):361-369. doi: 10.1007/s00737-019-00970-8. Epub 2019 Jun 29. PMID: 31256258; PMCID: PMC6935433.

DIVISION OF ULTRASOUND



David Kauffman, MD
Lead Physician

OVERVIEW

The Division of Obstetric and Gynecologic Ultrasound continues to provide exceptional imaging services for patients throughout western Pennsylvania and eastern Ohio. Our physicians are all board certified / board eligible Maternal-Fetal Medicine specialists or experienced gynecologists with additional training in pelvic imaging. This background in clinical obstetrics and gynecology, unique to our program, enhances the imaging protocols, report documentation, clinical recommendations, and final report interpretation provided by our physicians. Imaging is performed on-site at Magee Women's Hospital for scheduled outpatients, acute inpatients, genetics procedures, intraoperative guidance and for Emergency Department patients. Off-site imaging is performed at both MWH satellite clinics, UPMC affiliated clinics, and other freestanding clinics and hospitals. On-call image interpretation by our Ultrasound Division physicians is provided 24 hours a day, 7 days a week. Despite a temporary reduction in volume due to COVID-19, ultrasound volumes quickly rebounded and have continued to increase.

In addition to a robust clinical practice, the Division of Obstetric and Gynecologic Ultrasound is involved in the education and training of multiple levels of practitioners, including sonography technology students, University of Pittsburgh medical students, UPMC radiology residents, MWH OBGYN residents, and MWH MFM fellows. The division supports research projects across multiple specialties including the Center for Innovative Fetal Intervention and Urogynecology. As our clinical volumes and responsibilities have continued to expand, we have added additional faculty to support this growth.

Clinical Program

The ultrasound division performed and interpreted 78,023 exams in FY2020, averaging approximately 300 studies per day. Please refer to the table below (not inclusive of all types of exams) for highlighted reference volumes.

Exam type	Volume FY 2020
Pelvic ultrasound exam	23,934
Obstetric complete and extended exam	13,541
First trimester screen	3653
Intraoperative ultrasound guidance	229
Amniocentesis + CVS	173

Services were provided at 38 different sites which include Magee-Womens Hospital, MWH satellite offices, as well as a variety of UPMC and non-UPMC affiliated sites including UPMC Hamot, UPMC Horizon, UPMC Northwest, UPMC Altoona, UPMC Bedford, UPMC Mercy, Washington Health System, UPP private offices in Butler, and Trinity Health System (Ohio). The majority of studies were performed remotely, with images transmitted to the central MWH site for interpretation by one of the ultrasound physicians. 28,476 exams were performed at Magee-Womens Hospital in Oakland. This year, the Ultrasound Division expanded our physical presence at two additional sites- UPMC Hamot and UPMC Altoona. At each of these sites, one of the ultrasound physicians performs both on-site maternal fetal medicine consultation as well ultrasound imaging and interpretation. This expansion has improved access for patients who live remotely yet require comprehensive imaging by a physician.

To accommodate our heavy patient volume, the division added several physicians to our practice: Dr. Richard Guido (GYN), Dr. Christina Pisani-Conway (MFM), Dr. Paul Speer (MFM), Dr. Anna Binstock (MFM), and Dr. Sarah Rogan (MFM). This brought the total number of physicians (both full and part-time) to fifteen. It is anticipated that more division members will be added in the coming year. In addition to the OBGYN Ultrasound physicians, the division also employs four UPP Ultrasound Specialists, highly experienced sonographers who have received additional training. Their main purpose is to assist with patient workflow, physician efficiency, image and documentation quality, and staff training. They also assist with all genetics procedures and all fetal therapy procedures performed through the Center for Innovative Fetal Intervention.

Physicians in the division are responsible for performing all Department of Genetics procedures (amniocenteses and CVS). In addition, intraoperative real-time ultrasound guidance for Radiation Oncology brachytherapy device placement and ultrasound guidance as requested for procedures performed in the OR is a service provided by our physicians.

To improve physician wellness as well as provide flexibility for expansion, workstations were installed in each division member's home. These home workstations have identical functionality and image quality as the hospital reading room stations and allow several physicians to read from home each day. This has been particularly important during the coronavirus epidemic as it has enhanced social distancing in the reading room since some physicians can remain at home. It has also been critical in maintaining our workforce despite many physicians or family members requiring quarantine.

Quality is an important component of our clinical practice and several quality initiatives are in place. We perform quarterly quality reviews in which physicians "double read" scans previously interpreted by another

physician to ensure accuracy of the image quality and report. Significant discrepancies are logged and discussed. In addition, an annual Peer Review conference is held in which missed anomalies, incorrect diagnoses, and report inaccuracies are reviewed with the entire group of physicians, and divisional changes are implemented as needed based on the findings. Divisional protocols and guidelines are developed and updated to maintain internal consistency with imaging and reporting. Importantly, this year, a procedure safety checklist was developed to ensure that invasive ultrasound procedures (all amniocenteses and CVS) are performed safely, documentation is standardized, and tissue collection and distribution is correct.

Teaching Program

Training and education of a variety of different learners remains an important mission for the division, and formal educational ultrasound curricula are incorporated to guide the training. UPMC residents in Radiology as well as OBGYN rotate through the department. Teaching includes hands-on scanning time, time spent with UPP Ultrasound Specialists reviewing cases in real time, access to an archived anomaly case list, didactic lectures, simulation training with an ultrasound physician, and participation in a biweekly interesting case conference. Due to teaching modifications secondary to COVID, we also developed a system so that residents could review cases in real time via remote Teams meetings with one of the ultrasound physicians.

Providing a thorough educational program for fellows in Maternal Fetal Medicine is a top priority for the division. The ultrasound teaching program spans the 3 years of their training and includes ongoing didactics as well as clinical rotations. MFM fellows spent seven weeks during their first year, and then 3 months during their third year in the ultrasound department. Additional elective time is available and may include focused time with pediatric cardiology, if desired. In the clinical setting, the division provides graduated experiences over the 3 years, starting with extensive contact hours of hands-on basic scanning. As they gain more experience, the MFM fellows begin to work with the UPP Ultrasound Specialists providing real-time image review and problem solving for sonographers. Throughout their rotation, they have weekly one-on-one clinical teaching sessions in the reading room with an ultrasound physician. Eventually they begin independent image interpretation and report generation while assigned to and closely supervised by ultrasound faculty. During their clinical rotation, they also learn techniques of amniocentesis and participate, observe and sometimes perform CVS and other invasive procedures. Faculty provide a total of approximately 28 hours of classroom style didactics per year. Numerous ultrasound department teaching conferences including a biweekly interesting case conference and monthly Ultrasound Department grand rounds also contribute to their learning. In their third year, each fellow presents at the Ultrasound Department grand rounds. Several MFM fellows have ultrasound-related research projects ongoing.

Academic and Research Program

The division remains active in research projects related to OBGYN ultrasound, as well as supporting research projects in other divisions, such as Urogynecology and The Center for Innovative Fetal Intervention. Faculty members have held leadership positions at the American Institute for Ultrasound in Medicine (AIUM) and have been invited speakers at the national annual meeting. Five recent publications are listed at the end. Of note, additional publications are listed under MFM as some of the faculty are in both divisions.

Center for Innovative Fetal Intervention (CIFI)

The UPMC Center for Innovative Fetal Intervention (CIFI), led by Dr. Stephen Emery, is a multidisciplinary service that provides state-of-the-art medical and surgical care for the fetal patient. Centered at Magee-Womens Hospital, it is integrated with UPMC Children's Hospital of Pittsburgh (CHP) to provide seamless care through pregnancy, delivery, and newborn periods. Our referral base is Western Pennsylvania, Eastern Ohio, Northern West Virginia and Maryland, and Southwestern New York. The CIFI is a member of the North American Fetal Therapy Network (NAFTNet) and has been on the Executive Board for 7 years. The CIFI offers all evidence-based fetal therapy including needle-based procedures, fetoscopic procedures, and open fetal surgery. The CIFI participates in multiple NAFTNet research protocols in order to expand the knowledge of the field. Dr. Emery pioneered a minimally-invasive treatment of placenta chorangioma that is becoming the standard of care in the management of this deadly fetal disorder. He has also collaborated with the Department of Neurosurgery at Children's Hospital of Pittsburgh to initiate a program of in-utero repair of fetal open neural tube defects. The CIFI and the University of Pittsburgh are spearheading a multidisciplinary evaluation of in-utero shunting for fetal hydrocephalus. Dr. Emery through the CIFI was recently awarded a \$300K research Grant from the Hearst Foundation, and is the recipient of a \$100K Coulter award.

Fetal procedures performed through the CIFI clinic in FY2020 include 43 PUBS/Intrauterine Transfusions, 5 laser therapy procedures for twin-twin transfusion syndrome pregnancies, 1 thoracoamniotic shunt procedure, 2 radiofrequency ablations, and 1 EXIT procedure. It is of note that this list comprises only those pregnancies in which fetal procedures were actually performed. Many additional patients were evaluated and counseled by Dr. Emery in the CIFI.

Faculty Listing

David Kauffman, MD, Clinical Professor of Obstetrics, Gynecology and Reproductive Sciences, Lead Physician, Division of OBGYN Ultrasound

Bonnie Coyne, MD, Assistant Professor of Obstetrics, Gynecology and Reproductive Sciences

Stephen Emery, MD, Associate Professor of Obstetrics, Gynecology and Reproductive Sciences and Director, Center for Innovative Fetal Intervention

Maureen Hamel, MD, Assistant Professor of Obstetrics, Gynecology and Reproductive Sciences

Allison Serra, MD, Assistant Professor of Obstetrics, Gynecology and Reproductive Sciences

Rosemary Froehlich, MD, Assistant Professor of Obstetrics, Gynecology and Reproductive Sciences

Sami Makaroun, MD, Assistant Professor of Obstetrics, Gynecology and Reproductive Sciences, co-Director, Center for Advanced Fetal Diagnosis

Jake Larkin, MD, Assistant Professor of Obstetrics, Gynecology and Reproductive Sciences and Director of Inpatient Obstetrical Services, Magee Womens Hospital, University of Pittsburgh School of Medicine

Noe Copley-Woods, MD, Assistant Professor of Obstetrics, Gynecology and Reproductive Sciences

Isabelle Wilkins, MD, Professor of Obstetrics, Gynecology and Reproductive Sciences, Vice Chair of Clinical Affairs

Christina Pisani-Conway, MD, Assistant Professor of Obstetrics, Gynecology and Reproductive Sciences, Lead Physician, UPMC Altoona MFM service

Paul Speer, MD, Associate Professor of Obstetrics, Gynecology and Reproductive Sciences, Lead Physician, UPMC Hamot MFM service

Richard Guido, MD, Professor of Obstetrics, Gynecology, and Reproductive Sciences, Director, Colposcopy Clinic, Co-Director of Fibroid Treatment Center

Anna Binstock, MD, Assistant Professor of Obstetrics, Gynecology and Reproductive Sciences

Sarah Rogan, MD, Assistant Professor of Obstetrics, Gynecology and Reproductive Sciences

Tonya Lightcap, ARDMS, UPP Specialist Sonographer

Carina Norris, ARDMS, UPP Specialist Sonographer

Ashleigh Dine, ARDMS, UPP Specialist Sonographer

Melissa Blanchard, ARDMS, UPP Specialist Sonographer

DIVISION OF REPRODUCTIVE ENDOCRINOLOGY AND INFERTILITY



OVERVIEW

The Division of Reproductive Endocrinology and Infertility (REI) continues its commitment to excellence in the academic and clinical growth of this dynamic field. The division is the largest provider of infertility services in Western Pennsylvania. An experienced team of reproductive endocrinologists offer full-service care for basic infertility, IVF, as well as fertility preservation (embryo, oocyte, and semen). Third-party reproduction services provide the ability for patients to use donor oocytes, donor embryos, donor sperm and gestational surrogacy to build their families. Telemedicine opportunities improve access for patients throughout the region. The division has a robust multi-disciplinary presence with collaboration for care for transgender patients, adolescent and pediatric reproductive endocrinology, and fertility preservation with gynecologic oncology, oncology, pediatric endocrinology and adolescent medicine.

Clinical Program

The breadth of the clinical program is facilitated through office-based care in Oakland, Penn Hills and Hermitage, Pennsylvania. Additional sites for patient care are staffed in multispecialty clinics in Cranberry, Erie, and Bethel Park, Pennsylvania. Our clinical team includes 6 core faculty, 4 REI fellows, and 4 advanced practice providers and maintains a core geographic presence that includes the northwest sector of Pennsylvania as well as eastern Ohio and western New York State.

Our multispecialty collaborations and ancillary services provide complete care to patients seeking options and treatment for fertility and reproductive health. Acupuncture and licensed clinical social work support are provided through the Oakland site at Magee-Womens Hospital. Fertility preservation services are offered to both female and male patients and range from standard of care approaches (oocyte and embryo cryopreservation) to experimental models (ovarian and testicular tissue cryopreservation). As part of the Oncofertility Consortium Network, we are integrated into the National Physicians Cooperative and Global Partner Network, a national, interdisciplinary initiative designed to explore reproductive futures for cancer

patients. Clinicians from the division provide outpatient and inpatient for reproductive concerns among pediatric and adolescent gynecologic patients. Finally, patients transitioning from male-to-female and female-to-male receive counseling regarding current and future fertility concerns as well as options they might wish to pursue.

Divisional faculty continue to offer state-of-the art fertility care across the spectrum of reproductive endocrinology and infertility. These services include, but are not limited to:

- Ovulation induction
- Intrauterine insemination
- Assisted reproductive technology (e.g. in vitro fertilization)
- Preimplantation genetic testing
- Fertility preservation
- Third party reproduction
- LGBTQI family planning
- Acupuncture

Clinical initiatives in the academic year include full integration of assisted reproductive technology (ART) with the Penn Hills location. ART services including in vitro fertilization (IVF) have been consolidated at this site in order to streamline services. Minor procedures continue at both the Magee and Hermitage locations. Increase in telemedicine consultation has been an ongoing initiative with high utilization. Patient reviews indicate this service, which provides patients with local (telemedicine) or in-home (tele-to-home) consultation, is very well received and allow the reach of division to expand throughout the region.

Assisted Reproductive Technology

The Center for Reproductive Endocrinology Infertility continues to maintain its present as the largest provider of assisted reproductive technology in Western Pennsylvania. Relative distribution of fresh IVF cycles (oocyte retrieval and embryo transfer) and frozen IVF cycles (embryo transfer) continues to reflect nationwide practice patterns in infertility with an equal distribution between the 2 types of clinical care.

Education/Teaching Program

The division continues its highly competitive, ACGME accredited 3-year REI fellowship program under the direction of **Dr. Joseph Sanfilippo** and **Dr. Meredith Snook**. In 2019, the fellowship program successfully petitioned ACGME for a temporary increase, which brings the current fellow complement to 4 fellows. Fellows are trained in advanced reproductive endocrinology and infertility care with clinical rotations in subspecialties such as medical endocrinology, pediatric endocrinology, genetics and urology. Studies completed by trainees during fellowship have been presented at national meetings and accepted to highly respected journals such as The New England Journal of Medicine, Human Reproduction, the Journal of the American Association Pediatrics, and Pediatrics. In addition, fellows from other subspecialties including medical endocrinology and pediatric endocrinology routinely shadow in the division to obtain experience in the care of reproductive endocrinology and infertility patients.

At the national level, **Dr. Gabriella Gosman** is a leader in the field of education. She serves as a member of the ACGME Review Committee for Ob/Gyn, and was selected as its chair starting in 2021. She is a member of the Case Log Subcommittee and received the 2020 ACGME Courage to Teach Award for outstanding Residency Program Directors.

Residents

Dr. Sanfilippo serves as coordinator of Reproductive Endocrine Infertility Resident Education. Residents rotate through the REI division in their PGY-2 and PGY-3 years and participate in didactic education with the REI fellows. Educational activities include journal clubs, lectures series, and patient reviews with faculty preceptors.

Medical Students

Dr. Marie Menke and Dr. Meredith Snook serve as lecturers in the annual **Reproductive and Developmental Biology Course (MED 5222) for the second-year medical students**. At the third-year medical student level, all REI clinical faculty are involved in patient-centered teaching during the clinical rotation on Obstetrics and Gynecology and frequently participate in the Problem-Based Learning Sessions.

Graduate and Post-graduate

Division faculty serve as invited speakers for departments including medical endocrinology, pediatric endocrinology as well as guests for graduate student lectures. **Dr. Gabriella Gosman** serves as co-course director for the graduate Professional Development Course (MEDEDU 2120) and Assessment of Medical Learners Course (MEDEDU 2125). **Dr. Marie Menke** provides lectures for the Molecular Genetics and Developmental Biology Program (Developmental Mechanisms of Human Disease/MSMGDB 2525).

Reproductive Endocrinology and Infertility Fellows

Rachel Beverley, MD – 3rd year fellow
Residency Program: University of Pittsburgh Medical Center
Medical School: Temple University School of Medicine

Priyanka Ghosh, MD – 2nd year fellow
Residency Program: Weill Cornell Medicine
Medical School: University of Connecticut School of Medicine

Monica Schointuch, MD – 1st year fellow
Residency Program: University of Alabama
Medical School: University of North Carolina at Chapel Hill School of Medicine

Sally Vitez, MD – 1st year fellow
Residency Program: Columbia University Medical Center
Medical School: Robert Wood Johnson Medical School

Research Program

The research program continues its record of productivity with clinical, translational, and basic science programs supported by both government and industry. Division faculty have produced numerous scientific publications and presentations at regional and national meetings. Collaboration with faculty at Magee-Womens Hospital and the Magee-Womens Research Institute has expanded the division's research scope to include investigation of technologies that will predict embryo quality and/or provide insight in age-related changes in oocytes.

Faculty listing:

Judith Albert MD – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. Dr. Albert served as IVF Medical Director until her recent retirement in December 2019.

Miguel Brieno-Enriquez PhD – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, REI Research Director. Dr. Brieno-Enriquez is an investigator with a focus on mammalian gametogenesis. He is the PI of both government and private grant funded research. As the REI Research Director, he plays an active role in fellow education and provides mentorship for trainees in basic and translational science research. He will continue to develop opportunities for trainee research education and development.

Robert Collins MD – Associate Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. Dr. Collins maintains a clinical practice that serves the needs of patients in the Erie-Hamot-Hermitage region. He provides outreach through telemedicine activity and actively participates in trainee education. His plans include further development of patient access in northern and western Pennsylvania through telemedicine and outpatient care.

Gabriella Gosman MD – Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Vice President for Medical Affairs and Chief Medical Officer, UPMC Magee-Womens Hospital. Dr. Gabriella Gosman is a leader in the field of education. She serves as a member of the ACGME Review Committee for Ob/Gyn and was selected as its chair starting in 2021. She is a member of the Case Log Subcommittee and received the 2020 ACGME Courage to Teach Award for outstanding Residency Program Directors. She serves as chair of the Magee-Womens Hospital weekly risk committee meeting and the Professional Practice Evaluation Committee. She is the course director for the following: Annual Dennis English Patient Safety Symposium, Annual Maternal Health Awareness Day, Department of Obstetrics, Gynecology and Reproductive Sciences Grand Rounds, Institute for Clinical Research Education, Master of Science in Medical Education. She serves as co-course director for the Professional Development Course (MEDEDU 2120) and Assessment of Medical Learners Course (MEDEDU 2125). She is on the planning committee for the University of Pittsburgh School of Medicine Academy of Master Educators Annual Med Ed Day.

Sunita Katari MD – Department of Obstetrics, Gynecology and Reproductive Sciences. Dr. Katari provides clinical care in reproductive endocrinology and infertility with particular interest in third-party reproduction and the genetics of infertility. Her plans include development of the third-party reproduction program with

concurrent research interests. She is an active participant in trainee education through fellow didactics and preceptorship.

Carolyn Kubik MD – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Practice Director, Division of Reproductive Endocrinology and Infertility. Dr. Kubik serves as practice director, primarily at the Penn Hills office of the division. She precepts the fellow clinic in reproductive endocrinology and infertility and is actively involved in strategic planning for the division.

Marie Menke MD, MPH – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division Director, Division of Reproductive Endocrinology and Infertility. Dr. Menke has research interests in access to care and obesity. She has served on the Reproductive Working Group of the multicenter Longitudinal Assessment of Bariatric Surgery and is a member of the Access to Care committee of the American Society of Reproductive Medicine. Her clinical activities include those management of patients with primary ovarian insufficiency, polycystic ovary disease, and the full spectrum of reproductive endocrinology and infertility patient care.

Kyle Orwig, PhD – Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. Dr. Orwig is a leader in the field of fertility preservation research. He holds numerous grants both public and private for investigation into basic science and translational approaches. He serves as a mentor for fellows in their training in research and project development.

Joseph Sanfilippo MD, MBA – Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Fellowship Program Director, Division of Reproductive Endocrinology and Infertility. Dr. Sanfilippo is a clinician-educator who serves as program director for the Reproductive Endocrinology and Infertility fellowship. He is actively involved in teaching of medical students and residents. He serves as a site inspector for the Fellowship Minimally Invasive Gynecology Surgical (FMIGS) Program. He has a national presence in the field of adolescent/pediatric gynecology in addition to his clinical role in reproductive endocrinology and infertility.

Meredith Snook MD – Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Associate Fellowship Program Director, Division of Reproductive Endocrinology and Infertility. Dr. Snook is a clinician-educator with a focus on fellowship education. She serves as associate fellowship program director and facilitates weekly educational sessions for Reproductive Endocrinology and Infertility fellows. Her academic interests include mentoring and advising of trainees.

Hanna Pulaski, PhD – Research Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Fertility Preservation Program Coordinator, Division of Reproductive Endocrinology and Infertility. Dr. Valli coordinates the care of fertility preservation in order to expedite their clinical treatment. She has received grant funding in the field of fertility preservation and will continue to expand her role in this field.

Anthony Zeleznik, PhD - Professor, Department of Obstetrics, Gynecology and Reproductive Sciences. Dr. Zeleznik mentors fellows in their research training and development. He participates in weekly educational sessions and chairs the fellow thesis committee for their program requirements.

Advanced Practice Providers

Rebecca Jossey, PA-C
Carley Magner, PA-C
Katherine Pendergast, PA-C
Lacie Rodman, PA-C

Publications – Division of Reproductive Endocrinology and Infertility

Goossens E, Jahnukainen K, Mitchell RT, van Pelt A, Pennings G, Rives N, Poels J, Wyns C, Lane S, Rodriguez-Wallberg KA, Rives A, **Valli-Pulaski H** et al., Fertility preservation in boys: recent developments and new insights. *Hum Reprod Open*. 2020 Jun 6;2020(3).

Morimoto H, Kanatsu-Shinohara M, **Orwig KE**, Shinohara T. Expression and functional analyses of EPHA2 in mouse spermatogonial stem cells. *Biol Reprod* 2020; 102:220-232. PMID: 31403678.

Shetty G, Mitchell JM, Meyer JM, Wu Z, Lam TNA, Phan TT, Zhang J, Hill L, Tailor RC, Peters KA, Penedo MC, Hanna C, **Orwig KE**, Meistrich ML. Restoration of Functional Sperm Production in Irradiated Pubertal Rhesus Monkeys by Spermatogonial Stem Cell Transplantation. *Andrology* 2020; doi: 10.1111/andr.12807. PMID: 32351003.

Shami AN¹, Zheng X¹, Munyoki SK¹, Ma Q, Manske GL, Green GD, Sukhwani M, **Orwig KE***, Li JL*, Hammoud SS*. Single-cell RNA sequencing of human, macaque, and mouse testes uncovers conserved and divergent features of mammalian spermatogenesis. *Dev Cell* 2020, 54(4):529-547.e12. doi: 10.1016/j.devcel.2020.05.010. PMID: 32504559. ¹These authors contributed equally to this manuscript

Nahata L, Woodruff TK, Quinn GP, Meacham LR, Chen D, Appiah LC, Finlayson C, **Orwig KE**, Laronda MM, Rowell EE, Anazodo A, Frias O, Rios JS, Whiteside S, Gomez-Lobo V, Dwiggin M, Childress KJ, Hoefgen HR, Levine JM, Jayasinghe Y, Moravek M. Ovarian tissue cryopreservation as standard of care: what does this mean for pediatric populations? *J Assist Reprod Genet*. 2020; doi: 10.1007/s10815-020-01794-7. PMID: 32390071.

Meacham LR, Burns K, **Orwig KE**, Levine J. Standardizing risk assessment for treatment-related gonadal insufficiency and infertility in childhood adolescent and young adult cancer: The Pediatric Initiative Network risk stratification system. *J Adolesc Young Adult Oncol*. 2020 doi: 10.1089/jayao.2020.0012. PMID: 32456570.

Goossens E, Jahnukainen K, Mitchell RT, van Pelt A, Pennings G, Rives N, Poels J, Wyns C, Lane S, Rodriguez-Wallberg KA, Rives A, **Valli-Pulaski H**, Steimer S, Kliesch S, Braye A, Andres MM, Medrano J, Ramos L, Kristensen SG, Andersen CY, Bjarnason R, **Orwig KE**, Neuhaus N, Stukenborg JB. Fertility Preservation in Boys: Recent Developments and New Insights. *Hum Reprod Open*. 2020. doi: 10.1093/hropen/hoaa016. eCollection 2020. PMID: 32529047.

Tan K, Song HW, Thompson M, Munyoki SK, Sukhwani M, Hsieh TC, **Orwig KE**, Wilkinson MF. Transcriptome profiling reveals signaling conditions dictating human spermatogonia fate in vitro. *PNAS*. 2020 Jul 13;202000362. doi: 10.1073/pnas.2000362117. PMID: 32661178.

Yersal N, Köse S, Horzum U, Özkavukcu S, **Orwig KE**, Korkusuz P. Leptin promotes proliferation of neonatal mouse stem/progenitor spermatogonia. *J Assist Reprod Genet*. 2020 Aug 25;. doi: 10.1007/s10815-020-01929-w. PMID: 32840762.

Ainsworth, A.J., **Barnard, E.P.**, Baumgarten, S.C., Weaver, A.L., Khan, Z. "Intrauterine insemination cycles: prediction of success and thresholds for poor prognosis and futile care." *J Assist Reprod Genet* August 2020.

Pereira C, Smolka MB, Weiss RS, **Brieño-Enríquez MA** "ATR signaling in mammalian meiosis: From upstream scaffolds to downstream signaling." doi:10.1002/em.22401, Epub 2020 *Environ Mol Mutagen*. Aug 13. PMID: 32725817 Review. 2020 Aug;61(7):752-766.

Robinette TM, Nicholatos JW, Francisco AB, Brooks KE, Diao RY, Sorbi S, Ricca V, Nacmias B, **Brieño-Enríquez MA**, Libert S. *Nat Commun*, "SIRT1 accelerates the progression of activity-based anorexia." 2020 Jun 4;11(1):2814. doi: 10.1038/s41467-020-16348-9. PMID: 32499508 **Free PMC article**.

Barreñada O, Fernández-Pérez D, Larriba E, **Brieño-Enriquez M**, Del Mazo J. "Diversification of piRNAs expressed in PGCs and somatic cells during embryonic gonadal development." *RNA Biol*. 2020 Sep;17(9):1309-1323. doi: 10.1080/15476286.2020.1757908. Epub 2020 May 6. PMID: 32375541

Toledo M, Sun X, **Brieño-Enríquez MA**, Raghavan V, Gray S, Pea J, Milano CR, Venkatesh A, Patel L, Borst PL, Alani E, Cohen PE. *PLoS Genet*. A mutation in the endonuclease domain of mouse MLH3 reveals novel roles for MutLγ during crossover formation in meiotic prophase I." 2019 Jun 6;15(6):e1008177. doi: 10.1371/journal.pgen.1008177. eCollection 2019 Jun. PMID: 31170160 **Free PMC article**.

Cohen, A., Chan S., **Sanfilippo, J.** Pediatric Vaginal Bleeding. *Annals of Infertility and Reproductive Endocrinology* January 3, 2020

Kindsfather-Panko, A. Sanfilippo, J. Female Fertility Preservation in Pediatric and Adolescent Cancer Patient Population *Annals of Reproductive Medicine and Treatment* in press

Ghosh, P., Hefa, N., **Sanfilippo J.** Practice Management: Managing Many for the Care of One Fertility and Sterility 2020 accepted for publication

Lindheim, S., Christianson, M., **Sanfilippo, J.** The Need for Business in Reproductive Medicine Fertility and Sterility-accepted for publication

Atlass J, Menke M, Parks WT, Catov JM. Pre-conception blood pressure and evidence of placental malperfusion. *BMC Pregnancy Childbirth*. 2020 Jan 8;20(1):25. doi: 10.1186/s12884-019-2699-3. PMID: 31914950

Sylvester C, Menke M, Lopa S, Gopalan P. Disordered eating and distress in women seeking in vitro fertilization. *J Psychosom Res*. 2020 Jan;128:109880. doi: 10.1016/j.jpsychores.2019.109880. Epub 2019 Nov 18. PMID: 31760342

Barnard EP, Dhar CP, **Rothenberg SS, Menke MN**, Witchel SF, Montano GT, **Orwig KE**, Valli-**Pulaski H**. Fertility Preservation Outcomes in Adolescent and Young Adult Feminizing Transgender Patients. *Pediatrics*. 2019 Sep;144(3):e20183943. doi: 10.1542/peds.2018-3943. Epub 2019 Aug 5. PMID: 31383814

Ainsworth AJ, **Barnard EP**, Baumgarten SC, Weaver AL, Khan Z. Intrauterine insemination cycles: prediction of success and thresholds for poor prognosis and futile care. J Assist Reprod Genet. 2020 Oct;37(10):2435-2442. doi: 10.1007/s10815-020-01918-z. Epub 2020 Aug 15. PMID: 2803421

Textbooks

- Endometriosis in Adolescents C., Nezhat, **J. Sanfilippo** eds. Springer Verlag publisher estimated date of publication 12 2020

DIVISION OF REPRODUCTIVE GENETICS



Michael Bashford, MD
Division Director

OVERVIEW

The Division of Reproductive Genetics and Genomics provides clinical evaluation and genetic counseling to men and women with genetic/genomic disorders in the areas of preconception, prenatal, adult and cancer genetics. In addition, the division is involved in the diagnosis and management of fetal structural birth defects through the Center for Advanced Fetal Diagnostics. The division offers cutting edge genetic/genomic testing and results interpretation and harbors or participates in training programs for medical genetics residents, laboratory genetics and genomics fellows, and medical biochemical genetics fellows. The division provides education to medical students, residents, and fellows including OB/GYN, pathology, reproductive endocrinology, and maternal fetal-medicine trainees. Research within the division encompasses topics including: non-invasive methods for fetal genomic diagnoses, development of algorithms for whole exome and genome analyses, mechanisms of cancer predisposition, the etiology of recurrent pregnancy loss and aneuploidies, genetics of premature ovarian failure, menopause, male infertility, and leiomyomas, as well as the utility and design of chromosomal microarrays for use on constitutional and cancer genetics. The Division is a part of the Center for Clinical Genetics and Genomics (pittgenomics.org), which encompasses clinical genetic and genomic services across the UPMC system.

FACULTY/RESEARCH PROGRAMS

Dr. Michael Bashford serves as the medical director for the Clinical Genomics Laboratory at Magee-Womens Hospital and the adult genetics clinic. His primary interest is in educating providers and expanding the use of genetic information into primary care and other specialties. He collaborates with other departments on research focused on the clinical utility of genomic testing in neonatal intensive care unit patients and during pregnancy. He further collaborates with the department of Family Medicine on the Primary Care Precision Medicine initiative and with the UPMC Genome Center. He is also a member of the UPMC Health Plan Governance Committee on Genetic Testing and is the vice-chair of the American College of Medical Genetics and Genomics Committee on Professional Practice Guidelines which authors the professional society's guidelines for clinical genetics practice.

Dr. Daniel Bellissimo serves as laboratory director of the Clinical Genomics Laboratory at UPMC Magee-Womens Hospital. His work focuses on development of the next generation sequencing technology and bioinformatics for the sequencing of exomes and large gene panels for clinical diagnosis as well as research studies. He collaborates with various departments and research groups at the University of Pittsburgh to develop relevant testing for bleeding disorders, hereditary cancer syndromes, pharmacogenetics, pulmonary fibrosis, hereditary hemorrhagic telangiectasia, cardiomyopathy, and other genetic disorders. Dr. Bellissimo is also involved in PISCES research study to evaluate the use of genome sequencing to diagnose NICU patients.

Dr. Tianjiao Chu is interested in the development of statistical tools for liquid biopsy using next generation sequencing data. Dr. Chu has developed two statistical algorithms to determine, based on the DNA sequencing data of a maternal plasma, whether abnormal copy number variations occur in the fetal genome. In collaboration with Dr. Peters, Dr. Chu is developing new algorithms for non-invasive diagnosis for other diseases. Dr. Chu also collaborates with Drs. Sadovsky and Mouillet, through NIH funded grants, to develop computational/statistical tools to study the function of microRNAs and lncRNAs in human placenta, and to discover the comprehensive genomic regulatory network in human placenta involving miRNAs, lncRNAs, mRNAs, and proteins.

Dr. Jie Hu's research expertise is in use of CGH_SNP microarray technology combined with the conventional chromosome analysis and fluorescence in situ hybridization, to study genomic alterations linked to certain traits and candidate genes within these genomic alterations in a large cohort of individuals. Her current research in this area has revealed a number of new findings related to contiguous gene abnormalities that result in developmental delay, autism, seizures, and intellectual disabilities. Her research also involves a study of reproductive outcomes in recurrent pregnancy loss associated with a parental carrier of a balanced structural chromosomal rearrangement.

Dr. Phuong L. Mai is the medical director of the cancer genetics clinic. She is interested in epidemiologic and clinical research studies aimed at better understanding familial cancer syndromes, cancer risks, and early detection and interventions to formulate the most effective, individualized risk management strategy for patients with a cancer predisposition. Another of Dr. Mai's interest is the effort to expand cancer genetic services to underserved populations. She is also involved in research exploring the psychological and social impact that having a hereditary cancer syndrome has on the individual as well as the family. Dr. Mai participates in the Pennsylvania Cancer Coalition, contributing to the Commonwealth's effort to increase access to cancer genetic care. Dr. Mai is also the Director of the Breast/Ovarian Cancer Risk Assessment and Prevention Program, where she provides care to patients at increased risk of developing cancer. As part of this program, she is conducting research looking into how to better evaluate subsequent breast cancer risk for patients diagnosed with benign breast lesions

Dr. David Peters Dr. Peters developed the first non-invasive prenatal test for aneuploidy at MWRI and collaborated with clinical staff at MWH to demonstrate clinical utility of this approach. He has more recently expanded on these efforts to explore the development of non-invasive phenotyping and diagnostic approaches for a variety of complex diseases. Current areas of focus are in Necrotizing Enterocolitis, Endometriosis, Ovarian Cancer and Preeclampsia. These efforts, which involve collaborations with neonatologists, psychiatrists and gynecologists are aimed at developing new clinical tools for the diagnosis and management of complex disease.

Dr. Devereux N. Saller, Jr. is the medical director of the prenatal genetics clinic and has a long-standing interest in prenatal diagnosis and management of fetal structural birth defects. In addition to providing clinical care via telemedicine in the CAFD clinic, he is interested in the applications of non-invasive prenatal testing to high risk and low risk pregnancies and establishing new guidelines for prenatal genetic screening.

Dr. Judith Yanowitz is specifically interested in meiotic crossover recombination as a major determinant of chromosome mis-segregation during the formation of eggs and sperm. Her research is directly relevant to the etiology of aneuploidy in humans as well as the age of menopause. The Yanowitz lab is funded by multiple grants from NIGMS: to study a novel checkpoint system that monitors whether each chromosome receives the crossover; to interrogate the function of the evolutionary conserved germ cell determinant GCNA; and to explore the direct targets of the proteasome during meiosis. Dr. Yanowitz also focuses efforts on the relationship between meiotic crossover formation and the repair of normal double strand breaks, and this work has a strong potential to extend beyond germ line development into mechanistic studies of processes that underlie cancer progression.

Dr. Alex Yatsenko focuses on the genetics of male infertility. He is utilizing genomic approaches such as array comparative genome hybridization and whole exome/genome sequencing to understand causes of male infertility and subfertility. He closely collaborates with members of the Division of Reproductive Endocrinology and Infertility as well as members of the Department of Urology. Dr. Yatsenko discovered multiple novel genetic defects responsible for male infertility. One of the most significant findings was an X-linked gene responsible for azoospermia. He also works on sperm RNA biomarkers that could be utilized in predicting fertilization outcomes in infertile men. He was recently awarded an NIH/NICHD five-year grant entitled, "Genetics of Male Infertility: A Marker of Overall Health."

Dr. Svetlana Yatsenko is the laboratory director of the Clinical Cytogenetics Laboratory at UPMC Magee-Womens Hospital. Her research includes studying the utility of chromosomal microarrays in perinatal disorders, disorders of sexual differentiation, and oncology. Her laboratory is focused on developing improved microarray assays for better detection of clinically significant copy-number abnormalities and single cell isolations and genomic analysis of individual cell populations in clinical diagnosis and research.

TEACHING PROGRAMS

The Division is active in resident, medical student, and graduate student teaching. Second year residents in obstetrics and gynecology rotate through the division for one week. A 4th year clinical elective is also available to medical students. Dr. Bashford is the course director for these programs. Dr. Bashford also provides a lecture series to Maternal-Fetal Medicine fellows, as well as lectures to pathology residents and genetic counseling students at the School of Public Health. Dr. Yanowitz is co-Director of the Reproductive Development course which is offered every other year to undergraduate, graduate students and clinical fellows. Dr. S. Yatsenko provides frequent lectures to Genetic Counselors, graduate students and fellows in the Human Genetics course and reproductive endocrinology, and pathology residents, as does Dr. Bellissimo.

Clinical Genomics Case Conference is offered monthly for CME credits and broadcast by video link to Children's Hospital of Pittsburgh. Cases of interest are discussed in depth to an audience consisting of physicians, genetic counselors, laboratory personnel, residents, medical students and fellows.

Magee Clinical Genetic Meetings occur weekly in which patient care, cases, and pertinent publications are reviewed and discussed in depth. This includes prenatal, cancer, and CAFD meetings. In addition to educating trainees, these weekly conferences coordinate patient care in a multidisciplinary setting.

LABORATORY GENETICS & GENOMICS FELLOWSHIP (LGG)

The division offers a 2-year fellowship program in Laboratory Genetics and Genomics to qualified MD and PhD candidates. This is a new specialty created by the American Board of Medical Genetics and Genomics (ABMGG) that combined the previously separate fellowships in Molecular Genetics and Cytogenetics. The program trains individuals to develop and interpret clinical laboratory testing in both cytogenetic and molecular techniques. The program recently underwent a transition to accreditation under the American Board of Medical Specialties (ABMS).

MEDICAL GENETIC RESIDENCY

The Division of Genetics at Children's Hospital of Pittsburgh offers two positions per year in an ACGME accredited medical genetics residency training program in collaboration with the faculty of the Division of Reproductive Genetics. Magee-Womens Hospital is a training site for this program. This 2-year residency prepares physicians to be exceptional clinical geneticists, training them how to evaluate, manage, treat, and counsel patients in metabolic, prenatal, pediatric, adult, and cancer genetics.

CLINICAL PROGRAMS

Clinical programs within the Division encompass both direct patient care and clinical laboratory services. All clinical operations during the year were significantly affected by the COVID-19 pandemic. In response to the initial stay-at-home orders, multiple changes were made. In the prenatal clinic, video visits to patient's homes were performed whenever possible. Patients who had ultrasounds or needed to be seen in clinic were still seen in clinic. In order to limit the number of personnel in clinic, half of the genetic counselors worked from home on alternating days. All in-person patient visits were temporarily suspended in the cancer genetics clinic. Video visits to patients in their homes were done whenever possible. In the adult clinic, because of the need to perform physical dysmorphology exams, no patients were seen until it was appropriate to resume in-person clinic visits. In the laboratories, personnel worked from home whenever possible. Off-site options for viewing and interpreting laboratory data was expanded. Because of the general cessation of all non-emergent clinical care throughout the region, case load in the laboratories dropped significantly for approximately 2 months. At the time of this report, many activities have returned to pre-pandemic status although a combination of in-person and video visits continues, and some laboratory personnel continue to work from home.

The direct patient care services are as follows:

The Center for Advanced Fetal Diagnostics (CAFD) coordinates the efforts of various specialties, including genetics, ultrasound, maternal-fetal medicine, neonatology, and pediatric subspecialty services to evaluate and manage pregnancies complicated by fetal birth defects. In FY20 there were 596 patient visits through the CAFD, down 8.5% from 651 in FY19. The fetal therapy program (Center for Innovative Fetal Intervention, CIFI) continues to be a leader in the region in performing a complete complement of *in utero* procedures from

ultrasound-guided fetal interventions such as intrauterine transfusion, to fetoscopic procedures such as laser photocoagulation for twin-twin transfusion syndrome.

Genetic Counseling and Clinical Genetics Consultation (Prenatal/Adult /Cancer). Consults are accepted for genetic counseling and clinical evaluation from care providers throughout the UPMC system. These include OB/GYN and Maternal-Fetal medicine, oncologists, rheumatologists, primary care providers and other physicians. Patients can be seen in person or through a robust telegenetics network. In addition, genetic counselors from the division support the cardiac genetics clinic within the Heart-Vascular Institute at Presbyterian Hospital and the high-risk breast clinic within the Hillman Cancer Center. In FY20, a total of 4,850 patient visits were completed, representing a 5.5% increase from the previous year. There were a total of 2,149 Prenatal Genetics consults (almost no change from 2139 the previous year), 1,973 Cancer Genetics consults (an increase of 11% increase over 1778 the previous year), and 132 Adult Genetics consults (up 355% from 29 the previous year). Administrative staff in the clinic also coordinate aneuploidy screening tests with the laboratory.

Laboratory services include:

Pregnancy Screening Laboratory (PSL): Performs on-site routine pregnancy screening for aneuploidy and neural tube defects through the quad screen, first-trimester screen, and amniotic fluid AFP and acetylcholinesterase tests. From July 2019 – June 2020, a total of 6,059 tests were performed in-house, a 4% decrease from the previous year. Additionally, the laboratory coordinates cell-free fetal DNA screening (non-invasive prenatal screening) for send-out to other reference laboratories. Routine clinical practice is evolving away from serum screening and toward non-invasive screening as the screening methodology of choice. As such the volume of testing in-house is decreasing as the send-out service increases. The laboratory has investigated bringing on an in-house version of the non-invasive prenatal screen but is not currently actively developing that assay.

Pittsburgh Cytogenetics Laboratory (PCL): Serves as the cytogenetics reference laboratory for the UPMC system and for several hospitals in the tri-state area. Services include: 1) high quality chromosomal analysis, molecular cytogenetic analyses by fluorescence *in situ* hybridization (FISH), and microarray analyses (CGH+SNP,X-HR). Sample types accepted include amniotic fluid, chorionic villus samples (CVS), peripheral blood, cord blood, bone marrow, lymph node, skin biopsy, malignant tumors and products of conception. In addition, the PCL is a key part of the LGG fellowship training program. In FY20, a total of 16729 tests were performed, which represents a 7% decrease over the previous year. The PCL continues to work closely with the Pittsburgh Clinical Genomics Laboratory (PCGL) to coordinate testing when both cytogenetic and molecular methods are required to fully evaluate a sample.

Pittsburgh Clinical Genomics Laboratory (PCGL): Serves as a germline genetics molecular testing laboratory for the UPMC system. Services include prenatal carrier screening, pharmacogenomic CYP2C19 genotyping, and cancer risk assessment through next-generation sequencing of common cancer risk genes such as BRCA1 and BRCA2. During this year, the laboratory developed carrier screening for spinal muscular atrophy and expanded the gene-sequencing options for cancer risk assessment. The laboratory finalized the development of a comprehensive whole exome sequencing test which became available in late 2020. A large group of disease-specific gene panels is also under current development. From July 2019 through June 2020, a total of 5,283 tests were performed by the PCGL; an increase of 65% over the previous year.

FACULTY LISTING

Melanie Babcock, PhD
Michael Bashford, MD
Daniel Bellissimo, PhD
Tianjiao Chu, PhD
Jie Hu, MD, PhD
Phuong L. Mai, MD, MS
David Peters, PhD
Devereux N. Saller, Jr., MD
Judith Yanowitz, PhD
Alexander Yatsenko, MD, PhD
Svetlana Yatsenko, MD

CLINICAL RESIDENTS

Jacob Wesley Ulm, MD (Medical Genetics and Genomics)
Jee Lee, MD (Medical Genetics and Genomics)

LABORATORY GENETICS & GENOMICS FELLOWSHIP (LGG)

Angela Verdoni, PhD

GENETIC COUNSELORS

Vickie Bacon, MS, LCGC (new this year)
Christina Bittner, MS, LCGC
Melissa Bourdus, MS, LCGC
Abigail Byrnes Pepper, MS, LCGC
Michele Clemens, MS, LCGC
Shenin Dettwyler, MS, LCGC
Luanne Fraer, MS, LCGC
Rachel Huziak, MS, LCGC
Meredith Jones, MS, LCGC
Maureen May, MS, LCGC
Marianne McGuire, MS, LCGC
Elizabeth Sheehan, MS, LCGC
Julia Stone, MS, LCGC
Darcy Thull, MS, LCGC

GENETIC COUNSELOR ASSISTANTS

Allison Brawn
Rachel Elias
Andrew Fazenbaker
Kaylynn McKinney

WEBSITE: <https://www.obgyn.pitt.edu/our-divisions/reproductive-genetics-and-genomics>

Publications – Division of Reproductive Genetics

1. **Mai PL**, Miller A, Gail MH, Skates S, Lu K, Sherman ME, Ioffe OB, Rodriguez G, Cohn DE, Boggess J, Rutherford T, Kauff ND, Rader JS, Phillips K, DiSilvestro PA, Olawaiye AB, Ridgway MR, Greene MH, Piedmonte M, Walker JL. Risk-Reducing Salpingo-Oophorectomy and Breast Cancer Risk Reduction in the Gynecologic Oncology Group Protocol-0199 (GOG-0199). *J Nat Cancer Inst Cancer Spectrum*, 2020; 4(1): pkz075
2. **Mai PL**, Huang HQ, Wenzel LB, Han PK, Moser RP, Rodriguez GC, Boggess J, Rutherford TJ, Cohn DE, Kauff ND, Phillips KA, Wilkinson K, Wenham RM, Hamilton C, Powell MA, Walker JL, Greene MH, Hensley ML. Prospective follow-up of quality of life for participants undergoing risk-reducing salpingo-oophorectomy or ovarian cancer screening in GOG-0199: An NRG Oncology/GOG study. *Gynecol Oncol* 2020; 156(1):131-9. PMID: 31759774
3. Bhargava V, Goldstein CD, Russell L, Xu L, Ahmed M, Li W, Casey A, Servage K, Kollipara R, Picciarelli Z, Kittler R, **Yatsenko A**, Carmell M, Orth K, Amatruda JF, **Yanowitz JL**, Buszczak M. GCNA Preserves Genome Integrity and Fertility Across Species. *Dev Cell*. 2020 Jan 6;52(1):38-52.e10. doi: 10.1016/j.devcel.2019.11.007. Epub 2019 Dec 12. PMID: 31839537; PMCID: PMC6946843.
4. Shin SJ, Dodd-Eaton EB, Peng G, Bojadzieva J, Chen J, Amos CI, Frone MN, Khincha PP, **Mai PL**, Savage SA, Ballinger ML, Thomas DM, Yuan Y, Strong LC, Wang W. Penetrance of Different Cancer Types in Families with Li-Fraumeni Syndrome: A Validation Study Using Multicenter Cohorts. *Cancer Res*. 2020 Jan 15;80(2):354-360. doi: 10.1158/0008-5472.CAN-19-0728. Epub 2019 Nov 12. PMID: 31719101; PMCID: PMC6980689.
5. Dekanek EW, Thull DL, Massart M, Grubs RE, Rajkovic A, **Mai PL**. Knowledge and opinions regarding BRCA1 and BRCA2 genetic testing among primary care physicians. *J Genet Couns*. 2020 Feb;29(1):122-130. doi: 10.1002/jgc4.1189. Epub 2019 Nov 14. PMID: 31729099.
6. Patel VL, Busch EL, Friebel TM, Cronin A, Leslie G, McGuffog L, Adlard J, Agata S, Agnarsson BA, Ahmed M, Aittomäki K, Alducci E, Andrulis IL, Arason A, Arnold N, Artioli G, Arver B, Auber B, Azzollini J, Balmaña J, Barkardottir RB, Barnes DR, Barroso A, Barrowdale D, Belotti M, Benitez J, Bertelsen B, Blok MJ, Bodrogi I, Bonadona V, Bonanni B, Bondavalli D, Boonen SE, Borde J, Borg A, Bradbury AR, Brady A, Brewer C, Brunet J, Buecher B, Buys SS, Cabezas-Camarero S, Caldés T, Caliebe A, Caligo MA, Calvella M, Campbell IG, Carnevali I, Carrasco E, Chan TL, Chu ATW, Chung WK, Claes KBM, Collaborators GS, Collaborators E, Cook J, Cortesi L, Couch FJ, Daly MB, Damante G, Darder E, Davidson R, de la Hoya M, Pappa LD, Dennis J, Díez O, Ding YC, Ditsch N, Domchek SM, Donaldson A, Dworniczak B, Easton DF, Eccles DM, Eeles RA, Ehrencrona H, Ejlersen B, Engel C, Evans DG, Faivre L, Faust U, Feliubadaló L, Foretova L, Fostira F, Fountzilas G, Frost D, García-Barberán V, Garre P, Gauthier-Villars M, Géczi L, Gehrig A, Gerdes AM, Gesta P, Giannini G, Glendon G, Godwin AK, Goldgar DE, Greene MH, Gutierrez-Barrera AM, Hahnen E, Hamann U, Hauke J, Herold N, Hogervorst FBL, Honisch E, Hopper JL, Hulick PJ, Investigators K, Investigators H, Izatt L, Jager A, James P, Janavicius R, Jensen UB, Jensen TD, Johannsson OT, John EM, Joseph V, Kang E, Kast K, Kiiski JI, Kim SW, Kim Z, Ko KP, Konstantopoulou I, Kramer G, Krogh L, Kruse TA, Kwong A, Larsen M, Lasset C, Lautrup C, Lazaro C, Lee J, Lee JW, Lee MH, Lemke J, Lesueur F, Liljegren A, Lindblom A, Llovet P, Lopez-Fernández A, Lopez-Perolio I, Lorca V, Loud JT, Ma ESK, **Mai PL**, Manoukian S, Mari V, Martin L, Matricardi L, Mebirouk N, Medici V, Meijers-Heijboer HEJ, Meindl A, Mensenkamp AR, Miller C, Gomes DM, Montagna M, Mooij TM, Moserle L, Mouret-Fourme E, Mulligan AM, Nathanson KL, Navratilova M, Nevanlinna H, Niederacher D, Nielsen FCC, Nikitina-Zake L, Offit K, Olah E, Olopade OI, Ong KR, Osorio A, Ott CE, Palli D, Park SK, Parsons MT, Pedersen

- IS, Peissel B, Peixoto A, Pérez-Segura P, Peterlongo P, Petersen AH, Porteous ME, Pujana MA, Radice P, Ramser J, Rantala J, Rashid MU, Rhiem K, Rizzolo P, Robson ME, Rookus MA, Rossing CM, Ruddy KJ, Santos C, Saule C, Scarpitta R, Schmutzler RK, Schuster H, Senter L, Seynaeve CM, Shah PD, Sharma P, Shin VY, Silvestri V, Simard J, Singer CF, Skytte AB, Snape K, Solano AR, Soucy P, Southey MC, Spurdle AB, Steele L, Steinemann D, Stoppa-Lyonnet D, Stradella A, Sunde L, Sutter C, Tan YY, Teixeira MR, Teo SH, Thomassen M, Tibiletti MG, Tischkowitz M, Tognazzo S, Toland AE, Tommasi S, Torres D, Toss A, Trainer AH, Tung N, van Asperen CJ, van der Baan FH, van der Kolk LE, van der Luijt RB, van Hest LP, Varesco L, Varon-Mateeva R, Viel A, Vierstraete J, Villa R, von Wachenfeldt A, Wagner P, Wang-Gohrke S, Wappenschmidt B, Weitzel JN, Wieme G, Yadav S, Yannoukakos D, Yoon SY, Zanzottera C, Zorn KK, D'Amico AV, Freedman ML, Pomerantz MM, Chenevix-Trench G, Antoniou AC, Neuhausen SL, Ottini L, Nielsen HR, Rebbeck TR. Association of Genomic Domains in *BRCA1* and *BRCA2* with Prostate Cancer Risk and Aggressiveness. *Cancer Res.* 2020 Feb 1;80(3):624-638. doi: 10.1158/0008-5472.CAN-19-1840. Epub 2019 Nov 13. PMID: 31723001.
7. Shridhar V, **Chu T**, Simhan H, Shaw PA, **Peters DG**. High-resolution analysis of the human placental DNA methylome in early gestation. *Prenat Diagn.* 2020 Mar;40(4):481-491. doi: 10.1002/pd.5618. Epub 2020 Feb 3. PMID: 31981376.
 8. Li H, Ouyang Y, Sadovsky E, Parks WT, **Chu T**, Sadovsky Y. Unique microRNA Signals in Plasma Exosomes from Pregnancies Complicated by Preeclampsia. *Hypertension.* 2020 Mar;75(3):762-771. doi: 10.1161/HYPERTENSIONAHA.119.14081. Epub 2020 Jan 27. PMID: 31983308; PMCID: PMC7076905.
 9. Rea B, Aggarwal N, **Yatsenko SA**, Bailey N, Liu YC. Acute myeloid leukemia with isolated del(5q) is associated with IDH1/IDH2 mutations and better prognosis when compared to acute myeloid leukemia with complex karyotype including del(5q). *Mod Pathol.* 2020 Apr;33(4):566-575. doi: 10.1038/s41379-019-0396-4. Epub 2019 Nov 4. PMID: 31685963.
 10. **Hu J**, Ou Z, Surti U, Kochmar S, Hoffner L, Madan-Khetarpal S, Arnold GL, Walsh L, Acquaro R, Sebastian J, **Yatsenko SA**. Four children with postnatally diagnosed mosaic trisomy 12: Clinical features, literature review, and current diagnostic capabilities of genetic testing. *Am J Med Genet A.* 2020 Apr;182(4):813-822. doi: 10.1002/ajmg.a.61482. Epub 2020 Jan 8. PMID: 31913574.
 11. **Mai PL**, Sand SR, Saha N, Oberti M, Dolafi T, DiGianni L, Root EJ, Kong X, Bremer RC, Santiago KM, Bojadzieva J, Barley D, Novokmet A, Ketchum KA, Nguyen N, Jacob S, Nichols KE, Kratz CP, Schiffman JD, Evans DG, Achatz MI, Strong LC, Garber JE, Ladwa SA, Malkin D, Weitzel JN. Li-Fraumeni Exploration Consortium Data Coordinating Center: Building an Interactive Web-Based Resource for Collaborative International Cancer Epidemiology Research for a Rare Condition. *Cancer Epidemiol Biomarkers Prev.* 2020 May;29(5):927-935. doi: 10.1158/1055-9965.EPI-19-1113. Epub 2020 Mar 10. PMID: 32156722; PMCID: PMC7196512.
 12. McClain L, Segreti AM, Nau S, Shaw P, Finegold DN, Pan LA, **Peters DG**. Chromosome 15q13.3 microduplications are associated with treatment refractory major depressive disorder. *Genes Brain Behav.* 2020 Jun;19(5):e12628. doi: 10.1111/gbb.12628. Epub 2019 Dec 15. PMID: 31828948.
 13. Kim O, Park EY, Klinkebiel DL, Pack SD, Shin YH, Abdullaev Z, Emerson RE, Coffey DM, Kwon SY, Creighton CJ, Kwon S, Chang EC, Chiang T, **Yatsenko AN**, Chien J, Cheon DJ, Yang-Hartwich Y, Nakshatri H, Nephew KP, Behringer RR, Fernández FM, Cho CH, Vanderhyden B, Drapkin R, Bast RC Jr, Miller KD, Karpf AR, Kim J. In vivo modeling of metastatic human high-grade serous ovarian cancer in mice. *PLoS Genet.* 2020 Jun 4;16(6):e1008808. doi: 10.1371/journal.pgen.1008808. PMID: 32497036; PMCID: PMC7297383.
 14. Eozenou C, Gonen N, Touzon MS, Jorgensen A, **Yatsenko SA**, Fusee L, Kamel AK, Gellen B, Guercio G, Singh P, Witchel S, Berman AJ, Mainpal R, Totonchi M, Mohseni Meybodi A, Askari M, Merel-Chali T, Bignon-

- Topalovic J, Migale R, Costanzo M, Marino R, Ramirez P, Perez Garrido N, Berensztein E, Mekkawy MK, Schimenti JC, Bertalan R, Mazen I, McElreavey K, Belgorosky A, Lovell-Badge R, Rajkovic A, Bashamboo A. Testis formation in XX individuals resulting from novel pathogenic variants in Wilms' tumor 1 (*WT1*) gene. *Proc Natl Acad Sci U S A*. 2020 Jun 16;117(24):13680-13688. doi: 10.1073/pnas.1921676117. Epub 2020 Jun 3. PMID: 32493750; PMCID: PMC7306989.
15. Olszewska M, Stokowy T, Pollock N, Huleyuk N, Georgiadis A, **Yatsenko S**, Zastavna D, **Yatsenko AN**, Kurpisz M. Familial Infertility (Azoospermia and Cryptozoospermia) in Two Brothers-Carriers of t(1;7) Complex Chromosomal Rearrangement (CCR): Molecular Cytogenetic Analysis. *Int J Mol Sci*. 2020 Jun 26;21(12):4559. doi: 10.3390/ijms21124559. PMID: 32604929; PMCID: PMC7349667.
 16. Silvestri V, Leslie G, Barnes DR; and the CIMBA Group, Agnarsson BA, Aittomäki K, Alducci E, Andrulis IL, Barkardottir RB, Barroso A, Barrowdale D, Benitez J, Bonanni B, Borg A, Buys SS, Caldés T, Caligo MA, Capalbo C, Campbell I, Chung WK, Claes KBM, Colonna SV, Cortesi L, Couch FJ, de la Hoya M, Diez O, Ding YC, Domchek S, Easton DF, Ejlersen B, Engel C, Evans DG, Feliubadalò L, Foretova L, Fostira F, Géczi L, Gerdes AM, Glendon G, Godwin AK, Goldgar DE, Hahnen E, Hogervorst FBL, Hopper JL, Hulick PJ, Isaacs C, Izquierdo A, James PA, Janavicius R, Jensen UB, John EM, Joseph V, Konstantopoulou I, Kurian AW, Kwong A, Landucci E, Lesueur F, Loud JT, Machackova E, **Mai PL**, Majidzadeh-A K, Manoukian S, Montagna M, Moserle L, Mulligan AM, Nathanson KL, Nevanlinna H, Ngeow Yuen Ye J, Nikitina-Zake L, Offit K, Olah E, Olopade OI, Osorio A, Papi L, Park SK, Pedersen IS, Perez-Segura P, Petersen AH, Pinto P, Porfirio B, Pujana MA, Radice P, Rantala J, Rashid MU, Rosenzweig B, Rossing M, Santamariña M, Schmutzler RK, Senter L, Simard J, Singer CF, Solano AR, Southey MC, Steele L, Steinsnyder Z, Stoppa-Lyonnet D, Tan YY, Teixeira MR, Teo SH, Terry MB, Thomassen M, Toland AE, Torres-Esquius S, Tung N, van Asperen CJ, Vega A, Viel A, Vierstraete J, Wappenschmidt B, Weitzel JN, Wieme G, Yoon SY, Zorn KK, McGuffog L, Parsons MT, Hamann U, Greene MH, Kirk JA, Neuhausen SL, Rebbeck TR, Tischkowitz M, Chenevix-Trench G, Antoniou AC, Friedman E, Ottini L. Characterization of the Cancer Spectrum in Men With Germline BRCA1 and BRCA2 Pathogenic Variants: Results From the Consortium of Investigators of Modifiers of BRCA1/2 (CIMBA). *JAMA Oncol*. 2020 Aug 1;6(8):1218-1230. doi: 10.1001/jamaoncol.2020.2134. PMID: 32614418; PMCID: PMC7333177.
 17. Janisiw E, Raices M, Balmir F, Paulin LF, Baudrimont A, von Haeseler A, **Yanowitz JL**, Jantsch V, Silva N. Poly(ADP-ribose) glycohydrolase coordinates meiotic DNA double-strand break induction and repair independent of its catalytic activity. *Nat Commun*. 2020 Sep 25;11(1):4869. doi: 10.1038/s41467-020-18693-1. PMID: 32978394.
 18. Mouillet JF, Goff J, Sadovsky E, Sun H, Parks T, **Chu T**, Sadovsky Y. Transgenic expression of human C19MC miRNAs impacts placental morphogenesis. *Placenta*. 2020 Sep 29;101:208-214. doi: 10.1016/j.placenta.2020.09.069. Epub ahead of print. PMID: 33017713.

**COMMUNITY PRACTICES SERVICE LINE
(Outside Allegheny County)**



**David Badway, MD
Vice Chair**

OVERVIEW

During the academic year, 2019 - 2020 the Community Practice Service Line, in Western Pennsylvania, remained faithful to its mission of providing compassionate, quality-integrated care. The core clinical program continues to be general obstetrical and gynecologic care. The previous closure of the Uniontown practice and the integration of the Butler practice into Magee resulted in a slight decline of overall clinical volume for obstetrical and gynecologic visits, deliveries, and procedures; however, our providers continue to provide dedicated, efficient quality care at UPMC Horizon, UPMC Northwest, UPMC Altoona, and UPMC Hamot in Erie. Our core services continue to strengthen by the addition of new providers and programs.

The Service Line continues to develop our subspecialty service with our community practices. Gynecologic Oncology, Urogynecology, Reproductive Medicine and Magee Ultrasound have dedicated personnel and resources for UPMC Hamot, UPMC Altoona, and UPMC Horizon. Maternal Fetal Medicine and Reproductive Genetics continue to effectively utilize telemedicine to provide consultative services to many of our community practice sites.

The community practices continue to participate in the educational and research missions of the department by providing access to medical students and residents and participation in clinical research projects. These providers have embraced departmental quality and value initiatives such as the obstetrical bundle and hysterectomy pathways. The Horizon practice was awarded a monetary grant to participate in the PAPQC LARC Pilot. Also, the PAPQC and Jewish Healthcare Foundation awarded monies to Northwest, Horizon and Hamot for the care of newborns with NAS. These service line practices outside of Allegheny County will continue to appropriately expand and integrate services necessary to meet the needs of the department.

Clinical Program

The service line has seen an expansion in patient care, development of new clinical programs and continuing quality and patient safety activities. The core clinical program is general OB/GYN care, including routine and complex obstetrics, benign gynecology including minimally invasive surgical techniques and office surgery, contraception, mid-life and well-woman care.

The challenges of FY 2019 continued into FY 2020 especially with the impact of Coronavirus. The utilization of telemedicine was greatly increased to continue to provide safe effective care. The impact of changing health plan paradigms shifting a higher cost burden onto patients for medical services via increasing deductible and co-insurance requirements remains. UPMC's decision to renew its relationship with Highmark, the regional Blue Cross Blue Shield product and the major insurer in the region, will continue to offer access to these patients throughout Western Pennsylvania.

COMMUNITY PRACTICES IN WESTERN PENNSYLVANIA

Service	FY 2016-2017	FY 2017-2018	FY 2018-2019	FY 2019-2020
Total OB Visits	25,944	39,276	34,211	27,920
Total GYN Visits	62,886	86,094	68,530	50,035
Total Outpatient and Inpatient Procedures	10,002	15,234	12,663	9,082
Total Deliveries	2,607	3,724	3,225	2,731

The service line continues to develop and refine our departmental objective of integrating academic and subspecialty services with our communities. The work will become even more important as we develop a Department-wide answer to the changing market condition. Maternal-Fetal Medicine continues to make significant progress with telemedicine consultation at several sites, and now provides inpatient consultations for several community hospitals. Maternal Fetal Medicine has also expanded to provide on-site care at Altoona and Hamot. Reproductive Genetics has also started a telemedicine service in the communities Magee Ultrasound reaches into every community site via teleradiology, providing a consistent, high quality platform for community providers and subspecialists to utilize during telemedicine consultations. GYN Oncology, Reproductive Medicine, and Urogynecology continue their strong presence by providing consultation, outpatient, and some inpatient surgical services at many of our community sites.

Educational Program

As Clinical Faculty, the members of the service line take seriously their commitment to the education of future providers. Members of the service line provide teaching for the following groups:

1. Medical students of University of Pittsburgh School of Medicine
2. Visiting students from other institutions
3. Residents in Obstetrics, Gynecology and Reproductive Sciences

Teaching activities take place in community practice offices, inpatient units including Labor and Delivery and the operating room. Some members also lead problem-based learning groups, and many provide instruction in the second-year Breast and Pelvic Examination sessions. The goal of these efforts is to provide a "real world" environment to experience the presentation and management of OB/GYN issues. Clinical issues in the community setting often require a different approach than that of an academic medical center, and the faculty provides myriad examples of surgical technique, case management and physician interaction with patients, colleagues and staff.

Strategic Planning

The rapid growth of the service line required thoughtful examination of both the assets and direction of the practices. A continued focus remains on these challenges:

1. Maximizing the use of analytics.
2. Attracting and retain highly qualified physicians and staff to help build long-term relationships with patients.
3. Addressing demographic shifts with new offerings.
4. Adopting a process improvement focus.
5. Improving the office and clinic environment to provide more comfort for patients.
6. Achieving greater integration with Department and affiliated UPMC facilities and services.

The service line's four broad strategic goals are:

1. Community Practices will develop and maintain a satisfied and engaged workforce.
2. Community Practices will successfully integrate with their partners in the Department of OB/GYN/RS and UPMC.
3. Community Practices will continuously improve organizational quality
4. Community Practices will continuously improve clinical quality and safety.

These strategic goals, directly coupled with the goals of the Department and UPMC, continue to guide the activities of the Service Line.

Future Growth and Development

The service line has halted the acquisition of practices due to the challenges facing healthcare at this time. The integration of subspecialty services, especially maternal-fetal medicine, urogynecology, and gynecologic oncology, will continue. Aware of the coming changes in health care delivery and the need for appropriate resource utilization, the service line is in a continuing process of evaluation of all clinical site utilization, working toward appropriate, analytics-driven consolidation or expansion, as appropriate. Further, more effort will be placed on utilization of Advanced Practice Providers, as well as the development and implementation of bundles and protocols to enhance and standardize care management. Enhancement of resident and student opportunities will remain a priority. Patient safety and quality programs will continue to expand and increased provider financial risks for episodes of patient care will directly affect our practices as a paradigm shift in provider reimbursement evolves.

UROGYNECOLOGY AND RECONSTRUCTIVE PELVIC SURGERY



Pam Moalli, MD, PhD
Division Director

OVERVIEW

The Division of Urogynecology & Reconstructive Pelvic Surgery collectively aims to provide comprehensive care to women with pelvic floor disorders including pelvic organ prolapse, bladder and bowel incontinence, and pain disorders (interstitial cystitis and myofascial pain syndromes), fistulas and urethral diverticuli throughout the greater Pittsburgh region and beyond via outreach and telemedicine. In addition to UPMC Magee-Womens Hospital, our 9 urogynecologists, 4 physician assistants, 1 research assistant professor, and 14 staff members provide care to women in Altoona, Bethel Park, Butler, Clarion, Cranberry, Delmont, Erie, Franklin, Hermitage, Irwin, and Natrona Heights. We are a young and rapidly expanding division with 6 of our 9 members joining in the last 3 years. Our division is represented by leaders in the field with commitment to advancing care for women with pelvic floor disorders through clinical, translational, and basic research. In 2019, our division received \$2.5 million in grant funding and \$2.0 million direct costs. We represent the most racially and ethnically diverse faculty in the Department of Obstetrics and Gynecology. We are committed to training the next generation of clinicians and researchers with 4 clinical fellows, one postdoctoral fellow, 5 graduate students, and numerous medical and undergraduates at the University of Pittsburgh. Collectively, we have authored 35 manuscripts in peer reviewed journals including JAMA, Acta Biomaterialia, Obstetrics & Gynecology Journal, American Journal of Obstetrics and Gynecology among others. We presented over 60 abstracts at annual meetings – and received numerous awards including “Best overall paper”, “Best basic science paper”, and “Best paper by a trainee”. We continue to adjust our vision to align with the region’s health care environment, with the addition of “televisits” and future emphasis on increasing our presence in Erie and Altoona and initiating clinical care in Somerset. We are pioneering expertise in imaging of the pelvic organs and their supportive muscles/connective tissues via ultrasonography to inform patients of their specific injury and to provide targeted repair. We are developing and testing novel devices for use in urogynecologic surgical procedures. We have launched a novel robotic surgical platform and developed comprehensive remote robotic surgical proctoring technologies. We anticipate being the only center in the

region to offer these technologies and approaches to care. Finally, we are opening a clinic to optimize healing following vaginal birth as an educational and preventative approach to pelvic floor health.

Research Program

We strive to be among the highest research funded Urogynecology programs in the country. We have a broad portfolio of funding that includes NIH, foundation, industry sponsored, and intramural. Our clinical research program has 2 research coordinators that assist with recruitment/retention in our clinical trials. We support a PhD level statistician who assists with study design and data analysis. All of our fellows receive a certificate or masters degree in clinical or translational research. We have monthly meetings in which our current studies are reviewed and new studies are introduced. We view research cooperatively and as beneficial to all in the division. Thus, we recruit for all studies as a collective group and view each patient as a learning opportunity. A representative but not all-inclusive list of our funding sources is as follows (please see appendices for a comprehensive list of our research endeavors):



- NIH funded surgical networks (U01): Under the leadership of Dr. Zyczynski (PI) and Dr. Moalli (Alternate PI), we have a long record of participation in surgical networks beginning with the NIH funded Urinary Incontinence Treatment Network and now the Pelvic Floor Disorders Network (PFDN). Dr. Zyczynski is currently leading a PFDN trial on percutaneous tibial nerve stimulation treatment of fecal incontinence in women. Dr. Moalli is leading 2 studies: 1) an MRI based study in which computational models are used to define mechanisms of recurrence following prolapse surgery and 2) vaginal fibroblasts are used to biofabricate novel ligaments for use in prolapse repair surgery.
- Translational: NIH funded biomaterials testing program (PI, Moalli 2R01s, R21, DOD) is one of the only in labs the world in which a comprehensive analysis of the host response to biomaterials used in pelvic reconstructive current surgeries is performed. In addition, the group collaborates to design novel materials to be used in surgeries to repair prolapse and incontinence with a design that is based on overcoming the limitations of current devices. The lab has 5 PhD students, 2 technicians, and a postdoctoral fellow. Dr. Rui Liang, MD, a research assistant professor in the lab, is independently funded and leads studies on macrophage dysfunction in the host response to biomaterials placed into women with diabetes.
- Mentored faculty development awards (K12):
 - Women's Health Reproductive Research: Dr. Mary Ackenbom has received both NIH and private funding to understand the impact of Urogynecologic surgeries on neurocognition in our elderly patients.
 - Bridging Interdisciplinary Research in Women's Health: Dr. Amanda Artsen is studying dysregulated wound healing as a mechanism leading to biomaterial complications.
- Industry sponsored:
 - Hologics (Bradley, PI): Pivotal trial of novel device used to treat refractory urgency incontinence
 - UroCure (Napoe, PI): 522 study of a novel mid-urethral sling used to treat urinary incontinence
 - Ethicon (Fitzgerald, PI): Retrospective and prospective outcomes of Ethicon urogynecologic devices

- Foundation:
 - American Urogynecology Society Foundation Award: Dr. Megan Bradley has received foundation funding to perform a qualitative analysis of patients' perception of physician management of asymptomatic bacteriuria.
 - Medical Staff Grant: Dr. Giugale is developing a post clinic to optimize healing after vaginal birth.

List of Clinical Trials (select)

- Apical Suspension Repair for Vault Prolapse in a Three-Arm Randomized Trial Design (Moalli)
 - Effectiveness of Bilateral PTNS compared to Unilateral PTNS for the treatment of Overactive Bladder/Urge Incontinence (Napoe)
 - Hologic TRANSFORM Urgency Urinary Incontinence Trial (Bradley)
 - Impact of level III support procedures on normalization of enlarged genital hiatus after minimally invasive sacrocolpopexy: a randomized controlled trial (Glass-Clark/Bradley)
 - Treatment for Mixed Urinary Incontinence: Mid-urethral Sling vs. Botox A (Zyczynski)
 - Study of Uterine Prolapse Procedures - Randomized Trial (Zyczynski)
 - Postoperative Cognitive Dysfunction in Older Women Undergoing Pelvic Organ Prolapse Surgery (Ackenbom)
 - Reducing Pelvic Floor Injury by Induction of Labor (Burkett/Moalli)
 - Optimizing the Care of Women with Complex Obstetrical Lacerations (Giugale)

Teaching Activities

The division members are dedicated to the education of health care providers. Teaching for the division includes the following group of individuals:

- Female Pelvic Medicine & Reconstructive Surgery Fellows
- Residents in Obstetrics, Gynecology and Reproductive Sciences
- Medical Students of the University of Pittsburgh
- Graduate Students of the Department of Bioengineering, University of Pittsburgh
- MSTP/PSTP Students
- Graduate Students in the Cellular Approaches to Tissue Engineering and Regeneration (CATER) program
- Graduate Students in the Biomedical Masters Program (BMP) Clinical and Research Laboratory
- Dr. Bonidie provides offsite teleproctoring for surgeons acquiring robotic skills
- Dr. Moalli participates in multiple programs for graduate student training

Formal Educational Events

- Didactics Weekly Conference: The fellow responsible for each week's outline also reviews the ABOG FPMRS relevant learning objectives to prepare fellows for taking the boards. Attendings proctor these sessions with a "hands off" self-guided learning approach.
- Fellows Weekly Conference: Current structure includes M&M, research, guest speakers, challenging cases pre-op discussion, radiology rounds, and UDS interpretation. Conference is attended by faculty, fellows, clinical and research staff.
- Monthly Division Research Conference: Once per month faculty and research staff meet to discuss

recruitment/retention into studies, problems with data collection, analysis etc. These meetings are also an opportunity to present study designs for new studies and discuss data analysis.

- Translational Research in Urogynecology: The translational research lab meets once per week to discuss study progress, trouble shoot on difficulties, introduction of novel techniques, and manuscript organization/prep. This meeting involves graduate students, post docs, medical students on their research rotations, and fellows.
- Female Pelvic Medicine and Reconstructive Surgery Fellowship at UPMC Magee-Womens Hospital and the University of Pittsburgh: We have recently received approval by the hospital and the ACGME to increase our total fellowship complement to 6 (2 fellows per year). The fellowship is designed as a three-year curriculum for individuals who have completed an ACGME-approved residency training in obstetrics and gynecology or two-year curriculum for urology residents. The ideal candidate for this fellowship program will be an individual with a strong interest in pursuing a career in academic Urogynecology, to include excellence and leadership in education, research, and patient care. The fellowship has been approved by the American Board of Obstetrics and Gynecology since 2002 and most recently by the Accreditation Council for Graduate Medical Education (ACGME) effective July 1, 2012. The curriculum is designed to provide broad training and experience in clinical care and research for women with pelvic floor disorders. Clinical rotations include inpatient and outpatient urogynecology, urology, and gastroenterology. Surgical approaches to pelvic floor disorders include abdominal, vaginal, and laparoscopic procedures. Research rotations will include the opportunity to participate in both basic science (laboratory) research and clinical research, guided by the fellows' interests. Fellows will have the option to complete a 9-credit course at the Institute for Clinical Research Education (ICRE) at the University of Pittsburgh.
- Masters/Graduate Student Program: Dr. Moalli participates in a number of programs that offer training for graduate students in a masters or PhD program.
- Physician/Clinical Scientist Training Program: Our division members mentor medical students in this one-year research program.

Clinical Program

The clinical division is composed of 9 Urogynecologists, 4 Physician Assistants, and 4 clinical fellows. We see patients at 10 sites within the greater Pittsburgh area and 2 outreach sites (Erie and Altoona). Our division is young and rapidly growing with 2 new faculty in 2019 and 2 faculty in 2020. With 7 physicians with varied times protected for research (.25 FTE-.8FTE), we performed 5, 239 NEW patient visits and performed ~1000 surgeries generating 32, 686 RVUs and billing \$5.7 million. In addition to seeing patients in the office, we perform cystoscopies, intravesical BOTOX injections, multi- channel cystometrics and cystoscopy. We have expanded our "in office" presence by including televisits in our service line. We are one of a handful of programs that offers multiple approaches to surgical care all of which are minimally invasive. Our highly skilled surgeons offer expertise in robotics, laparoscopic and transvaginal approaches to surgical repairs of pelvic organ prolapse and urinary incontinence. As a world leader in biomaterials and technology, we provide our patients with the confidence that their surgeries are state of the art and being performed by evidence-based material testing protocols and guidelines. We have improved our social media presence and engagement via multiple channels, including Twitter, Facebook, and Instagram to increase online visibility and "reach" for both clinical and research contributions of the division and the FPMRS fellowship. We are also working with leadership to make usability improvements to the division website to improve the patient experience.

List of Faculty

Physicians

- Pamela A. Moalli, MD, PhD, Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Director of Division of Urogynecology & Reconstructive Pelvic Surgery; Associate Professor Department of Bioengineering, Associate Professor in the Department of Molecular and Cellular Pathology
- Mary F. Ackenbom, MD, MSc, Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Urogynecology & Reconstructive Pelvic Surgery
- Amanda M. Artsen, MD, MSc, Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Urogynecology & Reconstructive Pelvic Surgery
- Michael J. Bonidie, MD, Associate Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Urogynecology & Reconstructive Pelvic Surgery
- Megan S. Bradley, MD, Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Urogynecology & Reconstructive Pelvic Surgery
- Jocelyn J. Fitzgerald, MD, Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Urogynecology & Reconstructive Pelvic Surgery
- Lauren E. Giugale, MD, Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Urogynecology & Reconstructive Pelvic Surgery
- Gnankang Sarah Napoe, MD, MS, Assistant Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Urogynecology & Reconstructive Pelvic Surgery
- Halina M. Zyczynski, MD, Professor, Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Urogynecology & Reconstructive Pelvic Surgery

Research Faculty

- Rui Liang, MD, MSc, Research Assistant Professor, Department of Obstetrics, Gynecology & Reproductive Sciences
- Steve Abramowitch, PhD, Associate Professor of Bioengineering, Musculoskeletal Research Center, and Associate Professor of Obstetrics, Gynecology, and Reproductive Sciences

Current Female Pelvic Medicine & Reconstructive Surgery Fellowship Trainees

- Linda Burkett, MD, 3rd Year Fellow
- Stephanie Glass Clark, MD, 2nd Year Fellow
- Marina Guirguis, MD, 1st Year Fellow
- Alexandra Melnyk, MD, 1st Year Fellow

FACULTY RESEARCH INTERESTS

Mary Ackenbom, MD, MSc, Assistant Professor, Division of Urogynecology and Pelvic Reconstructive Surgery, Department of Obstetrics, Gynecology and Reproductive Sciences at UPMC Magee-Womens Hospital and University of Pittsburgh. Dr. Ackenbom completed her medical school training at The Ohio State University, followed by residency at the Hospital of the University of Pennsylvania, and fellowship training in FPMRS at University of Pittsburgh Medical Center. She joined the faculty in 2017. She is a scholar in the Women's Reproductive Health Research program through the Magee-Womens Research Institute. Her research interests are focused on surgical outcomes in the elderly urogynecologic patient population.

Amanda M. Artsen, MD, MSc, Assistant Professor, Division of Urogynecology and Pelvic Reconstructive Surgery, Department of Obstetrics, Gynecology and Reproductive Sciences at UPMC Magee-Womens Hospital and University of Pittsburgh. The goal of Dr. Artsen's research is to improve current treatment paradigms of pelvic floor disorders by understanding the mechanisms behind vaginal mesh complications. Polypropylene mesh is frequently used to decrease failure rates of prolapse repairs and treat stress urinary incontinence but is associated with rates of pain and exposure into the vagina in up to 10% of cases. To date, little attention has been paid to the role of the host in the response to a urogynecologic mesh. Using mesh samples removed from women with complications, mouse models and innovative tissue-modeling systems, Dr. Artsen aims to test the role of dysregulated wound healing in mesh complications and to test the therapeutic utility of extracellular matrix-associated molecules in vaginal healing after mesh placement. Gaining an improved understanding of the host response to biomaterials used in reconstructive pelvic surgeries will open new potential therapeutic avenues and contribute to a future in which these complications are rare events.

Michael J. Bonidie, MD, Director, Division of Robotic Gynecology; Associate Professor, Division of Urogynecology, Department of Obstetrics, Gynecology and Reproductive Sciences at UPMC Magee-Womens Hospital and University of Pittsburgh. Dr. Bonidie is a graduate of the University of Pittsburgh School of Medicine where he was awarded the outstanding student research award in 1991. He did his residency at the Medical College of Virginia. He joined the faculty of the Western Pennsylvania Hospital in 1998 and served as the Director of the Division of Urogynecology from 2000 to 2021. He was also the Ob/Gyn Residency Program Director from 2002 to 2009. He joined the faculty at Magee-Womens Hospital in 2010 as the Director of Robotic Gynecology and was added to the Division of Urogynecology in 2012. Dr. Bonidie has been instrumental in the growth and expansion of robotic surgery within the University of Pittsburgh health system and instrumental in the incorporation of robotic simulation into resident and fellowship training.

Megan Bradley, MD, Fellowship Program Director, Female Pelvic Medicine and Reconstructive Surgery; Assistant Professor, Division of Urogynecology and Pelvic Reconstructive Surgery, Department of Obstetrics, Gynecology and Reproductive Sciences at UPMC Magee-Womens Hospital and University of Pittsburgh. Dr. Bradley completed her medical school and residency at the University of Pittsburgh and Magee-Womens Hospital. She then matriculated to Duke University for fellowship in FPMRS. She joined the faculty in 2017 and serves as the divisional representative to the residency program. Her research interests include surgical outcomes and lower urinary tract disorders including recurrent urinary tract infections.

Lauren E. Giugale, MD, Assistant Professor, Division of Urogynecology and Pelvic Reconstructive Surgery, Department of Obstetrics, Gynecology and Reproductive Sciences at UPMC Magee-Womens Hospital and University of Pittsburgh. Dr. Giugale completed her medical school at the University of Virginia School of Medicine. She completed her residency and fellowship at the University of Pittsburgh, UPMC Magee-Womens Hospital. She joined the faculty in 2019. Her clinical and research interests include surgical outcomes, obstetric anal sphincter injuries and postpartum pelvic floor dysfunction.

Rui Liang, MD, MSc, Research Assistant Professor, Department of Obstetrics, Gynecology & Reproductive Sciences, University of Pittsburgh. Her research focuses on regenerative medicine, host response to medical implants and soft tissue healing. In 2010, she joined the Magee-Womens Research Institute and worked with Dr. Pamela A. Moalli to evaluate the impact of synthetic incontinence slings/prolapse meshes, which are widely used in the surgical repair of urinary incontinence and pelvic organ prolapse, on the function, morphology and remodeling of vagina. Currently her research focuses on investigating the mechanisms by which diabetic women have a significantly higher chance to develop mesh related complications. Her goal is to develop preventive strategies that will benefit the women population with diabetes who receive mesh implantation. Eventually, the strategies can be extended to improve the success of all medical implants used in the diabetic population, including life-saving heart valves, stents, etc.

Pamela A. Moalli, MD, PhD, Professor, **Director of the Division** of Urogynecology and Reconstructive Pelvic Surgery, Department of Obstetrics, Gynecology, and Reproductive Sciences, UPMC Magee- Womens Hospital and University of Pittsburgh; Investigator, Magee-Womens Research Institute. Dr. Moalli graduated from the NIH sponsored Medical Scientist Training Program at Northwestern University in 1994. She had earned a PhD in molecular and cellular biology and a medical degree over a period of 8 years. She served her residency in Obstetrics and Gynecology at Magee-Womens Hospital of the University of Pittsburgh from 1994 to 1998. From 1998 to 2000 she completed a fellowship in Female Pelvic Medicine and Reconstructive Pelvic Surgery at the same institution. Dr. Moalli's NIH- supported laboratory housed in the Magee-Womens Research Institute focuses primarily on the study of current and the development of novel biomaterials for use in pelvic reconstructive surgeries. In addition, she studies mechanisms of maternal birth injury as a pathway to inform future prevention strategies. Finally, she uses computational modeling to understand why current urogynecologic procedures fail. Dr. Moalli is alternate PI of the Pelvic Floor Disorders Network and chair of the national Pelvic Floor Disorders Registry. Her research team is highly transdisciplinary involving members of the Center for Biological Imaging, the Department of Bioengineering, the Department of Regenerative Medicine and the Division of Urogynecology.

Gnankang Sarah Napoé, MD, MS, Assistant Professor, Division of Urogynecology and Pelvic Reconstructive Surgery, Department of Obstetrics, Gynecology and Reproductive Sciences at UPMC Magee-Womens Hospital and University of Pittsburgh. Dr. Napoé is a graduate of the University of Pittsburgh School of Medicine. She completed an obstetrics and gynecology residency at the Harvard Integrated Program at Brigham and Women's Hospital and Massachusetts General Hospital. Following residency, Dr. Napoé attended fellowship in Female Pelvic Medicine and Reconstructive Surgery at Brown University. Dr. Napoé has an interest in Global Health and participated in several medical and surgical trips. Dr. Napoé is a committed educator and has received several teaching awards. Her research interests are in surgical outcomes and optimizing treatments for urinary incontinence. She joined the faculty in 2019.

Halina Zyczynski, MD, Professor, Division of Urogynecology and Pelvic Reconstructive Surgery, Department of Obstetrics, Gynecology and Reproductive Sciences at UPMC Magee-Womens Hospital and University of Pittsburgh; Chair of the Department of Obstetrics and Gynecology at UPMC Hamot. Dr. Zyczynski joined the faculty after completing her residency at the University of Pittsburgh Health Center in 1989. She founded and

directed the division of Urogynecology (2004-2019) during which the clinical program expanded to 9 satellite offices and 3 surgical campuses in western Pennsylvania. Dr. Zyczynski is an Investigator in the Magee-Womens Research Institute, and site principal investigator of the NICHD Pelvic Floor Disorders Network (PFDN) and NIDDK Urinary Incontinence Treatment Network (UITN) with a focus on design and implementation of multicenter clinical trials investigating diagnostic algorithms and treatment modalities for urinary and fecal incontinence, and pelvic organ prolapse in women. She maintains an active clinical practice on both MWH campuses in Pittsburgh and Erie.

Publications – Division of Urogynecology and Pelvic Reconstruction

1. Jelovsek JE, Markland AD, Whitehead WE, Barber MD, Newman DK, Rogers RG, Dyer K, Visco AG, Sutkin G, **Zyczynski HM**, Carper B, Meikle SF, Sung VW, Gantz MG; National Institute of Child Health and Human Development Pelvic Floor Disorders Network. Controlling faecal incontinence in women by performing anal exercises with biofeedback or loperamide: a randomised clinical trial. *Lancet Gastroenterol Hepatol*. 2019 Sep;4(9):698-710. doi: 10.1016/S2468-1253(19)30193-1. Epub 2019 Jul 15. PMID: 31320277
2. Nager CW, Visco AG, Richter HE, Rardin CR, Rogers RG, Harvie HS, **Zyczynski HM**, Paraiso MFR, Mazloomdoost D, Grey S, Sridhar A, Wallace D; NICHD Pelvic Floor Disorders Network. Effect of Vaginal Mesh Hysteropexy vs Vaginal Hysterectomy with Uterosacral Ligament Suspension on Treatment Failure in Women with Uterovaginal Prolapse: A Randomized Clinical Trial. *JAMA*. 2019 Sep 17;322(11):1054-1065. doi: 10.1001/jama.2019.12812. PMID: 31529008
3. Sung VW, Borello-France D, Newman DK, Richter HE, Lukacz ES, **Moalli P**, Weidner AC, Smith AL, Dunivan G, Ridgeway B, Nguyen JN, Mazloomdoost D, Carper B, Gantz MG; NICHD Pelvic Floor Disorders Network. Effect of Behavioral and Pelvic Floor Muscle Therapy Combined with Surgery vs Surgery Alone on Incontinence Symptoms Among Women with Mixed Urinary Incontinence: The ESTEEM Randomized Clinical Trial. *JAMA*. 2019 Sep 17;322(11):1066-1076. doi: 10.1001/jama.2019.12467. PMID: 31529008
4. **Ackenbom MF**, Dong S, Romanova A, Baranski L, Davis EM, Butters MA, **Zyczynski HM**. Postoperative Opioid Utilization in Older Women Undergoing Pelvic Organ Prolapse Surgery. *Female Pelvic Med Reconstr Surg*. 2020 Feb 5. doi: 10.1097/SPV.0000000000000844.
5. **Fitzgerald JJ** and Richter LA. The Role of MRI in the diagnosis of Pelvic Floor Disorders. *Current Urology Reports*. May 2020, 21(26).
6. **Fitzgerald JJ**, Davitt J, Scott F, Robinson JK. Case report: Critically high carboxyhemoglobin level following extensive hysteroscopic myomectomy. *Journal of Minimally Invasive Gynecology*, September 2019.
7. **Artsen AM**, Rytel M, **Liang R**, King GE, Meyn L, **Abramowitch SD**, **Moalli PA**. Mesh induced fibrosis: The protective role of T regulatory cells. *Acta Biomater*. 2019 Jul 19. pii: S1742-7061(19)30520-3. doi: 10.1016/j.actbio.2019.07.031. [Epub ahead of print] PMID: 31320277
8. Routzong MR, **Moalli PA**, Maiti S, De Vita R, **Abramowitch SD**. Novel simulations to determine the impact of superficial perineal structures on vaginal delivery. *Interface Focus*. 2019 Aug 6;9(4):20190011. doi: 10.1098/rsfs.2019.0011. Epub 2019 Jun 14. PMID: 31320277
9. **Knight KM**, **Artsen AM**, Routzong MR, King GE, **Abramowitch SD**, **Moalli PA**. New Zealand white rabbit: a novel model for prolapse mesh implantation via a lumbar colpopexy. *Int Urogynecol J*. 2020 Jan;31(1):91-99. doi: 10.1007/s00192-019-04071-z. Epub 2019 Aug 15. PMID: 31418044; PMID: 31320277.
10. **Giugale LE**, **Moalli PA**, Canavan TP, Meyn LA, Oliphant SS. Prevalence and Predictors of Urinary

Incontinence at 1 Year Postpartum. Female Pelvic Med Reconstr Surg. 2020 Oct 1. doi: 10.1097/SPV.0000000000000955. Epub ahead of print. PMID: 33009263.

11. Lassey SC, **Napoe GS**, Carusi D, Schantz-Dunn J, Robinson JN. Hyponatremia Among Parturients Transferred to the Hospital After Prolonged Labor During an Attempted Home Birth. *Obstet and Gynecol*. 2019 Jul; 134(1): 106-108. PMID 31188315.
12. **Napoe GS**, Rardin CR. Case report of a peritoneal inclusion cyst presenting as pelvic organ prolapse. *J Obstet Gynaecol*. 2019; Oct 12: 1-2. PMID: 31607189.
13. **Napoe GS**, Adjei NN, Cooper AC, Raker C, Korbly NB. Postpartum Urinary Retention Management: A Survey of Obstetrics and Gynaecology Residents in the United States. *J Obstet Gynaecol*. 2020; Feb 18 :1-4. PMID 32068448.
14. **Napoe GS**, Stewart LE, Myers, DL. Impact of cystotomy location on cystography results. *Female Pelvic Med Reconstruct Surg*. 2020; Jan 25. Online ahead of print. PMID 32217915.
15. Sutkin G, **Zyczynski HM**, Sridhar A, Jelovsek JE, Rardin CR, Mazloomdoost D, Rahn DD, Nguyen JN, Andy UU, Meyer I, Gantz MG; NICHD Pelvic Floor Disorders Network. Am J Obstet Gynecol. Association between adjuvant posterior repair and success of native tissue apical suspension. 2020 Feb;222(2):161.e1-161.e8. doi: 10.1016/j.ajog.2019.08.024. Epub 2019 Aug 23. PMID: 31449806
16. **Giugale LE**, Carter-Brooks CM, Ross JH, Shepherd JP, **Zyczynski HM**. Outcomes of a Staged Midurethral Sling Strategy for Stress Incontinence and Pelvic Organ Prolapse. *Obstet Gynecol*. 2019 Oct;134(4):736-744. doi: 10.1097/AOG.0000000000003448. PMID: 31503149
17. Turner LC, **Zyczynski HM**, Shepherd JP. Intravenous Acetaminophen Before Pelvic Organ Prolapse Repair: A Randomized Controlled Trial. *Obstet Gynecol*. 2019 Mar;133(3):492-502. PMID: 30741813 Clinical Trial.

Senior Authored Publications

1. Venuti KR, Cabrera C, Burkett L, and **Bradley MS**. Impact of Menopausal Status on Uropathogen Prevalence and Antimicrobial Resistance Profiles. *Female Pelvic Med Reconstr Surg*. 2019 Sept 11. PMID: 31517668
2. Sassani JC, Ross JH, Lopa S, Handzel RM, **Bradley MS**, **Bonidie M**. Prolapse Recurrence After Sacrocolpopexy Mesh Removal: A Retrospective Cohort Study. *Female Pelvic Med Reconstr Surg*. 2020 Feb;26(2):92-96. PMID: 31990794
3. Sassani JC, **Artsen AM**, **Moalli PA**, **Bradley MS**. Temporal Trends of Urogynecologic Mesh Reports to the U.S. Food and Drug Administration. *Obstet Gynecol*. 2020 May. PMID: 32282600
4. Sassani JC, **Artsen AM**, **Moalli PA**, **Bradley MS**. Temporal Trends of Urogynecologic Mesh Reports to the U.S. Food and Drug Administration. *Obstet Gynecol*. 2020 May;135(5):1084-1090. doi: 10.1097/AOG.0000000000003805. PMID: 32282600.
5. Romanova AL, Carter-Brooks C, Ruppert KM, **Zyczynski HM**. 30-Day unanticipated healthcare encounters after prolapse surgery: impact of same day discharge. *Am J Obstet Gynecol*. 2020 May;222(5):482.e1-482.e8. doi: 10.1016/j.ajog.2019.11.1249. Epub 2019 Nov 13. PMID: 31733206
6. Sassani JC, Kantartzis K, Wu L, Fabio A, **Zyczynski HM**. Bowel preparation prior to minimally invasive sacrocolpopexy: a randomized controlled trial. *Int Urogynecol J*. 2020 Jul;31(7):1305-1313. doi: 10.1007/s00192-019-04120-7. Epub 2019 Nov 26. PMID: 31773199

Other Publications

2. Meyer I, Whitworth RE, Lukacz ES, Smith AL, Sung VW, Visco AG, **Ackenbom MF**, Wai CY, Mazloomdoost D, Gantz MG, Richter HE; NICHD Pelvic Floor Disorders Network and the National Institutes of Health Office of Research on Women's Health. Outcomes of native tissue transvaginal apical approaches in women with advanced pelvic organ prolapse and stress urinary incontinence. *Int*

- Urogynecol J. 2020 Mar 7. doi: 10.1007/s00192-020-04271-y.
3. Does a Recent Urinary Tract Infection (UTI) Increase the Risk of Post-Injection UTI after Onabotulinum Toxin A? Bickhaus JA, **Bradley MS**, Amundsen CL, Visco AG, Truong T, Li Y, and Siddiqui NY. Female Pelvic Med Reconstr Surg. 2019 Jul 8. PMID: 31295185
 4. Cameron AP, Wiseman JB, Smith AR, Merion RM, Gillespie BW, Bradley CS, Amundsen CL, Yang CC, Lai HH, DeLancey JOL, Helmuth ME, **Bradley MS**, Agochukwu N, Andreev VP, Kirkali Z, Clemens JQ; LURN Study Group. Are three-day voiding diaries feasible and reliable? Results from the Symptoms of Lower Urinary Tract Dysfunction Research Network (LURN) cohort. Neurourol Urodyn. 2019 Nov;38(8):2185-2193. doi: 10.1002/nau.24113. 2019 Jul 25. PMID: 31347211
 5. Richter HE, Jelovsek JE, Iyer P, Rogers RG, Newman D, Harm-Ernandes I, Dyer KY, Wohlrab K, **Bradley MS**, Mazloomdoost D, and Gantz M. Associated With A Clinically Important Treatment Response in Women Under-going Non-surgical Therapy for Fecal Incontinence. American Journal of Gastroenterology. Jan 2020. PMID:31895722
 6. Dubinskaya A, **Bradley MS**, Wakefield DB, Shepherd JP. The impact of prior prolapse repairs on surgical outcomes with minimally invasive sacral colpopexy. Int Urogynecol J. 2020 Mar 4. PMID: 32130464
 7. Clemens JQ, Wiseman JB, Smith AR, Amundsen CL, Yang CC, **Bradley MS**, Kirkali Z, Agochukwu NQ, Cameron AP, and the LURN Study Group. Prevalence, Subtypes, and Correlates of Nocturia in the Symptoms of Lower Urinary Tract Dysfunction Research Network (LURN) Cohort. Neurourol Urodyn. April 2020. PMID: 32249998
 8. Lenger SM, **Bradley MS**, Thomas DA, Bertolet MH, Lowder JL, Sutcliffe S. D-mannose vs Other Agents for Recurrent Urinary Tract Infection Prevention in Adult Women: A Systematic Review and Meta-Analysis. Accepted Am J Obstet Gynecol May 2020. PMID: 32497610
 9. Carey, E, Fader, A, **Fitzgerald, JJ**, Hammons, L, Nensi, A, Park, A, Ricci, S, Rosenfield, R, Scheib, S, Weston, E, Stone R. Enhanced Recovery and Surgical Optimization Protocol for Minimally Invasive Gynecologic Surgery : An AAGL White Paper. Journal of Minimally Invasive Gynecology. August 2020.
 10. Menefee S, Richter HE, Myers D, Weidner A, **Moalli P**, Harvie H, Rahn D, Jeppson P, Paraiso M, Thomas S, Mazloomdoost D; NICHD Pelvic Floor Disorders Network. Design of a 3-Arm Randomized Trial for Posthysterectomy Vault Prolapse Involving Sacral Colpopexy, Transvaginal Mesh, and Native Tissue Apical Repair: The Apical Suspension Repair for Vault Prolapse in a Three-Arm Randomized Trial. Female Pelvic Med Reconstr Surg. 2020 Jul;26(7):415-424. doi: 10.1097/SPV.0000000000000803. PMID: 31860566; PMCID: PMC7326314.
 11. Routzong MR, Rostaminia G, **Moalli PA**, Abramowitch SD. Pelvic floor shape variations during pregnancy and after vaginal delivery. Comput Methods Programs Biomed. 2020 Oct;194:105516. doi: 10.1016/j.cmpb.2020.105516. Epub 2020 May 5. PMID: 32473515.
 12. Sung VW, Menefee S, Dunivan G, Richter HE, **Moalli P**, Weidner A, Andy UU, Jelovsek E, Mazloomdoost D, Whitworth R, Thomas S; NICHD Pelvic Floor Disorders Network. Design of a Study to Measure Patient-Perspectives in Adverse Event Reporting (the PPAR Study): Supplementary Study to the ASPIRe Trial. Female Pelvic Med Reconstr Surg. 2020 Jun 1. doi: 10.1097/SPV.0000000000000845. Epub ahead of print. PMID: 32487881.
 13. Komesu YM, Dinwiddie DL, Richter HE, Lukacz ES, Sung VW, Siddiqui NY, **Zyczynski HM**, Ridgeway B, Rogers RG, Arya LA, Mazloomdoost D, Levy J, Carper B, Gantz MG; Eunice Kennedy Shriver National Institute of Child Health and Human Development Pelvic Floor Disorders Network. Defining the relationship between vaginal and urinary microbiomes. Am J Obstet Gynecol. 2020 Feb;222(2):154.e1-154.e10. doi: 10.1016/j.ajog.2019.08.011. Epub 2019 Aug 14. PMID: 31421123

MAGEE-WOMENS RESEARCH INSTITUTE



Yoel Sadovsky, MD
MWRI Executive

OVERVIEW

Magee-Womens Research Institute (MWRI) is home to University of Pittsburgh scientists engaged in research in reproductive biology and women's health. Unique to MWRI is the multidimensionality of its reproductive biology research, spanning approaches from molecular biology to epidemiology and community outreach, research systems from worms to humans, and processes from early embryonic development to reproductive aging. MWRI's researchers use diverse basic, translational, and clinical investigative tools that support our central mission to:

- Advance knowledge in the field of reproductive biology and medicine
- Translate discoveries into improved health for women and their infants
- Train current and future scholars in the reproductive sciences
- Foster community investment and involvement in women's health research

MWRI houses all the research pursuits of the Department of Obstetrics, Gynecology and Reproductive Sciences (OBGYN-RS), including basic, translational, clinical, behavioral, and outcomes investigations, all taking place at MWRI's research building on Craft Avenue, at Magee-Womens Hospital, or at Craft Place across the Boulevard of the Allies from the Hospital and Institute. Our 106 investigators include 72 primary faculty members (see data on gender equality below). Of these, 62 are from the OBGYN-RS department and 10 from various other Pitt Departments. Approximately half of the primary faculty members are engaged mainly in basic and translational research, and the other half are engaged mainly in clinical, outcomes and health services research. In addition, 34 University of Pittsburgh researchers with primary appointments in other University departments hold affiliate faculty appointments at MWRI. These include representatives from the Departments of Anesthesiology, Microbiology and Molecular Genetics, Pharmacology and Chemical Biology, Medicine, Radiology, Surgery, Pediatrics, and Psychiatry in the School of Medicine; Epidemiology, Human Genetics, Environmental and Occupational Health, and Behavioral and Community Health Sciences in the Graduate School of Public Health; Bioengineering in the Swanson School of Engineering; and representatives from the Schools of Pharmacy and Nursing. MWRI's collaborative, transdisciplinary approach to research, affiliation with the University of Pittsburgh and Magee-Womens Hospital of UPMC, and location immediately adjacent to Magee's large clinical patient care center further buttress our research programs.

Despite continuing challenges in NIH funding, MWRI continues to excel in securing financial support for new and ongoing initiatives. As the research arm of the Department of OBGYN-RS, MWRI remains a leader in NIH-funded

research among obstetrics and gynecology departments in the United States. In fiscal year 2019-2020, funding from all grants and contracts was \$48 million, of which 83% (\$39.7 million) was from Federal sources, primarily from the NIH, and including entities such as the FDA, CDC, and the Department of Defense.

Key new grants this year include:

- *Mary Ackenbom, MD*, received a \$260K, 2-year R03 grant from NIH/NIA, entitled “A Prospective Examination of Perioperative Neurocognitive Disorders in Older Women Undergoing Urogynecologic Surgery”
- *Mary Ackenbom, MD*, also received a \$155K, 3-year grant from the Alzheimer's Association, entitled “Alzheimer’s Disease Pathology and Perioperative Neurocognitive Disorders”
- *Ron Buckanovich, MD, PhD, and Anda Vlad MD, PhD*, received a \$2.2M, 5-year R01 grant from NIH-NCI, entitled “ALDH Inhibition as Modulator of Tumor Immunobiology”
- *Christina Quesada Candela, PhD (Judy Yanowitz’s lab)*, received a \$200K, 2-year grant from the Buck Institute, entitled “Proteasomal Targets Driving Meiotic Failure During Reproductive Aging”
- *Catherine Chappell, MD*, received a \$466K, 2-year R21 grant from NIH/NICHD, entitled “A Phase 1 PK and Safety Study of Velpatasvir/Sofosbuvir for Chronic Hepatitis C Infection in Pregnant Women”
- *John Harris, MD*, received a \$1.9M, 5-year R01 grant from NIH/AHRQ, entitled “Developing and Testing an Evidence-Based Toolkit for Nursing Home Care of Residents with Obesity”
- *Kata Himes, MD*, received a \$290K, 1-year R56 grant from NIH/NINR, entitled “Healthy Beyond Pregnancy: Leveraging Behavior Economics to Improve Postpartum Care”
- *Liz Krans, MD, with Beatriz Luna, PhD, and Ashok Panigrahy, MD, Co-PIs (Psychiatry and Pediatrics)* received a \$276K, 1.5-year R34 grant from NIH/NIDA, entitled “Investigation of Opioid Exposure and Neurodevelopment (iOPEN)”
- *Rui Liang, MD*, received a \$456K, 2-year R21 grant from NIH/NICHD, entitled “Targeting Macrophage to Improve the Outcomes of Urogynecologic Meshes in Diabetic Women”
- *Faina Linkov, PhD*, received a \$61K grant from Phi Beta Psi Sorority for cancer research
- *Christina Megli, MD*, received a \$350K, 2-year K12 RSDP grant from NIH/NICHD, entitled “Regulation of Macrophage Function by the Placenta”
- *Kyle Orwig, PhD*, received a \$8.5M, 5-year P50 grant from NIH/NICHD, entitled “Genetics of Male Infertility: A Marker of Overall Health”
- *Kyle Orwig, PhD, (with co-PI Marvin Meistrich, MD-Anderson)* also received a \$4.1M, 5-year R01 grant from NICHD, entitled “Next Generation Therapies for Fertility Preservation in Male Cancer Patients”
- *Lisa Rohan, PhD*, received a \$50K, 1-year University of Pittsburgh CTSI Grant, entitled “Q-GRFT Nasal Spray for SARS-COV2 Prevention”
- *Yoel Sadovsky, MD, and Adrian Morelli, MD, PhD*, received a \$2.66M, 5-year R01 grant from NIH/NIAID, entitled “Placental Extracellular Vesicles as Regulators of Maternal Adaptive Immunity”
- *Judy Yanowitz, PhD, with Michael Busczak, PhD (UT Southwestern)* received a \$1.85M, 4-year R01 grant from NIH/NIGMS, entitled “Role of GCNA in Preserving Genome Integrity and Fertility”
- *Judy Yanowitz, PhD*, also received a \$53K Administrative Supplement from NIH/NIGMS, entitled “Characterization of a Meiotic Crossover Surveillance System”

MWRI investigators’ notable accomplishments in their research and scholarly endeavors were acknowledged via the following honors and leadership service:

- *Mary Ackenbom, MD*, was elected as a member of American Urogynecologic Society Scientific Committee (15 members, 3-year role)
- *Miguel Brieno-Enriquez, MD, PhD*, was selected as a reviewer for the National Council of Science and Technology’s (Mexico) “Frontier Science 2019” and nominated as the guest editor for *Frontiers in Cell*

and Developmental Biology for the collection “Germ Cell Development and Reproductive Aging”

- *Ronald Buckanovich, MD, PhD*, served as the Editor of *Cancers* and as a standing member of the NIH Tumor Microenvironment study section
- *Janet Catov, PhD*, was reappointed to the Steering Committee of the NHLBI-funded multi-site cohort nuMoM2b Heart Healthy Study that has been renewed through 2027
- *Judy Chang, MD*, was selected as President Elect for the Academy of Communication in Healthcare
- *Catherine Chappell, MD*, was selected as a Scientific Program Committee member for the Infectious Diseases Society for Obstetrics and Gynecology
- *Richard Guido, MD*, served as the Chair of the Risk-Based Management project for the American Society for Colposcopy and Cervical Pathology (ASCCP), a project that develops national guidelines for the management of abnormal pap smear screening tests
- *Sharon Hillier, PhD*, served as the Chair for the Conference on Retroviruses and Opportunistic Infections, which brings together approximately 4000 scientists from around the world (virtually in 2020) to engage in research associated with HIV
- *Rui Liang, MD*, received the 2019 Pitt Ventures Chancellor’s Award
- *Steffi Oesterreich, PhD*, received the 2019 William E. Brown Outstanding MSTP [Medical Scientist Training Program] Mentor Award
- *Kyle Orwig, PhD*, served as Co-Chair of the Gordon Research Conference on Mammalian Reproduction at Mount Holyoke College
- *Robert Powers, PhD*, was appointed to the Preeclampsia Foundation’s Scientific Advisory Board
- *James Roberts, MD*, gave the keynote lecture for the 2019 Annual Meeting of the European Congress of the International Society for the Study of Hypertension in Pregnancy and was featured as a “Giant in Obstetrics and Gynecology” by the *American Journal of Obstetrics & Gynecology*
- *Lisa Rohan, PhD*, received the 2020 Outstanding Scholarly Contribution Award by the student members of the Alpha Omicron Chapter of the Rho Chi Society, and a “Pitt Innovator Award” at the 13th Annual Celebration of Innovation
- *Yoel Sadovsky, MD*, was invited to serve on the Advisory Council of the NIH’s Office of Research on Women’s Health (ORWH); gave the Graduate College Distinguished Lectureship, Nanyang Technological University, Singapore; and completed a 7-year term as Editor for the journal *Placenta*
- *Gerald Schatten, PhD*, gave the 2019 Mendel Medal Award and Lecture, “Would Gregor Mendel be Alarmed that Designer Babies Walk Among Us?”
- *Hyagriv Simhan, MD*, was appointed as a member of the Women and Children’s Health Advisory Council for March of Dimes
- *Sarah Taylor, MD*, received the American Society of Clinical Oncology’s Conquer Cancer Career Development Award
- *Judith Yanowitz, PhD*, was invited to serve on WormBoard, an advisory board to the “worm community” that develops and organizes key resources and meetings
- *Alexander Yatsenko, MD, PhD*, was reappointed as Co-Chair of the Communications and Public Affairs Committee, American Society of Andrology, and elected to the editorial board of the journal, *Andrology*
- *Svetlana Yatsenko, MD*, was selected as a member of the Education Committee, Cancer Genomics Consortium
- *Halina Zyczynski, MD*, served as the Female Pelvic Medicine and Reconstructive Surgery Subspecialty Representative to the American College of Obstetricians and Gynecologists Executive Board of Directors; was appointed the Medical Director of MWRI in Erie; was appointed to the Penn State Behrend Council of Fellows Board of Directors; and received the 2019 Polish Institute of Arts and Sciences of America Tadeusz Sendzimir Applied Sciences Award

GENDER EQUALITY IN RESEARCH

In UNESCO's 2016 report, "Science Report Towards 2030," it was noted that women only make up ~30% of the global researcher pool. While MWRI is centered on advancing research in women's health and cognizant of its impact on health worldwide, we are also proud of the gender representation at MWRI; 56% of our 106 faculty investigators are women, and our 72 primary faculty members are almost equally divided (37 women, 35 men). Our 2019-2020 publication data reflect similar equality in productivity: of our 228 publications, 138 were contributed by female faculty members, and 119 by male faculty (the overlap represents 29 publications in which both women and men contributed); women contributed as senior authors to 45 publications versus men contributing to 33 publications; and women contributed as any author to publications 162 times vs. men contributing 134 times. These data are further reinforced in salary equality between women and men, with the women's average 2018 salary 1% higher than men's at the associate professor level.

RESEARCH AREAS

Research programs at MWRI center on diverse aspects of reproductive biology and women's and infant's health. These include the following main areas:

Reproductive development

Research in this general area centers on early embryonic development, gonadal and germ cell genetics and epigenetics, development and differentiation, reproductive aging, and meiotic crossover recombination. Key researchers include Yaacov Barak, PhD; Miguel Brieno-Enriquez, MD, PhD; Tianjiao Chu, PhD; Mellissa Mann, PhD; Kyle Orwig, PhD; David Peters, PhD; Gerald Schatten, PhD; and Judith Yanowitz, PhD.

Overview

Research studies in this area encompass differentiation of human and nonhuman embryonic stem cells into germ cells; mechanisms of germ cell formation and differentiation, including centriole biology; adipogenesis and the novel role of key transcription factors in this process; and mechanisms of meiotic recombination and aneuploidy. Initiatives also include genetics; epigenetics; genomic imprinting; the molecular biology of gametes, embryos, and stem cells; the origins of developmental diseases; and the potential of stem cells and genome editing for treating human disease. The studies utilize diverse animal models, from worms to mice and nonhuman primates. Translational efforts emanating from such studies promote better understanding of male and female infertility; genetic determinants of reproductive aging; regeneration of gonadal and reproductive tract tissues; origin of aneuploidy; genomic imbalances; early embryonic development; and antecedents of chronic diseases.

Research advances

- *Yaacov Barak, PhD:* We developed a reverse-RXR α -knockout mouse, which enables placenta-specific ablation of retinoid X-receptor alpha – a model of placenta-driven congenital heart defects. We also made progress in understanding the roles of PPAR γ and its target gene *Muc1* in hypoxic adaptation and survival of trophoblasts. We discovered that PPAR γ , while critical for the viability and lipid droplet integrity of adipocytes, is dispensable for their differentiation and lipid accumulation; this finding challenges one of the longest-standing paradigms in the obesity/diabetes field.
- *Miguel Brieno-Enriquez, MD, PhD:* This year, our research found that, in the long-lived naked mole-rat (*Heterocephalus glaber*), the entire process of oogenesis occurs postnatally, which is in contrast to mouse, human, and other mammals, in which these processes occur *in utero*. Using pluripotency markers SOX2 and OCT4 (POU5F1) and primordial germ cell (PGC) marker BLIMP1 (PRDM1), we observed the presence of mitotically active PGCs in postnatal ovaries that led to an increase in the total

number of oocytes. These cells are relevant to repopulating the ovary after birth, opening a new avenue in the field of reproductive aging.

- *Melissa Mann, PhD*: We looked at the maintenance of three imprinted genes associated with imprinting disorders. Our data showed that, while artificial reproductive technologies (ARTs) alter imprinted methylation, advanced maternal age had no effect on imprinted methylation acquisition in oocytes or on imprinted methylation maintenance in blastocysts. These results support cautious optimism that advanced maternal age is not a contributing factor to imprinted methylation errors in embryos produced in the clinic. Furthermore, our data on the effects of ARTs strengthen the need to advance clinical methods to reduce imprinted methylation errors in *in vitro*-produced embryos.
- *Judith Yanowitz, PhD*: We discovered that the ancestral germ line protein, GCNA, has an evolutionarily conserved role in preserving genome integrity. Specifically, GCNA limits the formation of DNA-protein crosslinks, which are toxic lesions that ultimately lead to DNA breaks and chromosome missegregation.
- *Tianjiao Chu, PhD*: In collaboration with David Peters, we developed procedures for the deconvolution of the methylome of circulating DNA fragments from plasma samples. These procedures will facilitate non-invasive diagnosis of various diseases, using blood samples.
- *David Peters, PhD*: We have developed a novel approach to liquid biopsy which may lead to the development of non-invasive tests for diagnosis and phenotyping of silent disease progression.
- *Jerry Schatten, PhD*: We are examining the role of the microtubule-related proteins, Tau, as well as amyloid, in reproductive tissues, with the intent of learning whether reproductive tissues might serve as meaningful models for investigation of Alzheimer's disease and related dementias.
- *Svetlana Yatsenko, PhD*: My research projects are focused on the study of X chromosome alterations, aberrations involving non-coding regulatory sequences, and their contribution to intellectual disability, disorders of sex determination, ovarian and testicular failure, infertility, embryonic and fetal viability.

Pregnancy and newborn medicine

Research in this general area centers on prenatal genetics, feto-placental growth and development, abnormal fetal growth, preterm birth, maternal diseases during pregnancy, preeclampsia, obstetrical pharmacology, and newborn medicine. Key researchers include Yaacov Barak, PhD, Steve Caritis, MD, Janet Catov, PhD, Tianjiao Chu, PhD, Francesca Facco, MD, Maisa Feghali, MD, Kata Himes, MD, Carl Hubel, PhD, Elizabeth Krans, MD, Jacob Larkin, MD, Melissa Mann, PhD, Jean-Francois Mouillet, PhD, Yingshi Ouyang, PhD, David Peters, PhD, Robert Powers, PhD, James Roberts, MD, Yoel Sadovsky, MD, and Hyagriv Simhan, MD.

Overview

Research in the areas of embryogenesis, pregnancy, and pregnancy outcomes centers on normal and abnormal processes that shape maternal-fetal health. Investigators analyze diverse influences on the feto-placental genome and epigenome and on gene expression, including genomic imprinting, gene-environment interactions, nutrition, and the effect of drugs and medications during pregnancy. Building on these fundamental research trajectories, MWRI scientists collaborate with other scientists worldwide to study key pregnancy complications, such as preeclampsia, fetal growth restriction, preterm birth, and the neonatal, childhood, and lifelong complications stemming from these gestational diseases. Major initiatives include (a) the use of next-generation sequencing of first trimester maternal plasma DNA to provide improved diagnostic sensitivity and specificity over existing technologies; (b) the mechanistic link between placental development and the fetal heart; (c) preterm birth, including the long-term risk for cardiovascular disease of women who have had preterm birth; (d) cellular and molecular mechanisms of preeclampsia, as well as behavioral, epidemiological, and clinical components leading to the disorder; (e) the pathways by which preeclampsia may inform the unique pathophysiology of later-life cardiovascular disease in women; (f) molecular mechanisms, including genomic and microRNA (miRNA) pathways, underlying early and late placental development, differentiation, and adaptation

to cellular injury and the metabolic processes, such as ferroptosis, that are essential for micronutrient supply to the developing embryo; (g) small extracellular vesicle (sEVs, exosome)-based fetal-placental-maternal interaction to maintain homeostasis and deliver miRNAs that attenuate viral infections; (h) substance use disorders during pregnancy and postpartum; and (i) deep phenotyping in pregnancy, pregnancy outcome, and infant mortality.

We continue to advance our “9 months to 90 years” (9-90) research initiative, a collaboration with Richard King Mellon Foundation leadership and investigators at Pitt, University of Pennsylvania, Stanford University, and RAND Corporation to address pertinent questions related to infant mortality in our region. Drs. Sadovsky and Catov also partner with University of Pittsburgh’s Clinical and Translational Science Institute leadership on special populations and a women’s health practice-based research network. This collaboration involves special populations across the lifespan and provides key support for our Magee Obstetrical Maternal-Infant (MOMI) database and biobank.

Research advances

- *Janet Catov, PhD:* Our group has published evidence that maternal vascular malperfusion lesions in the placenta are a marker of microvascular impairments in other vascular beds 10 years after pregnancy. Our group has also published several reports that examine application of the new blood pressure guidelines early in pregnancy to detect risk of preeclampsia, offering a new opportunity to identify a group with stage 1 hypertension who have a two-fold risk of preeclampsia.
- *Stephen Emery, MD:* We have received a Notice of Allowance from the U.S. Patent and Trademark Office for our ventriculoamniotic shunt device (PITT 03579 - U.S. Patent Application Serial No. 15/765,72).
- *Maisa Feghali, MD:* There are significant differences in underlying pathophysiologic mechanisms of hyperglycemia in women with gestational diabetes that can be identified at the time of testing and are associated with differences in adverse pregnancy outcomes.
- *Carl Hubel, PhD:* At 1 year post-pregnancy, a history of preeclampsia accompanied by gestational hyperuricemia identifies a subset of women with microvascular aberrations, including reduced perfusion of the sublingual microvasculature (data unpublished).
- *Elizabeth Krans, MD:* Medication-assisted treatment is underutilized during pregnancy, which contributes to adverse maternal and neonatal health outcomes. In partnership with the American College of Obstetricians and Gynecologists, we created a patient safety bundle to optimize clinical care pathways in clinical settings to improve health outcomes for pregnant women with opioid use disorder and their children.
- *Robert Powers, PhD:* We have been investigating a unique mouse model of preeclampsia that exhibits pregnancy-specific hypertension and develops endothelium-dependent and -independent vascular dysfunction, and we have been able to moderate the pregnancy phenotype in this model with maternal citrulline supplementation. We have also investigated a model of pre-pregnancy chronic maternal stress and found that pre-pregnancy stress has significant effects on the physiology of pregnancy, including pregnancy-specific hypertension and vascular dysfunction.
- *James Roberts, MD:* We discovered that women with low PlGF in the second trimester of pregnancy had echocardiographic changes consistent with later-life cardiovascular disease. This was independent of pregnancy outcome.
- *Yoel Sadovsky, MD:* We discovered unique miRNA that are differentially expressed in small extracellular vesicles (sEVs) between healthy pregnant women and women with preeclampsia, and these differences were not evident in whole plasma samples, suggesting an advantage to sEV analyses in assessing pregnancy health. We also defined, for the first time, the role of ferroptosis in placental injury. We published a major review in *Science Translational Medicine* on “Systems biology of pregnancy: A unique

lens on wellness from 9 months to 90 years.”

- *Hyagriv Simhan, MD*: Our most exciting research advances in the past year are related to our work in hypertensive disorders of pregnancy and their consequences beyond pregnancy. We are leading participants in the NHBLI-supported Heart Health Study, which followed thousands of pregnant women from their first pregnancy for several years prospectively with respect to cardiovascular and metabolic disease phenotypes. We have demonstrated that several pregnancy complications in the first pregnancy are associated with the development of hypertension 2-7 years later, supporting the important recommendation that preventive care for women should include a detailed pregnancy history to aid in counseling about hypertension risk. We deployed our research to develop a nursing call center–driven blood pressure management and treatment algorithm, initiated for women with hypertensive disorders of pregnancy after hospital discharge until 6 weeks postpartum. This is a feasible, scalable remote monitoring program connected to the electronic medical record. This program has included 2000 women, to date.

Recent discoveries, patents, and IND applications

- Patent application by Stephen Emery, MD, and colleagues on ventriculoamniotic shunt for fetal aqueductal stenosis
- Patent applications by David Peters, PhD, with Tianjiao Chu, PhD, and colleagues on diagnosis of central nervous system disorders, fetal aneuploidy and/or sub-chromosomal fetal copy number, and computational filtering of methylated sequence data for predictive modeling

Infectious diseases

Research in this general area centers on vaginal microbicides, sexually transmitted HIV infections, reproductive tract infections, pharmaceuticals, and novel drug delivery technologies. Key researchers include Sharon Achilles, MD, PhD, Richard Beigi, MD, Rhonda Brand, PhD, Catherine Chappell, MD, Beatrice Chen, MD, Sharon Hillier, PhD, Lisa Rohan, PhD, and Harold Wiesenfeld, MD.

Overview

The study of reproductive infectious disease includes common infections, such as vaginitis, and sexually transmitted diseases, such as HIV. This research includes infections that occur during pregnancy and those that affect adolescents, women of reproductive age, and postmenopausal women. Current research ranges from basic studies into host-pathogen interactions, the impact of sexually transmitted diseases and other lower genital tract infections on the development of pelvic inflammatory disease, infertility, and identification of drug delivery systems designed to protect women or men from acquisition of sexually transmitted infections. A unique focus is the development of topical microbicides to prevent HIV in women and in men. Major initiatives include the *Microbicide Trials Network*, an HIV/AIDS clinical trials network, jointly sponsored by NICHD and NIAID, that brings together international investigators and community and industry partners devoted to preventing or reducing the sexual transmission of HIV through the development and evaluation of products applied topically to mucosal surfaces or administered orally. Many of these studies have been also supported by private foundations such as the Bill and Melinda Gates Foundation. In addition, the pharmaceuticals laboratory is dedicated to developing safe and effective products and identifying essential criteria for drug delivery systems, with a focus on the design of drug delivery systems targeted for prevention of HIV/AIDS.

Research advances

- *Sharon Achilles, MD, PhD*: We found increased HIV target cells and cervical inflammation temporally associated with Cu-IUD initiation. Use of hormonal contraception, including DMPA, did not increase cervical HIV target cells or inflammation. Although the copper IUD has often been used as a

nonhormonal contraceptive comparator, we demonstrated that it is not immunologically inert, particularly in the first 30 days following insertion, which is an important framework for data interpretation. Future work can focus on investigating biological mechanisms underlying the observed contraceptive-induced immune alterations, which benefit future contraceptive and multipurpose product development.

- *Rhonda Brand, PhD*: Over the past year, we have expanded our mucosal immunology research beyond our preclinical and Phase 1 clinical trials on potential new HIV prevention agents and delivery methods to include inflammatory bowel disease (IBD) and GI-related cancers. Using our *ex vivo* model of freshly obtained, human colorectal explants, which maintain local immune environment and intact tissue architecture, we determined that a combination of cytokines, chemokines, and pro-inflammatory agents differentiate between tissue from healthy volunteers and histologically normal-appearing biopsies from IBD and Lynch syndrome patients. Current work is focused on whether these findings can lead to targeted therapies.
- *Catherine Chappell, MD*: Long-acting reversible contraceptive methods (such as intrauterine devices and contraceptive implants) have higher continuation rates than short-acting reversible contraceptive methods (oral pills and injectables) among women enrolled in an HIV prevention study and living in sub-Saharan Africa. Long-acting reversible contraceptive methods should be routinely offered in the context of HIV prevention efforts.
- *Sharon Hillier, PhD*: Through the Microbicide Trials Network, we are conducting clinical trials focused on HIV prevention in South Africa, Uganda, Malawi, and Zimbabwe in adolescents as well as pregnant and breastfeeding women. We are also completing a trial of new product-delivery approaches for prevention of HIV among transgender people in Thailand, South America, South Africa, Malawi, and the U.S.
- *Lisa Rohan, PhD*: Our lab has developed an extended-release vaginal film for administration of an integrase inhibitor for HIV pre-exposure prophylaxis. We recently filed an IND with the FDA, which was accepted, and first in-human studies will begin in the upcoming months. Additionally, the enemas which we developed for rectal administration of a protein drug for HIV prevention were shown to be safe in the first in-human trials. This same drug is being developed by our lab as a nasal spray for use in the prevention of COVID-19. It is hoped that clinical trials will be initiated later this year.

Recent discoveries, patents, and IND applications

- Patents filed by Lisa Rohan, PhD, and Galit Regev, PhD, on vaginal films and hot melt extrusion for pharmaceutical vaginal film products
- A patent awarded to Lisa Rohan, PhD, and colleagues on griffithsin mutants

Gynecology

Research in this area centers on family planning, benign gynecological disorders, urogynecology, and pelvic floor dysfunction. Key researchers include Sharon Achilles, MD, PhD, Mary Ackenbom, MD, Megan Bradley, MD, Beatrice Chen, MD, Nicole Donnellan, MD, Richard Guido, MD, John Harris, MD, Rui Liang, MD, Faina Linkov, PhD, Pamela Moalli, MD, PhD, Harold Wiesenfeld, MD, and Halina Zyczynski, MD.

Overview

Gynecology research focuses on women's health from the earliest reproductive age through maturity. MWRI is one of the few research institutes in the country with a dedicated research center for family planning and the development of new contraceptive methods. Research is also intended to impact the use and availability of contraceptives worldwide. Pelvic floor biology and medicine is a key area of basic, translational, and clinical

research, and includes the identification of mechanisms that lead to pelvic floor health and dysfunction, the testing of synthetic meshes used for pelvic floor surgery, and the assessment of means to prevent pelvic floor injury. These studies target molecular, cellular, immunological, and biomechanical approaches to the decipherment of mechanisms of pelvic floor disorders. Studies are also designed to shed light on treatment and quality of life among women who suffer from pelvic floor disorders and the long-term outcomes of commonly used interventions to correct urinary and fecal incontinence. Clinical trials in neuromodulation of visceral function and uterine suspension as an alternative to hysterectomy for prolapse address patient preferences and gaps in informed consent. New initiatives target novel molecular mechanisms underlying the development of fibroids and surgical techniques for the treatment of fibroids using radiofrequency ablation.

Research advances

- *Mary Ackenbom, MD:* We found that one-third of older women who undergo prolapse surgery develop postoperative cognitive dysfunction. Preoperative counseling should include discussions on this potential adverse event, given its detrimental impact on postoperative recovery and independence.
- *Rui Liang, MD:* We found that diabetes is associated with macrophage dysfunction at the mesh-tissue interface, demonstrating a disturbed phenotypic transition from M1 to M2, an impaired efferocytosis and an aberrant production of cytokines/chemokines. The dysfunction may result from diabetes-induced epigenetic modifications in macrophages, which serve as a primary mechanism leading to an increased risk of developing urogynecologic mesh complications in diabetic women.
- *Halina Zyczynski, MD:* Our long-term follow-up on the clinical outcomes of transvaginal mesh prolapse procedures continues with colleagues of the NIH-established Pelvic Floor Disorders Network. We have completed the 5-year follow-up of women participating in the SUPeR trial of hysteropexy versus hysterectomy and look forward to publishing our findings to addend the 3-year outcomes published in *JAMA* in September 2019. These data will address the void identified by the FDA, surgeons, and patients in the recent mesh debates and product suspensions.

Recent discoveries, patents, and IND applications

- An invention discovery filed by Rui Liang, MD, on an engineered cell product to improve wound healing/implant outcomes in diabetic patients

Reproductive endocrinology and fertility

Research in this general area centers on female and male germ cell development, infertility, ovarian aging, fertility preservation, the hypothalamic-pituitary-gonadal axis, and gonadal biology. Key researchers include Marie Menke, MD, Kyle Orwig, PhD, Hanna Valli, PhD, William Walker, PhD, Alexander Yatsenko, MD, PhD, and Anthony Zeleznik, PhD.

Overview

MWRI researchers from this group interrogate the fundamental mechanisms that govern germ cell development and reproduction in mammalian species. Research ranges from the biochemical to the genetic and from *in vitro* cell biology to *in vivo* systems biology that spans mammalian evolution from rodents, through nonhuman primates, to humans. Inquiries include the developmental and molecular mechanisms that give rise to oogenesis and spermatogenesis in postnatal mammals. This includes a focus on spermatogonial stem cells in order to gain insight into how these cells maintain male fertility and how they might be exploited to regenerate spermatogenesis in cases of male infertility. It also includes an investigation into normal and premature ovarian aging. Researchers from this group are actively investigating the genetics of infertility and use high-throughput genetic screens of patient tissues designed to identify genetic lesions associated with infertile phenotypes. Current studies are designed to characterize the effects of cancer treatments on the germ cell and somatic/endocrine environments of ovaries and testes and to develop means to protect or restore fertility. Kyle

Orwig and his group continue to advance the Fertility Preservation Program, a collaborative effort that provides new options for preserving fertility in boys who may lose fertility because of treatments for cancer or other diseases, and the assessment of genome-editing tools for correction of mutations that are associated with male infertility, discovered by Alex Yatsenko.

Research advances

- *Marie Menke, MD:* We have been researching issues related to access to care and finishing up pilot studies on lipids and IVF care.
- *Kyle Orwig, PhD:* We produced a mouse model of human azoospermia by introducing the human mutation into the orthologous sequence of the mouse genome. An infertile phenotype in the Tex11D mutant mice validated the human variant and served as a model to develop a targeted gene therapy. Spermatogonial stem cells (SSCs) were isolated from the testes of Tex11D mice, CRISPR/Cas9 was used to correct mutant sequence, and gene-corrected SSCs were transplanted back into infertile recipient males. The corrected cells restored spermatogenesis with sperm that were competent to fertilize and produce healthy offspring.
- *William Walker, PhD:* We identified mechanisms by which male fertility is maintained by testosterone. We found that full male fertility and development of male accessory organs require both classical and non-classical testosterone signaling. We found that meiosis in male germ cells is dependent on classical testosterone signaling in Sertoli cells, and we identified essential gene targets in germ cells required for meiosis, which are regulated by testosterone.
- *Alexander Yatsenko, MD, PhD:* We successfully applied genomic sequencing for large-scale searches for genes responsible for severe forms of male infertility in many families. We performed a study of small genomic/structural aberrations to male infertility and demonstrated their significant contribution. We also identified a new gene candidate for human male infertility and, with colleagues, investigated its role in genome stability and meiosis.

Recent discoveries, patents, and IND applications

- An invention discovery filed by Kyle Orwig, PhD, Kien Tran, BS, and colleagues on a PDMS-roof trans-well organ culture system
- A patent filed by Kyle Orwig, PhD, and Brian Hermann, PhD, on an ultrasound-guided rete testis injection/aspiration device
- A patent filed by Kyle Orwig, PhD, Alex Yatsenko, MD, PhD, Aleks Rajkovic, MD, PhD, and Chatchanan Doungkamchan, MD, on gene therapy for treatment of infertility
- A patent filed by Kyle Orwig, PhD, Bryan Brown, PhD, and colleagues on the use of ovarian-derived hydrogels for restoration of reproductive function and health in women

Women's cancer

Research in this general area, under the umbrella of the Women's Cancer Research Center (a joint initiative of the University of Pittsburgh Cancer Institute and MWRI, housed in MWRI's research building), includes reproductive tract cancers and breast cancer. Key researchers include Ron Buckanovich, MD, PhD, Lan Coffman, MD, PhD, Robert Edwards, MD, Faina Linkov, PhD, Adrian Lee, PhD, Francesmary Modugno, PhD, Carola Neumann, PhD, Steffi Oesterreich, PhD, Anda Vlad, MD, PhD, Jennifer Xavier, PhD, and Mei Zhang, PhD.

Overview

MWRI's cancer biology team of basic, translational, and clinical researchers investigates the fundamental processes that lead to carcinogenesis in the female pelvic organs and the breast. The group includes fundamental research labs, gynecologic oncology academics, and surgeons whose collaborative work focuses on

the identification of biomarkers for pre-invasive or early-stage disease as predictors of severity, prognosis, and response to therapy. The group seeks to advance our understanding of disease pathogenesis in breast and gynecologic malignancies and to improve disease treatments through novel, integrated therapies. The Women's Cancer Research Center is designed to foster new research collaboration, technical and thematic synergy, education, and enhancement of community awareness. Major initiatives include the development of transgenic mouse models to study the pathogenesis of ovarian cancer; the unique role of steroid hormones and growth factors in the initiation and progression of breast and ovarian cancer; miRNA pathways that contribute to cancer, particularly in the context of tumor hypoxia; the role of host cells in promoting tumor growth and enhancing resistance to chemotherapy; the ability of the immune system to target cancer cells to prevent disease or induce disease regression; and the role of stem cells in the origin of cancer and cancer therapeutic resistance and metastasis.

A multicenter study, with investigators from Roswell Park Cancer Institute, Dana Farber Cancer Center, Memorial Sloan-Kettering Cancer Center, and others, continues to investigate factors associated with molecular signatures in female cancers. This and other initiatives enabled our researchers to participate in large, international studies such as the Cancer Genome Atlas and other cooperative research projects. Additionally, a Special Project of Research Excellence in Ovarian Cancer in collaboration with the Roswell Park Cancer Institute is focused on identifying novel immunologic approaches for the treatment of ovarian cancer. Two new investigator-initiated clinical trials, testing two new combination immune therapies, are currently ongoing.

Research advances

- *Ronald Buckanovich, MD, PhD:* We have identified a novel therapeutic approach to force cancer cells to remain dormant, thus offering the potential to prevent residual chemo-therapy resistant cancer cells from growing. Furthermore, we have identified a synergistic therapy that may eradicate these forced dormant cells.
- *Lan Coffman, MD, PhD:* We discovered that ovarian cancer epigenetically reprograms normal stroma cells into cancer-supportive stroma. This epigenetic reprogramming induces a mesenchymal-to-epithelial transition, which enables these cancer-educated stromal cells to tightly bind to cancer cells, leading to co-migration and enhancement of metastasis.
- *Richard Guido, MD:* The results of the cervical cancer risk-based management project were published in April 2020. This represents a paradigm shift in the management of abnormal cervical cancer screening. The results are not only risk based, but will be enduring. This process, which took 2 years, culminated in a two-session national consensus meeting held in June and October 2019.
- *Faina Linkov, PhD:* We recently analyzed data about pipelle biopsy failure rates, which is my most important accomplishment for the past half year.
- *Francesmary Modugno, PhD:* Together with colleagues at Brigham and Women's Hospital, we conducted the largest study to date of breastfeeding and ovarian cancer. Using data from case-control studies from three continents, we showed that breastfeeding is associated with reduced risk of ovarian cancer, and this protective effect was above and beyond pregnancy alone. The magnitude of the protective effect was almost as strong as pregnancy alone and longer duration increased the magnitude. We showed that breastfeeding for as little as 3 months was associated with reduced risk, and this association persisted for over 30 years. Our study further supports the positive health benefits of breastfeeding for both mother and baby and is another great reason to encourage and support breastfeeding for as long as the mother and baby desire.
- *Steffi Oesterreich, PhD:* We have performed comprehensive characterization of endocrine resistance in invasive lobular breast cancer, using unique model systems and clinical samples. We have identified a number of pathways that could be druggable, such as FGFR4.

- *Sarah Taylor, MD:* There are many barriers to completing BRCA genetic testing for ovarian cancer patients. We demonstrated that employing a tumor-testing strategy for completion of primary testing is a cost-effective way of circumventing many of the cited barriers to testing, which has large downstream implications for increasing cascade testing and being able to intervene with cancer risk–reduction strategies.
- *Anda Vlad, MD, PhD:* We identified several immune adjuvant effects of a new class of drugs called inhibitors of aldehyde dehydrogenase (ALDH1). These drugs have been previously studied for their capacity to inhibit ovarian tumor growth. Our data shows, for the first time, how ALDH1 can also increase efficacy of the immune system in fighting the tumors, pointing to their potential use as adjuvants to immunotherapy in ovarian cancer.

Recent discoveries, patents, and IND applications

- An invention discovery filed by Ron Buckanovich, MD, PhD, Anda Vlad MD, PhD, and Lan Coffman, MD, PhD, on hedgehog inhibition as an adjuvant to immune therapy
- A patent filed by Carola Neumann, PhD, and colleagues on electrophiles and electrophile pro-drugs as Rad51 inhibitors
- A patent filed by Robert Edwards, MD, Anda Vlad, MD, PhD, Xin Huang, PhD, and Swati Suryawanshi, PhD, on plasma miRNA biomarkers for endometriosis and endometriosis-associated ovarian cancer
- Patents filed by David Peters, PhD, with Tianjiao Chu, PhD, and colleagues on assessment and treatment of endometriosis, ovarian cancer, and necrotizing enterocolitis

Women's health services

Research in this general area centers on health services outcomes, patient-provider communication, behavioral health, quality-of-life measures, medical decision making, and community-based participatory research. Key investigators include Judy Chang, MD, Beatrice Chen, MD, John Harris, MD, Elizabeth Krans, MD, and Faina Linkov, PhD.

Overview

MWRI investigators perform health services and behavioral health research in the context of women's health. Health services research uses multidisciplinary approaches to examine the interaction of healthcare services and the populations and individuals affected by those services. This includes substance use among pregnant women, with a special focus on the current opioid epidemic, and the evaluations of best practices for improving the quality and cost-effectiveness of women's care and health services delivery, with special emphasis on development and testing of care models for nursing home residents with obesity. Ongoing projects include studies of intimate-partner violence, obesity, substance use, adolescent sexual health decision-making, parent-child communication about sexual health education, and the relationship between body weight and sexual risk behaviors. Patient-provider communication studies are designed to facilitate understanding of the communication approaches, elements, and styles that contribute to better patient health understanding, positive behavior change, informed medical decision-making, and improved health outcomes.

Research advances

- *Judy Chang, MD:* In our ethnographic study of communities with higher than average rates of opioid overdose deaths, we noted that the concept of stigma extended to the community level and impacted the larger community's recognition, understanding, and willingness to respond to the opioid crisis within it. We also identified a gulf in perceptions of pharmacologic therapies for opioid use disorder and whether these treatments are considered acceptable "cures."
- *John Harris, MD:* We are learning how people with severe obesity who are adequately cared for in a

home setting receive a much lower quality of care in nursing homes. While resources (equipment and staff) are much higher in nursing homes, the impersonal nature of care and lower risk tolerance of nursing home care leads to a great degradation in satisfaction among the care recipient and family.

EDUCATION

The field of reproductive biology is in need of bright, creative, productive, and energetic new scholars who can advance knowledge in the areas of reproductive development, physiology, and reproductive diseases. These scholars can capitalize on genomics, informatics, and “big data” technologies to illuminate unsolved questions in basic, translational, and clinical women’s health sciences. As one of the largest academic institutions in our field, we seek to capture the imagination of young scholars and train the next generation of researchers in the area of reproductive sciences and women’s health. This year we have bolstered our training programs at all levels of academic development, as detailed below.

Faculty training

We have two NIH K12-funded programs which center on early faculty career development. The first program, Building Interdisciplinary Research Careers in Women’s Health (BIRCWH), is a University of Pittsburgh program that supports the development of young faculty members as independent investigators in translational, clinical, epidemiologic, or health services research along a woman’s lifespan. The program, directed by Yoel Sadovsky, MD, is designed for faculty with appointments within the University of Pittsburgh’s six schools of the health sciences, whether MDs or PhDs, and has been a tremendous success. This year, the program hosted three scholars: Alisse Hauspurg, MD (OBGYN Maternal-Fetal Medicine), Katherine Grace Lim, MD (Anesthesiology) and Catherine Chappell, MD (OBGYN Infectious Diseases) who transitioned from the program on June 30, 2020. BIRCWH looks forward to welcoming Amanda Artsen, MD, in FY21.

The second K12 program, the Women's Reproductive Health Research (WRHR) program, led by Robert Edwards, MD, and Janet Catov, PhD, is designed to prepare outstanding OBGYN junior MD faculty for productive and exciting investigative careers in reproductive biology and biomedical research, emphasizing basic or translational research that is directly relevant to reproductive biology. This year, the program hosted Mary Ackenbom, MD, and Sarah Taylor, MD. Additional faculty supported by training or early investigator awards include Miguel Brieno-Enriquez, PhD, supported by the Magee Auxiliary Research Scholar (MARS) Award, Maisa Feghali, MD, supported by the University of Pittsburgh’s Clinical and Translational Scholars Program (NIH KL2) and a bridge award from the Foundation for the Society for maternal-Fetal Medicine/American Board of OBGYN, and Christina Megli, supported by the Reproductive Scientist Development Program (RSDP-K12).

Postdoctoral training

Three non-Federal funding streams supported MWRI’s trainees in FY20. Thanks to a generous donation by Tony Zeleznik, PhD, MWRI established a Faculty Fellowship Fund to provide funding for a third scholar in the MWRI Postdoctoral Fellowship. The Magee-Womens Hospital Auxiliary provided funding for two fellows under the Bright STAR program. Steve Caritis, MD, has established an endowed research fund for OBGYN residents and MFM fellows, which will provide \$25K annually for mentored research in pregnancy. This year, MWRI also launched a Research and Education Pilot Grant Funding Program for faculty and postdocs, providing up to \$50K for 1-2 years; we look forward to appointing our first scholars under this program in FY21. Kyle Orwig, PhD, continues to run the NIH-funded T32 training grant, Reproductive Development from Gonads to Fetuses (RDGF), supported two predoctoral and two postdoctoral trainees this year.

MWRI scholars were supported by competitive training awards, including:

- Alexander Cole, PhD (postdoctoral fellow, Ron Buckanovich's lab), supported by a \$75K, 1-year grant from the Ovarian Cancer Research Alliance, entitled "Investigating Regulators of Quiescence in Epithelial Ovarian Cancer"
- Katrina Knight, PhD (postdoctoral fellow mentored by Pamela Moalli, MD, PhD), supported by a \$31K, 1-year award from Tephra, Inc. on "Evaluation of the Mechanical Strength and Porosity of Poly-4-hydroxybutyrate (P4HB) Mesh" and a \$12,500, 6-month award from Caldera on "Desara Sling System: Cold Cut vs Heat Cut"
- Kavita Vinekar, MD (clinical fellow, Family Planning), supported by an 18-month, \$15K award from the Society for Family Planning Research, entitled "CRiSIS: CPC Regulations in States – Implications for Services – A Spatial Analysis and Mystery Caller Study"
- Cristina Quesada Candela, PhD (postdoctoral fellow, Judy Yanowitz's lab), received a \$200K, 2-year grant from the Buck Institute for her project "Proteasomal Targets Driving Meiotic Failure During Reproductive Aging"

Resident and clinical fellows training

Our Clinical Trainee Research Award provides financial support for the research activities of residents and clinical fellows based at Magee-Womens Hospital. It promotes research education by training them to prepare and write grant applications that include a hypothesis, a study design (including sample size), a budget, and a method for protecting research subjects. This year, the program funded four projects: Rachel Beverley, MD (Reproductive Endocrinology and Infertility Fellow), "Age-related Changes in Cohesin in Adult Human Oocytes"; Alexandra Buffie, MD (OBGYN-RS Resident), "Reducing Anxiety and Increasing Acceptance of Screen-and-Treat Methods for Cervical Intraepithelial Neoplasia in Kisumu, Kenya"; Stephanie Glass Clark, MD (Female Pelvic Medicine and Reconstructive Surgery Fellow), "Impact of L3SP on Normalization of Enlarged Genital Hiatus After Minimally Invasive Sacrocolpopexy: A Randomized Controlled Trial"; and Yasaswi Kislovskiy, MD (Reproductive Infectious Diseases and Immunology Fellow), "Understanding STD Risk, Contraceptive Choices, and Stigma from the Perspective of Individuals Who Participate in Sex in Exchange for Money, Favors, Goods or Services."

Graduate training

MWRI graduate students have a unique opportunity to take part in the process of translating fundamental laboratory bench discoveries in the field of reproductive sciences to the bedside. MWRI researchers have become members of several graduate programs within the University of Pittsburgh. Judy Yanowitz, PhD, is the coursemaster for the University's Interdisciplinary Biomedical Graduate Program's *Reproductive Development* course, and several MWRI investigators lecture in this and Pitt's Molecular Genetics and Developmental Biology Program's *Developmental Mechanisms of Human Disease* courses. Nineteen of MWRI's 72 primary investigators are members of graduate programs within the University of Pittsburgh.

College and high school programs

The College Student Summer Internship Program provides students with the opportunity to participate in basic, translational, or clinical scientific research, with the goal of stimulating them to engage in reproductive sciences research. This highly successful 8-week program continues to attract students from western Pennsylvania and beyond. Similarly, our 4-week high school program provides current high school juniors and seniors with early education in science related to women's and infants' health. In addition to research, trainees in the two programs enjoy informal lunch meetings, at which investigators discuss biomedical science as a career. We look forward to reinitiating these programs, which were cancelled in 2020 due to COVID, next year. We are also happy to report that Judy Yanowitz, PhD, recently received a \$10,000 administrative supplement to support undergraduate trainee's research on her grant, "Characterization of a Meiotic Crossover Surveillance System."

MWRI's national training programs

Sponsored through three R25 grants from the NIH's National Cancer Institute and National Institute on Aging, MWRI's Gerald Schatten, PhD, has engaged in national programs designed to train promising scientists, including physician-scientists, from predominately underrepresented communities in sophisticated technologies, using pluripotent stem cells for clinically relevant discoveries in aging and cancer. The programs, entitled "Frontiers in Alzheimer's and Aging Research," "Frontiers in Stem Cells in Cancer," and "Frontiers in Addiction Research and Pregnancy," include advanced dynamic training courses that provide a fresh series of daily lectures on emerging concepts, followed by extended discussion, laboratory research, technologically intense workshops, and informal seminars over week-long periods. The institutions include Morehouse School of Medicine (Georgia), Ponce Medical School (Puerto Rico), Xavier University (Louisiana), and San Diego State University (California). In the coming year, Dr. Schatten anticipates launching another novel research and mentoring program and expanding research activities, especially in Alzheimer's and aging in the Native American community.

MWRI Research Day in Reproductive Biology and Women's Health

The Annual Research Day was instituted to provide our trainees with the opportunity to present their research to faculty and staff from MWRI, Magee-Womens Hospital, and University of Pittsburgh and to raise the level of awareness, within the broader academic community, of our programs in women's and infants' health research. We regret that MWRI's Annual Research Day, focusing on "Big Data" and our ongoing collaborative annual conference series with the University of Pittsburgh's CTSI on "Reducing Health Disparities Across the Lifespan" were postponed due to COVID-19 measures. Key presentations from the planned day will be included in our hybrid virtual/in-person MWRI retreat this coming fall.

MWRI's Research Retreat

MWRI's Research Retreat focused on sex and gender differences and representation of women in research, with a unique application to reproductive sciences. The day included keynote lectures by Sabra Klein (Johns Hopkins University) on "Gender Differences in Immune Response and Infection" and Wendy Kohrt (University of Colorado and a BIRCWH mentor) on "Exercise and Metabolic Action of Sex Steroids." The interdisciplinary platform of the retreat incorporated presentations by University of Pittsburgh faculty outside the health sciences sphere: Lise Versterlund (Economics) spoke on "How Unrewarded Work Derails Women's Careers – and Ways to Fix That," and Bridget Keown (Gender, Sexuality & Women's Studies) spoke on "Stories that Make Statistics: Structural Issues, Traumatic Births and Maternal Mortality." Panel discussions included "Creating an Inclusive Environment" and "Advocating for Women's Health Research in the Current Political Climate."

MAGEE SUMMIT

We are in the midst of intense preparations for our second Summit on May 26-27, 2021. As before, Dr. Sadovsky, Michael Annichine, and the leadership team are working jointly, and pursuing novel models for our next event. At the present time, because of the COVID-19 pandemic, we are constructing a hybrid model, designed to accommodate speakers and participants who wish to attend our event in person and those who will attend virtually. Our main goal remains to serve as a premier forum for scientific exchange, disseminating knowledge, inspiring innovative thinking, stimulating junior scholars to pursue research in this area, advancing community engagement, and promoting Magee-Womens' prominence regionally, nationally, and globally. The 2021 "Magee-Womens Summit: Scientific Pathways to Health," will focus on three key themes of wellness: (a) *Healthy Beginnings*, exploring novel approaches designed to foster systems-oriented transdisciplinary research and personalized interventions that may vastly affect health and wellness during pregnancy; (b) *Shaping Metabolism*, assessing metabolic programs and the mechanisms involved in altered metabolism, a central force in regulating development, growth, activity, and reproductive function; and (c) *Healthy Mind Through*

Transitions, focusing on cognition, learning, stress, sleep, memory, and changes of these parameters across the lifespan. We will continue our tradition of the \$1 million Magee Prize, designed to foster global collaboration among researchers to spark medical innovation in reproductive biology and women's health.

FINAL NOTES

This year, Dr. Janet Catov worked with Mr. Annichine and Dr. Edwards to promote new collaborative research interactions with UPMC-Hamot, designed to extend the MOMI Database and Biobank to this region. Drs. Catov and Sadovsky are also leading our initiative to bolster our Women's Health Practice-Based Research Network (WH-PBRN) and expand a network of practices that are available for research by Pitt researchers. Additionally, through funding by the Richard King Mellon Foundation and others, MWRI collaborates with researchers from Children's Hospital in Philadelphia, Stanford University, and Rand Corporation in the use of our MOMI-based information, electronic health records, and patient reports to build a health profile that may allow the identification of pregnancies at risk of diseases that impact infant mortality and morbidity. This year also saw the launch of new research initiatives in Erie under the leadership of Halina Zyczynski, MD, and plans are ongoing to conduct our fall MWRI retreat in Erie, with inclusion of a possible hybrid platform. MWRI-Erie will also serve as a platform for new collaborations with researchers at Penn State Behrend.

While FY20 has brought new challenges related to the COVID-19 pandemic, MWRI continues to advance our mission. Our investigators, staff, and trainees have been flexible and creative in their approaches to continue discoveries, interactions with clinical research participants, and learning. Several investigators are pursuing new lines of research in the COVID domain, which we hope to report on in FY21. Within this context, we center primarily on new means to deliver COVID-19 prophylaxis, understand the effect of SARS-CoV-2 on sperm production, placental function, and placental response to SARS-CoV-2, evaluate the pandemic's impact on high-risk expectant mothers, the psychosocial impacts of being pregnant during the COVID-19 pandemic, and care adaptations in nursing homes

MWRI has long recognized the exquisite impact that the health of one population group, women, can have on the health of us all, the importance of inclusivity of vulnerable populations in research, and the diversity of disease processes across population groups. In the coming year, we will be searching for opportunities to be more inclusive, not only in our research populations, but in our actual body of researchers. As we interact with the University of Pittsburgh, our community, and our colleagues in the coming year, we look forward to enriching our programs as we promote greater diversity, equity, and inclusion in our field.

MWRI's research themes provide a unique platform, where fundamental questions relevant to reproductive biology and women's health are pursued using basic, translational, and clinical research tools. We strive to develop robust transdisciplinary research programs that further our understanding of diseases that affect women and their newborns and to train the next generation of scholars in our rapidly developing field. For more information, please view our website at www.mageewomens.org.

Publications – Magee-Womens Research Institute

Reproductive development

1. Amrit FRG, Naim N, Ratnappan R, Loose J, Mason C, Steenberge L, McClendon BT, Wang G, Driscoll M, **Yanowitz JL**, Ghazi A. The longevity-promoting factor, TCER-1, widely represses stress resistance and innate immunity. *Nat Commun* 2019;10:3042. PMID31316054. PMC6637209. doi:10.1038/s41467-019-10759-z.

2. Morimoto H, Kanatsu-Shinohara M, **Orwig KE**, Shinohara T. Expression and functional analyses of ephrin type-A receptor 2 in mouse spermatogonial stem cells. *Biol Reprod* 2020;102:220-32. PMID31403678. doi:10.1093/biolre/ioz156.
3. **Simerly CR**, Takahashi D, Jacoby E, Castro C, Hartnett C, Hewitson L, Navara C, **Schatten G**. Fertilization and cleavage axes differ in primates conceived by conventional (IVF) versus intracytoplasmic sperm injection (ICSI). *Sci Rep* 2019;9:15282. PMID31653971. PMC6814755. doi:10.1038/s41598-019-51815-4.
4. Kindsfather AJ, Czekalski MA, Pressimone CA, Erisman MP, **Mann MRW**. Perturbations in imprinted methylation from assisted reproductive technologies but not advanced maternal age in mouse preimplantation embryos. *Clin Epigenetics* 2019;11:162. PMID31767035. PMC6878706. doi:10.1186/s13148-019-0751-9.
5. Barrenada O, Fernandez-Perez D, Larriba E, **Brieno-Enriquez M**, Del Mazo J. Diversification of piRNAs expressed in PGCs and somatic cells during embryonic gonadal development. *RNA Biol* 2020.1-15. PMID32375541. doi:10.1080/15476286.2020.1757908.
6. Robinette TM, Nicholatos JW, Francisco AB, Brooks KE, Diao RY, Sorbi S, Ricca V, Nacmias B, **Brieno-Enriquez MA**, Libert S. SIRT1 accelerates the progression of activity-based anorexia. *Nat Commun* 2020;11:2814. PMID32499508. PMC7272424. doi:10.1038/s41467-020-16348-9.
7. Shami AN, Zheng X, Munyoki SK, Ma Q, Manske GL, Green CD, Sukhwani M, **Orwig KE**, Li JZ, Hammoud SS. Single-cell RNA sequencing of human, macaque, and mouse testes uncovers conserved and divergent features of mammalian spermatogenesis. *Dev Cell* 2020. PMID32504559. doi:10.1016/j.devcel.2020.05.010.
8. Janisiw E, Raices M, Balmir F, Paulin LF, Baudrimont A, von Haeseler A, **Yanowitz JL**, Jantsch V, Silva N. Poly(ADP-ribose) glycohydrolase coordinates meiotic DNA double-strand break induction and repair independent of its catalytic activity. *Nat Commun* 2020;11:4869. PMID32978394. PMC7519143. doi:10.1038/s41467-020-18693-1.

Pregnancy

1. Hauspurg A, Parry S, Mercer BM, Grobman W, Hatfield T, Silver RM, Parker CB, Haas DM, Iams JD, Saade GR, Wapner RJ, Reddy UM, **Simhan H**. Blood pressure trajectory and category and risk of hypertensive disorders of pregnancy in nulliparous women. *Am J Obstet Gynecol* 2019;221:277 e1- e8. PMID31255629. PMC6732036. doi:10.1016/j.ajog.2019.06.031.
9. Monk C, Webster RS, McNeil RB, Parker CB, Catov JM, Greenland P, Bairey Merz CN, Silver RM, **Simhan HN**, Ehrenthal DB, Chung JH, Haas DM, Mercer BM, Parry S, Polito L, Reddy UM, Saade GR, Grobman WA, nuMoM2b N, Networks NnbHHS. Associations of perceived prenatal stress and adverse pregnancy outcomes with perceived stress years after delivery. *Arch Womens Ment Health* 2020;23:361-9. PMID31256258. PMC6935433. doi:10.1007/s00737-019-00970-8.
10. Dyer MR, Alexander W, Hassoune A, Chen Q, Brzoska T, Alvikas J, Liu Y, Haldeman S, Plautz W, Loughran P, Li H, Boone B, **Sadovsky Y**, Sundd P, Zuckerbraun BS, Neal MD. Platelet-derived extracellular vesicles released after trauma promote hemostasis and contribute to DVT in mice. *J Thromb Haemost* 2019;17:1733-45. PMID31294514. PMC6773503. doi:10.1111/jth.14563.
11. **Krans EE**, Campopiano M, Cleveland LM, Goodman D, Kilday D, Kendig S, Leffert LR, Main EK, Mitchell KT, O'Gurek DT, D'Oria R, McDaniel D, Terplan M. National Partnership for Maternal Safety: Consensus bundle on obstetric care for women with opioid use disorder. *Obstet Gynecol* 2019;134:365-75. PMID31306323. doi:10.1097/AOG.0000000000003381.
12. **Emery SP**, Narayanan S, Greene S. Fetal aqueductal stenosis: Prenatal diagnosis and intervention. *Prenat Diagn* 2020;40:58-65. PMID31306500. doi:10.1002/pd.5527.
13. Burton GJ, Redman CW, **Roberts JM**, Moffett A. Pre-eclampsia: Pathophysiology and clinical implications. *BMJ* 2019;366:l2381. PMID31307997. doi:10.1136/bmj.l2381.

14. Koczo A, Marino A, **Jeyabalan A**, Elkayam U, Cooper LT, Fett J, Briller J, Hsich E, Blauwet L, McTiernan C, Morel PA, Hanley-Yanez K, McNamara DM, Investigators I. Breastfeeding, cellular immune activation, and myocardial recovery in peripartum cardiomyopathy. *JACC Basic Transl Sci* 2019;4:291-300. PMID31312753. PMC6609998. doi:10.1016/j.jacbts.2019.01.010.
15. Margolis L, **Sadovsky Y**. The biology of extracellular vesicles: The known unknowns. *PLoS Biol* 2019;17:e3000363. PMID31318874. PMC6667152 member of a Clinical Expert Advisory Panel to Illumina, Inc. doi:10.1371/journal.pbio.3000363.
16. **Caritis SN**, Panigrahy A. Opioids affect the fetal brain: reframing the detoxification debate. *Am J Obstet Gynecol* 2019;221:602-8. PMID31323217. doi:10.1016/j.ajog.2019.07.022.
17. **Barak Y**, Hemberger M, Sucov HM. Phases and mechanisms of embryonic cardiomyocyte proliferation and ventricular wall morphogenesis. *Pediatr Cardiol* 2019;40:1359-66. PMID31342113. PMC6786952. doi:10.1007/s00246-019-02164-6.
18. Bergman L, Torres-Vergara P, Penny J, Wikstrom J, Nelander M, Leon J, Tolcher M, **Roberts JM**, Wikstrom AK, Escudero C. Investigating maternal brain alterations in preeclampsia: the need for a multidisciplinary effort. *Curr Hypertens Rep* 2019;21:72. PMID31375930. doi:10.1007/s11906-019-0977-0.
19. Plunkett BA, Sandoval G, Bailit JL, Reddy UM, Wapner RJ, Varner MW, Thorp JM, Jr., **Caritis SN**, Prasad M, Tita ATN, Saade GR, Sorokin Y, Rouse DJ, Blackwell SC, Tolosa JE, Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units N. Association of labor with neonatal respiratory outcomes at 36-40 weeks of gestation. *Obstet Gynecol* 2019;134:495-501. PMID31403604. PMC6794151. doi:10.1097/AOG.0000000000003415.
20. Cortes YI, **Catov JM**, Brooks M, El Khoudary SR, Thurston RC, Matthews KA, Isasi CR, Jackson EA, Barinas-Mitchell E. Pregnancy-related events associated with subclinical cardiovascular disease burden in late midlife: SWAN. *Atherosclerosis* 2019;289:27-35. PMID31446211. PMC6952268. doi:10.1016/j.atherosclerosis.2019.07.012.
21. **Facco FL**, Lopata V, Wolsk JM, Patel S, Wisniewski SR. Can we use home sleep testing for the evaluation of sleep apnea in obese pregnant women? *Sleep Disord* 2019;2019:3827579. PMID31467725. PMC6699256. doi:10.1155/2019/3827579.
22. Silver RM, Hunter S, Reddy UM, **Facco F**, Gibbins KJ, Grobman WA, Mercer BM, Haas DM, **Simhan HN**, Parry S, Wapner RJ, Louis J, Chung JM, Pien G, Schubert FP, Saade GR, Zee P, Redline S, Parker CB, Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be S. Prospective evaluation of maternal sleep position through 30 weeks of gestation and adverse pregnancy outcomes. *Obstet Gynecol* 2019;134:667-76. PMID31503146. PMC6768734. doi:10.1097/AOG.0000000000003458.
23. Lavelle ES, Alam P, Meister M, Florian-Rodriguez M, Elmer-Lyon C, Kowalski J, Carter-Brooks C, Mazloomdoost D, **Zyczynski H**, Lowder J, Gutman R, Sutkin G. Antibiotic Prophylaxis during catheter-managed postoperative urinary retention after pelvic reconstructive surgery: A randomized controlled trial. *Obstet Gynecol* 2019;134:727-35. PMID31503155. doi:10.1097/AOG.0000000000003462.
24. Hauspurg A, Lemon LS, Quinn BA, Binstock A, **Larkin J**, **Beigi RH**, Watson AR, **Simhan HN**. A postpartum remote hypertension monitoring protocol implemented at the hospital level. *Obstet Gynecol* 2019;134:685-91. PMID31503166. doi:10.1097/AOG.0000000000003479.
25. Haragan AF, Zuwalla CA, **Himes KP**. Online information about periviable birth: Quality assessment. *JMIR Pediatr Parent* 2019;2:e12524. PMID31518325. PMC6716431. doi:10.2196/12524.
26. Krishnamurti T, Davis AL, **Simhan HN**. Worrying yourself sick? Association between pre-eclampsia onset and health-related worry in pregnancy. *Pregnancy Hypertens* 2019;18:55-7. PMID31525710. doi:10.1016/j.preghy.2019.09.003.
27. Bodnar LM, **Himes KP**, Hutcheon JA. Optimal gestational weight gain. *JAMA* 2019;322:1106-7. PMID31529002. PMC7257993. doi:10.1001/jama.2019.10946.

28. Glover AV, Battarbee AN, Gyamfi-Bannerman C, Boggess KA, Sandoval G, Blackwell SC, Tita ATN, Reddy UM, Jain L, Saade GR, Rouse DJ, Iams JD, Clark EAS, Chien EK, Peaceman AM, Gibbs RS, Swamy GK, Norton ME, Casey BM, **Caritis SN**, Tolosa JE, Sorokin Y, Manuck TA, Eunice Kennedy Shriver National Institute of Child Health Human Development Maternal-Fetal Medicine Units N. Association between features of spontaneous late preterm labor and late preterm birth. *Am J Perinatol* 2020;37:357-64. PMID31529452. PMC7058482. doi:10.1055/s-0039-1696641.
29. McClain L, Farrell L, LaSorda K, Pan LA, **Peters D**, Lim G. Genetic associations of perinatal pain and depression. *Mol Pain* 2019;15:1744806919882139. PMID31552780. PMC6796201. doi:10.1177/1744806919882139.
30. Haas DM, Parker CB, Marsh DJ, Grobman WA, Ehrenthal DB, Greenland P, Bairey Merz CN, Pemberton VL, Silver RM, Barnes S, McNeil RB, Cleary K, Reddy UM, Chung JH, Parry S, Theilen LH, Blumenthal EA, Levine LD, Mercer BM, **Simhan H**, Polito L, Wapner RJ, **Catov J**, Chen I, Saade GR, Study NnbHH. Association of adverse pregnancy outcomes with hypertension 2 to 7 years postpartum. *J Am Heart Assoc* 2019;8:e013092. PMID31564189. PMC6806043. doi:10.1161/JAHA.119.013092.
31. Mesner O, Davis A, Casman E, **Simhan H**, Shalizi C, Keenan-Devlin L, Borders A, Krishnamurti T. Using graph learning to understand adverse pregnancy outcomes and stress pathways. *PLoS One* 2019;14:e0223319. PMID31568495. PMC6768465 following competing interests: Drs. Krishnamurti, Davis, and Simhan are co-founders of Naima Health LLC and hold a patent pending (PCT/US2017/056632, filed October 13, 2017) entitled ""A structured medical data classification system for monitoring and remediating treatment risks." This does not alter our adherence to PLOS ONE policies on sharing data and materials. doi:10.1371/journal.pone.0223319.
32. Dias MAB, De Oliveira L, **Jeyabalan A**, Payne B, Redman CW, Magee L, Poston L, Chappell L, Seed P, von Dadelszen P, **Roberts JM**, Group PR. PREPARE: protocol for a stepped wedge trial to evaluate whether a risk stratification model can reduce preterm deliveries among women with suspected or confirmed preterm pre-eclampsia. *BMC Pregnancy Childbirth* 2019;19:343. PMID31590640. PMC6781345. doi:10.1186/s12884-019-2445-x.
33. Bodnar LM, **Himes KP**, Abrams B, Lash TL, Parisi SM, Eckhardt CL, Braxter BJ, Minion S, Hutcheon JA. Gestational weight gain and adverse birth outcomes in twin pregnancies. *Obstet Gynecol* 2019;134:1075-86. PMID31599828. PMC6814560. doi:10.1097/AOG.0000000000003504.
34. Redman EK, Hauspurg A, **Hubel CA**, **Roberts JM**, **Jeyabalan A**. Clinical course, associated factors, and blood pressure profile of delayed-onset postpartum preeclampsia. *Obstet Gynecol* 2019;134:995-1001. PMID31599846. PMC6922052. doi:10.1097/AOG.0000000000003508.
35. Yazer MH, Delaney M, Doughty H, Dunbar NM, Al-Riyami AZ, Triulzi DJ, Watchko JF, Wood EM, Yahalom V, **Emery SP**. It is time to reconsider the risks of transfusing RhD negative females of childbearing potential with RhD positive red blood cells in bleeding emergencies. *Transfusion* 2019;59:3794-9. PMID31625172. doi:10.1111/trf.15569.
36. Koppes E, Shaffer B, Sadovsky E, **Himes K**, **Barak Y**, **Sadovsky Y**, **Chaillet JR**. Klf14 is an imprinted transcription factor that regulates placental growth. *Placenta* 2019;88:61-7. PMID31675530. doi:10.1016/j.placenta.2019.09.013.
37. Vollger MR, Logsdon GA, Audano PA, Sulovari A, Porubsky D, Peluso P, Wenger AM, Concepcion GT, Kronenberg ZN, Munson KM, Baker C, Sanders AD, Spierings DCJ, Lansdorp PM, **Surti U**, Hunkapiller MW, Eichler EE. Improved assembly and variant detection of a haploid human genome using single-molecule, high-fidelity long reads. *Ann Hum Genet* 2020;84:125-40. PMID31711268. PMC7015760. doi:10.1111/ahg.12364.
38. Katheria A, Reister F, Essers J, Mendler M, Hummler H, Subramaniam A, Carlo W, Tita A, Truong G, Davis-Nelson S, Schmolzer G, Chari R, Kaempf J, Tomlinson M, Yanowitz T, Beck S, **Simhan H**, Dempsey E, O'Donoghue K, Bhat S, Hoffman M, Faksh A, Arnell K, Rich W, Finer N, Vaucher Y, Khanna P, Meyers M, Varner M, Allman P, Szychowski J, Cutter G. Association of umbilical cord milking vs delayed umbilical

- cord clamping with death or severe intraventricular hemorrhage among preterm infants. *JAMA* 2019;322:1877-86. PMID31742630. PMC6865839. doi:10.1001/jama.2019.16004.
39. Wu X, Zhang H, Miah MK, **Caritis SN**, Venkataramanan R. Physiologically based pharmacokinetic approach can successfully predict pharmacokinetics of citalopram in different patient populations. *J Clin Pharmacol* 2020;60:477-88. PMID31750550. doi:10.1002/jcph.1541.
 40. Blue NR, Hoffman M, Allshouse AA, Grobman WA, **Simhan HN**, Turan OM, Parry S, Chung JH, Reddy U, Haas DM, Myers S, Mercer B, Saade GR, Silver RM. Antenatal fetal adrenal measurements at 22 to 30 weeks' gestation, fetal growth restriction, and perinatal morbidity. *Am J Perinatol* 2019. PMID31756754. doi:10.1055/s-0039-3400308.
 41. Parry S, Leite R, Esplin MS, Bukowski R, Zhang H, Varner M, Andrews WW, Saade GR, Ileakis J, Reddy UM, Huang H, **Sadovsky Y**, Blair IA, Biggio J, Eunice Kennedy Shriver National Institute of Child H, Human Development G, Proteomic Network for Preterm Birth R. Cervicovaginal fluid proteomic analysis to identify potential biomarkers for preterm birth. *Am J Obstet Gynecol* 2020;222:493 e1- e13. PMID31758918. PMC7196033. doi:10.1016/j.ajog.2019.11.1252.
 42. Hauspurg A, Countouris ME, **Catov JM**. Hypertensive disorders of pregnancy and future maternal health: How can the evidence guide postpartum management? *Curr Hypertens Rep* 2019;21:96. PMID31776692. doi:10.1007/s11906-019-0999-7.
 43. Cheng SB, Nakashima A, Huber WJ, Davis S, Banerjee S, Huang Z, Saito S, **Sadovsky Y**, Sharma S. Pyroptosis is a critical inflammatory pathway in the placenta from early onset preeclampsia and in human trophoblasts exposed to hypoxia and endoplasmic reticulum stressors. *Cell Death Dis* 2019;10:927. PMID31804457. PMC6895177. doi:10.1038/s41419-019-2162-4.
 44. Gondwe T, Betha K, Kusneniwar GN, Bunker CH, Tang G, **Simhan H**, Haggerty CL. Adverse infant outcomes associated with caesarean section delivery in India. *Int Health* 2019. PMID31819983. doi:10.1093/inthealth/ihz111.
 45. McClain L, Segreti AM, Nau S, Shaw P, Finegold DN, Pan LA, **Peters DG**. Chromosome 15q13.3 microduplications are associated with treatment refractory major depressive disorder. *Genes Brain Behav* 2019.e12628. PMID31828948. doi:10.1111/gbb.12628.
 46. Sutton EF, Gemmel M, **Powers RW**. Nitric oxide signaling in pregnancy and preeclampsia. *Nitric Oxide* 2020;95:55-62. PMID31852621. doi:10.1016/j.niox.2019.11.006.
 47. Gondwe T, Betha K, Kusneniwar GN, Bunker CH, Tang G, **Simhan H**, Reddy PS, Haggerty CL. Maternal factors associated with mode of delivery in a population with a high cesarean section rate. *J Epidemiol Glob Health* 2019;9:252-8. PMID31854166. doi:10.2991/jegh.k.191017.001.
 48. Nakashima A, Cheng SB, Ikawa M, Yoshimori T, Huber WJ, Menon R, Huang Z, Fierce J, Padbury JF, **Sadovsky Y**, Saito S, Sharma S. Evidence for lysosomal biogenesis proteome defect and impaired autophagy in preeclampsia. *Autophagy* 2019.1-15. PMID31856641. doi:10.1080/15548627.2019.1707494.
 49. Khawajkie Y, Mechtouf N, Nguyen NMP, Rahimi K, Breguet M, Arseneau J, Ronnett BM, Hoffner L, Lazure F, Arnaud M, Peers F, Tan L, Rafea BA, Aguinaga M, Horowitz NS, Ao A, Tan SL, Brown R, Buckett W, **Surti U**, Hovanes K, Sahoo T, Sauthier P, Slim R. Comprehensive analysis of 204 sporadic hydatidiform moles: revisiting risk factors and their correlations with the molar genotypes. *Mod Pathol* 2020;33:880-92. PMID31857680. doi:10.1038/s41379-019-0432-4.
 50. Lemon LS, Bodnar LM, Garrard W, Venkataramanan R, Platt RW, Marroquin OC, **Caritis SN**. Ondansetron use in the first trimester of pregnancy and the risk of neonatal ventricular septal defect. *Int J Epidemiol* 2020;49:648-56. PMID31860078. doi:10.1093/ije/dyz255.
 51. **Caritis SN**, Venkataramanan R. Naltrexone use in pregnancy: a time for change. *Am J Obstet Gynecol* 2020;222:1-2. PMID31883574. doi:10.1016/j.ajog.2019.08.041.

52. Countouris ME, Holzman C, Althouse AD, Snyder GG, Barinas-Mitchell E, Reis SE, **Catov JM**. Lactation and maternal subclinical atherosclerosis among women with and without a history of hypertensive disorders of pregnancy. *J Womens Health (Larchmt)* 2020. PMID31895649. doi:10.1089/jwh.2019.7863.
53. **Roberts JM**, Countouris ME. Letter by Roberts and Countouris regarding article, "Impact of the 2017 ACC/AHA Guideline for high blood pressure on evaluating gestational hypertension-associated risks for newborns and mothers". *Circ Res* 2020;126:e3-e4. PMID31895656. doi:10.1161/CIRCRESAHA.119.316346.
54. Hu J, Ou Z, **Surti U**, Kochmar S, Hoffner L, Madan-Khetarpal S, Arnold GL, Walsh L, Acquaro R, Sebastian J, **Yatsenko SA**. Four children with postnatally diagnosed mosaic trisomy 12: Clinical features, literature review, and current diagnostic capabilities of genetic testing. *Am J Med Genet A* 2020;182:813-22. PMID31913574. doi:10.1002/ajmg.a.61482.
55. Premkumar A, Debbink MP, Silver RM, Haas DM, **Simhan HN**, Wing DA, Parry S, Mercer BM, Iams J, Reddy UM, Saade G, Grobman WA. Association of acculturation with adverse pregnancy outcomes. *Obstet Gynecol* 2020;135:301-9. PMID31923068. PMC7054005. doi:10.1097/AOG.0000000000003659.
56. Zhang H, Bastian JR, Zhao W, Chen H, Shaik IH, Chaphekar N, **Caritis SN**, Venkataramanan R. Pregnancy alters CYP- and UGT-mediated metabolism of buprenorphine. *Ther Drug Monit* 2020;42:264-70. PMID31929398. doi:10.1097/FTD.0000000000000724.
57. Grobman WA, Sandoval G, Reddy UM, Tita ATN, Silver RM, Mallett G, Hill K, Rice MM, El-Sayed YY, Wapner RJ, Rouse DJ, Saade GR, Thorp JM, Jr., Chauhan SP, Iams JD, Chien EK, Casey BM, Gibbs RS, Srinivas SK, Swamy GK, **Simhan HN**, Macones GA, Eunice Kennedy Shriver National Institute of Child H, Human Development Maternal-Fetal Medicine Units N. Health resource utilization of labor induction versus expectant management. *Am J Obstet Gynecol* 2020;222:369 e1- e11. PMID31930993. PMC7141954. doi:10.1016/j.ajog.2020.01.002.
58. **Himes KP**, Bodnar LM. Validation of criteria to identify severe maternal morbidity. *Paediatr Perinat Epidemiol* 2020. PMID31951038. doi:10.1111/ppe.12610.
59. Brands J, **Hubel CA**, Althouse A, Reis SE, Pacella JJ. Noninvasive sublingual microvascular imaging reveals sex-specific reduction in glycocalyx barrier properties in patients with coronary artery disease. *Physiol Rep* 2020;8:e14351. PMID31960625. PMC6971307. doi:10.14814/phy2.14351.
60. Paquette AG, Hood L, Price ND, **Sadovsky Y**. Deep phenotyping during pregnancy for predictive and preventive medicine. *Sci Transl Med* 2020;12. PMID31969484. doi:10.1126/scitranslmed.aay1059.
61. Shridhar V, **Chu T**, **Simhan H**, Shaw PA, **Peters DG**. High-resolution analysis of the human placental DNA methylome in early gestation. *Prenat Diagn* 2020;40:481-91. PMID31981376. doi:10.1002/pd.5618.
62. Yu YH, Filion KB, Bodnar LM, Brooks MM, Platt RW, **Himes KP**, Naimi AI. Visualization tool of variable selection in bias-variance tradeoff for inverse probability weights. *Ann Epidemiol* 2020;41:56-9. PMID31982245. doi:10.1016/j.annepidem.2019.12.006.
63. Li H, **Ouyang Y**, Sadovsky E, Parks WT, **Chu T**, **Sadovsky Y**. Unique microRNA signals in plasma exosomes from pregnancies complicated by preeclampsia. *Hypertension* 2020;75:762-71. PMID31983308. PMC7076905. doi:10.1161/HYPERTENSIONAHA.119.14081.
64. **Emery SP**, Lopa S, Waters JH. Impact of intrauterine transfusion on fetal coagulation physiology by thromboelastography. *Prenat Diagn* 2020;40:585-9. PMID31994748. doi:10.1002/pd.5651.
65. Parks WT, **Catov JM**. The placenta as a window to maternal vascular health. *Obstet Gynecol Clin North Am* 2020;47:17-28. PMID32008667. doi:10.1016/j.ogc.2019.10.001.
66. Lee W, Mack LM, Sangi-Haghpeykar H, Gandhi R, Wu Q, Kang L, **Canavan TP**, Gatina R, Schild RL. Fetal weight estimation using automated fractional limb volume with 2-dimensional size parameters: A multicenter study. *J Ultrasound Med* 2020. PMID32022946. doi:10.1002/jum.15224.
67. Yu YH, Bodnar LM, **Himes KP**, Brooks MM, Naimi AI. Association of overweight and obesity development between pregnancies with stillbirth and infant mortality in a cohort of multiparous women. *Obstet Gynecol* 2020;135:634-43. PMID32028483. PMC7147965. doi:10.1097/AOG.0000000000003677.

68. Son M, Lai Y, Bailit J, Reddy UM, Wapner RJ, Varner MW, Thorp JM, Jr., **Caritis SN**, Prasad M, Tita ATN, Saade G, Sorokin Y, Rouse DJ, Blackwell SC, Tolosa JE, Eunice Kennedy Shriver National Institute of Child H, Human Development Maternal-Fetal Medicine Units N. Association between time of day and the decision for an intrapartum cesarean delivery. *Obstet Gynecol* 2020;135:535-41. PMID32028489. doi:10.1097/AOG.0000000000003707.
69. Dude A, Fette LM, Reddy UM, Tita ATN, Silver RM, El-Sayed YY, Wapner RJ, Rouse DJ, Saade GR, Thorp JM, Jr., Chauhan SP, Iams JD, Chien EK, Casey BM, Srinivas SK, Swamy GK, **Simhan HN**, Eunice Kennedy Shriver National Institute of Child H, Human Development Maternal-Fetal Medicine Units N. Maternal sense of control during childbirth and infant feeding method. *Obstet Gynecol* 2020;135:583-90. PMID32028504. PMC7036026. doi:10.1097/AOG.0000000000003697.
70. Barone Gibbs B, Paley JL, Jones MA, Whitaker KM, Connolly CP, **Catov JM**. Validity of self-reported and objectively measured sedentary behavior in pregnancy. *BMC Pregnancy Childbirth* 2020;20:99. PMID32046663. PMC7014698. doi:10.1186/s12884-020-2771-z.
71. Allias F, Mechtouf N, Gaillot-Durand L, Hoffner L, Hajri T, Devouassoux-Shisheboran M, Massardier J, Golfier F, Bolze PA, **Surti U**, Slim R. A novel NLRP7 protein-truncating mutation associated with discordant and divergent p57 immunostaining in diploid biparental and triploid digynic moles. *Virchows Arch* 2020. PMID32055942. doi:10.1007/s00428-020-02769-w.
72. Sun B, Parks WT, **Simhan HN**, Bertolet M, **Catov JM**. Early pregnancy immune profile and preterm birth classified according to uteroplacental lesions. *Placenta* 2020;89:99-106. PMID32056560. doi:10.1016/j.placenta.2019.12.007.
73. Harville EW, Lewis CE, **Catov JM**, Jacobs DR, Jr., Gross MD, Gunderson EP. A longitudinal study of pre-pregnancy antioxidant levels and subsequent perinatal outcomes in black and white women: The CARDIA Study. *PLoS One* 2020;15:e0229002. PMID32059045. PMC7021312. doi:10.1371/journal.pone.0229002.
74. Bodnar LM, Cartus AR, Kirkpatrick SI, **Himes KP**, Kennedy EH, **Simhan HN**, Grobman WA, Duffy JY, Silver RM, Parry S, Naimi AI. Machine learning as a strategy to account for dietary synergy: an illustration based on dietary intake and adverse pregnancy outcomes. *Am J Clin Nutr* 2020. PMID32108865. doi:10.1093/ajcn/nqaa027.
75. McClain LL, Shaw P, Sabol R, Chedia AM, Segretti AM, Rengasamy M, Finegold DN, Pan L, **Peters DG**. Rare variants and biological pathways identified in treatment-refractory depression. *J Neurosci Res* 2020;98:1322-34. PMID32128872. doi:10.1002/jnr.24609.
76. Costantine MM, Smith K, Thom EA, Casey BM, Peaceman AM, Varner MW, Sorokin Y, Reddy UM, Wapner RJ, Boggess K, Tita ATN, Rouse DJ, Sibai B, Iams JD, Mercer BM, Tolosa JE, **Caritis SN**, VanDorsten JP, Eunice Kennedy Shriver National Institute of Child H, Human Development Maternal-Fetal Medicine Units Network BMD. Effect of thyroxine therapy on depressive symptoms among women with subclinical hypothyroidism. *Obstet Gynecol* 2020;135:812-20. PMID32168208. PMC7103482. doi:10.1097/AOG.0000000000003724.
77. Dude AM, Kominiarek MA, Haas DM, Iams J, Mercer BM, Parry S, Reddy UM, Saade G, Silver RM, **Simhan H**, Wapner R, Wing D, Grobman W. Weight gain in early, mid, and late pregnancy and hypertensive disorders of pregnancy. *Pregnancy Hypertens* 2020;20:50-5. PMID32172170. doi:10.1016/j.preghy.2020.03.001.
78. Blue NR, Grobman WA, **Larkin JC**, Scifres CM, **Simhan HN**, Chung JH, Saade GR, Haas DM, Wapner R, Reddy UM, Mercer B, Parry SI, Silver RM. Customized versus population growth standards for morbidity and mortality risk stratification using ultrasonographic fetal growth assessment at 22 to 29 weeks' gestation. *Am J Perinatol* 2020. PMID32198743. doi:10.1055/s-0040-1705114.
79. Bodnar LM, Khodyakov D, **Himes KP**, Burke JG, Parisi S, Hutcheon JA. Engaging patients and professionals to evaluate the seriousness of maternal and child health outcomes: Protocol for a modified Delphi study. *JMIR Res Protoc* 2020;9:e16478. PMID3222699. doi:10.2196/16478.

80. Krishnamurti T, **Simhan HN**, Borrero S. Competing demands in postpartum care: A national survey of U.S. providers' priorities and practice. *BMC Health Serv Res* 2020;20:284. PMID32252757. PMC7137294. doi:10.1186/s12913-020-05144-2.
81. Rice LW, Cedars MI, **Sadovsky Y**, Siddiqui NY, Teal SB, Wright JD, Zorbas A, Del Carmen MG. Increasing NIH funding for academic departments of obstetrics and gynecology: a call to action. *Am J Obstet Gynecol* 2020. PMID32272090. doi:10.1016/j.ajog.2020.03.022.
82. Battarbee AN, Sandoval G, Grobman WA, Reddy UM, Tita ATN, Silver RM, El-Sayed YY, Wapner RJ, Rouse DJ, Saade GR, Chauhan SP, Iams JD, Chien EK, Casey BM, Gibbs RS, Srinivas SK, Swamy GK, **Simhan HN**, Eunice Kennedy Shriver National Institute of Child Health Human Development Maternal-Fetal Medicine Units N. Maternal and neonatal outcomes associated with amniotomy among nulliparous women undergoing labor induction at term. *Am J Perinatol* 2020. PMID32299106. doi:10.1055/s-0040-1709464.
83. Lim G, LaSorda KR, Farrell LM, McCarthy AM, **Facco F**, Wasan AD. Obstetric pain correlates with postpartum depression symptoms: a pilot prospective observational study. *BMC Pregnancy Childbirth* 2020;20:240. PMID32321455. PMC7178606. doi:10.1186/s12884-020-02943-7.
84. Baumgartner T, Bhamidipalli SS, Guise D, Daggy J, Parker CB, Westermann M, Parry S, Grobman WA, Mercer BM, **Simhan HN**, Silver RM, Wapner RJ, Saade GR, Reddy UM, Haas DM, nuMo Mbs. Psychosocial and sociodemographic contributors to breastfeeding intention in first-time mothers. *Matern Child Health J* 2020. PMID32335805. doi:10.1007/s10995-020-02928-0.
85. Lane-Cordova AD, Gunderson EP, Greenland P, **Catov JM**, Lewis CE, Pettee Gabriel K, Wellons MF, Carnethon MR. Life-course reproductive history and cardiovascular risk profile in late mid-life: The CARDIA study. *J Am Heart Assoc* 2020;9:e014859. PMID32366209. doi:10.1161/JAHA.119.014859.
86. Sutton EF, Gemmel M, Brands J, Gallaher MJ, **Powers RW**. Paternal deficiency of complement component C1q leads to a preeclampsia-like pregnancy in wild-type female mice and vascular adaptations postpartum. *Am J Physiol Regul Integr Comp Physiol* 2020;318:R1047-R57. PMID32374620. doi:10.1152/ajpregu.00353.2019.
87. Leszko M, Keenan-Devlin L, Adam EK, Buss C, Grobman W, **Simhan H**, Wadhwa P, Mroczek DK, Borders A. Are personality traits associated with smoking and alcohol use prior to and during pregnancy? *PLoS One* 2020;15:e0232668. PMID32421742. doi:10.1371/journal.pone.0232668.
88. Haas DM, Mahnke B, Yang Z, Guise D, Daggy J, **Simhan HN**, Silver RM, Grobman WA, Wapner RJ, Makhoul J, Parry S, Mercer BM, Saade GR. Profile of reported alcohol, tobacco, and recreational drug use in nulliparous women. *Obstet Gynecol* 2020;135:1281-8. PMID32459419. PMC7263351. doi:10.1097/AOG.0000000000003826.
89. Bramham K, Villa PM, Joslin JR, Laivuori H, Hamalainen E, Kajantie E, Raikkonen K, Pesonen A, Seed P, Dalton RN, Turner C, Wong M, Von Dadelszen P, **Roberts JM**, Poston L, Chappell LC. Predisposition to superimposed preeclampsia in women with chronic hypertension: endothelial, renal, cardiac, and placental factors in a prospective longitudinal cohort. *Hypertens Pregnancy* 2020.1-10. PMID32479208. doi:10.1080/10641955.2020.1769643.
90. **Roberts JM**, Countouris M. White coat hypertension in pregnancy: The challenge of combining inconsistent data. *Hypertension* 2020;76:35-7. PMID32520624. doi:10.1161/HYPERTENSIONAHA.120.15056.
91. Sutton EF, Rogan SC, Lopa S, Sharbaugh D, Muldoon MF, **Catov JM**. Early pregnancy blood pressure elevations and risk for maternal and neonatal morbidity. *Obstet Gynecol* 2020. PMID32541286. doi:10.1097/AOG.0000000000003885.
92. **Sadovsky Y**, Mesiano S, Burton GJ, Lampl M, Murray JC, Freathy RM, Mahadevan-Jansen A, Moffett A, Price ND, Wise PH, Wildman DE, Snyderman R, Paneth N, Capra JA, Nobrega MA, **Barak Y**, Muglia LJ, Burroughs Wellcome Fund Pregnancy Think Tank Working G. Advancing human health in the decade ahead: pregnancy as a key window for discovery: A Burroughs Wellcome Fund Pregnancy Think Tank. *Am J Obstet Gynecol* 2020;223:312-21. PMID32565236. PMC7303037. doi:10.1016/j.ajog.2020.06.031.

93. **Catov JM**, Sun B, Bertolet M, Snyder GG, Lewis CE, Allen NB, Shikany JM, Ingram KH, Appiah D, Gunderson EP. Changes in cardiometabolic risk factors before and after gestational diabetes: A prospective life-course analysis in CARDIA women. *Obesity (Silver Spring)* 2020;28:1397-404. PMID32627948. PMC7501158. doi:10.1002/oby.22848.
94. Miga KH, Koren S, Rhie A, Vollger MR, Gershman A, Bzikadze A, Brooks S, Howe E, Porubsky D, Logsdon GA, Schneider VA, Potapova T, Wood J, Chow W, Armstrong J, Fredrickson J, Pak E, Tigyi K, Kremitzki M, Markovic C, Maduro V, Dutra A, Bouffard GG, Chang AM, Hansen NF, Wilfert AB, Thibaud-Nissen F, Schmitt AD, Belton JM, Selvaraj S, Dennis MY, Soto DC, Sahasrabudhe R, Kaya G, Quick J, Loman NJ, Holmes N, Loose M, **Surti U**, Risques RA, Graves Lindsay TA, Fulton R, Hall I, Paten B, Howe K, Timp W, Young A, Mullikin JC, Pevzner PA, Gerton JL, Sullivan BA, Eichler EE, Phillippy AM. Telomere-to-telomere assembly of a complete human X chromosome. *Nature* 2020;585:79-84. PMID32663838. PMC7484160. doi:10.1038/s41586-020-2547-7.
95. Clymer D, Kostadinov S, **Catov J**, Skvarca L, Pantanowitz L, Cagan J, LeDuc P. Decidual vasculopathy identification in whole slide images using multiresolution hierarchical convolutional neural networks. *Am J Pathol* 2020;190:2111-22. PMID32679230. doi:10.1016/j.ajpath.2020.06.014.
96. Sun B, Bertolet M, Brooks MM, **Hubel CA**, Lewis CE, Gunderson EP, **Catov JM**. Life course changes in cardiometabolic risk factors associated with preterm delivery: The 30-Year CARDIA study. *J Am Heart Assoc* 2020;9:e015900. PMID32696706. doi:10.1161/JAHA.119.015900.
97. Madhi SA, Polack FP, Piedra PA, Munoz FM, Trenholme AA, Simoes EAF, Swamy GK, Agrawal S, Ahmed K, August A, Baqui AH, Calvert A, Chen J, Cho I, Cotton MF, Cutland CL, Englund JA, Fix A, Gonik B, Hammit L, Heath PT, de Jesus JN, Jones CE, Khalil A, Kimberlin DW, Libster R, Llapur CJ, Lucero M, Perez Marc G, Marshall HS, Masenya MS, Martinon-Torres F, Meece JK, Nolan TM, Osman A, Perrett KP, Plested JS, Richmond PC, Snape MD, Shakib JH, Shinde V, Stoney T, Thomas DN, Tita AT, Varner MW, Vatish M, Vrbicky K, Wen J, Zaman K, Zar HJ, Glenn GM, Fries LF, Prepare Study (inc. Sadovsky Y) G. Respiratory syncytial virus vaccination during pregnancy and effects in infants. *N Engl J Med* 2020;383:426-39. PMID32726529. PMC7299433. doi:10.1056/NEJMoa1908380.
98. Chauhan SP, Rice MM, Grobman WA, Bailit J, Reddy UM, Wapner RJ, Varner MW, Thorp JM, Jr., **Caritis SN**, Prasad M, Tita ATN, Saade GR, Sorokin Y, Rouse DJ, Tolosa JE, Eunice Kennedy Shriver National Institute of Child H, Human Development Maternal-Fetal Medicine Units N. Neonatal and maternal composite adverse outcomes among low-risk nulliparous women compared with multiparous women at 39-41 weeks of gestation. *Obstet Gynecol* 2020;136:450-7. PMID32769638. PMC7483669. doi:10.1097/AOG.0000000000003951.
99. Cortes YI, Conant R, **Catov JM**, Matthews KA, Crawford SL, Hedderston MM, Thurston RC. Impact of nulliparity, hypertensive disorders of pregnancy, and gestational diabetes on vasomotor symptoms in midlife women. *Menopause* 2020. PMID32796290. doi:10.1097/GME.0000000000001628.
100. Battarbee AN, Ros ST, Esplin MS, Biggio J, Bukowski R, Parry S, Zhang H, Huang H, Andrews W, Saade G, **Sadovsky Y**, Reddy UM, Varner MW, Manuck TA, Eunice Kennedy Shriver National Institute of Child H, Human Development G, Proteomics Network for Preterm Birth R. Optimal timing of antenatal corticosteroid administration and preterm neonatal and early childhood outcomes. *Am J Obstet Gynecol* 2020;2. PMID32905377. PMC7469940. doi:10.1016/j.ajogmf.2019.100077.
101. D'Alton ME, Rood KM, Smid MC, **Simhan HN**, Skupski DW, Subramaniam A, Gibson KS, Rosen T, Clark SM, Dudley D, Iqbal SN, Paglia MJ, Duzyj CM, Chien EK, Gibbins KJ, Wine KD, Bentum NAA, Kominiares MA, Tuuli MG, Goffman D. Intrauterine vacuum-induced hemorrhage-control device for rapid treatment of postpartum hemorrhage. *Obstet Gynecol* 2020;136:882-91. PMID32909970. PMC7575019. doi:10.1097/AOG.0000000000004138.
102. El-Sayed YY, Rice MM, Grobman WA, Reddy UM, Tita ATN, Silver RM, Mallett G, Hill K, Thom EA, Wapner RJ, Rouse DJ, Saade GR, Thorp JM, Jr., Chauhan SP, Chien EK, Casey BM, Gibbs RS, Srinivas SK, Swamy GK, **Simhan HN**, Macones GA, Eunice Kennedy Shriver National Institute of Child H, Human Development

- Maternal-Fetal Medicine Units N. Elective labor induction at 39 weeks of gestation compared with expectant management: factors associated with adverse outcomes in low-risk nulliparous women. *Obstet Gynecol* 2020;136:692-7. PMID32925628. PMC7529933. doi:10.1097/AOG.0000000000004055.
103. Silver RM, Rice MM, Grobman WA, Reddy UM, Tita ATN, Mallett G, Hill K, Thom EA, El-Sayed YY, Wapner RJ, Rouse DJ, Saade GR, Thorp JM, Jr., Chauhan SP, Chien EK, Casey BM, Gibbs RS, Srinivas SK, Swamy GK, **Simhan HN**, Macones GA, Eunice Kennedy Shriver National Institute of Child H, Human Development Maternal-Fetal Medicine Units N. Customized probability of vaginal delivery with induction of labor and expectant management in nulliparous women at 39 weeks of gestation. *Obstet Gynecol* 2020;136:698-705. PMID32925634. doi:10.1097/AOG.0000000000004046.
 104. Holzman CB, Senagore P, Xu J, Dunietz GL, Strutz KL, Tian Y, Bullen BL, Eagle M, **Catov JM**. Maternal risk of hypertension 7-15 years after pregnancy: clues from the placenta. *BJOG* 2020. PMID32931608. doi:10.1111/1471-0528.16498.
 105. **Ouyang Y**, **Mouillet JF**, Sorkin A, **Sadovsky Y**. Trophoblastic extracellular vesicles and viruses: Friends or foes? *Am J Reprod Immunol* 2020.e13345. PMID32939907. doi:10.1111/aji.13345.
 106. Li H, Pinilla-Macua I, **Ouyang Y**, Sadovsky E, Kajiwarra K, Sorkin A, **Sadovsky Y**. Internalization of trophoblastic small extracellular vesicles and detection of their miRNA cargo in P-bodies. *J Extracell Vesicles* 2020;9:1812261. PMID32944196. PMC7480505. doi:10.1080/20013078.2020.1812261.
 107. Ekeke P, Mendez DD, **Yanowitz TD**, **Catov JM**. Racial differences in the biochemical effects of stress in pregnancy. *Int J Environ Res Public Health* 2020;17. PMID32977397. PMC7579659. doi:10.3390/ijerph17196941.

Infectious diseases

108. Regev G, **Patel SK**, **Moncla BJ**, Twist J, Devlin B, **Rohan LC**. Novel application of hot melt extrusion for the manufacturing of vaginal films containing microbicide candidate dapivirine. *AAPS PharmSciTech* 2019;20:239. PMID31243640. doi:10.1208/s12249-019-1442-8.
109. Neary M, **Chappell CA**, Scarsi KK, Nakalema S, Matovu J, **Achilles SL**, **Chen BA**, Siccardi M, Owen A, Lamorde M. Effect of patient genetics on etonogestrel pharmacokinetics when combined with efavirenz or nevirapine ART. *J Antimicrob Chemother* 2019;74:3003-10. PMID31299074. PMC6753484. doi:10.1093/jac/dkz298.
110. Palanee-Phillips T, Brown ER, Szydlo D, Matovu Kiweewa F, Pather A, Harkoo I, Nair G, Soto-Torres L, **Hillier SL**, Baeten JM, Team M-AS. Risk of HIV-1 acquisition among South African women using a variety of contraceptive methods in a prospective study. *AIDS* 2019;33:1619-22. PMID31306167. PMC6636847. doi:10.1097/QAD.0000000000002260.
111. Gong T, **Patel SK**, Parniak MA, Ballou B, **Rohan LC**. Nanocrystal formulation improves vaginal delivery of CSIC for HIV prevention. *AAPS PharmSciTech* 2019;20:286. PMID31410664. doi:10.1208/s12249-019-1503-z.
112. Thurman A, Cunningham T, Fichorova R, Herold BC, **Hillier SL**, Chandra N, Doncel GF. A phase I randomized safety study of a single-size silicone rubber diaphragm used with or without a lactic-acid-containing diaphragm gel. *Contraception* 2019;100:430-7. PMID31442441. doi:10.1016/j.contraception.2019.06.004.
113. **Hillier SL**. The need for better evidence to support probiotics for vaginitis. *BJOG* 2020;127:300. PMID31446672. doi:10.1111/1471-0528.15910.
114. **Chappell CA**, **Achilles SL**. Drug interactions: not just for orally administered drugs. *Lancet HIV* 2019;6:e563-e4. PMID31498104. PMC7262782. doi:10.1016/S2352-3018(19)30185-7.
115. McKinley D, **Patel SK**, Regev G, **Rohan LC**, Akil A. Delineating the effects of hot-melt extrusion on the performance of a polymeric film using artificial neural networks and an evolutionary algorithm. *Int J Pharm* 2019;571:118715. PMID31560958. PMC6891106. doi:10.1016/j.ijpharm.2019.118715.

116. Baeten JM, Hendrix CW, **Hillier SL**. Topical microbicides in HIV prevention: State of the promise. *Annu Rev Med* 2020;71:361-77. PMID31613684. doi:10.1146/annurev-med-090518-093731.
117. Wiringa AE, Ness RB, Darville T, **Beigi RH**, Haggerty CL. *Trichomonas vaginalis*, endometritis and sequelae among women with clinically suspected pelvic inflammatory disease. *Sex Transm Infect* 2019. PMID31719170. doi:10.1136/sextrans-2019-054079.
118. Matubu A, **Hillier SL**, Meyn LA, Stoner KA, Mhlanga F, Mbizvo M, Maramba A, Chirenje ZM, **Achilles SL**. Depot medroxyprogesterone acetate and norethisterone enanthate differentially impact T-cell responses and expression of immunosuppressive markers. *Am J Reprod Immunol* 2020;83:e13210. PMID31729087. doi:10.1111/aji.13210.
119. Reddy K, Kelly C, Brown ER, Jeenarain N, Naidoo L, Siva S, Bekker LG, Nair G, Makanani B, Chinula L, Mgodini N, Chirenje Z, Kiweewa FM, Marrazzo J, **Bunge K**, Soto-Torres L, Piper J, Baeten JM, Palanee-Phillips T, Mtn A, Teams M-VS. Use of the dapivirine vaginal ring and effect on cervical cytology abnormalities. *AIDS* 2020;34:559-67. PMID31764068. PMC7262458. doi:10.1097/QAD.0000000000002451.
120. Gunaydin G, Edfeldt G, Garber DA, Asghar M, Noel-Romas L, Burgener A, Wahlby C, Wang L, **Rohan LC**, Guenther P, Mitchell J, Matoba N, McNicholl JM, Palmer KE, Tjernlund A, Broliden K. Impact of Q-Griffithsin anti-HIV microbicide gel in non-human primates: In situ analyses of epithelial and immune cell markers in rectal mucosa. *Sci Rep* 2019;9:18120. PMID31792342. PMC6889265. doi:10.1038/s41598-019-54493-4.
121. Woodward Davis AS, Roozen HN, Dufort MJ, DeBerg HA, Delaney MA, Mair F, Erickson JR, Slichter CK, Berkson JD, Klock AM, Mack M, Lwo Y, Ko A, **Brand RM**, McGowan I, Linsley PS, Dixon DR, Prlic M. The human tissue-resident CCR5(+) T cell compartment maintains protective and functional properties during inflammation. *Sci Transl Med* 2019;11. PMID31801887. doi:10.1126/scitranslmed.aaw8718.
122. Peebles K, van der Straten A, Palanee-Phillips T, Reddy K, **Hillier SL**, Hendrix CW, Harkoo I, Gati Miremba B, Jeenarain N, Baeten JM, Brown ER. Brief Report: Anal intercourse, HIV-1 risk, and efficacy in a trial of a dapivirine vaginal ring for HIV-1 prevention. *J Acquir Immune Defic Syndr* 2020;83:197-201. PMID31809308. PMC7027377. doi:10.1097/QAI.0000000000002253.
123. Phillips A, Cambiano V, Johnson L, Nakagawa F, Homan R, Meyer-Rath G, Rehle T, Tanser F, Moyo S, Shahmanesh M, Castor D, Russell E, Jamieson L, Bansi-Matharu L, Shroufi A, Barnabas R, **Parikh UM**, Mellors JW, Revill P. Potential impact and cost-effectiveness of condomless-sex-concentrated PrEP in KwaZulu-Natal accounting for drug resistance. *J Infect Dis* 2019. PMID31851759. doi:10.1093/infdis/jiz667.
124. Mhlanga FG, Balkus JE, Singh D, **Chappell C**, Kamira B, Harkoo I, Szydlo D, Mukaka S, Piper J, **Hillier SL**. Feasibility and safety of IUD Insertion by mid-level providers in Sub-Saharan Africa. *Int Perspect Sex Reprod Health* 2019;45:61-9. PMID31859669. doi:10.1363/45e8019.
125. Li J, Regev G, **Patel SK**, Patton D, Sweeney Y, Graebing P, Grab S, Wang L, Sant V, **Rohan LC**. Rational design of a multipurpose bioadhesive vaginal film for co-delivery of dapivirine and levonorgestrel. *Pharmaceutics* 2019;12. PMID31861267. PMC7023193. doi:10.3390/pharmaceutics12010001.
126. Balan IC, Lentz C, Giguere R, Mayo AJ, Rael CT, Soto-Torres L, Palanee-Phillips T, Mgodini NM, **Hillier S**, Baeten JM, Team M-HS. Implementation of a fidelity monitoring process to assess delivery of an evidence-based adherence counseling intervention in a multi-site biomedical HIV prevention study. *AIDS Care* 2020.1-10. PMID31899954. doi:10.1080/09540121.2019.1709614.
127. **Bunge KE**, Levy L, Szydlo DW, Zhang J, Gaur AH, Reirden D, Mayer KH, Futterman D, Hoesley C, **Hillier SL**, Marzinke MA, Hendrix CW, Gorbach PM, Wilson CM, Soto-Torres L, Kapogiannis B, Nel A, Squires KE, Team MIS. Brief Report: Phase IIa safety study of a vaginal ring containing dapivirine in adolescent young women. *J Acquir Immune Defic Syndr* 2020;83:135-9. PMID31929401. doi:10.1097/QAI.0000000000002244.

128. Stoner KA, Beamer MA, Avolia HA, Meyn LA, **Hillier SL**, **Achilles SL**. Optimization of processing female genital tissue samples for lymphocyte analysis by flow cytometry. *Am J Reprod Immunol* 2020;83:e13227. PMID31991032. PMC7176536. doi:10.1111/aji.13227.
129. Marrazzo J, Balkus JE, **Achilles S**, Noguchi L. ECHO: Context and limitations. *Lancet* 2020;395:e23. PMID32035559. doi:10.1016/S0140-6736(19)33112-5.
130. **Wiesenfeld HC**, Meyn LA, Darville T, Macio IS, **Hillier SL**. A randomized controlled trial of ceftriaxone and doxycycline, with or without metronidazole, for the treatment of acute pelvic inflammatory disease. *Clin Infect Dis* 2020. PMID32052831. doi:10.1093/cid/ciaa101.
131. McCormick KD, Penrose KJ, Brumme CJ, Harrigan PR, Viana RV, Mellors JW, **Parikh UM**, Wallis CL. Discordance between etravirine phenotype and genotype-based predicted phenotype for subtype C HIV-1 from first-line antiretroviral therapy failures in South Africa. *Antimicrob Agents Chemother* 2020;64. PMID32071061. PMC7179637. doi:10.1128/AAC.02101-19.
132. Bedford L, Parker SE, Davis E, Salzman E, **Hillier SL**, Foxman B, Harlow BL. Characteristics of the vaginal microbiome in women with and without clinically confirmed vulvodynia. *Am J Obstet Gynecol* 2020. PMID32135142. doi:10.1016/j.ajog.2020.02.039.
133. Bachmann LH, Kirkcaldy RD, Geisler WM, **Wiesenfeld HC**, Manhart LE, **Taylor SN**, Sena AC, McNeil CJ, Newman L, Myler N, Fuchs R, Bowden KE, the MLWG. Prevalence of Mycoplasma genitalium infection, antimicrobial resistance mutations and symptom resolution following treatment of urethritis. *Clin Infect Dis* 2020. PMID32185385. doi:10.1093/cid/ciaa293.
134. Haddad LB, Swaims-Kohlmeier A, Mehta CC, Haaland RE, Brown NL, Sheth AN, Chien H, Titanji K, **Achilles SL**, Lupo D, Hart CE, Ofotokun I. Impact of etonogestrel implant use on T-cell and cytokine profiles in the female genital tract and blood. *PLoS One* 2020;15:e0230473. PMID32214321. PMC7098611. doi:10.1371/journal.pone.0230473.
135. Lane K, Miller E, Kisloff L, **Wiesenfeld HC**. Many parents would accept sexually transmitted infection screening for their adolescent at a pediatric office visit. *J Adolesc Health* 2020;66:626-8. PMID32331625. doi:10.1016/j.jadohealth.2019.12.019.
136. **Hillier SL**, Austin M, Macio I, Meyn LA, Badway D, **Beigi R**. Diagnosis and treatment of vaginal discharge syndromes in community practice settings. *Clin Infect Dis* 2020. PMID32350529. doi:10.1093/cid/ciaa260.
137. Patel A, Sant V, Velankar S, Dutta M, Balasubramanyam V, Sane P, Agrawal V, Wilson J, **Rohan LC**, Sant S. Self-assembly of multi-scale anisotropic hydrogels through interfacial polyionic complexation. *J Biomed Mater Res A* 2020. PMID32418322. doi:10.1002/jbm.a.37001.
138. Peebles K, Kiweewa FM, Palanee-Phillips T, **Chappell C**, Singh D, Bunge KE, Naidoo L, Makanani B, Jeenarain N, Reynolds D, **Hillier SL**, Brown ER, Baeten JM, Balkus JE, team MTNAs. Elevated risk of bacterial vaginosis among users of the copper intrauterine device: A prospective longitudinal cohort study. *Clin Infect Dis* 2020. PMID32505132. doi:10.1093/cid/ciaa703.
139. **Achilles SL**, Meyn LA, Mhlanga FG, Matubu TA, Stoner KA, Beamer MA, Chirenje ZM, **Hillier SL**. Zim CHIC: A cohort study of immune changes in the female genital tract associated with initiation and use of contraceptives. *Am J Reprod Immunol* 2020.e13287. PMID32533883. doi:10.1111/aji.13287.
140. Tarleton J, **Chen BA**, Meyn LA, Hendrix CW, Marzinke MA, **Achilles SL**. Pharmacokinetic and Pharmacodynamic Impacts of Depot Medroxyprogesterone Acetate Use on HIV Pre-exposure Prophylaxis in Women. *J Acquir Immune Defic Syndr* 2020;85:182-8. PMID32568766. doi:10.1097/QAI.0000000000002421.
141. Young Holt B, Kiarie J, Kopf GS, Nanda K, Hemmerling A, **Achilles SL**. Bridging the gap: Advancing multipurpose prevention technologies from the lab into the hands of women. *Biol Reprod* 2020;103:286-8. PMID32657337. PMC7401373. doi:10.1093/biolre/ioaa085.
142. Swamy GK, Metz TD, Edwards KM, Soper DE, **Beigi RH**, Campbell JD, Grassano L, Buffi G, Dreisbach A, Margarit I, Karsten A, Henry O, Lattanzi M, Bebia Z. Safety and immunogenicity of an investigational

maternal trivalent group B streptococcus vaccine in pregnant women and their infants: Results from a randomized placebo-controlled phase II trial. *Vaccine* 2020;38:6930-40. PMID32883555. doi:10.1016/j.vaccine.2020.08.056.

143. **Chappell CA**, Scarsi KK, Kirby BJ, Suri V, Gaggar A, Bogen DL, Macio IS, Meyn LA, **Bunge KE**, **Krans EE**, **Hillier SL**. Ledipasvir plus sofosbuvir in pregnant women with hepatitis C virus infection: a phase 1 pharmacokinetic study. *Lancet Microbe* 2020;1:e200-e8. PMID32939459. PMC7491553. doi:10.1016/S2666-5247(20)30062-8.
144. Guthrie KM, Fava JL, Vargas SE, Rosen RK, Shaw JG, Kojic EM, Ham AS, **Rohan LC**, Katz D, Panameno A, Collieran C, Friend DF, Buckheit KW, Buckheit RW, Jr. The role of volume in the perceptibility of topical vaginal formulations: user sensory perceptions and experiences of heterosexual couples during vaginal sex. *AIDS Res Hum Retroviruses* 2020. PMID32988214. doi:10.1089/AID.2020.0138.

Gynecology

145. Routzong MR, **Moalli PA**, Maiti S, De Vita R, Abramowitch SD. Novel simulations to determine the impact of superficial perineal structures on vaginal delivery. *Interface Focus* 2019;9:20190011. PMID31263532. PMC6597524. doi:10.1098/rsfs.2019.0011.
146. Jelovsek JE, Markland AD, Whitehead WE, Barber MD, Newman DK, Rogers RG, Dyer K, Visco AG, Sutkin G, **Zyczynski HM**, Carper B, Meikle SF, Sung VW, Gantz MG, National Institute of Child H, Human Development Pelvic Floor Disorders N. Controlling faecal incontinence in women by performing anal exercises with biofeedback or loperamide: a randomised clinical trial. *Lancet Gastroenterol Hepatol* 2019;4:698-710. PMID31320277. PMC6708078. doi:10.1016/S2468-1253(19)30193-1.
147. **Artsen AM**, Rytel M, **Liang R**, King GE, Meyn L, Abramowitch SD, **Moalli PA**. Mesh induced fibrosis: The protective role of T regulatory cells. *Acta Biomater* 2019;96:203-10. PMID31326666. PMC6717663. doi:10.1016/j.actbio.2019.07.031.
148. Knight KM, **Artsen AM**, Routzong MR, King GE, Abramowitch SD, **Moalli PA**. New Zealand white rabbit: A novel model for prolapse mesh implantation via a lumbar colpopexy. *Int Urogynecol J* 2020;31:91-9. PMID31418044. PMC7061177. doi:10.1007/s00192-019-04071-z.
149. Komesu YM, Dinwiddie DL, Richter HE, Lukacz ES, Sung VW, Siddiqui NY, **Zyczynski HM**, Ridgeway B, Rogers RG, Arya LA, Mazloomdoost D, Levy J, Carper B, Gantz MG, Eunice Kennedy Shriver National Institute of Child H, Human Development Pelvic Floor Disorders N. Defining the relationship between vaginal and urinary microbiomes. *Am J Obstet Gynecol* 2020;222:154 e1- e10. PMID31421123. PMC6995424. doi:10.1016/j.ajog.2019.08.011.
150. Sutkin G, **Zyczynski HM**, Sridhar A, Jelovsek JE, Rardin CR, Mazloomdoost D, Rahn DD, Nguyen JN, Andy UU, Meyer I, Gantz MG, Network NPFD. Association between adjuvant posterior repair and success of native tissue apical suspension. *Am J Obstet Gynecol* 2020;222:161 e1- e8. PMID31449806. PMC6995410. doi:10.1016/j.ajog.2019.08.024.
151. Giugale LE, Carter-Brooks CM, Ross JH, Shepherd JP, **Zyczynski HM**. Outcomes of a staged midurethral sling strategy for stress incontinence and pelvic organ prolapse. *Obstet Gynecol* 2019;134:736-44. PMID31503149. doi:10.1097/AOG.0000000000003448.
152. Sung VW, Borello-France D, Newman DK, Richter HE, Lukacz ES, **Moalli P**, Weidner AC, Smith AL, Dunivan G, Ridgeway B, Nguyen JN, Mazloomdoost D, Carper B, Gantz MG, Network NPFD. Effect of behavioral and pelvic floor muscle therapy combined with surgery vs surgery alone on incontinence symptoms among women with mixed urinary incontinence: The ESTEEM Randomized Clinical Trial. *JAMA* 2019;322:1066-76. PMID31529007. PMC6749544. doi:10.1001/jama.2019.12467.
153. Nager CW, Visco AG, Richter HE, Rardin CR, Rogers RG, Harvie HS, **Zyczynski HM**, Paraiso MFR, Mazloomdoost D, Grey S, Sridhar A, Wallace D, Network NPFD. Effect of vaginal mesh hysteropexy vs vaginal hysterectomy with uterosacral ligament suspension on treatment failure in women with

- uterovaginal prolapse: a randomized clinical trial. *JAMA* 2019;322:1054-65. PMID31529008. PMC6749543. doi:10.1001/jama.2019.12812.
154. Romanova AL, Carter-Brooks C, Ruppert KM, **Zyczynski HM**. 30-Day unanticipated healthcare encounters after prolapse surgery: impact of same day discharge. *Am J Obstet Gynecol* 2020;222:482 e1- e8. PMID31733206. doi:10.1016/j.ajog.2019.11.1249.
 155. Sassani JC, Kantartzis K, Wu L, Fabio A, **Zyczynski HM**. Bowel preparation prior to minimally invasive sacrocolpopexy: a randomized controlled trial. *Int Urogynecol J* 2019. PMID31773199. PMC7247935. doi:10.1007/s00192-019-04120-7.
 156. Foley C, **Donnellan N**, **Harris J**. Tissue extraction in gynecologic surgery: Past, present, and future. *Clin Obstet Gynecol* 2020;63:305-19. PMID31850944. doi:10.1097/GRF.0000000000000511.
 157. Menefee S, Richter HE, Myers D, Weidner A, **Moalli P**, Harvie H, Rahn D, Jeppson P, Paraiso M, Thomas S, Mazloomdoost D, Network NPF. Design of a 3-arm randomized trial for posthysterectomy vault prolapse involving sacral colpopexy, transvaginal mesh, and native tissue apical repair: The apical suspension repair for vault prolapse in a three-arm randomized trial. *Female Pelvic Med Reconstr Surg* 2019. PMID31860566. doi:10.1097/SPV.0000000000000803.
 158. **Chen BA**, Eisenberg DL, Schreiber CA, Turok DK, Olariu AI, Creinin MD. Bleeding changes after levonorgestrel 52-mg intrauterine system insertion for contraception in women with self-reported heavy menstrual bleeding. *Am J Obstet Gynecol* 2020;222:S888 e1-S e6. PMID31866516. doi:10.1016/j.ajog.2019.11.1288.
 159. **Ackenbom MF**, Dong S, Romanova A, Baranski L, Butters MA, Davis EM, **Zyczynski HM**. Postoperative opioid utilization in older women undergoing pelvic organ prolapse surgery. *Female Pelvic Med Reconstr Surg* 2020. PMID32032130. doi:10.1097/SPV.0000000000000844.
 160. Peters A, Siripong N, Wang L, **Donnellan NM**. Enhanced recovery after surgery outcomes in minimally invasive nonhysterectomy gynecologic procedures. *Am J Obstet Gynecol* 2020. PMID32087147. doi:10.1016/j.ajog.2020.02.008.
 161. Meyer I, Whitworth RE, Lukacz ES, Smith AL, Sung VW, Visco AG, **Ackenbom MF**, Wai CY, Mazloomdoost D, Gantz MG, Richter HE, Network NPF, the National Institutes of Health Office of Research on Women's H. Outcomes of native tissue transvaginal apical approaches in women with advanced pelvic organ prolapse and stress urinary incontinence. *Int Urogynecol J* 2020. PMID32146521. doi:10.1007/s00192-020-04271-y.
 162. Erekson E, Menefee S, Whitworth RE, Amundsen CL, Arya LA, Komesu YM, Ferrando CA, **Zyczynski HM**, Sung VW, Rahn DD, Tan-Kim J, Mazloomdoost D, Gantz MG, Richter HE, Eunice Kennedy Shriver NPF. The design of a prospective trial to evaluate the role of preoperative frailty assessment in older women undergoing surgery for the treatment of pelvic organ prolapse: The FAST Supplemental Trial. *Female Pelvic Med Reconstr Surg* 2020. PMID32217922. doi:10.1097/SPV.0000000000000833.
 163. Schiffman M, Wentzensen N, Perkins RB, **Guido RS**. An introduction to the 2019 ASCCP risk-based management consensus guidelines. *J Low Genit Tract Dis* 2020;24:87-9. PMID32243305. PMC7147413. doi:10.1097/LGT.0000000000000531.
 164. Cheung LC, Egemen D, Chen X, Katki HA, Demarco M, Wiser AL, Perkins RB, **Guido RS**, Wentzensen N, Schiffman M. 2019 ASCCP risk-based management consensus guidelines: Methods for risk estimation, recommended management, and validation. *J Low Genit Tract Dis* 2020;24:90-101. PMID32243306. PMC7147416. doi:10.1097/LGT.0000000000000528.
 165. Perkins RB, **Guido RS**, Castle PE, Chelmow D, Einstein MH, Garcia F, Huh WK, Kim JJ, Moscicki AB, Nayar R, Saraiya M, Sawaya GF, Wentzensen N, Schiffman M, Committee AR-BMCG. 2019 ASCCP risk-based management consensus guidelines for abnormal cervical cancer screening tests and cancer precursors. *J Low Genit Tract Dis* 2020;24:102-31. PMID32243307. PMC7147428. doi:10.1097/LGT.0000000000000525.

166. Egemen D, Cheung LC, Chen X, Demarco M, Perkins RB, Kinney W, Poitras N, Befano B, Locke A, **Guido RS**, Wiser AL, Gage JC, Katki HA, Wentzensen N, Castle PE, Schiffman M, Lorey TS. Risk estimates supporting the 2019 ASCCP risk-based management consensus guidelines. *J Low Genit Tract Dis* 2020;24:132-43. PMID32243308. PMC7147417. doi:10.1097/LGT.0000000000000529.
167. Demarco M, Egemen D, Raine-Bennett TR, Cheung LC, Befano B, Poitras NE, Lorey TS, Chen X, Gage JC, Castle PE, Wentzensen N, Perkins RB, **Guido RS**, Schiffman M. A study of partial human papillomavirus genotyping in support of the 2019 ASCCP risk-based management consensus guidelines. *J Low Genit Tract Dis* 2020;24:144-7. PMID32243309. PMC7141756. doi:10.1097/LGT.0000000000000530.
168. Perkins RB, Fuzzell LN, Lake P, McIntyre M, Nayar R, Saraiya M, Loukissas J, Felder T, **Guido RS**, Vadaparampil ST. Incorporating stakeholder feedback in guidelines development for the management of abnormal cervical cancer screening tests. *J Low Genit Tract Dis* 2020;24:167-77. PMID32243312. PMC7147423. doi:10.1097/LGT.0000000000000524.
169. Clarke MA, Massad LS, Khan MJ, Smith KM, **Guido RS**, Mayeaux EJ, Jr., Darragh TM, Huh WK, Johnson AL, Gold MA, Schiffman M, Wentzensen N. Challenges associated with cervical cancer screening and management in obese women: A provider perspective. *J Low Genit Tract Dis* 2020;24:184-91. PMID32243314. doi:10.1097/LGT.0000000000000506.
170. Rindos NB, Fulcher IR, **Donnellan NM**. Pain and quality of life after laparoscopic excision of endometriosis. *J Minim Invasive Gynecol* 2020. PMID32272239. doi:10.1016/j.jmig.2020.03.013.
171. Sassani JC, **Artsen AM**, **Moalli PA**, Bradley MS. Temporal trends of urogynecologic mesh reports to the U.S. Food and Drug Administration. *Obstet Gynecol* 2020;135:1084-90. PMID32282600. doi:10.1097/AOG.0000000000003805.
172. Routzong MR, Rostaminia G, **Moalli PA**, Abramowitch SD. Pelvic floor shape variations during pregnancy and after vaginal delivery. *Comput Methods Programs Biomed* 2020;194:105516. PMID32473515. doi:10.1016/j.cmpb.2020.105516.
173. Sung VW, Menefee S, Dunivan G, Richter HE, **Moalli P**, Weidner A, Andy UU, Jelovsek E, Mazloomdoost D, Whitworth R, Thomas S, Network NFPD. Design of a study to measure patient-perspectives in adverse event reporting (the PPAR Study): Supplementary study to the ASPIRe trial. *Female Pelvic Med Reconstr Surg* 2020. PMID32487881. doi:10.1097/SPV.0000000000000845.
174. Judge-Golden CP, **Wiesenfeld HC**, **Chen BA**, Borrero S. Adherence to recommended practices for provision of long-acting reversible contraception among providers in a large U.S. Health care system. *J Womens Health (Larchmt)* 2020. PMID32667847. doi:10.1089/jwh.2019.8169.
175. Donley G, **Chen BA**, Borrero S. The legal and medical necessity of abortion care amid the COVID-19 pandemic. *J Law Biosci* 2020;7:lsaa013. PMID32728460. PMC7197550. doi:10.1093/jlb/lsaa013.
176. Perkins RB, **Guido RL**, Castle PE, Chelmow D, Einstein MH, Garcia F, Huh WK, Kim JJ, Moscicki AB, Nayar R, Saraiya M, Sawaya G, Wentzensen N, Schiffman M. Response to Letter to the Editor regarding: 2019 ASCCP Risk-based management consensus guidelines for abnormal cervical cancer screening tests and cancer precursors. *J Low Genit Tract Dis* 2020;24:426. PMID32732648. doi:10.1097/LGT.0000000000000562.
177. Sung VW, Richter HE, **Moalli P**, Weidner AC, Nguyen JN, Smith AL, Dunivan G, Ridgeway B, Borello-France D, Newman DK, Mazloomdoost D, Carper B, Gantz MG, Eunice Kennedy Shriver National Institute of Child H, Human Development Pelvic Floor Disorders N. Characteristics associated with treatment failure 1 year after midurethral sling in women with mixed urinary incontinence. *Obstet Gynecol* 2020;136:482-91. PMID32769647. PMC7483953. doi:10.1097/AOG.0000000000003989.
178. **Artsen AM**, **Liang R**, Meyn L, Rytel M, Palcsey S, Abramowitch SD, **Moalli PA**. T regulatory cells and TGF-beta1: Predictors of the host response in mesh complications. *Acta Biomater* 2020;115:127-35. PMID32771596. doi:10.1016/j.actbio.2020.07.051.

179. Bradley MS, Cabrera C, Clark SG, Sassani J, Venuti K, **Ackenbom MF**. Sporadic compared to recurrent urinary tract infections: Considerations for urogynecologic patients. *Neurourol Urodyn* 2020;39:2186-91. PMID32803912. doi:10.1002/nau.24471.
180. **Ackenbom MF**, Butters MA, Davis EM, Abebe KZ, Baranski L, **Zyczynski HM**. Incidence of postoperative cognitive dysfunction in older women undergoing pelvic organ prolapse surgery. *Int Urogynecol J* 2020. PMID32827107. doi:10.1007/s00192-020-04495-y.
181. **Moalli PA**, Bowen ST, Abramowitch SD, Lockhart ME, Ham M, Hahn M, Weidner AC, Richter HE, Rardin CR, Komesu YM, Harvie HS, Ridgeway BM, Mazloomdoost D, Shaffer A, Gantz MG, Network NPDF. Methods for the defining mechanisms of anterior vaginal wall descent (DEMAND) study. *Int Urogynecol J* 2020. PMID32870340. doi:10.1007/s00192-020-04511-1.
182. Ferrante KL, Gantz MG, Sridhar A, Smith A, Rahn DD, Ellington DR, Weidner AC, Wohlrab K, Mazloomdoost D, **Moalli P**, Lukacz ES, Network NPDF. Do women who self-report more exercise have increased rates of symptomatic stress urinary incontinence after midurethral slings? *Female Pelvic Med Reconstr Surg* 2020. PMID32898050. doi:10.1097/SPV.0000000000000893.
183. Siff LN, Barber MD, **Zyczynski HM**, Rardin CR, Jakus-Waldman S, Rahn DD, Smith AL, Mazloomdoost D, Sridhar A, Gantz MG, Network NPDF. Immediate postoperative pelvic organ prolapse quantification measures and 2-year risk of prolapse recurrence. *Obstet Gynecol* 2020;136:792-801. PMID32925609. PMC7526641. doi:10.1097/AOG.0000000000004043.
184. Carter-Brooks CM, Romanova AL, DeRenzo JS, Shepherd JP, **Zyczynski HM**. Age and perioperative outcomes after implementation of an enhanced recovery after surgery pathway in women undergoing major prolapse repair surgery. *Female Pelvic Med Reconstr Surg* 2020. PMID32941314. doi:10.1097/SPV.0000000000000944.
185. **Zyczynski HM**, Richter HE, Sung VW, Arya LA, Lukacz ES, Visco AG, Rahn DD, Carper B, Mazloomdoost D, Gantz MG, Network NPDF. Performance, acceptability, and validation of a phone application bowel diary. *Neurourol Urodyn* 2020;39:2480-9. PMID32960998. PMC7680657. doi:10.1002/nau.24520.

Reproductive endocrinology and fertility

186. Sylvester C, **Menke M**, Gopalan P. Selective serotonin reuptake inhibitors and fertility: Considerations for couples trying to conceive. *Harv Rev Psychiatry* 2019;27:108-18. PMID30676405. doi:10.1097/HRP.0000000000000204.
187. **Plant TM**. The neurobiological mechanism underlying hypothalamic GnRH pulse generation: the role of kisspeptin neurons in the arcuate nucleus. *F1000Res* 2019;8. PMID31297186. PMC6600864. doi:10.12688/f1000research.18356.2.
188. Barnard EP, Dhar CP, **Rothenberg SS**, **Menke MN**, Witchel SF, Montano GT, **Orwig KE**, **Valli-Pulaski H**. Fertility preservation outcomes in adolescent and young adult feminizing transgender patients. *Pediatrics* 2019;144. PMID31383814. doi:10.1542/peds.2018-3943.
189. Sylvester C, **Menke M**, Lopa S, Gopalan P. Disordered eating and distress in women seeking in vitro fertilization. *J Psychosom Res* 2020;128:109880. PMID31760342. doi:10.1016/j.jpsychores.2019.109880.
190. Bhargava V, Goldstein CD, Russell L, Xu L, Ahmed M, Li W, Casey A, Servage K, Kollipara R, Picciarelli Z, Kittler R, **Yatsenko A**, Carmell M, Orth K, Amatruda JF, **Yanowitz JL**, Buszczak M. GCNA preserves genome integrity and fertility across species. *Dev Cell* 2020;52:38-52 e10. PMID31839537. PMC6946843. doi:10.1016/j.devcel.2019.11.007.
191. Atlash J, **Menke M**, Parks WT, **Catov JM**. Pre-conception blood pressure and evidence of placental malperfusion. *BMC Pregnancy Childbirth* 2020;20:25. PMID31914950. PMC6950980. doi:10.1186/s12884-019-2699-3.
192. Pelzman DL, **Orwig KE**, Hwang K. Progress in translational reproductive science: testicular tissue transplantation and in vitro spermatogenesis. *Fertil Steril* 2020;113:500-9. PMID32111477. doi:10.1016/j.fertnstert.2020.01.038.

193. David S, **Orwig KE**. Spermatogonial stem cell culture in oncofertility. *Urol Clin North Am* 2020;47:227-44. PMID32272995. PMC7158865. doi:10.1016/j.ucl.2020.01.001.
194. Shetty G, Mitchell JM, Meyer JM, Wu Z, Lam TNA, Phan TT, Zhang J, Hill L, Tailor RC, Peters KA, Penedo MC, Hanna C, **Orwig KE**, Meistrich ML. Restoration of functional sperm production in irradiated pubertal rhesus monkeys by spermatogonial stem cell transplantation. *Andrology* 2020. PMID32351003. doi:10.1111/andr.12807.
195. Nahata L, Woodruff TK, Quinn GP, Meacham LR, Chen D, Appiah LC, Finlayson C, **Orwig KE**, Laronda MM, Rowell EE, Anazodo A, Frias O, Rios JS, Whiteside S, Gomez-Lobo V, Dwiggins M, Childress KJ, Hoefgen HR, Levine JM, Jayasinghe Y, Moravek M. Ovarian tissue cryopreservation as standard of care: what does this mean for pediatric populations? *J Assist Reprod Genet* 2020. PMID32390071. doi:10.1007/s10815-020-01794-7.
196. Meacham LR, Burns K, **Orwig KE**, Levine J. Standardizing risk assessment for treatment-related gonadal insufficiency and infertility in childhood adolescent and young adult cancer: The Pediatric Initiative Network Risk Stratification System. *J Adolesc Young Adult Oncol* 2020. PMID32456570. doi:10.1089/jayao.2020.0012.
197. Eozenou C, Gonen N, Touzon MS, Jorgensen A, **Yatsenko SA**, Fusee L, Kamel AK, Gellen B, Guercio G, Singh P, Witchel S, Berman AJ, Mainpal R, Totonchi M, Mohseni Meybodi A, Askari M, Merel-Chali T, Bignon-Topalovic J, Migale R, Costanzo M, Marino R, Ramirez P, Perez Garrido N, Berensztein E, Mekkiwky MK, Schimenti JC, Bertalan R, Mazen I, McElreavey K, Belgorosky A, Lovell-Badge R, Rajkovic A, Bashamboo A. Testis formation in XX individuals resulting from novel pathogenic variants in Wilms' tumor 1 (WT1) gene. *Proc Natl Acad Sci USA* 2020. PMID32493750. doi:10.1073/pnas.1921676117.
198. Goossens E, Jahnukainen K, Mitchell RT, van Pelt A, Pennings G, Rives N, Poels J, Wyns C, Lane S, Rodriguez-Wallberg KA, Rives A, **Valli-Pulaski H**, Steimer S, Kliesch S, Braye A, Andres MM, Medrano J, Ramos L, Kristensen SG, Andersen CY, Bjarnason R, **Orwig KE**, Neuhaus N, Stukenborg JB. Fertility preservation in boys: recent developments and new insights (dagger). *Hum Reprod Open* 2020;2020:hoaa016. PMID32529047. PMC7275639. doi:10.1093/hropen/hoaa016.
199. Tan K, Song HW, Thompson M, Munyoki S, Sukhwani M, Hsieh TC, **Orwig KE**, Wilkinson MF. Transcriptome profiling reveals signaling conditions dictating human spermatogonia fate in vitro. *Proc Natl Acad Sci U S A* 2020;117:17832-41. PMID32661178. PMC7395452. doi:10.1073/pnas.2000362117.
200. Pereira C, Smolka MB, Weiss RS, **Brieno-Enriquez MA**. ATR signaling in mammalian meiosis: From upstream scaffolds to downstream signaling. *Environ Mol Mutagen* 2020;61:752-66. PMID32725817. doi:10.1002/em.22401.
201. MacDonald WA, **Mann MRW**. Long noncoding RNA functionality in imprinted domain regulation. *PLoS Genet* 2020;16:e1008930. PMID32760061. PMC7410213. doi:10.1371/journal.pgen.1008930.
202. Yersal N, Kose S, Horzum U, Ozkavukcu S, **Orwig KE**, Korkusuz P. Leptin promotes proliferation of neonatal mouse stem/progenitor spermatogonia. *J Assist Reprod Genet* 2020;37:2825-38. PMID32840762. PMC7642194. doi:10.1007/s10815-020-01929-w.

Women's cancer

203. Fan H, Atiya H, Wang Y, Pisanic TR, Wang T-H, Shih L-M, Foy KK, Frisbie L, Chandler CK, Shen H, **Coffman L**. Epigenetic reprogramming towards mesenchymal-epithelial transition in ovarian cancer-associated mesenchymal stem cells drives metastasis. *bioRxiv* 2020.
204. Liu JF, Barry WT, Birrer M, Lee JM, Buckanovich RJ, Fleming GF, Rimel BJ, Buss MK, Nattam SR, Hurteau J, Luo W, Curtis J, Whalen C, Kohn EC, Ivy SP, Matulonis UA. Overall survival and updated progression-free survival outcomes in a randomized phase II study of combination cediranib and olaparib versus olaparib in relapsed platinum-sensitive ovarian cancer. *Ann Oncol* 2019;30:551-7. PMID30753272. PMC6503628. doi:10.1093/annonc/mdz018.

205. Levine KM, Priedigkeit N, Basudan A, Tasdemir N, Sikora MJ, Sokol ES, Hartmaier RJ, Ding K, Ahmad NZ, Watters RJ, Weiss KR, Blohmer JU, Denkert C, Machleidt A, Karsten MM, Boisen MM, Elishaev E, Lucas PC, **Lee AV**, **Oesterreich S**. FGFR4 overexpression and hotspot mutations in metastatic ER+ breast cancer are enriched in the lobular subtype. *NPJ Breast Cancer* 2019;5:19. PMID31263748. PMC6597581. doi:10.1038/s41523-019-0114-x.
206. Cai C, Cooper GF, Lu KN, Ma X, Xu S, Zhao Z, Chen X, Xue Y, **Lee AV**, Clark N, Chen V, Lu S, Chen L, Yu L, Hochheiser HS, Jiang X, Wang QJ, Lu X. Systematic discovery of the functional impact of somatic genome alterations in individual tumors through tumor-specific causal inference. *PLoS Comput Biol* 2019;15:e1007088. PMID31276486. PMC6650088. doi:10.1371/journal.pcbi.1007088.
207. Ward Rashidi MR, Mehta P, Bregenzner M, Raghavan S, Fleck EM, Horst EN, Harissa Z, Ravikumar V, Brady S, Bild A, Rao A, **Buckanovich RJ**, Mehta G. Engineered 3D model of cancer stem cell enrichment and chemoresistance. *Neoplasia* 2019;21:822-36. PMID31299607. PMC6624324. doi:10.1016/j.neo.2019.06.005.
208. Saha AK, Mourad M, Kaplan MH, Chefetz I, Malek SN, **Buckanovich R**, Markovitz DM, Contreras-Galindo R. The genomic landscape of centromeres in cancers. *Sci Rep* 2019;9:11259. PMID31375789. PMC6677800. doi:10.1038/s41598-019-47757-6.
209. Jezierska-Drutel A, Attaran S, Hopkins BL, Skoko JJ, Rosenzweig SA, **Neumann CA**. The peroxidase PRDX1 inhibits the activated phenotype in mammary fibroblasts through regulating c-Jun N-terminal kinases. *BMC Cancer* 2019;19:812. PMID31419957. PMC6697950. doi:10.1186/s12885-019-6031-4.
210. **Buckanovich RJ**, Rustin G, Uppal S, **Olawaiye AB**, **Kelley JL**, Berger JL, Landen CN. No role for maintenance bevacizumab for up-front stage IIIc (R0) ovarian cancer. *J Clin Oncol* 2019;37:2707-8. PMID31449471. doi:10.1200/JCO.19.01650.
211. Manichaikul A, Peres LC, Wang XQ, Barnard ME, Chyn D, Sheng X, Du Z, Tyrer J, Dennis J, Schwartz AG, Cote ML, Peters E, Moorman PG, Bondy M, Barnholtz-Sloan JS, Terry P, Alberg AJ, Bandera EV, Funkhouser E, Wu AH, Pearce CL, Pike M, Setiawan VW, Haiman CA, African American Breast Cancer C, African Ancestry Prostate Cancer C, Palmer JR, LeMarchand L, Wilkens LR, Berchuck A, Doherty JA, **Modugno F**, Ness R, Moysich K, Karlan BY, Whittemore AS, McGuire V, Sieh W, Lawrenson K, Gayther S, Sellers TA, Pharoah P, Schildkraut JM, African American Cancer Epidemiology S, the Ovarian Cancer Association C. Identification of novel epithelial ovarian cancer loci in women of African ancestry. *Int J Cancer* 2020;146:2987-98. PMID31469419. doi:10.1002/ijc.32653.
212. **Olawaiye AB**, Leath CA, 3rd. Contemporary management of uterine clear cell carcinoma: A Society of Gynecologic Oncology (SGO) review and recommendation. *Gynecol Oncol* 2019;155:365-73. PMID31500893. doi:10.1016/j.ygyno.2019.08.031.
213. Zhu L, Narloch JL, Onkar S, Joy M, Broadwater G, Luedke C, Hall A, Kim R, Pogue-Geile K, Sammons S, Nayyar N, Chukwueke U, Brastianos PK, Anders CK, Soloff AC, Vignali DAA, Tseng GC, Emens LA, Lucas PC, Blackwell KL, **Oesterreich S**, **Lee AV**. Metastatic breast cancers have reduced immune cell recruitment but harbor increased macrophages relative to their matched primary tumors. *J Immunother Cancer* 2019;7:265. PMID31627744. PMC6798422. doi:10.1186/s40425-019-0755-1.
214. Gutkin DW, Shurin MR, El Azher MA, Shurin GV, Velikokhatnaya L, Prosser D, Shin N, **Modugno F**, Stemmer P, Elishaev E, Lokshin A. Novel protein and immune response markers of human serous tubal intraepithelial carcinoma of the ovary. *Cancer Biomark* 2019;26:471-9. PMID31658047. PMC6928436. doi:10.3233/CBM-190528.
215. Bai S, Zhu W, **Coffman L**, **Vlad A**, Schwartz LE, Elishaev E, Drapkin R, **Buckanovich RJ**. CD105 is expressed in ovarian cancer precursor lesions and is required for metastasis to the ovary. *Cancers (Basel)* 2019;11. PMID31684072. PMC6896092. doi:10.3390/cancers11111710.
216. Rea B, Aggarwal N, **Yatsenko SA**, Bailey N, Liu YC. Acute myeloid leukemia with isolated del(5q) is associated with IDH1/IDH2 mutations and better prognosis when compared to acute myeloid leukemia

- with complex karyotype including del(5q). *Mod Pathol* 2020;33:566-75. PMID31685963. doi:10.1038/s41379-019-0396-4.
217. **Taylor SE, Chu T**, Elvin JA, **Edwards RP**, Zorn KK. Phase II study of everolimus and bevacizumab in recurrent ovarian, peritoneal, and fallopian tube cancer. *Gynecol Oncol* 2020;156:32-7. PMID31739991. doi:10.1016/j.ygyno.2019.10.029.
 218. Ross MS, Chandler CK, Matsuo K, Vargo JA, Elishaev E, Siripong N, Berger JL, **Kelley JL, 3rd, Taylor SE**. Cancer antigen 125 is associated with disease status in uterine carcinosarcoma. *Rare Tumors* 2019;11:2036361319884159. PMID31741727. PMC6843728. doi:10.1177/2036361319884159.
 219. Fu Z, Moysich K, Ness RB, **Modugno F**. Gender of offspring and risk of ovarian cancer: The HOPE study. *Cancer Epidemiol* 2020;64:101646. PMID31835157. PMC6983354. doi:10.1016/j.canep.2019.101646.
 220. Cillo AR, Kurten CHL, Tabib T, Qi Z, Onkar S, Wang T, Liu A, Duvvuri U, Kim S, Soose RJ, **Oesterreich S**, Chen W, Lafyatis R, Bruno TC, Ferris RL, Vignali DAA. Immune landscape of viral- and carcinogen-driven head and neck cancer. *Immunity* 2020;52:183-99 e9. PMID31924475. PMC7201194. doi:10.1016/j.immuni.2019.11.014.
 221. Heng YJ, Hankinson SE, Wang J, Alexandrov LB, Ambrosone CB, de Andrade VP, Brufsky AM, Couch FJ, King TA, **Modugno F**, Vachon CM, Eliassen AH, Tamimi RM, Kraft P. The Association of Modifiable Breast Cancer Risk Factors and Somatic Genomic Alterations in Breast Tumors: The Cancer Genome Atlas Network. *Cancer Epidemiol Biomarkers Prev* 2020;29:599-605. PMID31932411. PMC7060119. doi:10.1158/1055-9965.EPI-19-1087.
 222. Wan L, **Neumann CA**, LeDuc PR. Tumor-on-a-chip for integrating a 3D tumor microenvironment: chemical and mechanical factors. *Lab Chip* 2020;20:873-88. PMID32025687. PMC7067141. doi:10.1039/c9lc00550a.
 223. Lee AW, Wu AH, Wiensch A, Mukherjee B, Terry KL, Harris HR, Carney ME, Jensen A, Cramer DW, Berchuck A, Doherty JA, **Modugno F**, Goodman MT, Alimujiang A, Rossing MA, Cushing-Haugen KL, Bandera EV, Thompson PJ, Kjaer SK, Hogdall E, Webb PM, Huntsman DG, Moysich KB, Lurie G, Ness RB, Stram DO, Roman L, Pike MC, Pearce CL, Ovarian Cancer Association C. Estrogen plus progestin hormone therapy and ovarian cancer: A complicated relationship explored. *Epidemiology* 2020;31:402-8. PMID32028322. doi:10.1097/EDE.0000000000001175.
 224. Samanta S, Tamura S, Dubeau L, Mhawech-Fauceglia P, Miyagi Y, Kato H, Lieberman R, **Buckanovich RJ**, Lin YG, Neamati N. Clinicopathological significance of endoplasmic reticulum stress proteins in ovarian carcinoma. *Sci Rep* 2020;10:2160. PMID32034256. PMC7005787. doi:10.1038/s41598-020-59116-x.
 225. Cole AJ, Iyengar M, Panesso-Gomez S, O'Hayer P, Chan D, Delgoffe GM, Aird KM, Yoon E, Bai S, **Buckanovich RJ**. NFATC4 promotes quiescence and chemotherapy resistance in ovarian cancer. *JCI Insight* 2020;5. PMID32182216. PMC7205258. doi:10.1172/jci.insight.131486.
 226. Ma W, Sun J, Xu J, Luo Z, Diao D, Zhang Z, Oberly PJ, Minnigh MB, Xie W, Poloyac SM, **Huang Y**, Li S. Sensitizing triple negative breast cancer to tamoxifen chemotherapy via a redox-responsive vorinostat-containing polymeric prodrug nanocarrier. *Theranostics* 2020;10:2463-78. PMID32194813. PMC7052901. doi:10.7150/thno.38973.
 227. Cole AJ, Fayomi AP, Anyaeche VI, Bai S, **Buckanovich RJ**. An evolving paradigm of cancer stem cell hierarchies: Therapeutic implications. *Theranostics* 2020;10:3083-98. PMID32194856. PMC7053211. doi:10.7150/thno.41647.
 228. Babic A, Sasamoto N, Rosner BA, Tworoger SS, Jordan SJ, Risch HA, Harris HR, Rossing MA, Doherty JA, Fortner RT, Chang-Claude J, Goodman MT, Thompson PJ, Moysich KB, Ness RB, Kjaer SK, Jensen A, Schildkraut JM, Titus LJ, Cramer DW, Bandera EV, Qin B, Sieh W, McGuire V, Sutphen R, Pearce CL, Wu AH, Pike M, Webb PM, **Modugno F**, Terry KL. Association between breastfeeding and ovarian cancer risk. *JAMA Oncol* 2020.e200421. PMID32239218. PMC7118668. doi:10.1001/jamaoncol.2020.0421.

229. Zhou Z, Zhou H, Ponzoni L, Luo A, Zhu R, He M, **Huang Y**, Guan KL, Bahar I, Liu Z, Wan Y. EIF3H orchestrates Hippo pathway-mediated oncogenesis via catalytic control of YAP stability. *Cancer Res* 2020. PMID32269044. doi:10.1158/0008-5472.CAN-19-3718.
230. Mai PL, Miller A, Gail MH, Skates S, Lu K, Sherman ME, Ioffe OB, Rodriguez G, Cohn DE, Boggess J, Rutherford T, Kauff ND, Rader JS, Phillips KA, DiSilvestro PA, **Olawaiye AB**, Ridgway MR, Greene MH, Piedmonte M, Walker JL. Risk-reducing salpingo-oophorectomy and breast cancer risk reduction in the Gynecologic Oncology Group Protocol-0199 (GOG-0199). *JNCI Cancer Spectr* 2020;4:pkz075. PMID32337492. PMC7050151. doi:10.1093/jncics/pkz075.
231. Brown JR, Chan DK, Shank JJ, Griffith KA, Fan H, Szulawski R, Yang K, Reynolds RK, Johnston C, McLean K, Uppal S, Liu JR, Cabrera L, **Taylor SE**, Orr BC, **Modugno F**, Mehta P, Bregenzler M, Mehta G, Shen H, **Coffman L**, **Buckanovich RJ**. Phase II clinical trial of metformin as a cancer stem cell-targeting agent in ovarian cancer. *JCI Insight* 2020. PMID32369446. doi:10.1172/jci.insight.133247.
232. Farabaugh SM, Litzenburger BC, Elangovan A, Pecar G, Walheim L, **Atkinson (Xavier) JM**, **Lee AV**. IGF1R constitutive activation expands luminal progenitors and influences lineage differentiation during breast tumorigenesis. *Dev Biol* 2020;463:77-87. PMID32376245. doi:10.1016/j.ydbio.2020.04.007.
233. Andreano KJ, Baker JG, Park S, Safi R, Artham S, **Oesterreich S**, Jeselsohn R, Brown M, Sammons S, Wardell SE, Chang CY, Norris JD, McDonnell DP. The dysregulated pharmacology of clinically relevant ESR1 mutants is normalized by ligand-activated WT receptor. *Mol Cancer Ther* 2020. PMID32381587. doi:10.1158/1535-7163.MCT-19-1148.
234. Gebru MT, **Atkinson (Xavier) JM**, Young M, Zhang L, Tang Z, Liu Z, Lu P, Dower C, Chen L, Annageldiyev C, Sharma A, Kawasawa Y, Zhao Z, Miller BA, Claxton D, Wang HG. Glucocorticoids enhance the anti-leukemic activity of FLT3 inhibitors in FLT3 mutant acute myeloid leukemia. *Blood* 2020. PMID32396937. doi:10.1182/blood.2019003124.
235. Boone DN, Warburton A, Som S, **Lee AV**. SNHG7 is a lncRNA oncogene controlled by Insulin-like Growth Factor signaling through a negative feedback loop to tightly regulate proliferation. *Sci Rep* 2020;10:8583. PMID32444795. PMC7244715. doi:10.1038/s41598-020-65109-7.
236. Schink JC, Filiaci V, Huang HQ, Tidy J, Winter M, Carter J, Anderson N, Moxley K, Yabuno A, **Taylor SE**, Kushnir C, Horowitz N, Miller DS. An international randomized phase III trial of pulse actinomycin-D versus multi-day methotrexate for the treatment of low risk gestational trophoblastic neoplasia; NRG/GOG 275. *Gynecol Oncol* 2020. PMID32460997. doi:10.1016/j.ygyno.2020.05.013.
237. Levine KM, Ding K, Chen L, **Oesterreich S**. FGFR4: A promising therapeutic target for breast cancer and other solid tumors. *Pharmacol Ther* 2020.107590. PMID32492514. doi:10.1016/j.pharmthera.2020.107590.
238. Kim O, Park EY, Klinkebiel DL, Pack SD, Shin YH, Abdullaev Z, Emerson RE, Coffey DM, Kwon SY, Creighton CJ, Kwon S, Chang EC, Chiang T, **Yatsenko AN**, Chien J, Cheon DJ, Yang-Hartwich Y, Nakshatri H, Nephew KP, Behringer RR, Fernandez FM, Cho CH, Vanderhyden B, Drapkin R, Bast RC, Jr., Miller KD, Karpf AR, Kim J. In vivo modeling of metastatic human high-grade serous ovarian cancer in mice. *PLoS Genet* 2020;16:e1008808. PMID32497036. doi:10.1371/journal.pgen.1008808.
239. Song H, Dicks EM, Tyrer J, Intermaggio M, Chenevix-Trench G, Bowtell DD, Traficante N, Group A, Brenton J, Goranova T, Hosking K, Piskorz A, van Oudenhoove E, Doherty J, Harris HR, Rossing MA, Duerst M, Dork T, Bogdanova NV, **Modugno F**, Moysich K, Odunsi K, Ness R, Karlan BY, Lester J, Jensen A, Kruger Kjaer S, Hogdall E, Campbell IG, Lazaro C, Pujara MA, Cunningham J, Vierkant R, Winham SJ, Hildebrandt M, Huff C, Li D, Wu X, Yu Y, Permut JB, Levine DA, Schildkraut JM, Riggan MJ, Berchuck A, Webb PM, Group OS, Cybulski C, Gronwald J, Jakubowska A, Lubinski J, Alsop J, Harrington P, Chan I, Menon U, Pearce CL, Wu AH, de Fazio A, Kennedy CJ, Goode E, Ramus S, Gayther S, Pharoah P. Population-based targeted sequencing of 54 candidate genes identifies PALB2 as a susceptibility gene for high-grade serous ovarian cancer. *J Med Genet* 2020. PMID32546565. doi:10.1136/jmedgenet-2019-106739.

240. Konstantinopoulos PA, Cheng SC, Wahner Hendrickson AE, Penson RT, Schumer ST, Doyle LA, Lee EK, Kohn EC, Duska LR, Crispens MA, **Olawaiye AB**, Winer IS, Barroilhet LM, Fu S, McHale MT, Schilder RJ, Farkkila A, Chowdhury D, Curtis J, Quinn RS, Bowes B, D'Andrea AD, Shapiro GI, Matulonis UA. Berzosertib plus gemcitabine versus gemcitabine alone in platinum-resistant high-grade serous ovarian cancer: a multicentre, open-label, randomised, phase 2 trial. *Lancet Oncol* 2020. PMID32553118. doi:10.1016/S1470-2045(20)30180-7.
241. Martins FC, Couturier DL, Paterson A, Karnezis AN, Chow C, Nazeran TM, Odunsi A, Gentry-Maharaj A, Vrvilo A, Hein A, Talhouk A, Osorio A, Hartkopf AD, Brooks-Wilson A, DeFazio A, Fischer A, Hartmann A, Hernandez BY, McCauley BM, Karpinskyj C, de Sousa CB, Hogdall C, Tiezzi DG, Herpel E, Taran FA, **Modugno F**, Keeney G, Nelson G, Steed H, Song H, Luk H, Benitez J, Alsop J, Koziak JM, Lester J, Rothstein JH, de Andrade JM, Lundvall L, Paz-Ares L, Robles-Diaz L, Wilkens LR, Garcia MJ, Intermaggio MP, Alcaraz ML, Brett MA, Beckmann MW, Jimenez-Linan M, Anglesio M, Carney ME, Schneider M, Traficante N, Pejovic N, Singh N, Le N, Sinn P, Ghatage P, Erber R, **Edwards R**, Vierkant R, Ness RB, Leung S, Orsulic S, Brucker SY, Kaufmann SH, Fereday S, Gayther S, Winham SJ, Kommoss S, Pejovic T, Longacre TA, McGuire V, Rhenius V, Sieh W, Shvetsov YB, Whittemore AS, Staebler A, Karlan BY, Rodriguez-Antona C, Bowtell DD, Goode EL, Hogdall E, Candido Dos Reis FJ, Gronwald J, Chang-Claude J, Moysich KB, Kelemen LE, Cook LS, Goodman MT, Fasching PA, Crawford R, Deen S, Menon U, Huntsman DG, Kobel M, Ramus SJ, Pharoah PDP, Brenton JD. Clinical and pathological associations of PTEN expression in ovarian cancer: a multicentre study from the Ovarian Tumour Tissue Analysis Consortium. *Br J Cancer* 2020. PMID32555365. doi:10.1038/s41416-020-0900-0.
242. Blohmer M, Zhu L, **Atkinson (Xavier) JM**, Beriwal S, Rodriguez-Lopez JL, Rosenzweig M, Brufsky AM, Tseng G, Lucas PC, **Lee AV**, **Oesterreich S**, Jankowitz RC. Patient treatment and outcome after breast cancer orbital and periorbital metastases: a comprehensive case series including analysis of lobular versus ductal tumor histology. *Breast Cancer Res* 2020;22:70. PMID32586354. PMC7318761. doi:10.1186/s13058-020-01309-3.
243. Zhao Y, Wu D, Jiang D, Zhang X, Wu T, Cui J, Qian M, Zhao J, **Oesterreich S**, Sun W, Finkel T, Li G. A sequential methodology for the rapid identification and characterization of breast cancer-associated functional SNPs. *Nat Commun* 2020;11:3340. PMID32620845. PMC7334201. doi:10.1038/s41467-020-17159-8.
244. Brieger KK, Peterson S, Lee AW, Mukherjee B, Bakulski KM, Alimujiang A, Anton-Culver H, Anglesio MS, Bandera EV, Berchuck A, Bowtell DDL, Chenevix-Trench G, Cho KR, Cramer DW, DeFazio A, Doherty JA, Fortner RT, Garsed DW, Gayther SA, Gentry-Maharaj A, Goode EL, Goodman MT, Harris HR, Hogdall E, Huntsman DG, Shen H, Jensen A, Johnatty SE, Jordan SJ, Kjaer SK, Kupryjanczyk J, Lambrechts D, McLean K, Menon U, **Modugno F**, Moysich K, Ness R, Ramus SJ, Richardson J, Risch H, Rossing MA, Trabert B, Wentzensen N, Ziogas A, Terry KL, Wu AH, Hanley GE, Pharoah P, Webb PM, Pike MC, Pearce CL, Ovarian Cancer Association C. Menopausal hormone therapy prior to the diagnosis of ovarian cancer is associated with improved survival. *Gynecol Oncol* 2020;158:702-9. PMID32641237. PMC7487048. doi:10.1016/j.ygyno.2020.06.481.
245. Tao Y, Lei H, Fu X, **Lee AV**, Ma J, Schwartz R. Robust and accurate deconvolution of tumor populations uncovers evolutionary mechanisms of breast cancer metastasis. *Bioinformatics* 2020;36:i407-i16. PMID32657393. PMC7355293. doi:10.1093/bioinformatics/btaa396.
246. Holleran JL, Parise RA, Guo J, Kiesel BF, **Taylor SE**, Ivy SP, Chu E, Beumer JH. Quantitation of iohexol, a glomerular filtration marker, in human plasma by LC-MS/MS. *J Pharm Biomed Anal* 2020;189:113464. PMID32659569. PMC7484441. doi:10.1016/j.jpba.2020.113464.
247. Tasdemir N, Ding K, Savariau L, Levine KM, Du T, Elangovan A, Bossart EA, **Lee AV**, Davidson NE, **Oesterreich S**. Proteomic and transcriptomic profiling identifies mediators of anchorage-independent growth and roles of inhibitor of differentiation proteins in invasive lobular carcinoma. *Sci Rep* 2020;10:11487. PMID32661241. PMC7359337. doi:10.1038/s41598-020-68141-9.

248. Raghavan S, Snyder CS, Wang A, McLean K, Zamarin D, **Buckanovich RJ**, Mehta G. Carcinoma-associated mesenchymal stem cells promote chemoresistance in ovarian cancer stem cells via PDGF signaling. *Cancers (Basel)* 2020;12. PMID32726910. PMC7464970. doi:10.3390/cancers12082063.
249. Palliyaguru DL, Yang L, Chartoumpekis DV, Wendell SG, Fazzari M, Skoko JJ, Liao Y, **Oesterreich S**, Michalopoulos GK, Kensler TW. Sulforaphane diminishes the formation of mammary tumors in rats exposed to 17beta-estradiol. *Nutrients* 2020;12. PMID32751496. PMC7468750. doi:10.3390/nu12082282.
250. Lee AW, Rosenzweig S, Wiensch A, Australian Ovarian Cancer Study G, Ramus SJ, Menon U, Gentry-Maharaj A, Ziogas A, Anton-Culver H, Whittemore AS, Sieh W, Rothstein JH, McGuire V, Wentzensen N, Bandera EV, Qin B, Terry KL, Cramer DW, Titus L, Schildkraut JM, Berchuck A, Goode EL, Kjaer SK, Jensen A, Jordan SJ, Ness RB, **Modugno F**, Moysich K, Thompson PJ, Goodman MT, Carney ME, Chang-Claude J, Rossing MA, Harris HR, Doherty JA, Risch HA, Khoja L, Alimujiang A, Phung MT, Brieger K, Mukherjee B, Pharoah PDP, Wu AH, Pike MC, Webb PM, Pearce CL. Expanding our understanding of ovarian cancer risk: the role of incomplete pregnancies. *J Natl Cancer Inst* 2020. PMID32766851. doi:10.1093/jnci/djaa099.
251. Kurozumi S, Alsaleem M, Monteiro CJ, Bhardwaj K, Joosten SEP, Fujii T, Shirabe K, Green AR, Ellis IO, Rakha EA, Mongan NP, Heery DM, Zwart W, **Oesterreich S**, Johnston SJ. Targetable ERBB2 mutation status is an independent marker of adverse prognosis in estrogen receptor positive, ERBB2 non-amplified primary lobular breast carcinoma: a retrospective in silico analysis of public datasets. *Breast Cancer Res* 2020;22:85. PMID32782013. PMC7422515. doi:10.1186/s13058-020-01324-4.
252. Adambekov S, Lopa S, **Edwards RP**, Lemon L, Wang S, **Taylor SE**, Orr B, **Linkov F**. Survival and recurrence after intraperitoneal chemotherapy use: Retrospective review of ovarian cancer hospital registry data. *Cancer Med* 2020;9:7388-97. PMID32813321. PMC7571805. doi:10.1002/cam4.3340.
253. Horne ZD, Teterichko SR, Glaser SM, Wegner RE, Hasan S, Crafton SM, Miller EM, Krivak TC, Viswanathan A, **Olawaiye AB**, Sukumvanich P, Beriwal S. Race-driven survival differential in women diagnosed with endometrial cancers in the USA. *Int J Gynecol Cancer* 2020. PMID32847996. doi:10.1136/ijgc-2020-001560.
254. Heayn M, Skvarca LB, Zhu L, **Edwards RP**, **Olawaiye AB**, **Modugno F**, Elishaev E, Bhargava R. Impact of Ki-67 labeling index on prognostic significance of the chemotherapy response score in women with tubo-ovarian cancer treated with neoadjuvant chemotherapy. *Int J Gynecol Pathol* 2020. PMID32897953. doi:10.1097/PGP.0000000000000706.
255. Sokol ES, Pavlick D, Khiabani H, Frampton GM, Ross JS, Gregg JP, Lara PN, **Oesterreich S**, Agarwal N, Necchi A, Miller VA, Alexander B, Ali SM, Ganesan S, Chung JH. Pan-cancer analysis of BRCA1 and BRCA2 genomic alterations and their association with genomic instability as measured by genome-wide loss of heterozygosity. *JCO Precis Oncol* 2020;4:442-65. PMID32903788. PMC7446440. doi:10.1200/po.19.00345.
256. Stenzel AE, Abrams SI, Joseph JM, Goode EL, Tario JD, Jr., Wallace PK, Kaur D, Adamson AK, Buas MF, Lugade AA, Laslavic A, **Taylor SE**, Orr B, **Edwards RP**, Elishaev E, Odunsi K, Mongioli JM, Etter JL, Winham SJ, Kaufmann SH, **Modugno F**, Moysich KB. Circulating CD14(+) HLA-DR(lo/-) monocytic cells as a biomarker for epithelial ovarian cancer progression. *Am J Reprod Immunol* 2020.e13343. PMID32905653. doi:10.1111/aji.13343.
257. Iheagwara UK, Vargo JA, Boisen MM, **Taylor SE**, Berger JL, Comerci JT, Orr BC, Sukumvanich P, **Olawaiye AB**, **Kelley JL**, **Edwards RP**, Courtney-Brooks MB, Beriwal S. Regional control and chemoradiotherapy dose response for clinically involved lymph nodes in patients with locally advanced endometrial cancers who are not candidates for upfront surgical staging extrafascial hysterectomy. *Clin Oncol (R Coll Radiol)* 2020. PMID32919862. doi:10.1016/j.clon.2020.08.009.
258. Keller A, Rodriguez-Lopez JL, Patel AK, Vargo JA, Kim H, Houser CJ, Sukumvanich P, Berger JL, Boisen MM, **Edwards RP**, **Taylor SE**, Courtney-Brooks MB, Orr BC, **Olawaiye AB**, Beriwal S. Early outcomes after

definitive chemoradiation therapy with Vienna/Venezia hybrid high-dose rate brachytherapy applicators for cervical cancer: A single-institution experience. *Brachytherapy* 2020. PMID32952053. doi:10.1016/j.brachy.2020.08.006.

259. **Modugno F**, Fu Z, Jordan SJ, Group A, Chang-Claude J, Fortner RT, Goodman MT, Moysich KB, Schildkraut JM, Berchuck A, Bandera EV, Qin B, Sutphen R, McLaughlin JR, Menon U, Ramus SJ, Gayther SA, Gentry-Maharaj A, Karpinskyj C, Pearce CL, Wu AH, Risch HA, Webb PM. Offspring sex and risk of epithelial ovarian cancer: a multinational pooled analysis of 12 case-control studies. *Eur J Epidemiol* 2020. PMID32959149. doi:10.1007/s10654-020-00682-9.
260. Richman AH, Vargo JA, Ling DC, Sukumvanich P, Berger JL, Boisen MM, **Edwards R**, **Taylor SE**, Courtney-Brooks MB, **Olawaiye A**, Orr BC, Beriwal S. Dose-escalated intensity modulated radiation therapy in patients with locally-advanced vulvar cancer - does it increase response rate? *Gynecol Oncol* 2020. PMID32981696. doi:10.1016/j.ygyno.2020.09.019.

Women's health services

261. Jarlenski M, Minney S, Hogan C, **Chang JC**. Obstetric and Pediatric Provider Perspectives on Mandatory Reporting of Prenatal Substance Use. *J Addict Med* 2019;13:258-63. PMID30550393. doi:10.1097/ADM.0000000000000489.
262. Lei M, **Linkov F**. Comment on: Preoperative functional health status as a predictor of short-term postoperative morbidity and mortality following bariatric surgery. *Surg Obes Relat Dis* 2019;15:e17. PMID31255234. doi:10.1016/j.soard.2019.03.023.
263. Liu SJ, Mair C, Songer TJ, **Krans EE**, Wahed A, Talbott E. Opioid-related hospitalizations in Pennsylvania: A latent class analysis. *Drug Alcohol Depend* 2019;202:185-90. PMID31352309. doi:10.1016/j.drugalcdep.2019.05.009.
264. Morrison PK, Jones K, Miller E, Cluss PA, George D, Fleming R, Hawker L, Bicehouse T, **Chang JC**. Human services utilization among male IPV Perpetrators: Relationship to timing and completion of batterer intervention programs. *Violence Vict* 2019;34:635-60. PMID31416971. doi:10.1891/0886-6708.VV-D-18-00001.
265. Lu N, Adambekov S, **Edwards RP**, Ramanathan RC, Bovbjerg DH, **Linkov F**. Relationships Between a history of abuse, changes in body mass index, physical health, and self-reported depression in female bariatric surgery patients. *Bariatric Surg Pract Patient Care* 2019;14:113-9. PMID31572626. PMC6763960. doi:10.1089/bari.2018.0051.
266. Pallatino C, **Chang JC**, **Krans EE**. The intersection of intimate partner violence and substance use among women with opioid use disorder. *Subst Abus* 2019.1-8. PMID31638868. doi:10.1080/08897077.2019.1671296.
267. Martin CE, Terplan M, **Krans EE**. Pain, opioids, and pregnancy: Historical context and medical management. *Clin Perinatol* 2019;46:833-47. PMID31653311. doi:10.1016/j.clp.2019.08.013.
268. Cochran G, Smid MC, **Krans EE**, Bryan MA, Gordon AJ, Lundahl B, Silipigni J, Haaland B, Tarter R. A pilot multisite study of patient navigation for pregnant women with opioid use disorder. *Contemp Clin Trials* 2019;87:105888. PMID31731006. PMC7201898. doi:10.1016/j.cct.2019.105888.
269. Hollander MAG, Donohue JM, Stein BD, **Krans EE**, Jarlenski MP. Association between opioid prescribing in medicare and pharmaceutical company gifts by physician specialty. *J Gen Intern Med* 2019. PMID31792860. doi:10.1007/s11606-019-05470-0.
270. Zelazny SM, **Chang JC**, Burke JG, Hawk M, Miller E. Adolescent and young adult women's recommendations for establishing comfort with family planning providers' communication about and assessment for intimate partner violence. *J Commun Healthc* 2019;12:32-43. PMID31983925. PMC6980289. doi:10.1080/17538068.2018.1560073.

271. Jarlenski MP, **Krans EE**, Kim JY, Donohue JM, James AE, 3rd, Kelley D, Stein BD, Bogen DL. Five-year outcomes among medicaid-enrolled children with in utero opioid exposure. *Health Aff (Millwood)* 2020;39:247-55. PMID32011940. doi:10.1377/hlthaff.2019.00740.
272. Atiya H, Frisbie L, Pressimone C, **Coffman L**. Mesenchymal stem cells in the tumor microenvironment. *Adv Exp Med Biol* 2020;1234:31-42. PMID32040853. doi:10.1007/978-3-030-37184-5_3.
273. Castle NG, Hyer K, **Harris JA**, Engberg J. Nurse aide retention in nursing homes. *Gerontologist* 2020. PMID32144426. doi:10.1093/geront/gnz168.
274. Chernoff E, Silverstein G, Delos Trinos J, Veldkamp P, **Chang JC**, Belizario VY. Health and education officials' perspectives on the impact of Typhoon Haiyan on mass drug administration for soil-transmitted helminth infections in the Philippines. *Disaster Med Public Health Prep* 2020.1-5. PMID32279688. doi:10.1017/dmp.2020.34.
275. Demirci JR, Suffoletto B, Doman J, Glasser M, **Chang JC**, Sereika SM, Bogen DL. The development and evaluation of a text message program to prevent perceived insufficient milk among first-time mothers: Retrospective analysis of a randomized controlled trial. *JMIR Mhealth Uhealth* 2020;8:e17328. PMID32347815. PMC7221632. doi:10.2196/17328.
276. Schiff DM, Nielsen T, Hoepfner BB, Terplan M, Hansen H, Bernson D, Diop H, Bharel M, **Krans EE**, Selk S, Kelly JF, Wilens TE, Taveras EM. Assessment of racial and ethnic disparities in the use of medication to treat opioid use disorder among pregnant women in Massachusetts. *JAMA Netw Open* 2020;3:e205734. PMID32453384. doi:10.1001/jamanetworkopen.2020.5734.
277. Jarlenski MP, Paul NC, **Krans EE**. Polysubstance use among pregnant women with opioid use disorder in the United States, 2007-2016. *Obstet Gynecol* 2020;136:556-64. PMID32769641. PMC7483798. doi:10.1097/AOG.0000000000003907.
278. Jarlenski M, **Krans EE**, Chen Q, Rothenberger SD, Cartus A, Zivin K, Bodnar LM. Substance use disorders and risk of severe maternal morbidity in the United States. *Drug Alcohol Depend* 2020;216:108236. PMID32846369. PMC7606664. doi:10.1016/j.drugalcdep.2020.108236.
279. O'Connor-Terry C, Burton D, Gowda T, Laing A, **Chang JC**. Challenges of seeking reproductive health care in people experiencing intimate partner violence. *J Interpers Violence* 2020.886260520959627. PMID32969311. doi:10.1177/0886260520959627.

GRANT FUNDING AWARDED IN FY20

Principal Investigator	Grant Title	Funding Type	Direct Funds	Indirect Funds
Achilles	Developing and testing a decision support tool for women making tubal sterilization decisions	Federal	\$ 4,448	\$ 2,513
Achilles	Estera E 4 Freedom	Industry	\$ 1,746	\$ 436
Achilles	Phase 2B/3 double-blinded placebo-controlled efficacy trial of Amphora gel for the prevention of acquisition of urogenital chlamydia trachomatis infection	Industry	\$ 47,222	\$ 29,986
Ackenbom	A Prospective Examination of Perioperative Neurocognitive Disorders in Older Women Undergoing Urogynecologic Surgery	Federal	\$ 81,722	\$ 55,945
Ackenbom	AD Pathology and Perioperative Neurocognitive Disorders	Foundation	\$ 148,998	\$ 12,901
Ackenbom	Examining the Role of Inflammation in Perioperative Neurocognitive Disorders in Women Undergoing Urogynecologic Surgery	Philanthropy	\$ 50,000	\$ -
Barak	Placental Origin of Congenital Heart Defects - A Paradigm Coming of Age	Foundation	\$ 364,858	\$ 14,076
Barak	Role of the Cell-Death Domain Protein CIDEC in Adipocyte Survival	Nonfederal	\$ 80,181	\$ 16,036
Beigi	Preparedness for Pandemic Influenza	Federal	\$ 17,737	\$ 11,263
Berger	Biomarkers in the HPA Axis and Inflammatory Pathways for Maladaptive Stress Response in Children	Federal	\$ 2,470	\$ 1,396
Bradley	Selective Bladder Denervation Using RF Energy for the Treatment of UUI	Industry	\$ 151,012	\$ 37,953
Brand	A Phase I, multicompartmental pharmacokinetic study of cabotegravir long-acting in healthy adult volunteers.	Nonfederal	\$ 22,451	\$ 5,613
Brand	Leadership and Operations Center ACTG	Federal	\$ 34,390	\$ 21,838
Brieno-Enriquez	NIMA-like Kinase NEK1 as a Regulator of Mammalian Gametogenesis	Federal	\$ 198,371	\$ 34,753
Brieno-Enriquez	Transgenerational Effects of Opioids in the Germ Cell Line	Nonfederal	\$ 18,855	\$ 3,771
Buckanovich	Characterization of EPHA3 intragenic rearrangements in high-grade serous carcinoma progression and recurrence	Federal	\$ 2,421	\$ 1,368
Buckanovich	Developing a Human in Mouse Cancer Model with a Completely Humanized Stroma	Federal	\$ 595,821	\$ 67,150

Buckanovich	Development of a Novel ALDH Inhibitor as an Adjunct to Immunotherapy	Philanthropy	\$ 125,000	\$ -
Buckanovich	Isozyme-selective ALDH Inhibitors for Sensitizing Ovarian Cancer Stem-like Cells to Chemotherapy	Federal	\$ 144,387	\$ 15,055
Buckanovich	Ovarian Cancer Tumoroids to Study Heterogeneity and Chemoresistance	Foundation	\$ 51,198	\$ 2,226
Buckanovich	Targeting Tumor Desmoplasia to Enhance Immunotherapy	Foundation	\$ 272,727	\$ 27,273
Buckanovich	The DoD Omics Consortium to Study the Origins of Ovarian Cancer	Federal	\$ 61,162	\$ 38,838
Buckanovich	The Function of EGFL6 in Ovarian Cancer Cell Biology, Tumor Initiation, and Therapy	Federal	\$ 297,059	\$ 52,466
Buckanovich	Using microfluidic single cell culture to characterize cancer cell asymmetric division	Federal	\$ 334,038	\$ 23,731
Buckanovich /Vlad	ALDH Inhibition as Modulator of Tumor Immunobiology	Federal	\$ 366,958	\$ 101,939
Caritis	Optimization of Drug Dosing in Pregnant Women through Research and Education	Federal	\$ 770,901	\$ 210,763
Caritis	Pharmacokinetic Parameters of 17-OHPC administered SC via autoinjector (275mg) vs. IM (250mg) in pregnant women	Industry	\$ 363,151	\$ 7,869
Caritis	Pharmacologically-based Strategies for Buprenorphine Treatment During Pregnancy	Federal	\$ 540,722	\$ 152,507
Cascio	Role of MUC1 in Cancer and Inflammation	Foundation	\$ 30,000	\$ 3,000
Catov	Longitudinal Epigenomic Study of Gestational Diabetes Mellitus and Cardiac Structure and Function	NFederal	\$ 79,455	\$ 7,945
Catov	Mechanisms for Early and Late Postpartum Hypertension in Human Preeclampsia	Foundation	\$ 86,710	\$ 5,244
Catov	Pregnancy-related risk factors and glucose intolerance in women during midlife	Federal	\$ 3,185	\$ 1,800
Catov	Shared Antecedents to Pre-term Birth and Cardiovascular Disease in Women	Federal	\$ 246,573	\$ 104,703
Catov	Women's Health Research and Policy Partnership or Cardiovascular Disease in Pregnancy	Foundation	\$ 384,395	\$ -
Chang	Leading Emerging and Diverse Scientist to Success (LEADS)	Federal	\$ 10,091	\$ 807
Chang	The IPV Provider Network: Engaging the Health Care Provider Response to Interpersonal Violence Against Women	Federal	\$ (97)	\$ (29)

Chappell	A Phase 1 PK and Safety Study of Velpatasvir/Sofosbuvir for Chronic Hepatitis C Infection in Pregnant Women	Federal	\$ 189,637	\$ 78,344
Chappell	A PK evaluation of Sofosbuvir & Ledipasvir in Pregnancy	Industry	\$ 59,094	\$ 14,773
Chappell	HCV Genotypes Among Incarcerated Pregnant Women	Federal	\$ 18,185	\$ -
Chen	A Multi-Center, Randomized Study to Evaluate the Pharmacokinetic and Pharmacodynamic Profile, Contraceptive Efficacy and Safety of Daily Oral Low Dose Ulipristal Acetate	Federal	\$ 30,564	\$ 10,616
Chen	A Phase 3, Multicenter, Open-Label Study of a Levonorgestrel 52 mg Intrauterine System for the Treatment of Heavy Menstrual Bleeding	Industry	\$ 31,247	\$ 6,249
Chen	A Phase 3, Prospective, Multi-Center, Single-Arm, Open-Label Study to Evaluate VeraCept™, a Long-Acting Reversible Intrauterine Contraceptive for Contraceptive Efficacy, Safety, and Tolerability	Industry	\$ 69,017	\$ 24,156
Chen	A Randomized, Phase 1, Open-Label Study in Healthy HIV-Negative Women to Evaluate the Pharmacokinetics, Safety and Bleeding Patterns Associated with 90-Day Use of Matrix Vaginal Rings Containing 200 mg Dapivirine and 320 mg Levonorgestrel	Federal	\$ 154,072	\$ 35,898
Chen	Family Health International 360 Copper IUD trial	Foundation	\$ 119,710	\$ 17,957
Chen	Pitt-Ohio State-Georgetown Clinical Trials Unit	Federal	\$ 6,053	\$ 3,269
Chu	Administrative Supplement to Placental miRNA Profiles Associated with Maternal Insulin Resistance and Fetal Adiposity: Maternal-Placental	Federal	\$ 15,715	\$ 8,949
Edwards	Magee-Womens Basic and Translational Reproductive Health Training Program	Federal	\$ 430,442	\$ 7,417
Edwards	NCI NCTN-Network Lead Academic Participating Site at UPMC Hillman Cancer Center	Federal	\$ 20,689	\$ 15,618
Edwards	Targeting the Chemokine System to Sensitize Tumors to Immunotherapy	Federal	\$ 260,815	\$ 125,615
Edwards	Transcriptomic profiling and functional characterization of fusion genes in recurrent ovarian cancer	Federal	\$ (20)	\$ -

Emery	A Multicenter, Prospective Observational Study to Characterize the Clinical Course of Pregnant Women and Children at High Risk for Early Onset Hemolytic Disease of the Fetus and Newborn	Industry	\$ 5,000	\$ 1,500
Emery	Fetal Aqueductal Stenosis Ventriculoamniotic Shunting	Foundation	\$ 300,000	\$ -
Emery	Fetal Hydrocephalus Intervention	Foundation	\$ 50,000	\$ -
Emery	Ventriculoamniotic Shunting for Fetal Aqueductal Stenosis	Foundation	\$ 150,000	\$ -
Feghali	Metabolic Analysis for Treatment Choice in Gestational Diabetes Mellitus	Federal	\$ 132,999	\$ 2,000
Feghali	Metformin for Prevention of Hypertensive Disorders of Pregnancy in Women with Type 1 Diabetes Mellitus	Industry	\$ 26,702	\$ -
Guido	Intra-Operative Sampling of Fallopian Tubes	Federal	\$ 52,868	\$ 28,957
Harris	Developing and Testing an Evidence-Based Toolkit for Nursing Home Care of Residents with Obesity	Federal	\$ 314,896	\$ 84,587
Hauspurg-Janicki	Cardiovascular adaptation to pregnancy, risk of adverse pregnancy outcomes and future hypertension	Federal	\$ 12,232	\$ 7,768
Hillier	A Multi-Center, Open-Label Study to Evaluate the Safety of a Single Oral Dose of Solosec (secnidazole) 2g Oral Granules for the Treatment of Adolescent Girls with Bacterial Vaginosis.	Industry	\$ 2,596	\$ 1,648
Hillier	A Phase 3 Multi-Center, Double-Blind, Placebo-Controlled, Randomized Study of DARE-BV1 in the Treatment of Bacterial Vaginosis	Industry	\$ 36,874	\$ 23,408
Hillier	Agar dilution testing for anaerobic bacteria from the female genital tract of women with and without bacterial vaginosis	Industry	\$ 15,600	\$ 9,906
Hillier	Diagnostic Accuracy by Providers (DAP) Study	Industry	\$ 4,977	\$ 1,523
Hillier	Film Antiretroviral Microbicide Evaluation (FAME II)	Federal	\$ 2,603,092	\$ 471,938
Hillier	HIV Prevention Clinical Trials Network Leadership and Operations Center Year 14	Federal	\$ 25,589	\$ 14,458
Hillier	Hormones, Immunity and HIV Risk	Federal	\$ 325,717	\$ 108,534
Hillier	MTN - Leadership and Operations Center (LOC): Microbicide Trials Network	Federal	\$ 17,004,689	\$ 2,248,222

Himes	Effect of Antenatal Milk Expression on Breastfeeding Outcomes among Overweight and Obese Women	Federal	\$ 23,795	\$ 13,444
Himes	Healthy Beyond Pregnancy: Leveraging Behavior Economics to Improve Postpartum Care	Federal	\$ 236,265	\$ 53,388
Himes	Innovative approaches to inform evidence-based pregnancy weight gain guidelines	Federal	\$ 90,112	\$ 41,483
Jeyabalan	Sedentary Behavior Across Pregnancy and Cardiometabolic Health	Foundation	\$ (104)	\$ -
Jeyabalan /Powers	Relating Pregnancy Phenotype with Chromosome Copy Number in Placentation Cells from the Endocervix	Federal	\$ 18,178	\$ 10,231
Knight	Desara Sling System: Cold cut vs Heat cut	Industry	\$ 12,500	\$ -
Krans	Optimizing Pregnancy and Treatment Interventions for Moms	Federal	\$ 173,496	\$ 67,913
Krans	Investigation of Opioid Exposure and Neurodevelopment (iOPEN)	Federal	\$ 114,254	\$ 68,738
Krans	Longitudinal Evaluation of the Impact of the COVID-19 Pandemic on High-risk New and Expectant Mothers	Federal	\$ 4,071	\$ 2,300
Krans	Appalachian Node	Federal	\$ 12,454	\$ 13,676
Krans	Availability, accessibility, and structure of opioid use disorder treatment and maternal and child health outcomes	Federal	\$ 199,384	\$ 42,366
Krans	Management of HCV infection in opioid dependent pregnant women: the potential of an integrated medical home model	Industry	\$ 38,291	\$ 9,572
Krans	NIDA CTN-0080 – Medication treatment for opioid use disorder in expectant mothers (MOMs): a pragmatic randomized trial comparing extended-release and daily buprenorphine formulations	Federal	\$ 160,052	\$ 101,633
Liang	Targeting Macrophage to Improve the Outcomes of Urogynecologic Meshes in Diabetic Women	Federal	\$ 162,460	\$ 53,150
Liang	Advancing Innovation, Entrepreneurship and Opportunity Commercialization	Federal	\$ 3,000	\$ -
Linkov	Factors influencing biopsy choices: Implications for Endometrial Cancer Screening	Foundation	\$ 61,136	\$ -
Mann	Investigation of a Novel Mechanism Regulating Physical Interactions in an Imprinted Domain	Nonfederal	\$ 116,465	\$ 23,293

McGowan	Dipyridamole as a Modulator of HIV-1 Inflammation by Adenosine Regulation	Federal	\$ (280)	\$ (151)
Meyn	Native-like Envelope Trimer Therapeutic Vaccination for Induction of Broadly Neutralizing Antibodies to Facilitate HIV Functional Cure	Federal	\$ 19,256	\$ 11,350
Moalli	Assessing the Impact of Macrophage Polarization Upon the Success of Biomaterials Implants	Federal	\$ 12,307	\$ 6,953
Moalli	AUGS's PFD Registry Pessary Patient	Foundation	\$ 2,300	\$ -
Moalli	BioLift Feasibility Study - PFDN Capitation	Federal	\$ (65,804)	\$ (23,105)
Moalli	Development of the PFDR REDCap Database platform - Fee for Service	Foundation	\$ 8,160	\$ 2,448
Moalli	Overcoming Complications of Polypropylene Prolapse Meshes: Development of Novel Elastomeric Auxetic Devices	Federal	\$ 474,138	\$ 53,491
Moalli	Porosity and tensioning: Critical factors to consider when choosing a prolapse mesh	Federal	\$ 401,314	\$ 112,666
Modugno	Epidemiology and Genomics of Ovarian Clear Cell Carcinoma	Federal	\$ 18,578	\$ 10,497
Modugno	Gynecologic Cancer Project 1	Industry	\$ 43,243	\$ 31,485
Modugno	Novel Immunological Biomarkers in Ovarian Cancer Prognosis	Federal	\$ 70,398	\$ 28,311
Mouillet	A CRISPR/Cas9 Approach to the Analysis of Placenta-Specific C19MC miRNAs	Nonfederal	\$ 81,325	\$ 16,265
Orr	Using Artificial Intelligence powered Evidence Based Molecular Decision Making for Improved Outcomes in Ovarian Cancer	Industry	\$ 360,865	\$ -
Orwig	Derivation of Functional Spermatogonia Stem Cells from Rhesus Macaque iPSCs	Federal	\$ 87,728	\$ 34,465
Orwig	Fertility Preservation for Transgender Females	Foundation	\$ 125,000	\$ -
Orwig	Genetics of Male Infertility: A Marker of Overall Health	Federal	\$ 3,010,959	\$ 484,366
Orwig	Next Generation Therapies for Fertility Preservation in Male Cancer Patients	Federal	\$ 743,615	\$ 95,955
Orwig	Reproductive Development from Gonads to Fetuses	Federal	\$ 214,260	\$ 15,173
Orwig	Towards a preclinical model for overcoming infertility with induced pluripotent stem cells	Federal	\$ 56,099	\$ 35,623
Orwig	Towards In vitro Gametogenesis: A game-changer for infertile men and women	Philanthropy	\$ 100,268	\$ -

Powers	Immune Activating Syncytiotrophoblast Microvesicles and Danger Associated Molecular Patterns in Preeclampsia Risk	Federal	\$ 85,675	\$ 52,529
Powers	Teen Mothers' Prenatal Cannabis Use and Co-Use with Tobacco	Federal	\$ 30,984	\$ 17,506
Roberts	AWARE - Angiogenic factors Will Add in Risk Evaluation	Industry	\$ 39,904	\$ 3,991
Roberts	Grand Challenges Brazil Prematurity Reduction by Preeclampsia Care (PREPARE)	NFederal	\$ 55,123	\$ 2,012
Roberts	Prenatal Blood Pressure Patterns to Predict Pregnancy-Related Hypertension and Later Life Cardiovascular Risk	Federal	\$ 6,390	\$ 3,610
Roberts	SLAB 7	Foundation	\$ 40,000	\$ 4,000
Rohan	Griffithsin-based Rectal Microbicides for PREvention of Viral ENTry (PREVENT)	Federal	\$ 16,375	\$ 9,380
Rohan	Laboratory Center (LC): Microbicide Trials Network	Federal	\$ 3,818,549	\$ 1,033,328
Rohan	Long Acting Film Technology for Contraception (LATCH)	Federal	\$ 1,193,032	\$ 124,764
Rohan	Physiologically-based Model of the Female Reproductive Tract: Vaginal and Intrauterine Delivery Components Support New Approaches to Improve Product Manufacturing and Quality	Federal	\$ 266,282	\$ 43,240
Rohan	Prevent COVID	Nonfederal	\$ 568,131	\$ -
Rohan	Studies to Assess Interactions Between Dapivirine & Vaginally-Applied, OTC Products	Federal	\$ 286,330	\$ 41,629
Sadovsky	Adaptive Signals Emanating from the Injured Placenta	Foundation	\$ 100,000	\$ -
Sadovsky	Building Interdisciplinary Research Careers in Women's Health in Pittsburgh	Federal	\$ 530,476	\$ 6,753
Sadovsky	Exosome Based Placental Maternal Communication	Federal	\$ 277,398	\$ 22,449
Sadovsky	Extracellular Vesicles and Their ncRNA Cargo as Markers of Trophoblast Injury	Federal	\$ 628,302	\$ 22,237
Sadovsky	Infant Mortality Risk Reduction Initiative	Foundation	\$ 2,118,854	\$ -
Sadovsky	Maternal-Fetal Environment, Epigenetics and Complex Congenital Heart Disease	Foundation	\$ 8,776	\$ -
Sadovsky	Placenta Extracellular Vesicles as Long-range Regulators of the Mother Immunity	Federal	\$ 12,000	\$ 7,620
Sadovsky	Placental extracellular vesicles as regulators of maternal adaptive immunity	Federal	\$ 37,609	\$ 21,249

Sadovsky	Placental miRNA Profiles Associated with Maternal Insulin Resistance and Fetal Adiposity: Maternal-placental crosstalk	Federal	\$ 29,474	\$ -
Sadovsky	Pregnancy Health: The Beginning of Wellness	Foundation	\$ 1,500,000	\$ -
Sadovsky	Preeclampsia Research	Foundation	\$ 12,500	\$ -
Sadovsky	University of Pittsburgh Clinical and Translational Science Institute	Federal	\$ 157,026	\$ 24,351
Sadovsky	Zika Research	Foundation	\$ 12,500	\$ -
Schatten	Frontiers in Addiction Research and Pregnancy	Federal	\$ 356,348	\$ 13,030
Schatten	Frontiers in Alzheimer's and Aging Research (FrA2R)	Federal	\$ 361,708	\$ 16,204
Schatten	Frontiers in Stem Cells in Cancer (FriSC2)	Federal	\$ 300,325	\$ 15,035
Simhan	A Randomized Controlled Trial of Pravastatin for the Prevention of Preeclampsia in High Risk Women ("Pravastatin")	Federal	\$ 5,833	\$ 3,576
Simhan	Chronic Hypertension and Pregnancy - CHAP Clinical Coordinating Center	Federal	\$ 6,341	\$ 1,470
Simhan	Continuation of nuMoM2b Heart Health Study	Federal	\$ 102,718	\$ 30,509
Simhan	Identification and Prediction of Peripartum Depression from Natural Language Collected in a Mobile Health App	Federal	\$ 9,923	\$ 5,606
Simhan	Intergenerational Effects of Maternal Childhood Trauma on the Fetal Brain	Federal	\$ 60,126	\$ -
Simhan	Leveraging Big Data Science to Link Genomics, Epigenetics and the Family to Improve the Health of Children with CHD	Foundation	\$ 47,615	\$ 4,762
Simhan	NICHD Maternal-Fetal Medicine Units (MFMU) Network	Federal	\$ 353,830	\$ 167,857
Simhan	Optimizing health from pregnancy through one year postpartum: A sequential multiple assignment randomized trial (SMART) of perinatal lifestyle intervention	Federal	\$ 24,623	\$ 13,970
Simhan	Placental origins of phthalate-induced changes in fetal reproductive development	Federal	\$ 60,057	\$ 11,057
Simhan	Pre and Postnatal Exposure Periods for Child Health: Common Risks and Shared Mechanisms (ECHO)	Federal	\$ 268,291	\$ 164,287
Simhan	Preconception Stress Exposure: Impact on Pregnancy and Child Health Outcomes	Federal	\$ 12,105	\$ 6,839
Simhan	Pregnancy as a Window to Future Cardiovascular Health: Adverse Pregnancy	Federal	\$ 10,440	\$ 6,630

Simhan	Prospective Phase III Evaluation of Fetal Fibronectin in a High Risk Asymptomatic Population for the Prediction of Spontaneous Preterm Birth – Extension Study	Industry	\$ 26,804	\$ 8,041
Simhan	Prospective, Single Arm, Pivotal Clinical Trial Designed to Assess the Safety and Effectiveness of the InPress Device In Treating Primary Postpartum Hemorrhage (PPH-02)	Industry	\$ 17,891	\$ 11,360
Simhan	Social Disadvantage and Fetal Programming of Newborn-Infant Telomere Biology	Federal	\$ 511,633	\$ 108,044
Taylor	Phase IIA trial of delayed initiation of olaparib maintenance therapy in platinum sensitive recurrent ovarian cancer	Foundation	\$ 31,358	\$ 1,976
Vlad	Ovarian Cancer Therapy via Conditional STING Pathway Activation	Federal	\$ 158,966	\$ 37,897
Wiesenfeld	A randomized, placebo-controlled trial of TOL-463 for suppression of bacterial vaginosis (BV)	Federal	\$ 581,020	\$ 3,420
Wiesenfeld	Mycoplasma genitalium among men with urethritis attending STD clinics in the US	Federal	\$ 32,493	\$ -
Wiesenfeld	Overall Administrative and Support Activities for the STI CTG to Include Procedures to Identify, Discuss, and Develop Scientific Concepts	Federal	\$ 2,993	\$ 1,796
Wiesenfeld	Rectal and Oropharyngeal Swabs to Diagnose Gonococcal and Chlamydial Infections in Men and Women	Industry	\$ 48,099	\$ 12,025
Wiesenfeld	Chlamydia Vaccine Initiative	Federal	\$ 502,763	\$ 265,511
Yanowitz	Characterization of a Meiotic Crossover Surveillance System	Federal	\$ 315,952	\$ 44,826
Yanowitz	Role of Chromosomally Tethered Proteasome in Meiotic Pairing and Recombination	Federal	\$ 155,737	\$ 8,341
Yanowitz	Role of GCNA in preserving genome integrity and fertility	Federal	\$ 402,536	\$ 84,569
Yatsenko	DNA Biomarkers of Meiotic Arrest in Male Infertility	Nonfederal	\$ 26,043	\$ 5,209
Zyczynski	Pelvic Floor Disorders Network PFDN Capitation Funding	Federal	\$ 92,193	\$ 9,224
Zyczynski	Pittsburgh Pelvic Floor Research Program	Federal	\$ 203,702	\$ 55,704

Department of OB/GYN Funded Research Activities

FY 2016 - 2020 (in thousands)

DIRECTS	FY16	FY17	FY18	FY19	FY20
Federal	35,504	34,634	36,473	34,010	31,456
Non Federal	6,287	7,298	7,669	7,366	7,537
Total	41,791	41,932	44,142	41,377	38,993

INDIRECTS	FY16	FY17	FY18	FY19	FY20
Federal	7,216	8,059	7,678	7,901	8,278
Non Federal	825	835	920	815	688
Total	8,041	8,894	8,597	8,716	8,966

Residency Training Program in Obstetrics & Gynecology

The mission of the residency program is to train future specialists and subspecialist practitioners, to serve society by providing outstanding patient-centered care, contributing to knowledge and scholarship in women's health, while advocating and promoting excellence in obstetrics and gynecology. We take tremendous pride in the accomplishments and multi-faceted career paths of our graduates including frontline care providers, NIH-funded basic science researchers, advocates for women's health, educators, and leaders in academic Obstetrics and Gynecology.

We provide rigorous clinical experience and didactics with the goal of excellence in general obstetrics and gynecology; along with opportunities for individualized training as a foundation for a fulfilling career in medicine by promoting expertise, leadership skills, and scholarly achievement. We strive to build a supportive learning and working environment that allows physicians to grow as role models for professionalism, caring, and compassion. We are committed to a culture of diversity, equity, and inclusion centered on the well-being of all individuals in our clinical and academic community. We endeavor to harness our integrated capabilities to deliver outstanding safe, quality, and high-value care.

We continue to attract the very top candidates from medical schools nationally and had another successful NRMP Match. During the 2020 interview season, we screened 857 applicants with 750 from LCME schools and 107 international medical graduates. Of these applicants, 126 were invited and interviewed. The 2020-2021 intern class filled the 9 offered PGY1 positions.

RESIDENCY CURRICULUM AND MAJOR CHANGES

1. Clinical Experience and Education: The Annual Program Evaluation and input of residents and faculty at large, contributed to several major initiatives:
 - a. The Gynecologic Oncology Division designated weekly faculty rounder, which enabled the resident/fellow team to optimize morning rounding and patient care on this clinically busy service.
 - b. Labor and Delivery Triage Unit implemented a series of structural changes and initiatives under the leadership of the new medical director (Dr. Michael England): addition of a swing shift (non-resident) provider during weekdays and designated core group of faculty supervisors to improve efficiency, and clearly defined expectations for resident supervision and education.
 - c. The 2nd year resident experience on L&D was reduced from 3 to 2 rotations, with workforce needs filled by Advanced Practice Providers, Family Medicine Residents, and Attendings. Importantly the number of days dedicated to labor management was unchanged and based on procedure log review c-section experience preserved for the PGY2 year.
 - d. We launched a longitudinal operative vaginal delivery curriculum developed by Drs. Waltner-Toews and Sakamoto-including one on one simulation sessions. Expectation for resident participation in all operative deliveries on the Labor Suite was codified and disseminated.
 - e. Residents received instruction on telehealth care in continuity and specialty clinics during Covid-19 pandemic.

2. **Well-Being:** Strategies to ensure resident adherence to duty hours maximums continue to be a top priority, with the department and hospital dedicating resources and personnel where necessary. The Residency Wellness Committee led the residency in participation in the American College of Obstetricians and Gynecologists' (ACOG) Wellness Week, with daily activities. Individual resident health concerns were addressed by the Program Leadership during the Covid-19 pandemic. Resident schedule/assignments were modified to minimize in hospital and in person contact during the pandemic, including work from home assignments, telehealth and restricting contact between inpatient and outpatient resident care teams. Residency and Hospital leadership held frequent virtual town halls with the residents, addressing ongoing resident concerns. The annual Resident Roast was streamed to smaller gatherings of residents this Spring to facilitate physical distancing.
3. **Diversity and Inclusion:** The Department named Dr. Alex Olawaiye Vice-Chair for Diversity. We continue our commitment to holistic application review to promote diversity in our program. Given the importance of away electives in the recruitment process, our Department leadership has made a commitment to fund scholarships to cover the supplemental costs of away electives at Magee-Womens Hospital for qualified URiM students, so that cost does not discourage any qualified applicants from considering our residency program. Annual Morris Turner Lectureship was timely discourse by program alumna Dr. Margaret Larkins-Pettigrew: Colors of My Heart: Embracing my Blackness through History, Legacy, Family, Fear and Faith "An examination of how structural racism leads to trauma and maternal loss for African American Women." Faculty and residents established a Reproductive Justice Journal Club to focus on healthcare disparities. Magee-Womens Hospital launched a series of Town Halls to examine possible causes and remedies to the recent report: Pittsburgh Inequality Across Race and Gender that highlighted worse healthcare outcomes for Black Women in Pittsburgh. Nina Ragunathan (PGY4) provided a focused examination of actionable components of this summary to the Department through her Grand Rounds in July.
4. **Didactic Curriculum:** The program added more level-specific education sessions to the core didactic series. For many topics, a junior and a senior session run concurrently to target the appropriate learning level. With this new structure, learning groups are smaller, promoting interactive learning. To maximize resident attendance at Grand Rounds and Core Didactics, we moved Core Didactics (previously on a different day) to follow Grand Rounds for the 2020-2021 academic year. This 3-hour block will be "protected" with clinical duties on all services covered by non-resident personnel. During the Covid-19 pandemic didactic sessions were conducted via TEAMS, and residents leveraged local and national (e.g. National Remote OBGYN Resident Didactics coordinated by UCSF) virtual learning opportunities. We also invited matched interns to participate in our core didactic sessions- which was a terrific way to connect with them during this period of physical distancing. Other local innovations included: streaming of gynecologic surgery with faculty miked to answer questions, narration of surgical videos by gynecologic subspecialty fellows, and remote ultrasound sessions real-time with faculty in the reading room. Drs. Donnellan, Sakamoto and Waltner-Toews continue to lead simulation education.

5. Resident Research: Resident Research Curriculum continues to be led by Drs. Maisa Feghali and John Harris, with statistical support facilitated from the Magee-Womens Research Institute. Journal clubs with specific emphasis on study design and statistics are incorporated into the Core Didactic schedule. Resident Research Day was transitioned to a virtual format due to Covid –19 restrictions with high attendance via TEAMS and engagement via the chat function. The keynote speaker (residency program graduate Dr. Amy Park) delivered her talk remotely focused on establishing and optimizing professional social media presence.
6. Quality Metrics: The program shares Magee’s quarterly NPIC and ARHQ obstetric quality metrics and benchmarks with residents. Residents impact care for nearly all obstetric inpatients at Magee, thus the hospital overall data reflects resident clinical performance. All PGY1 residents are required to attend a systemwide Patient Safety & Quality Education session. Dr. Ross (Clinic Chief) and Dr. Rowland (Medical Director of the Outpatient Clinic) implemented a Problem List- based charting system to standardize and improve efficiency of prenatal care documentation in the EMR. More than half of the Resident Research Day oral abstracts this May focused on institutional quality outcomes: e.g. Assessment of racial disparities in aspirin prophylaxis for preeclampsia prevention, Disparities in the treatment of severe postpartum hypertension, Twelve-month continuation rates for reversible contraception among postpartum women with opiate abuse disorder, Impact of surgical approach on Stage 1 high risk endometrial cancer outcome, and Incidence of sacral osteomyelitis after minimally invasive sacrocolpopexy.
7. Senior and Chief Resident Development: R4 leaders, including Administrative Co-Chief Residents, Teaching Resident, and Clinic Chief Resident, attended the UPMC Annual GME Leadership Conference and the UPMC Chief Resident Bootcamp.
8. Faculty Development: The Department conducted multiple faculty-focused sessions: Physician Advocacy for legislation, UPMC experience Program (Studer Group) to optimize patient experience, Shoulder Dystocia Management Update, Roll-out of post-placental IUD insertion program, and review of institutional post-op opiate prescribing practices. The focus of the Annual Patient Safety Symposium was Trust in Healthcare led by experts on team building, trauma informed care, liability and digital engagement. Drs. Parviainen (PD), Dr. Donnellan (APD) and Diana Brucha (Program Manager) are participating in a nationwide pilot UME to GME Transition Project: Right Resident, Right Program led by Dr. Maya Hammoud. Dr. Parviainen is part of the Ready for Intern-Year Curriculum and Assessments working group and Dr. Donnellan the Formation of Residency Learning Communities working group.

Doximity Rankings for Residencies and Training Institutions

Doximity’s Residency Navigator ranked the Obstetrics and Gynecology Residency fifth among more than 287 Ob/Gyn residencies in the United States! We are grateful to the incredible faculty, talented residents/fellows, supportive alumni, and generous institution that make this possible. Our program has enjoyed very high rankings, placing in the top 5 in all 5 years of their ranking.

AWARDS

During the past academic year, our residents were the recipients of the awards listed below. Highlights of their accomplishments include prize papers at national meetings, and School of Medicine teaching awards.

National Awards

Jodi L. Boocks, Fellowship Program Manager

- Council on Resident Education in Obstetrics and Gynecology, 2020 Empower Award

Latima Collins, MD (R2)

- Society of Maternal-Fetal Medicine – Resident Award for Excellence in Obstetrics

Jason Conger, MD (R2)

- Society of Gynecologic Oncology Annual Residency Award

Caroline Elbaum, MD, MPH (R2)

- North American Society for Pediatric and Adolescent Gynecology Outstanding Resident Award

Susan Lang, MD (R3)

- American Association of Gynecologic Laparoscopists - Special Excellence in Endoscopic Procedures Award

Mackenzzy Radolec, MD (R3)

- American Society of Colposcopy and Cervical Pathology

Nina Ragunathan, MD (R3)

- Society for Academic Specialists in General Obstetrics and Gynecology

Abby Stork, MD (R3)

- American Urogynecologic Society - Award for Excellence in Female Pelvic Medicine and Reconstructive Medicine

Kristen Venuti, MD (R4)

- Society of Laparoscopic Surgeons - Outstanding Resident Award
- Ryan Program Resident Award for Excellence in Family Planning
- Recipient of the 2020 Society of Academic Specialists in Obstetrics and Gynecology (SASGOG) Resident Reporters grant to attend the 2020 SASGOG Annual Meeting

Debra L. Dooley GME Program Coordinator Excellence Award



While Program Coordinators' titles may vary, this generally refers to the role that supports the program director, manages day-to-day program operations, and is actively involved in the program's ACGME-related functions. The Debra L. Dooley GME Program Coordinator Excellence Award recognizes these individuals for their deep understanding of the accreditation process, excellent communication and interpersonal skills, and projects that improve GME.



Diana Lynn Brucha, C-TAGME

Obstetrics and Gynecology
UPMC Medical Education
Pittsburgh, Pennsylvania

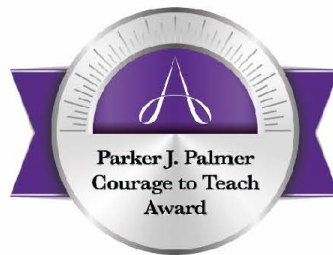
Nominators had this to say:

"Ms. Brucha's mentorship, effectiveness, and creativity allow the PD [program director] to reap the fulfillment of running a program."

"She is clearly one of the residents' biggest fans. This past year, she went above and beyond asking the residency if there was anything that we needed for our resident lounge. I assumed that she was referring to office supplies or materials for our laparoscopic trainer. Another resident requested a new TV along with snacks. Diana's response was, "What size TV?" Within a few months, there was a new flat screen TV to enjoy. The joy was palpable. As the medical community's focus intensifies on wellness, they are just catching up to Diana."

"One of Ms. Brucha's most valuable traits is to think things through multiple steps into the future. One example of this took place during license renewal in 2018. The State had just changed its medical licensing process, which ultimately required our team to re-design our licensing approach. Ms. Brucha helped us to estimate the delays caused by the State's change, and to think through alternate approaches. Her assistance minimized license delay or interruption for our new and continuing residents."

Parker J. Palmer Courage to Teach Award



The Parker J. Palmer Courage to Teach Award honors program directors who find innovative ways to teach residents and to provide quality health care while remaining connected to the initial impulse to care for others in this environment. Parker J. Palmer is the author of the book *The Courage to Teach* and whose promotion of the concept of "living divided no more" has proven relevant to teaching in academic health centers.



Gabriella G. Gosman, MD

Program Director for Obstetrics and Gynecology
UPMC Medical Education
Pittsburgh, Pennsylvania

Nominators had this to say:

"From a resident perspective, Dr. Gosman is the epitome of a program director. She is always available, whether it be mid-day, late night, or a weekend, to talk about a concern or to advocate for her residents. Every resident, regardless of level, is comfortable discussing personal concerns with Dr. Gosman, as they know that she will help them to find a solution. She is approachable and kind, the person who every resident would want in their corner. Dr. Gosman has developed an innovative simulation education curriculum, including pumpkin models of cesarean sections, which she personally builds and proctors despite her busy schedule. She also spends time with each individual resident in laparoscopic training sessions weekly to improve resident laparoscopic skills. She brings her teaching skills to the bedside when interacting with her patients as well with her signature handwritten note sheets on which she summarizes each patient encounter for each patient to take with them in order to facilitate understanding of their visit and ultimately their health. With the changes in healthcare delivery, a physician who takes the time to write notes for their patients is rare and something to be valued."

"In all of her endeavors, she is energetic, engaged and enthusiastic. She is known for her ability both to work as part of a team and to lead a team. She shares her knowledge and experience and mentors individuals at all levels. Dr. Gosman is an outstanding program director and leader in the GME Community."

Program Awards

Rachel Dang, MD (R1)

- Magee-Womens Hospital Junior Resident Award for Excellence in Family Planning

Jennifer de Groot, MD (R1)

- The Margaret Searce Compassionate Care Award

Kymberly Forsyth, MD (R1)

- Best General Obstetrical Skills by an Intern

Taylor Orellana, MD (R4)

- The Dr. Morris Turner Procedural Teaching and Guidance Award

Teaching Awards

RESIDENTS:

Alexandra Buffie, MD

- University of Pittsburgh School of Medicine, Best Second-Year Ob/Gyn Resident Teacher as selected by Third-Year Medical Students

Kristie Charek, MD

- University of Pittsburgh School of Medicine, Best Senior Ob/Gyn Resident Teacher as selected by Third-Year Medical Students

Jennifer de Groot, MD

- University of Pittsburgh School of Medicine, Best Second-Year Ob/Gyn Resident Teacher as selected by Third-Year Medical Students

Caroline Elbaum, MD, MPH

- University of Pittsburgh School of Medicine, Best Second-Year Ob/Gyn Resident Teacher as selected by Third-Year Medical Students

Emily MacArthur, MD

- University of Pittsburgh School of Medicine, Best First-Year Ob/Gyn Resident Teacher as selected by Third-Year Medical Students

Julia Tasset, MD, MPH

- University of Pittsburgh School of Medicine, Best Second-Year Ob/Gyn Resident Teacher as selected by Third-Year Medical Students

FELLOWS:Tiffany Deihl, MD

- University of Pittsburgh School of Medicine, Best OB Fellow Teacher as selected by Third-Year Medical Students

Chelsea Chandler, MD

- University of Pittsburgh School of Medicine, Best GYN Fellow Teacher as selected by Third-Year Medical Students

FACULTY:Tiffany Deihl, MD

- OB Fellow Teaching Award as selected by Residents

Maisa Feghali, MD

- OB Faculty Teaching Award as selected by Residents

John Harris, MD, MSc

- Society of Academic Specialists in Obstetrics and Gynecology Faculty Award as selected by Residents

Jennifer Makin, MD

- Magee Outpatient Clinic Faculty Teaching Award as selected by Residents

Laura Nywening, MD

- CREOG (Council on Resident Education in Obstetrics and Gynecology) National Faculty Award for Excellence in Resident Education

Ann Peters, MD

- Gyn Fellow Teaching Award as selected by Residents

Rebecca Waltner-Toews, MD

- APGO (Association of Professors of Gynecology and Obstetrics) Excellence in Resident Education Teaching Award

SCHOLARLY ACTIVITIES**Published Articles - Peer Review Articles**

Arian SE, Erfani H, Westerfield LE, Buffie A, Nassef S, Gibbons WE, Van Den Veyver IB. Prenatal testing in pregnancies conceived by in vitro fertilization with pre-implantation genetic testing. Prenat Diagn, 2020 Jun;40(7):846-851. doi: 10.1002/pd.5711. Epub 2020 May 20.

Venuti KR, Burkett LS, Cabrera C, Bradley MS. The impact of menopausal status on Uropathogen resistance patterns in women. Female Pelvic Med Reconstr Surg. 2019 Sep 11. doi: 10.1097/SPV.0000000000000778. Online ahead of print.

Garrett AA, Foley EC, Rindos N. Laparoscopic hysterectomy and resection of vaginal septum in a patient with bicornis uterus. J Minim Invasive Gynecol. Jul-Aug 2020;27(5):1003-1004. doi: 10.1016/j.jmig.2019.10.021. Epub 2019 Nov 2.

Melnyk A, Rindos NB, El Khoudary SR, Lee TTM. Comparison of laparoscopic hysterectomy in patients with endometriosis with and without an obliterated cul-de-sac. J Minim Invasive Gynecol. 2019 Jul 4. pii: S1553-4650(19)30300-0. doi: 10.1016/j.jmig.2019.07.001. [Epub ahead of print].

Melnyk A, Sassani J, Moalli P, Sinex D, Bonidie M. Does sacrocolpopexy mesh removal lead to recurrent prolapse? A retrospective cohort study. J Minim Invasive Gynecol. 2019 Jul 4. pii: S1553-4650(19)30300-0. doi: 10.1016/j.jmig.2019.07.001. [Epub ahead of print] 31279776.

Orellana TE, Peters A, Lee TTM. Cesarean section scar incontinence following first-trimester surgical abortion: A rare phenomenon requiring hysterectomy. J Minim Invasive Gynecol. . May-Jun 2020;27(4):800-802. doi: 10.1016/j.jmig.2019.08.022. Epub 2019 Aug 28.

Ragunathan NW, Lamb JE, Hauspurg A, Beck S. Assessment of racial disparities in aspirin prophylaxis for preeclampsia prevention. American Journal of Obstetrics & Gynecology 222 (1), S469, 2020.

Hauspurg A, Redman EK, Assibey-Mensah V, Tony Parks W, Jeyabalan A, Roberts JM, Catov JM. Placental findings in non-hypertensive term pregnancies and association with future adverse pregnancy outcomes: a cohort study. Placenta. 2018 Dec 15;74:14-19. doi: 10.1016/j.placenta.2018.12.008. Epub 2018 Dec 21.

Redman EK, Hauspurg A, Hubel CA, Roberts JM, Jeyabalan A. Clinical course, associated factors, and blood pressure profile of delayed-onset postpartum preeclampsia. Obstet Gynecol. 2019 Nov;134(5):995-1001. doi: 10.1097/AOG.0000000000003508.

Ackenbom MF, Dong S, Romanova AL, Baranski L, Butters MA, Davis EM, Zyczynski HM. Postoperative opioid utilization in older women undergoing pelvic organ prolapse surgery. Female Pelvic Med Reconstr Surg. 2020 Feb 5. doi: 10.1097/SPV.0000000000000844. Online ahead of print.

Published Articles - Peer Review Articles Continued

Romanova AL, Carter-Brooks C, Ruppert KM, Zyczynski HM. 30-Day unanticipated healthcare encounters after prolapse surgery: impact of same day discharge. Am J Obstet Gynecol. 2020 May;222(5):482.e1-482.e8. doi: 10.1016/j.ajog.2019.11.1249. Epub 2019 Nov 13.

Sassani JS, Ross JH, Lopa S, Handzel RM, Bradley MS, Bonidie M. Prolapse recurrence after sacrosolpopexy mesh removal: A retrospective cohort study. Female Pelvic Med Reconstr Surg. 2020 Feb;26(2):92-96. doi: 10.1097/SPV.0000000000000816.

Giugale LE, Charelle C, Carter-Brooks M, Ross JH, Shepherd JP, Zyczynski HM. Outcomes of a staged midurethral sling strategy for stress incontinence and pelvic organ prolapse. *Obstet Gynecol*. 2019 Oct;134(4):736-744. doi: 10.1097/AOG.0000000000003448.

Rosen MW, Tasset J, Kobernik EK, Smith YR, Johnston C, Quint EH. Risk factors for endometrial cancer or hyperplasia in adolescents and women 25 years old or younger. *J Pediatr Adolesc Gynecol*. 2019 Oct;32(5):546-549. doi: 10.1016/j.jpog.2019.06.004. Epub 2019 Jun 18.

Winner of the 2020 ACOG Junior Fellow College of Advisory Council Essay!

Tasset J. What Does the Future of Ob-Gyn Look Like to You? *Obstetrics & Gynecology*: May 2020 - Volume 135 - Issue 5 - p 1069.

Newcomb LK, Toal CT, Rindos NB, Wang L, Mansuria SM. Risk-reducing bilateral salpingo-oophorectomy: Assessing the incidence of occult ovarian cancer and surgeon adherence to recommended practices. *J Minim Invasive Gynecol*. 2020 Jan 9;S1553-4650(20)30037-6. doi: 10.1016/j.jmig.2020.01.004. Online ahead of print.

Venuti KR, Burkett LS, Cabrera C, Bradley MS. The impact of menopausal status on uropathogen resistance patterns in women. *Female Pelvic Med Reconstr Surg*. 2019 Sep 11. doi: 10.1097/SPV.0000000000000778. Online ahead of print.

Abstract Presentations

Poster Presentations

Venuti K, Cabrera C, Burkett L, Bradley M. Race and ethnicity representation in gynecologic oncology research. Winter Society of Gynecologic Oncologists, Feb 2020, Aspen, Colorado.

Venuti K, Cabrera C, Burkett L, Bradley M. Does menopausal status affect uropathogen and antimicrobial resistance patterns in women? American Urogynecologic Society/International Urogynecologic Association Scientific Meeting, Sept 2019, Nashville, Tennessee.

Hauspurg A, Lemon LS, Binstock A, Cabrera C, Redman EK, Larkin J, Watson AR, Quinn BA, Beigi RH, Simhan HN. The effect of a remote blood pressure monitoring program on postpartum healthcare utilization. Society for Maternal-Fetal Medicine 40th Annual Pregnancy Meeting , Feb 2020, Grapevine, Texas.

Poster Presentations Continued

Dave E, Vani K, Bodner L, Himes KP. Risk factors for medical management of gestational diabetes in twin pregnancies. American College of Obstetricians and Gynecologists Annual Clinical and Scientific Meeting, Apr 2020, Seattle, Washington.

Feghali M, Deihl T, and de Groot JL. The effect of fetal sex on maternal and fetal outcomes in women with gestational diabetes. Society for Maternal-Fetal Medicine 40th Annual Pregnancy Meeting , Feb 2020, Grapevine, Texas.

Garrett AA, Wiesenfeld HC. Percutaneous exposure incidents in Obstetrics and Gynecology residents. Council on Resident Education in Obstetrics and Gynecology & Association of Professors of Obstetrics and Gynecology Annual Meeting, Feb 2020, Orlando, Florida.

Garrett AA, Wiesenfeld HC. Percutaneous exposure incidents in Obstetrics and Gynecology residents. American College of Obstetricians and Gynecologists Annual Clinical and Scientific Meeting, Apr 2020, Seattle, Washington.

Orellana T, Garrett AA, Venuti K. Race and ethnicity representation in gynecologic oncology research. Winter Society of Gynecologic Oncologists, Feb 2020, Aspen, Colorado.

Suarez Mora A, Zeccola A, Garrett AA. Risk factors for surgical management of bowel obstruction in patients with gynecological malignancy. Society of Gynecologic Oncologists 2020 Annual Meeting on Women's Cancer, Mar 2020, Toronto, Canada.

Lang SM, Brucha D, Parviainen K. Gender bias in letters of recommendation in Obstetrics and Gynecology. 2020 Rita M. Patel GME Leadership Conference, Feb 2020, Pittsburgh, Pennsylvania.

Lang SM, Go C, Brucha D, Byrnes M, Sachdev U, Parviainen K. Gender bias in letters of recommendation in Vascular Surgery. 33rd Annual Meeting of the Eastern Vascular Society. Sept 2019.

Lang SM, Go C, Brucha D, Byrnes M, Sachdev U, Parviainen K. Gender bias in letters of recommendation in Vascular Surgery. American College of Surgeons Clinical Congress. Oct 2019.

Lang SM, Go C, Brucha D, Byrnes M, Sachdev U, Parviainen K. Reading between the lines: Implicit gender bias in LOR in Obstetrics and Gynecology. Council on Resident Education in Obstetrics and Gynecology & Association of Professors of Obstetrics and Gynecology Annual Meeting, Feb 2020, Orlando, Florida.

Taylor SE, Wield A, Fang Y, Bhargava R, Lang SM, Tseng G, Coffman LG, Oesterreich S. Endocrine biomarkers in low grade serous ovarian cancers (LGSC) and serous ovarian tumors of low malignant potential (LMP). American Society of Clinical Oncologists Annual Meeting, May 2020.

McGough CE, Chauhan SP, Wagner SM, Chang KWC, Yang LJS, Blackwell SC. Neonatal brachial plexus palsy and Hill's criteria of association or causation: An examination of the ACOG task

force's publication. Central Association of Obstetricians and Gynecologists Meeting, Oct 2019, Cancun, Mexico.

Poster Presentations Continued

Foley C, Melnyk A, Lee T. Endometriosis of the rectus rectus mMuscle endometriosis: A single center experience, novel laparoscopic approach and review of the literature. Society of Gynecologic Surgeons 46th Annual Scientific Meeting, Apr 2020, Jacksonville, Florida.

Melnyk A, Sassani J, Moalli P, Sinex D, Bonidie M. Application of a custom 3D vaginal model for sacrocolpopexy mesh fixation. 2020 Rita M. Patel GME Leadership Conference, Feb 2020, Pittsburgh, Pennsylvania.

Orellana T, Garrett AA, Venuti K. Race and ethnicity representation in gynecologic oncology research. Winter Society of Gynecologic Oncologists, Feb 2020, Aspen, Colorado.

Pombier K, Chan D, Courtney-Brooks M. A case report of uterine torsion in a non gravid uterus. American College of Obstetricians and Gynecology Air Force Division Conference, Sept 2019, San Diego, California.

Pombier K, Blake R. Sexual dysfunction in gynecologic oncology. International Society for the Study of Women's Sexual Health Annual Meeting, Mar 2020, in Orlando, Florida.

Ragunathan NW, Lamb JE, Hauspurg A, Beck S. Assessment of racial disparities in aspirin prophylaxis for preeclampsia prevention. Society for Maternal-Fetal Medicine 40th Annual Pregnancy Meeting, Feb 2020, Grapevine, Texas.

Ragunathan NW, Lamb JE, Hauspurg A, Beck S. Site of prenatal care impacts aspirin prophylaxis for preeclampsia prevention. American College of Obstetricians and Gynecology Annual Clinical and Scientific Meeting, Apr 2020, Seattle Washington.

Hauspurg A, Lemon LS, Binstock A, Cabrera C, Redman EK, Larkin J, Watson AR, Quinn BA, Beigi RH, Simhan HN. The effect of a remote blood pressure monitoring program on postpartum healthcare utilization. Society for Maternal-Fetal Medicine 40th Annual Pregnancy Meeting , Feb 2020, Grapevine, Texas.

Orellana T, Garrett AA, Venuti K. Race and ethnicity representation in gynecologic oncology research. Winter Society of Gynecologic Oncologists, Feb 2020, Aspen, Colorado.

Venuti K, Cabrera C, Burkett L, Bradley M. Race and ethnicity representation in gynecologic oncology research. Winter Society of Gynecologic Oncologists, Feb 2020, Aspen, Colorado.

Venuti K, Cabrera C, Burkett L, Bradley M. Does menopausal status affect uropathogen and antimicrobial resistance patterns in women? American Urogynecologic Society/International Urogynecologic Association Scientific Meeting, Sept 2019, Nashville, Tennessee.

Suarez Mora A, Zeccola A, Garrett AA. Risk factors for surgical management of bowel obstruction in patients with gynecological malignancy. Society of Gynecologic Oncologists 2020 Annual Meeting on Women's Cancer, Mar 2020, Toronto, Canada.

Oral Presentations

Barrera C, Boocks JL, Krueger M, Moynihan A, Perret K, Xhaferaj S. Program Evaluation Committee: A pretty epic coaster - Step Right Up! Council on Resident Education in Obstetrics and Gynecology & Association of Professors of Obstetrics and Gynecology Annual Meeting, Feb 2020, Orlando, Florida.

Donnellan N, Rindos N. CREST (Curriculum for Resident Education in Surgical Technique). Council on Resident Education in Obstetrics and Gynecology & Association of Professors of Obstetrics and Gynecology Annual Meeting, Feb 2020, Orlando, Florida.

Lyn H, Stephanie Mishaw S, Reddy S, Hohmann H, Wong M. A Spoonful of Sugar Helps the Medicine Go Down: Strategies to Address Student Mistreatment in Ob-Gyn. Council on Resident Education in Obstetrics and Gynecology & Association of Professors of Obstetrics and Gynecology Annual Meeting, Feb 2020, Orlando, Florida.

Sassani J, Ross JH, Handzel R, Lopa S, Bradley MS, Bonidie M. Does sacrocolpopexy mesh removal lead to recurrent prolapse? A retrospective cohort study. American Urogynecologic Society/International

Urogynecologic Association Scientific Meeting, Sept 2019, Nashville, Tennessee (Scientific salon presentation-round table discussion).

Teterichko SR, Horne ZD, Glaser SM, Crafton S, Miller E, Segretti E, Munns S, Krivak T, Olawaiye AO, Sukumvanich P, Beriwal S. Racially-driven diagnosis and survival differential in women diagnosed endometrial cancers in the United States. Winter Society of Gynecologic Oncologists Annual Meeting, Feb 2020, Aspen, Colorado.

Zeccola A, Foley C, Rindos N. Effect of age and prior gynecologic surgery on pathologic diagnosis in patients undergoing benign hysterectomy. American Association of Gynecologic Laparoscopists 48th Annual Congress Conference, Nov 2020, Vancouver, British Columbia.

Video Presentation

Conger J, Novelli P, Rindos N. Uterine artery embolization: A case presentation and review of UAE for OBGYNs. American College of Obstetricians and Gynecologists Annual Clinical and Scientific Meeting, April 2020, Seattle, Washington.

Melnyk A, Chao L, Lee T. A novel technique: Mesh repair after excision of rectus muscle endometriosis. American Association of Gynecologic Laparoscopists 48th Annual Congress Conference, Nov 2020, Vancouver, British Columbia.

Melnyk A, Mansuria S. Techniques to master a difficult bladder flap. American Association of Gynecologic Laparoscopists 48th Annual Congress Conference, Nov 2020, Vancouver, British Columbia.

Artsen A, Stork A, Zyczynski HM. The art of peritoneal closure during sacrocolpopexy. Society of Gynecologic Surgeons 46th Annual Scientific Meeting, Mar 2020, Jacksonville, Florida.

On-Line Training Module Developmentuffie A, Cabrera C, Sakamoto S. ptive vaginal delivery.

https://www.wiser.pitt.edu/apps/courses/courseview.asp?course_id=9804

Annual Residents' Research Day

The annual Residents' Research Day occurred on May 20, 2020. The format for the event was modified this year due to COVID-19 restrictions.

The invited alumni speaker for the day was Amy Park, MD, a 2006 alumna who shared her perspective on "Online 'Presence': Leveraging the Power of Social Media and the Internet." Career in Clinical Trials."

The department partnered with UPMC Magee-Womens Hospital to establish an endowment to award to the best resident oral presentation with the Marvin C. Rulin, MD, Resident Research Day Presentation Award. Doctor Marvin C. Rulin was a former Magee Ob/Gyn resident and faculty member who held numerous positions, both at Magee and at the University, before officially retiring in October of 2000. The 2020 award was presented to Dr. Camila Cabrera, for her project, "Disparities in the Treatment of Severe Postpartum Hypertension." Doctor Cabrera received a monetary and plaque award. Dr. Taylor Orellana, "Flatus After Undergoing Surgery: Creation of a Nomogram to Predict Postoperative Ileus After Gynecologic Oncologic Exploratory Laparotomy,"

and Dr. Nina Ragunathan, “Assessment of Racial Disparities in Aspirin Prophylaxis for Preeclampsia Prevention,” were also recognized for outstanding research.

Resident presentations:

Resident: Abby Stork, MD
Mentors: Halina Zyczynski, MD, and Lauren Giugale, MD
Title: “Incidence of Sacral Osteomyelitis and Discitis after Minimally Invasive Sacrocolpopexy”

Resident: Camila Cabrera, MD
Mentor: Alisse Hauspurg, MD
Title: “Disparities in the Treatment of Severe Postpartum Hypertension”

Resident: Jennifer de Groot, MD
Mentor: Maisa Feghali, MD
Title: “The Effect of Fetal Sex on Maternal and Fetal Outcomes in Women with Gestational Diabetes”

Resident: Solomiya Teterichko, DO
Mentors: Christina Megli, MD, and Elizabeth Krans, MD, MSc
Title: “IVDU Associated Infections in Pregnant Women Presenting for Methadone Conversion”

Resident: Aaron Campbell, MD
Mentor: Elizabeth Krans, MD, MSc
Title: “Twelve-Month Continuation Rates for Reversible Contraception Among Postpartum Women with Opiate Use Disorder”

Resident: Susan Lang, MD
Mentor: Kristiina E. Parviainen, MD, MS
Title: “Implicit Gender Bias in Letters of Recommendation in Obstetrics & Gynecology”

Resident: Nina Ragunathan, MD
Mentor: Stacy Beck, MD
Title: “Assessment of Racial Disparities in Aspirin Prophylaxis for Preeclampsia Prevention”

Resident: Mackenzy Radolec, MD
Mentor: Brian Orr, MD
Title: “Impact of Surgical Approach on Stage 1 High Risk Endometrial Cancer”

Resident: Taylor Orellana, MD
Mentor: Sarah Taylor, MD
Title: “Flatus After Undergoing Surgery: Creation of a Nomogram to Predict Postoperative Ileus After Gynecologic Oncologic Exploratory Laparotomy”

OBSTETRICS AND GYNECOLOGY RESIDENCY PROGRAM GRADUATES

Kristie Charek, MD	Ob/Gyn Generalist Private Practice Monroeville, PA
Alison Garrett, MD	Fellow, Gynecologic Oncology UPMC Medical Education, UPMC Magee-Womens Hospital, Pittsburgh, PA
Alexandra Melnyk, MD, MEd	Fellow, Female Pelvic Medicine and Reconstructive Surgery, UPMC Medical Education, UPMC Magee-Womens Hospital, Pittsburgh, PA
Taylor Orellana, MD	Fellow, Gynecologic Oncology UPMC Medical Education, UPMC Magee-Womens Hospital, Pittsburgh, PA
Kathleen Pombier, MD	Ob/Gyn Generalist, Nellis Air Force Base, Las Vegas, NV
Emily Redman, MD	Fellow, Maternal-Fetal Medicine Case Western Reserve University School of Medicine, Cleveland, OH
Anna Romanova, MD	Fellow, Female Pelvic Medicine and Reconstructive Surgery, Icahn School of Medicine at Mt. Sinai, New York, NY
James Ross, MD	Fellow, Female Pelvic Medicine and Reconstructive Surgery, Cleveland Clinic, OH
Katie Turgeon, MD	Ob/Gyn Generalist, UPMC Community Practice Womancare Associates, Pittsburgh, PA
Kristen Venuti, MD	Faculty, Northwestern Medicine Prentice Women's Hospital, Chicago, IL

First-Year Residents

Emily Carbaugh, MD	SUNY Downstate Medical Center College of Medicine
Rachel Dang, MD	University of Texas School of Medicine at San Antonio
Kymberly Forsyth, MD	Ohio State University College of Medicine
Emily MacArthur, MD	Chicago Medical School at Rosalind Franklin University of Medicine and Science
Christine McGough, MD	McGovern Medical School at the University of Texas Health Sciences Center at Houston
Nicole Meckes, MD	Lewis Katz School of Medicine at Temple University
Praveen Ramesh, MD	University of California Davis, School of Medicine
Kristin Romutis, MD	Virginia Commonwealth School of Medicine
Selma Su, MD	Drexel University College of Medicine

Second-Year Residents

Alexandra Buffie, MD	Baylor College of Medicine
Latima Collins, MD	The University of Toledo College of Medicine
Jason Conger, MD	Medical College of Georgia at Augusta University
Eesha Dave, MD	Icahn School of Medicine at Mount Sinai
Caroline Elbaum, MD, MPH	Tufts University School of Medicine
Taylor Rives, MD	Medical College of Georgia at Augusta University
Jourdan Schmitz, MD, MS	USF Health Morsani College of Medicine
Julia Tasset, MD, MPH	University of Michigan Medical School
Coralee Toal, MD	University of Oklahoma College of Medicine
Alison Zeccola, MD	Jacobs School of Medicine, Biomedical Sciences at the University of Buffalo

Third-Year Residents

Camila Cabrera, MD	University of South Florida Morsani College of Medicine
Aaron Campbell, MD	East Tennessee State University James H. Quillen College of Medicine
Jennifer de Groot, MD	Mercer University School of Medicine
Susan Lang, MD	University of Virginia School of Medicine
Mackenzy Radolec, MD	Sidney Kimmel Medical College of Thomas Jefferson University
Nina Ragunathan, MD	Harvard Medical School
Abby Stork, MD	University of Kansas School of Medicine
Solomiya Teterichko, DO	Western University of Health Sciences College of Osteopathic Medicine of the Pacific

Fourth-Year Residents

Alison Garrett, MD	Pennsylvania State University College of Medicine
Kristie Charek, MD	University of Cincinnati College of Medicine
Alexandra Melnyk, MD, MEd	University of Illinois at Chicago College of Medicine
Taylor Orellana, MD	Medical University of South Carolina College of Medicine
Kathleen Pombier, MD	University of South Florida Health Morsani College of Medicine
Emily Redman, MD	University of Rochester School of Medicine & Dentistry
Anna Romanova, MD	Northwestern University The Feinberg School of Medicine
James H.B. Ross, MD	New York Medical College
Katie Turgeon, MD	University of Pittsburgh School of Medicine
Kristen Venuti, MD	Medical College of Georgia at Georgia Regents University

CLINICAL FELLOWSHIP

The department offers fellowship training in the following eight subspecialty areas of obstetrics and gynecology: Female Pelvic Medicine and Reconstructive Surgery, Minimally Invasive Gynecologic Surgery, Gynecologic Oncology, Family Planning, Laboratory Genetics and Genomics, Reproductive Infectious Diseases, Maternal-Fetal Medicine, and Reproductive Endocrinology and Infertility.

Female Pelvic Medicine and Reconstructive Surgery

The fellowship in Female Pelvic Medicine and Reconstructive Surgery at Magee-Womens Hospital of the UPMC and the University of Pittsburgh is designed as a three-year curriculum for individuals who have completed residency training in obstetrics and gynecology or urology. The fellowship is an ACGME (Accreditation Counsel for Graduate Medical Education) accredited fellowship. The fellowship offers four positions over the course of three years. The curriculum is designed to provide broad training and experience in clinical care and research in women with pelvic floor disorders. Clinical rotations include in-patient and out-patient urogynecologic urology, geriatrics, colorectal surgery and gastroenterology. Surgical approaches to pelvic floor disorders include abdominal, vaginal and laparoscopic procedures. Research rotations will include the opportunity to participate in both basic science (laboratory) research and clinical research. Fellows will have the opportunity to apply for a Master's degree and/or obtain a certificate from the Institute for Clinical Research Education. Clinical experience in obstetrics is available but not required as part of the fellowship. Director: Megan Bradley, MD

Minimally Invasive Gynecologic Surgery

The Department has a two-year intense academic training program which focuses on minimally invasive gynecologic surgery. The program is designed to provide extensive training in endoscopic surgery from the gynecologic and general surgery perspectives. A research project is an integral part of the program with the expectation that it is submitted at a national level and published in a peer-review journal. Other activities include active participation in resident and student teaching programs and private patient sessions. Director: Ted Lee, MD

Gynecologic Oncology

An ACGME (Accreditation Counsel for Graduate Medical Education) approved fellowship. There are two positions per year for a three-year fellowship in Gynecologic Oncology. Fellows obtain advanced clinical and research training, with participation in the core Clinical Research Training Program. In addition, a variety of tracks are available should the fellow wish to pursue a Master's of Science in Clinical Research. Fellows will gain exposure to NIH- funded trials through the Gynecologic Oncology Group (GOG), Radiation Therapy Oncology Group (RTOG) and many other ongoing clinical and basic research Departments of Obstetrics and Gynecology, Radiation Oncology and Surgical Oncology (at UPMC Shadyside) Director: Paniti Sukumvanich, MD

Family Planning

This fellowship is one of only a few funded fellowships in family planning in the United States and is currently working towards ACGME accreditation. This two-year fellowship is designed to

include training in family planning clinical care, experience in gynecologic surgery and related family planning procedures, participation in the design and performance of clinical trials and international field work. During the

two years, the fellow is encouraged to complete coursework at the Graduate School of Public Health at the University of Pittsburgh to satisfy the requirements of a Master's degree in Public Health. Coursework can involve a multidisciplinary approach or a departmental curriculum including biostatistics, epidemiology and health care administration. The program is intended to foster the pursuit of an academic career by an overall emphasis on and preparation for clinical research and teaching. The fellow will be specially trained in contraceptive counseling, Nexplanon insertion and removal, IUD insertion and removal and the fitting of diaphragms. Additionally, the fellow will gain expertise in treating complications of hormonal contraception. Although these procedures may have been learned during residency, a concentrated experience will enable the fellow to be proficient with unusual or complicated cases. The fellow will receive specialized training and become very experienced in performing first trimester procedures including manual vacuum aspiration and medical abortions. The fellow will have similar experience with second trimester abortions by dilation and evacuation (D&E). Director: Beatrice Chen, MD, MPH

Medical Genetics

The two year ACGME-accredited graduate medical education program in medical genetics at the University of Pittsburgh provides the formal instruction and appropriately supervised clinical experience necessary for residents to develop the knowledge, skills, and attitudes essential to the practice of clinical medical genetics. This program is for physicians (MD, DO, MD/PhD) who have completed an entire ACGME-accredited residency in another specialty, and who can obtain a medical license in the Commonwealth of Pennsylvania. Director: Daniel Bellissimo, MD

Reproductive Infectious Disease

The ACGME (Accreditation Counsel for Graduate Medical Education) Reproductive Infectious Disease fellowship trains obstetrician-gynecologists to become experts in infections of the reproductive tract. It is a two-year fellowship which offers one position every other year. The program focuses on infectious diseases in obstetric and gynecologic patients but includes exposure to medical infectious disease, STD's and neonatal infections. Exposure to current laboratory techniques in microbiology, molecular biology and immunology is also offered as well as biostatistics and epidemiology. The fellows' efforts in basic science and clinical investigation are also fostered and expected. Director: Harold Wiesenfeld, MD

Maternal-Fetal Medicine

An ACGME (Accreditation Counsel for Graduate Medical Education) fellowship in MFM offers three positions per year. Extensive clinical training is provided using the large obstetrical population of 400+ maternal transport patients per year. Experience in ultrasound, reproductive genetics, neonatology and statistical methodology is part of the training. Basic research in cardiovascular physiology, pharmacology, infectious diseases, and molecular biology are available through the Magee-Womens Research Institute. Areas of clinical research focus include: preterm birth prevention, pharmacologic agents for the inhibition of labor, infectious diseases, preeclampsia and medical complications of pregnancy. Director: Katherine Himes, MD

Reproductive Endocrinology and Infertility

The University of Pittsburgh fellowship program in Reproductive Endocrinology and Infertility addresses all aspects of The ACGME (Accreditation Counsel for Graduate Medical Education) requirements for subspecialty training. This three-year program offers one position per year. Particular emphasis is placed on surgical training

spanning from pediatric to adult patients. Issues related to the specialty will be addressed with detailed faculty supervision with regard to didactic, medical surgical and assisted reproductive technology aspects of specialty training. Director: Joseph S. Sanfilippo, MD

FELLOWS AS OF JULY 2020

Female Pelvic Medicine and Reconstructive Surgery Fellows (Urogynecology):

Linda Burkett, MD

Medical School: Virginia Commonwealth University School of Medicine

Residency: Washington Hospital Center/Georgetown University, Obstetrics and Gynecology

Stephanie Glass-Clark, MD

Medical School: University of North Carolina School of Medicine

Residency: Virginia Commonwealth University, Obstetrics and Gynecology

Marina Guirguis, MD

Medical School: University of Missouri, Kansas City School of Medicine

Residency: Inova Fairfax Hospital, Obstetrics and Gynecology

Alison Melnyk, MD

Medical School: University of Illinois, College of Medicine

Residency: UPMC Medical Education, Obstetrics and Gynecology

Minimally Invasive Surgery Fellows:

Sarah Allen, MD

Medical School: University of Alabama, School of Medicine

Residency: Wake Forest, School of Medicine, Obstetrics and Gynecology

Nathan King, MD

Medical School: New York University, School of Medicine

Residency: McGaw Medical Center of Northwestern University, Obstetrics and Gynecology

Shana Miles, MD, PhD, USAF, MC, FS

Medical School: National Capital Consortium

Residency: Uniformed Services University

PhD: Uniformed Services University, Obstetrics and Gynecology

Gynecologic Oncology Fellows:

Daniel Chan, MD

Medical School: University of South Dakota, Sanford School of Medicine

Residency: UPMC Medical Education, Obstetrics & Gynecology

Chelsea Chandler, MD

Medical School: Medical College of Georgia at Augusta University

Residency: UPMC Medical Education, Obstetrics & Gynecology

Michael Cohen, MD

Medical School: University of Massachusetts Medical School

Residency: Alpert Medical School at Brown University/Women and Infants Hospital

Alison Garrett, MD

Medical School: Pennsylvania State University, College of Medicine

Residency: UPMC Medical Education, Obstetrics and Gynecology

Taylor Orellana, MD

Medical School: Medical University of South Carolina, College of Medicine

Residency: UPMC Medical Education, Obstetrics and Gynecology

Alyssa Wield, MD

Medical School: Chicago Medical School, Rosalind Franklin University of Medicine and Science

Residency: Cedars-Sinai Medical Center, Obstetrics and Gynecology

Family Planning Fellows:

Samantha Deans, MD

Medical School: Indiana University School of Medicine

Residency: University of Vermont Medical Center, Obstetrics and Gynecology

Mack Goldberg, MD

Medical School: George Washington University

Residency: Vanderbilt University Medical Center, Obstetrics and Gynecology

Reproductive Infectious Diseases Fellow:

Sharlay Butler, MD

Medical School: University of Washington Medical School

Residency: Northwestern University Feinberg School of Medicine, Obstetrics and Gynecology

Yasaswi (Paruchuri) Kislovskiy, MD

Medical School: Michigan State University, College of Human Medicine

Residency: UPMC Medical Education, Obstetrics & Gynecology

Maternal-Fetal Medicine Fellows:

Jacqueline Atlass, MD

Medical School: Florida International University, Herbert Wertheim College of Medicine

Residency: UPMC Medical Education, Obstetrics & Gynecology

Lauren Carlos, MD

Medical School: Yale University School of Medicine

Residency: Yale New Haven Hospital, Obstetrics and Gynecology

Tiffany Deihl, MD

Medical School: Pennsylvania State University College of Medicine

Residency: UPMC Medical Education, Obstetrics & Gynecology

Francis Hacker, MD

Medical School: Oregon Health & Sciences University

Residency: UPMC Medical Education, Obstetrics & Gynecology

Mitchell Onslow, MD

Medical School: University of Cincinnati College of Medicine

Residency: Indiana University School of Medicine, Obstetrics and Gynecology

Jaclyn Phillips, MD

Medical School: University of Pittsburgh School of Medicine

Residency: George Washington University School of Medicine & Health Sciences

Aalok Sanjanwala, MD

Medical School: Medical College of Georgia, School of Medicine

Residency: University of Alabama Birmingham, Obstetrics and Gynecology

Malinda Schaefer, MD

Medical School: Medical College of Georgia, School of Medicine

Residency: University of Minnesota, Obstetrics and Gynecology

Tiffany Wang, MD

Medical School: Ohio State University College of Medicine

Residency: MedStar Washington Hospital Center / Georgetown University Hospital, Obstetrics and Gynecology

Reproductive Endocrinology and Infertility Fellows:

Rachel Beverley, MD

Medical School: Temple University School of Medicine

Residency: UPMC Medical Education, Obstetrics & Gynecology

Priyanka Ghosh, MD

Medical School: University of Connecticut School of Medicine

Residency: New York Presbyterian Hospital, Weill Cornell Medical Center

Monica Schointuch, MD

Medical School: University of North Carolina, Chapel Hill School of Medicine

Residency: University of Alabama Birmingham, Obstetrics and Gynecology

Sally Vitez, MD

Medical School: Rutgers R W Johnson Medical School

Residency: Columbia University, New York Presbyterian Hospital, Obstetrics and Gynecology

Medical Genetics Fellowship:

Angela Verdoni, PhD

PhD: University of Wisconsin, Genetics

MS: University of Wisconsin, Genetics

DEPARTING FELLOWS – JUNE 30, 2020:

Female Pelvic Medicine and Reconstructive Surgery Fellows:

Amanda Artsen, MD

Current Position: Faculty

University of Pittsburgh School of Medicine, Department of OB/GYN/RS, Division of Urogynecology
Pittsburgh, PA

Jessica Sassani, MD

Current Position: Faculty

Allegheny Health Network, Division of Urogynecology
Pittsburgh, PA

Minimally Invasive Surgery Fellows:

Christine Foley, MD

Current Position: Faculty

Women and Infants Hospital, Division of Minimally Invasive Gynecology
Boston, MA

Laura Newcomb, MD

Current Position: Faculty

University of Virginia, School of Medicine, Division of Minimally Invasive Gynecologic Surgery
Charlottesville, VA

Gynecologic Oncology Fellows:

Lauren Hand, MD

Current Position: Faculty

Baptist MD Anderson
Jacksonville, FL

Adria Suarez Mora, MD

Current Position: Faculty

Cleveland Clinic Florida
Weston, FL

Family Planning Fellows:

Kavita Vinekar, MD

Current Position: Faculty
VA Greater LA/UCLA
Los Angeles, CA

Medical Genetics Fellows:

N/A

Reproductive Infectious Diseases Fellow:

N/A

Maternal Fetal Medicine Fellows:

Anna Binstock, MD

Current Position: Faculty
University of Pittsburgh School of Medicine, Department of OB/GYN/RS, Division of Maternal-Fetal Medicine
Pittsburgh, PA

Christina Megli, MD, PhD

Current Position: Faculty
University of Pittsburgh School of Medicine, Department of OB/GYN/RS, Division of Maternal-Fetal Medicine
Pittsburgh, PA

Sarah Rogan, MD, PhD

Current Position: Faculty
University of Pittsburgh School of Medicine, Department of OB/GYN/RS, Division of Maternal-Fetal Medicine
Pittsburgh, PA

Reproductive Endocrinology and Infertility:

Emily Barnard, DO

Current Position: Faculty
Shady Grove Fertility for REI
Maryland

University of Pittsburgh School of Medicine
University of Pittsburgh Physicians
Department of
Schedule of Revenue and Expenses Fiscal Year 2021 Budget

	University	UPP	Total Budget FY 2021
<u>Revenue</u>			
Patient Care	\$ -	\$ 82,405,927	\$ 82,405,927
Grant:			
Directs	\$ 6,445,223		\$ 6,445,223
Indirects	\$ 2,240,578		\$ 2,240,578
Hospital Contract		\$ 37,227,443	\$ 37,227,443
School of Medicine	\$ 439,715		\$ 439,715
VAMC		\$ 406,652	\$ 406,652
Other	\$ 6,555,409	\$ 1,701,055	\$ 8,256,464
Total Revenue	\$ 15,680,925	\$ 121,741,077	\$ 137,422,002
<u>Expenses</u>			
Salaries and Fringe Benefits:			
Faculty	\$ 13,177,678	\$ 57,217,454	\$ 70,395,132
Non-Faculty	\$ 2,050,207	\$ 28,707,193	\$ 30,757,400
Malpractice Insurance		\$ 5,550,992	\$ 5,550,992
Space Rental	\$ 120,000	\$ 4,838,870	\$ 4,958,870
UPP Overhead		\$ 5,303,721	\$ 5,303,721
University Overhead	\$ 1,244,525		\$ 1,244,525
Other Operating Expenses	\$ 719,374	\$ 29,773,646	\$ 30,493,020
Total Operating Expenses	\$ 17,311,785	\$ 131,391,876	\$ 148,703,661
Excess Revenue over Expenses	\$ (1,630,860)	\$ (9,650,799)	\$ (11,281,659)
Capital Equipment/Improvements	\$ -	\$ -	\$ -
<u>Fund Balances</u>			
University Restricted Accounts as of 6/30/20	\$ 4,501,635	\$ -	\$ 4,501,635
University Endowments as of 6/30/20	\$ 47,937		\$ 47,937
UPP Fund Balance as of 6/30/20	\$ 522,765		\$ 522,765
UPMC Endowments as of 6/30/20	\$ -	\$ 9,964,550	\$ 9,964,550
UPMC SPF Accounts as of 6/30/20	\$ -	\$ 116,251	\$ 116,251
	\$ 5,072,336	\$ -	\$ 5,072,336