



CAIRIBU URO-AGING RESEARCH INTEREST GROUP (UroAging RIG)

MONTHLY KNOWLEDGE EXCHANGES

FEATURED SPEAKERS ZOHREH IZADIFAR, PHD HEIDI BROWN, MD, MAS	CAIRIBU EVENTS URO-AGING RIG SEPTEMBER 28, 2026 3PM - 4PM ET	 
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EXECUTIVE SUMMARY 9/28/2026

Goal: Facilitate knowledge exchange and spur collaborations in uro-aging research and adjacent fields

Summary

Dr. Zohreh Izadifar: Human Bladder Chip: A New Frontier in Uro-Aging Research

Introduction

- Dr. Izadifar began by stating how **urogenital tract organs are highly functional but also biologically complex**.
 - Contributors to biological complexity include: micromechanically dynamic and biochemically complex nature, engagement in active crosstalk, capacity to hold multiple roles, and extent of immunological tolerances.
- In describing the limitations of conventional urogenital models, she noted that 70% of model results do not predict clinical trial results. She introduced the human organ on chip as a solution.

Human Organ on Chip

- Human organ-on-chips are engineered microchips with living human cells to reconstitute tissue- and organ-level functions with precise control of the culture microenvironment.
- With a chip, scientists can **recreate the *in vivo* environment of a tissue** using actual living cells, with the goal of recapitulating major physiology seen in humans.
- Models allow for different cell types on opposite sides of a membrane and variable control factors, such as air and blood, to study tissue interactions, bacteria, immune cells, and therapeutics.

Female Reproductive Tract Models

- Dr. Izadifar created cervical and vaginal chip models. **The mucus produced in the cervical chip model was found to mimic diversity and abundance in the glycomic profile of clinical mucus.**
- Using a bacterial vaginosis (BV) model chip, she was able to model bacterial load, epithelial cell injury, and inflammatory cytokines.
 - In under two weeks, she determined this chip model can be used for downstream applications including testing therapeutics, pathogenic bacteria, and immune responses.

Bladder Chips and Future Directions

- Dr. Izadifar collects human bladder tissue samples and isolates urothelial and stromal cells.
- Her lab developed a 3D urothelial-stromal interface that is positive for uroplakin with a protocol that enables resistance and tolerance of the tissue to urine.
- Currently, her lab is creating a biobank of both younger and older aged donors with the goal of age-specific bladder chips to investigate aging in the urinary tract.

Dr. Heidi Brown: Urine Trouble: UTIs are ubiquitous

Increased UTI Prevalence

- Dr. Brown began by establishing the fact that there is an **increased prevalence of UTIs** in the aging population.
 - Overall encounters of patients with UTIs increased ~30/1000 patients in 2015 to 110/1000 patients in 2022.
- Each year in the US, 2.9 million emergency department visits and 3.6 million outpatient visits are attributed to UTIs.

- Although the disease is rare (only affecting 0.05-3% of women with UTIs) there are fears around pyelonephritis.

Clinical UTI Guidelines

- Effective strategies to prevent recurrent UTI are urgently needed.
- The most updated AUA guidelines for recurrent uncomplicated UTIs state that for most patients in most circumstances, clinicians should recommend vaginal estrogen and offer cranberry, but better evidence could change clinician confidence. Clinicians may offer methenamine Hippurate but again, better evidence is likely to change confidence and the balance between benefits and risks/burdens is unclear.
 - **Overall, there is not enough evidence to definitively guide treatment as physicians move away from prophylactic care.**
- Dr. Brown discussed a new clinical trial spearheaded by Dr. Alison Huang (PI, CAIRIBU KUroEpi program at UCSF).
 - This trial, MEND-UTI, focuses on comparing three treatments for UTIs: vaginal estradiol, methenamine hippurate, and combined vaginal estradiol and methenamine hippurate, with the aim of finding a non-antibiotic treatment.

Moving Away from Antibiotics

- While UTI encounters and antibiotic prescriptions are increasing, **the number of positive urine cultures remains nearly the same.**
- **Antibiotic treatment is not benign** as it alters host microbiota and facilitates antimicrobial resistance, an increasing healthcare concern.
- The AUA now recognizes **supportive care as an option for acute UTI** in women with recurrent UTIs, with NSAIDs, analgesics, and increased hydration being acknowledged at-home remedies.
- Further research should investigate antibiotic sparing UTI approaches.

Zohreh Izadifar, PhD, is currently an Assistant Professor of Surgery at Harvard Medical School and Boston Children's Hospital. Dr. Izadifar earned her PhD in Biomedical Engineering-Tissue Engineering, and her research takes a multidisciplinary approach—integrating advanced engineering, cell biology, biofabrication, biomaterials, and life sciences—to recreate the structural and functional properties of human urogenital and reproductive tissues in vitro. These conditions, including chronic infections (UTIs, BV, STDs) and tissue abnormalities, are difficult to treat and disproportionately affect vulnerable populations such as children, women, and the elderly.

Heidi Brown, MD, MAS, is a urogynecologist and dissemination and implementation scientist in the Department of Research & Evaluation at Kaiser Permanente in Southern California. Her research focuses on improving access to effective solutions for pelvic floor disorders such as bladder and bowel incontinence and pelvic organ prolapse. She uses community engagement, user-centered design, and iterative testing to inform development, adaptation, implementation, and maintenance of interventions that improve quality of life.