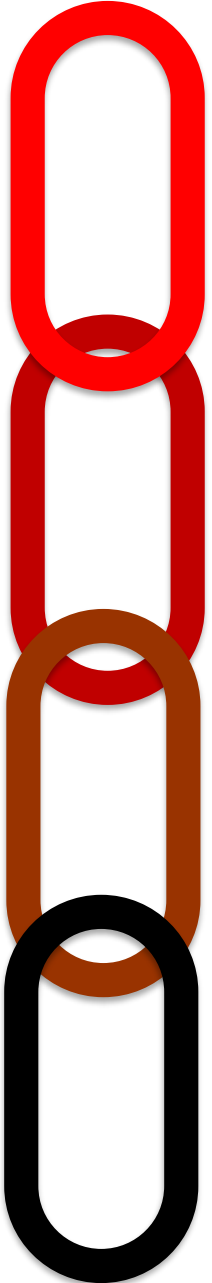


Segregating urinary phenome responses to microbes and other factors – new opportunities

Chad Vezina

**Professor and Associate Director,
George M. O'Brien Center for
Benign Urology Research
UW-Madison**





Inflammation ∞ presence of bacteria in human prostate

Hochreiter et al 2000 163:127-30

Inflammation ∞ progressive voiding dysfunction in men (incontinence, urinary retention, increased symptom index)

Torkko et al J Urol. 2015 194:454-61

Bacterial ∞ voiding dysfunction in mice (↑Frequency)

Lee et al PLoS One. 2015 10:e0116827

Bell-Cohn et al AJP Renal. 2019 316:F682-F692

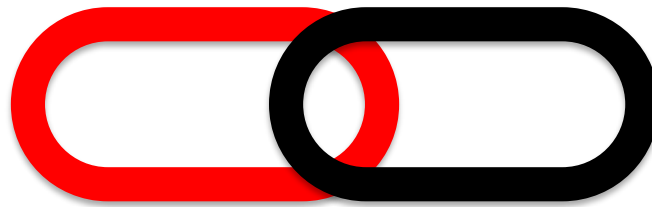
Bacterial prostatitis ∞ pain in mice

Rudick Infect Immun. 2011 Feb;79(2):628-35

We can see 'Active' inflammation /infection
but we cannot observe past events (especially subclinical)



Histology,
Anatomy,
Microbiology

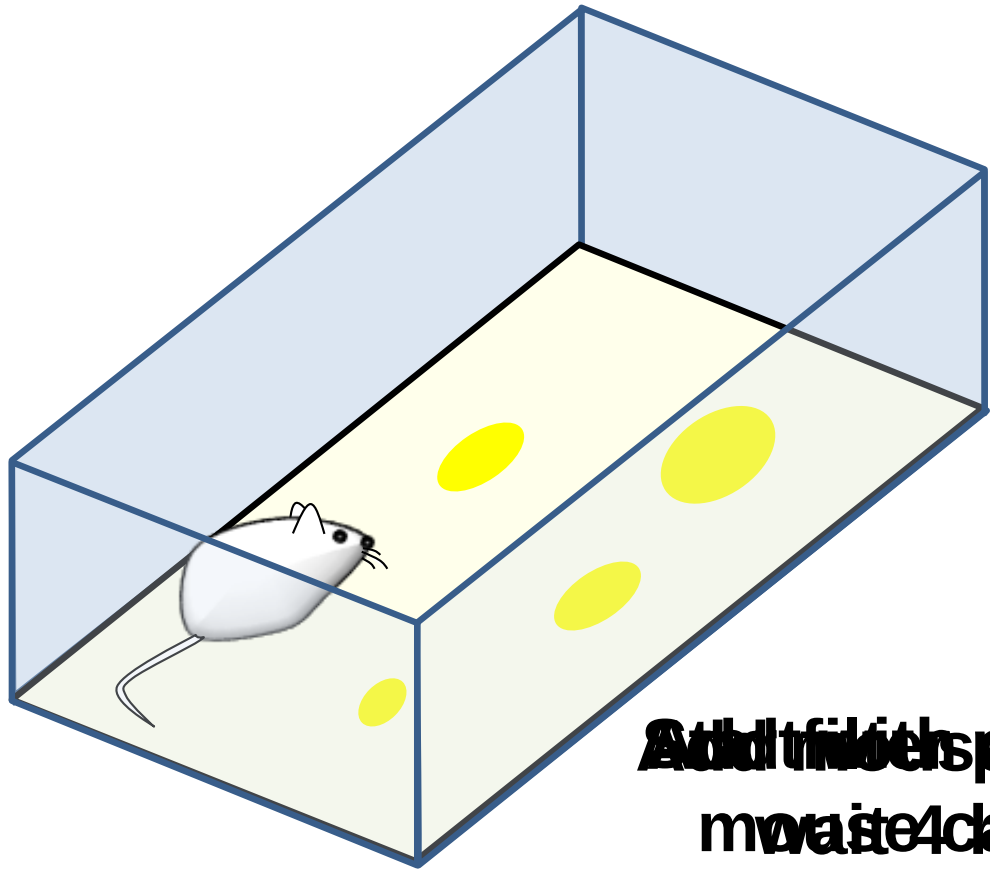


Physiology



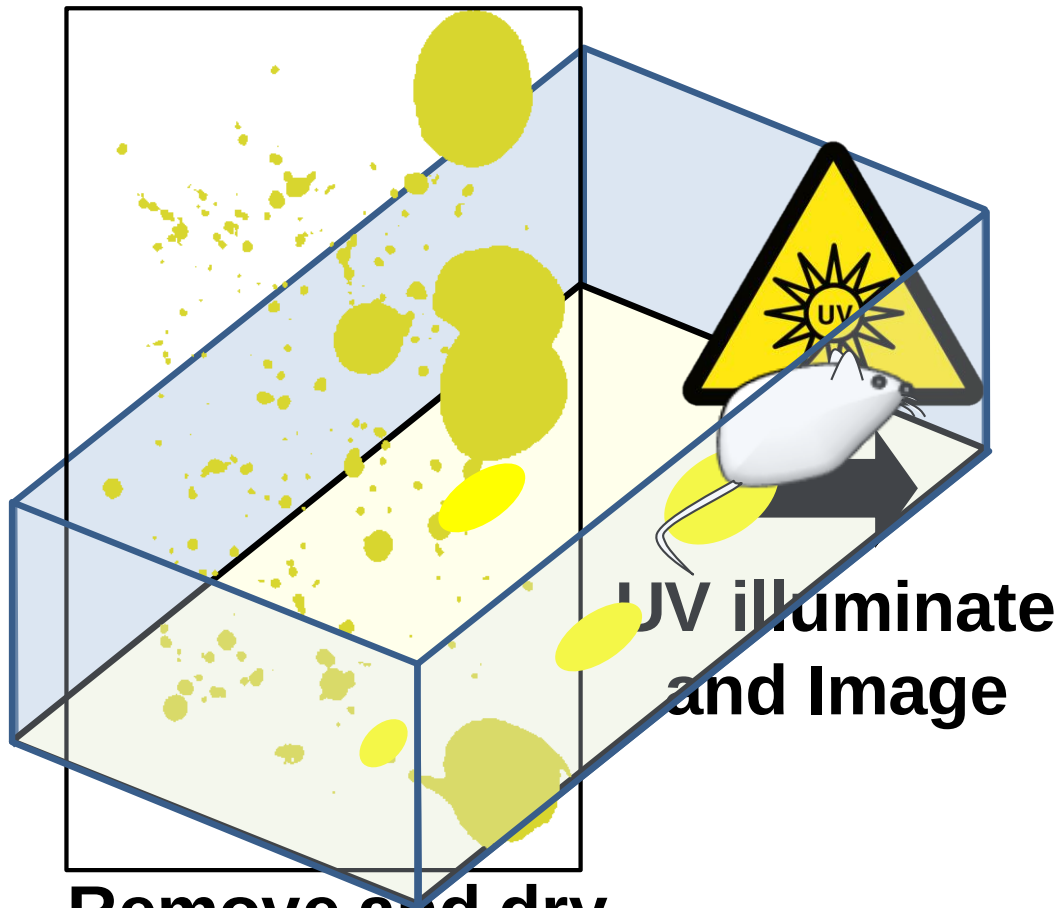
Standardized tests in the clinic (mostly), but what
about at the bench with research animals?

MAKE MOUSE VOIDING BEHAVIOR A QUANTITATIVE TRAIT



Add filter paper
mouse cage

MAKE MOUSE VOIDING BEHAVIOR A QUANTITATIVE TRAIT



Remove and dry

Use Void Whizzard Software to analyze 12
Filter paper features incl. spot number, size, distribution

MAKE MOUSE VOIDING BEHAVIOR A QUANTITATIVE TRAIT



Optimized for:

- Acclimatization time
- Mouse age
- Size and shape of cage
- Assay duration
- Cage type
- Time of day
- Consistency across institutions

Lisa Abler, Royal Oakes, Kyle Wegner

Wegner et al and Hill et al, Amer J Physiol-Renal 2018

Collaboration Among UW-Madison, Beaumont Health, Beth Israel / Harvard P20 Center, Vanderbilt University

Rinse and Repeat

Human

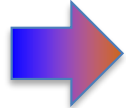
Voiding Diary



Mouse

Void Spot Assay

Uroflowmetry



Uroflowmetry

Cystometry



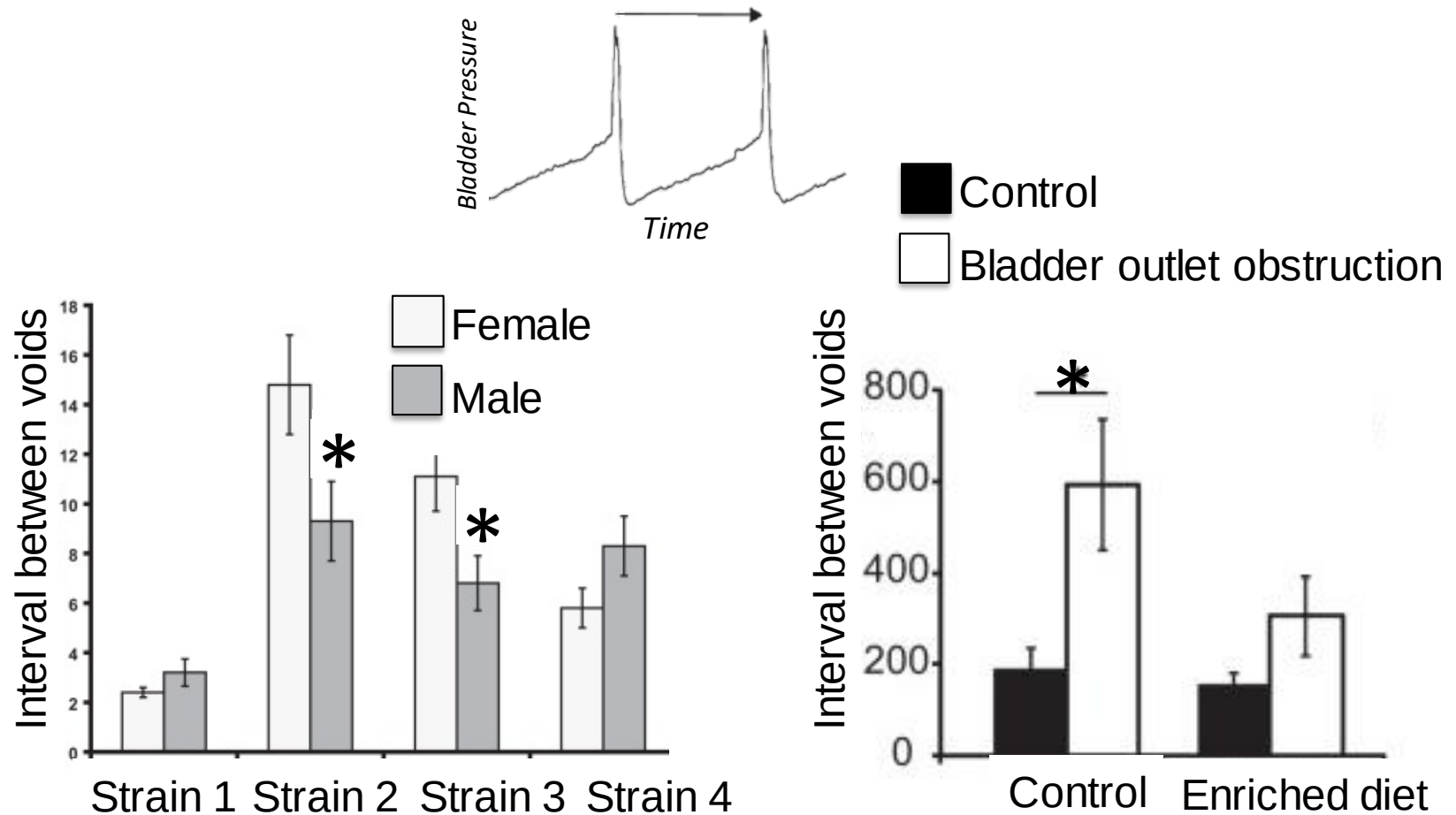
Cystometry

Urethrogram



Contrast enhanced ultrasound

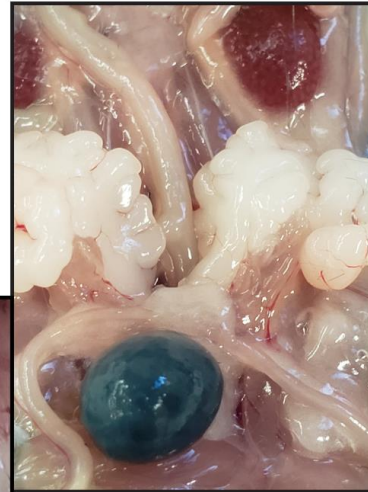
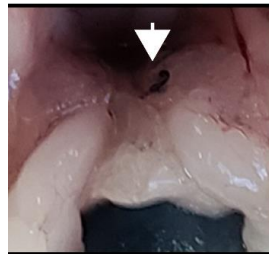
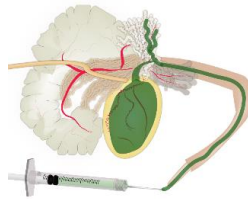
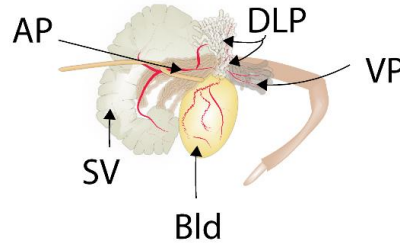
Current mouse urinary phenotyping assays can differentiate, but not diagnose



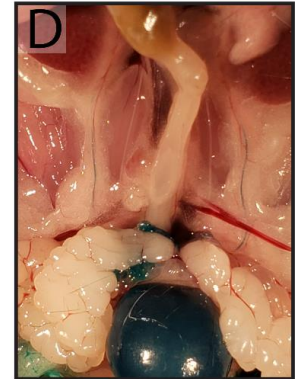
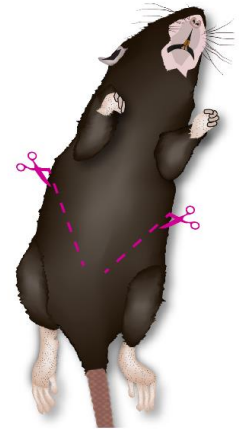
Bjorling, Zeidel, Vezina, Hill et al AJP Renal 2015

Keil et al AJP Renal 2015

A mouse model of prostate inflammation



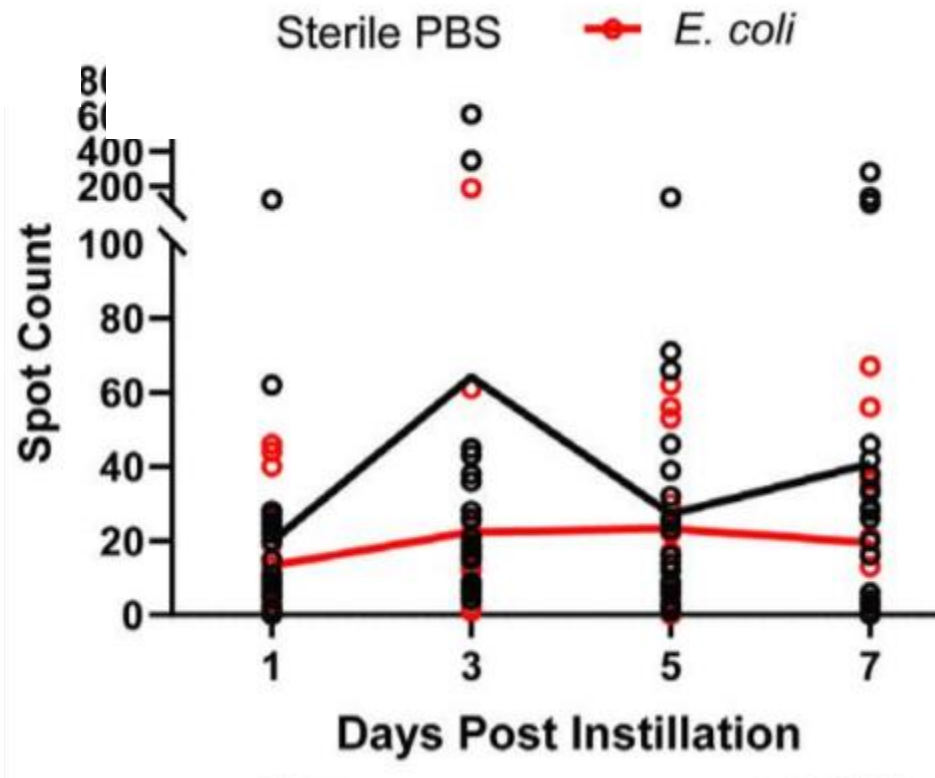
B



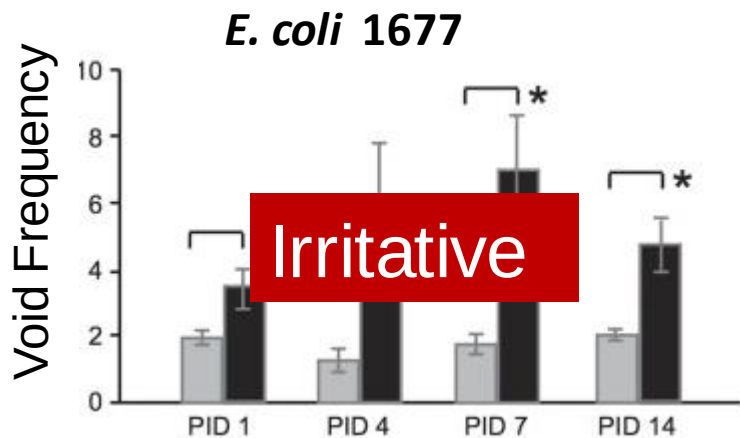
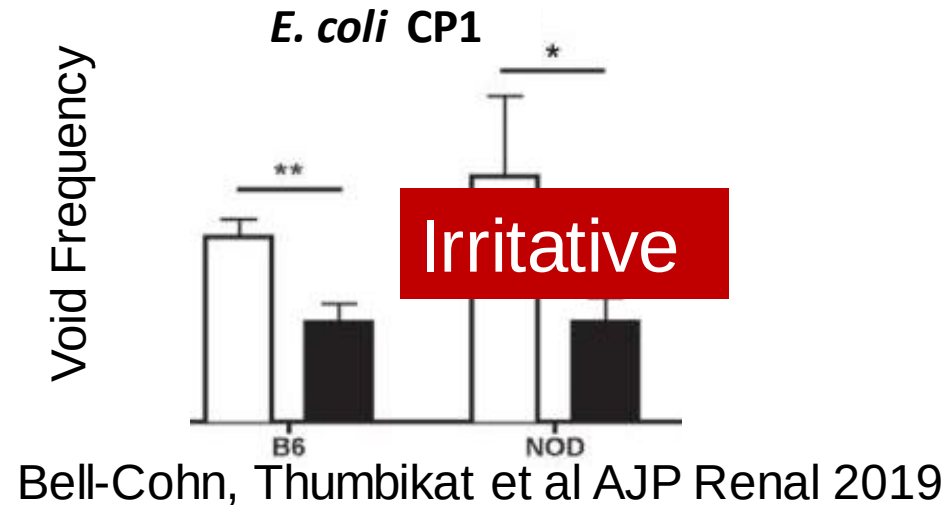
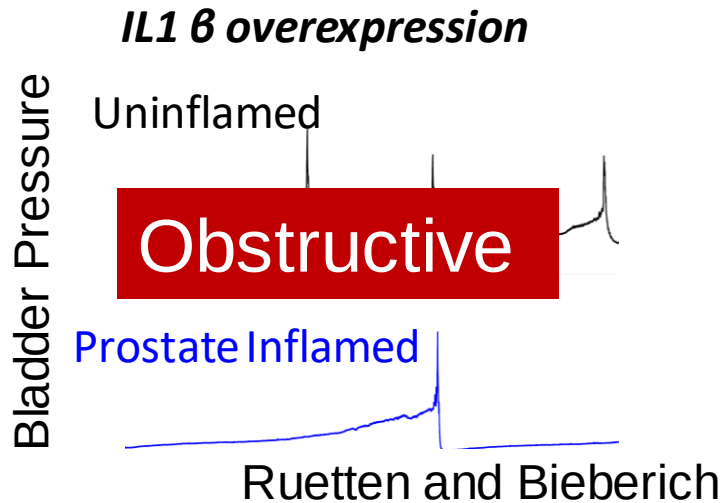
Ruetten et al In Press AJP-Renal

Collaboration between UW-Madison,
Columbia U. O'Brien Centers

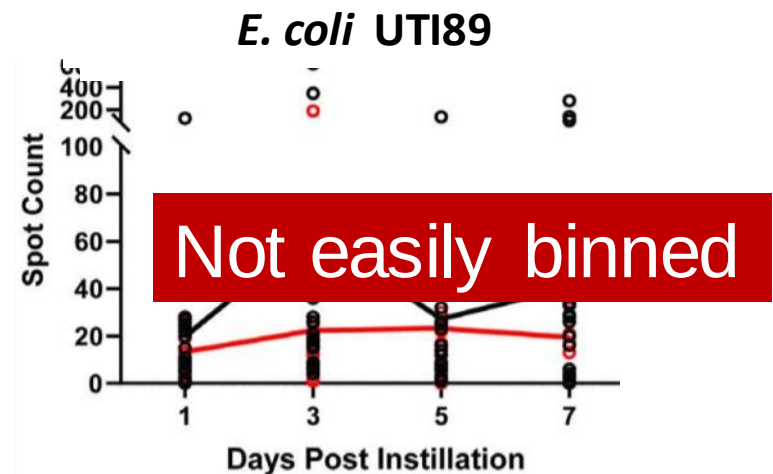
Bacterial prostatitis does not always increase urinary frequency



Prostate inflammation causes different voiding patterns in mice. **Is this also true in humans?**



Lee, Bushman PLoS One 2015

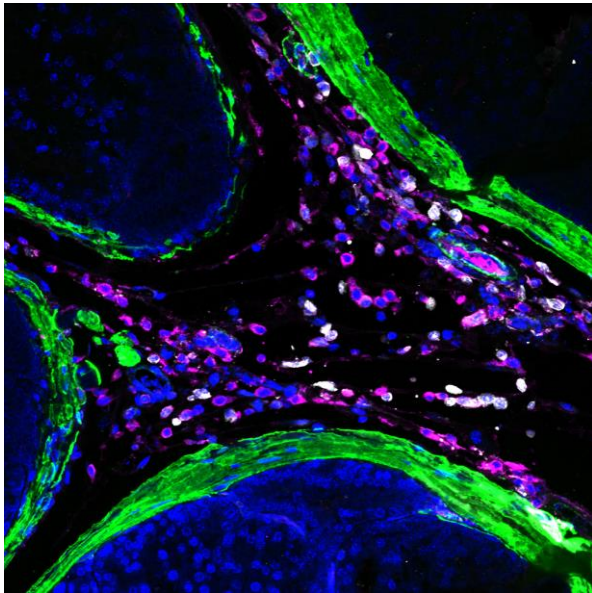


Ruetten et al In press

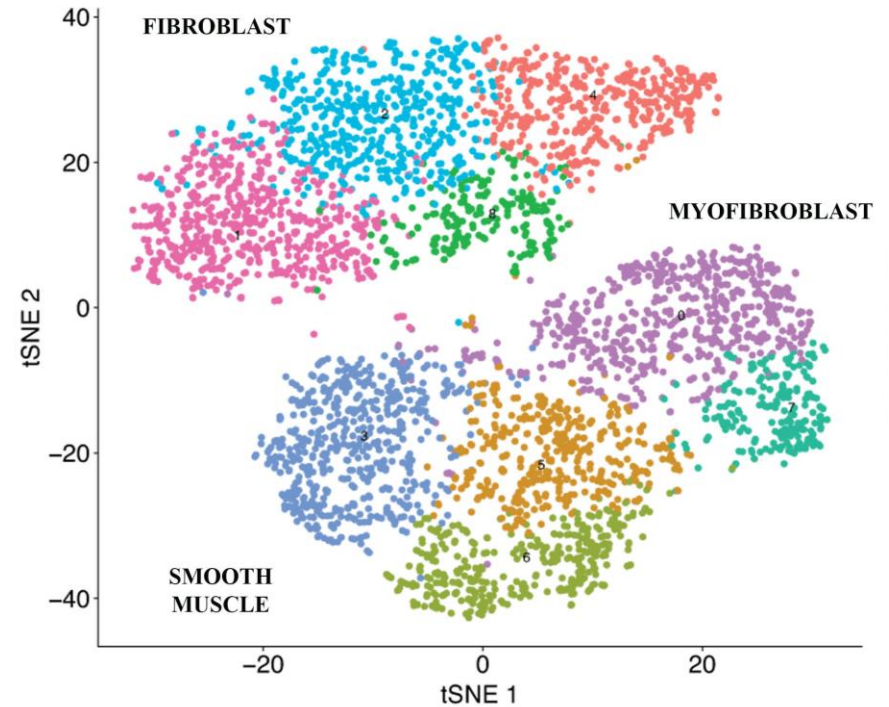
Maybe, we need to change our approach?

Single features

Nuclei + Sm. Muscle
+ Fibroblast + Inflammatory



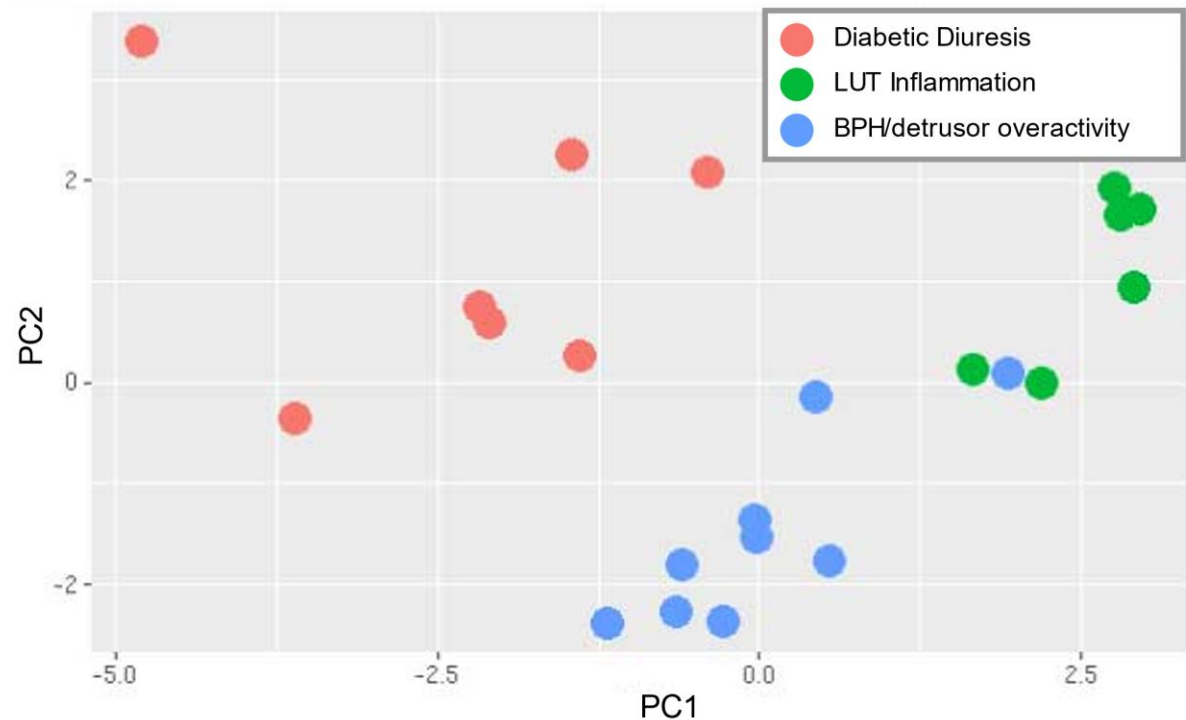
Many features



Kyle Wegner

Henry, Joseph, Strand et al

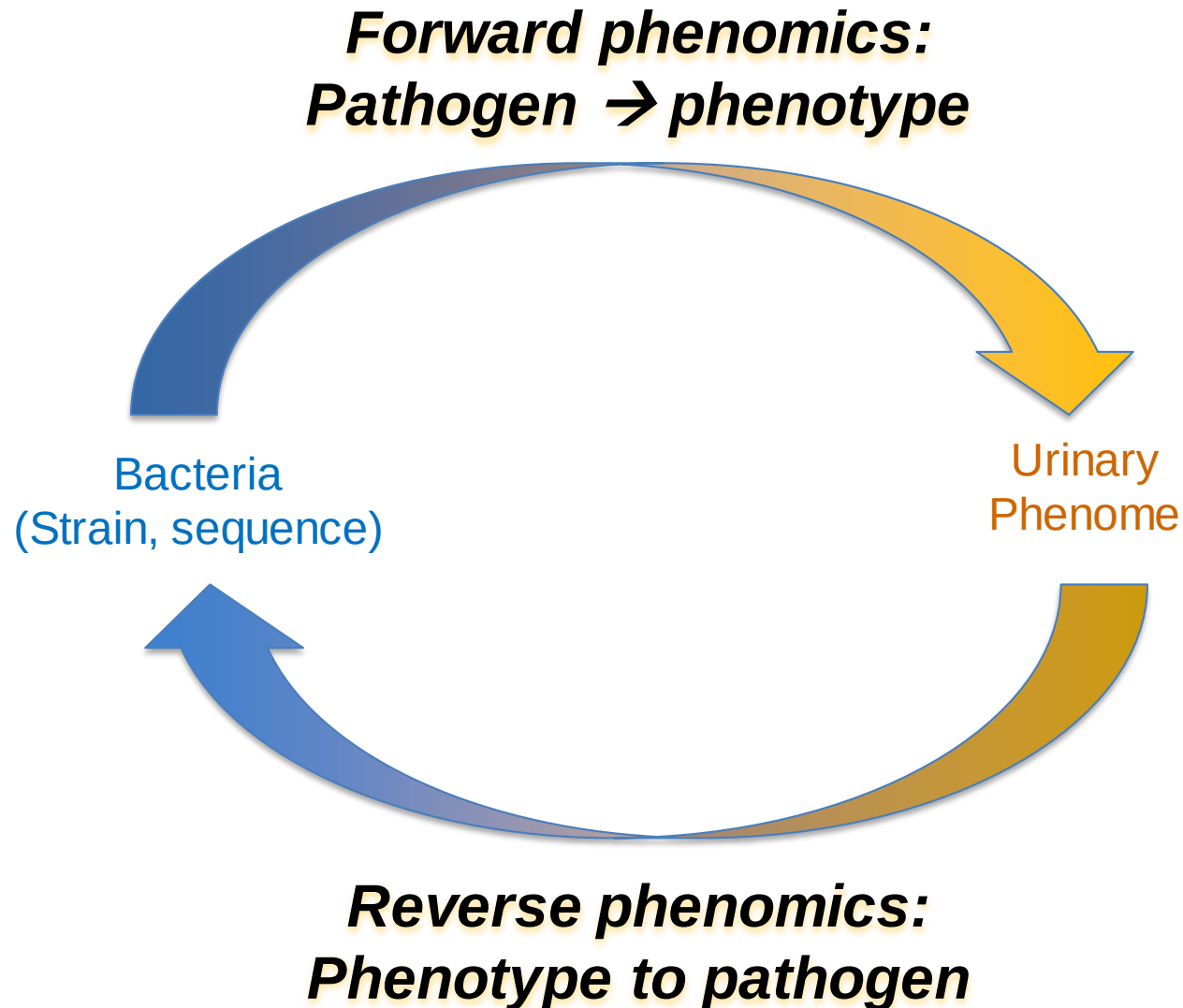
Aggregate
Void spot
assay data
successfully
classifies
mice based
on disease
process



*** Visit poster #47 for more information**

- Hannah Ruetten, Gervaise Henry,
- Unpublished
- Collaboration between Vezina and Strand Teams

A phenomics approach for identifying LUTD mechanisms and stratifying populations





Current

Thrishna Chaturvedula
Clara Cole
Olivia Fox
Thomas Peterson
Hannah Ruetten
Jaskiran Sandhu
Simran Sandhu
Brandon Scharpf
Anne Turco
Jonathan Zhu



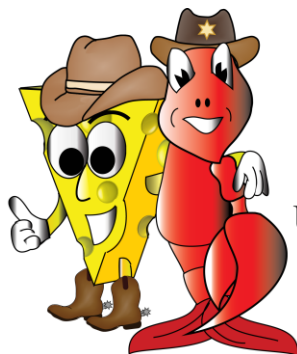
Recent

Lisa Abler
Mark Cadena
Nicholas Girardi
Brett Mueller
Royal Oakes
Chelsea O'Driscoll
Kyle Wegner
Marlyse Wehber
Helen Zhang

Doug Strand Lab, UT-Southwestern
Jill Macoska Lab, UT-Southwestern
Jonathan Barasch Lab, Columbia University
Chuck Bieberich, University of Maryland Baltimore
County

Collaborating Labs

Dale Bjorling Lab, UW-Madison
Paul Marker Lab, UW-Madison
Will Ricke Lab, UW-Madison
Petra Popovics, UW-Madison
Matthew Grimes, UW-Madison



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