580

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BLADDER ENVIRONMENT: MICROBIOTA AND OXYGEN RELATIONSHIPS (BE MOR STUDY)

Hypothesis / aims of study
To characterize the relationship between the female urinary microbiota and bladder urinary oxygen tension (BUOT).

Study design, materials and methods
Ambulatory female urogynecology patients willing to undergo transurethral catheterization were eligible for enrollment. Consented participants underwent BUOT determination with a non-invasive flow-through oxygen sensor with a compact fiber optic oxygen transmitter (Precision Sensing Regensburg, Germany) attached to the urethral catheter. Given the need to account for oxygen contamination within the sensor system, BUOT was defined as the lowest value obtained from the sensor if it reached a nadir within 2% of the previous value. Lowest oxygen values that did not meet this criterion were not considered to accurately represent the BUOT and thus excluded. Urine volume >50cc was often required for oxygen values to reach such a nadir. Outliers 1.5 IQR above the third quartile (n=2) were excluded from analysis.

Patients with measurable BUOT values were sorted into 3 groups: middle (mean BUOT +/- 1 SD), low (< mean BUOT - 1 SD) and high (> mean BUOT + 1 SD). Bacterial presence in urine was assessed with the Enhanced Quantitative Urinary Culture protocol; each distinct colony type was identified with Matrix-Assisted Laser Desorption/Ionization Time-of Flight mass spectroscopy. Fisher's Exact test was used for comparisons of demographic data.

Results
BUOT was measurable in 65% of participants (n=70). Most of these women were Caucasian (81.4%) and post-menopausal (78.6%); the mean age was 65 years (32-88). Mean BUOT was 24.84 mmHg (0.47- 53.7; SD 13.6); BUOT range for the 3 groups were: "middle" (11.50-38.40 mmHg), "low" (<11.50 mmHg), and "high" (>38.40 mmHg). Between BUOT groups, we detected no difference in age, BMI, ethnicity, menopausal status, or smoking status.

Interpretation of results
Using number of genera per patient, we detected a trend for less microbial diversity in the "low" BUOT group compared to the other 2 BUOT groups (Figure 1). *Escherichia* and *Staphylococcus* dominated the urinary microbiota in the "low" BUOT group (Figures 1 & 2).

Concluding message
This is the first study to demonstrate a wide range of BUOT values can be obtained in many urogynecology patients through a non-invasive oxygen sensor system. There appears to be an association between BUOT and the female urinary microbiota with low BUOT having increased representation of known uropathogens**.**

Figure 1: Genus level microbiota composition based on % CFU per urine sample, with ascending line representing BUOT

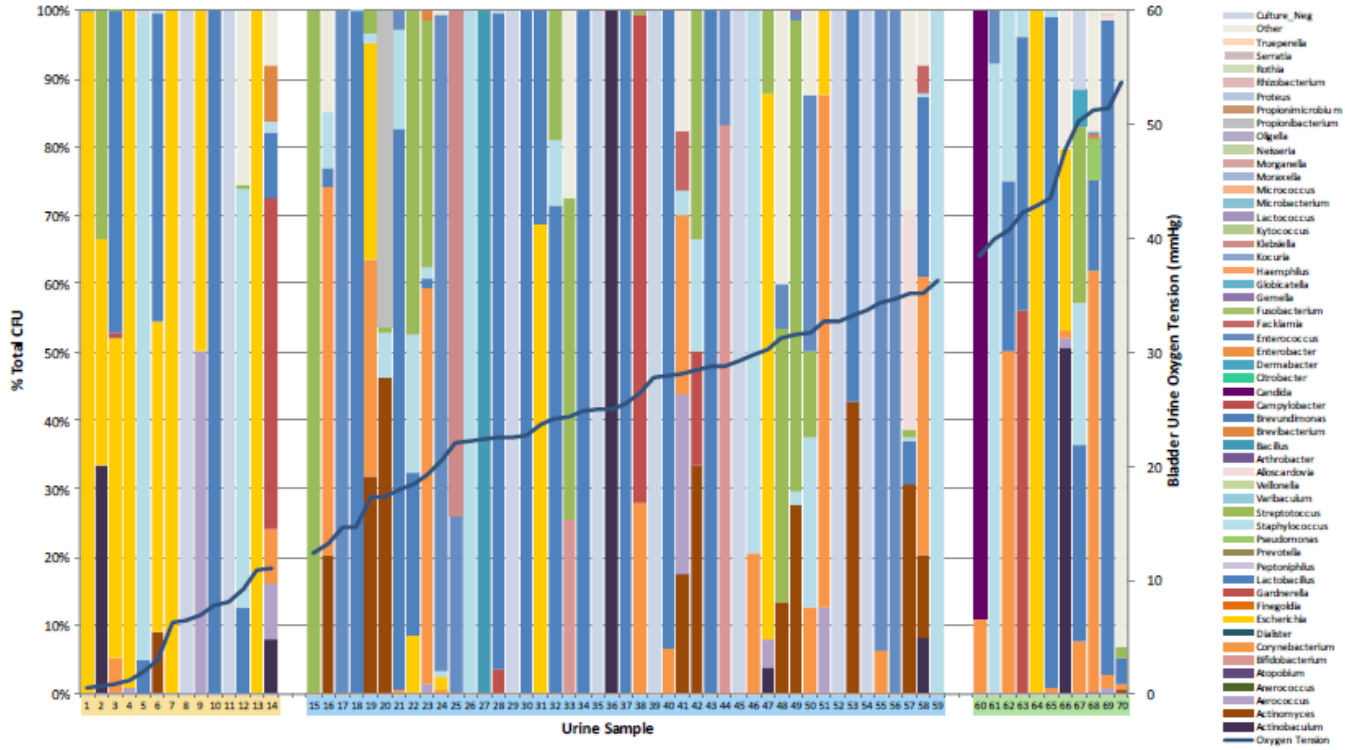
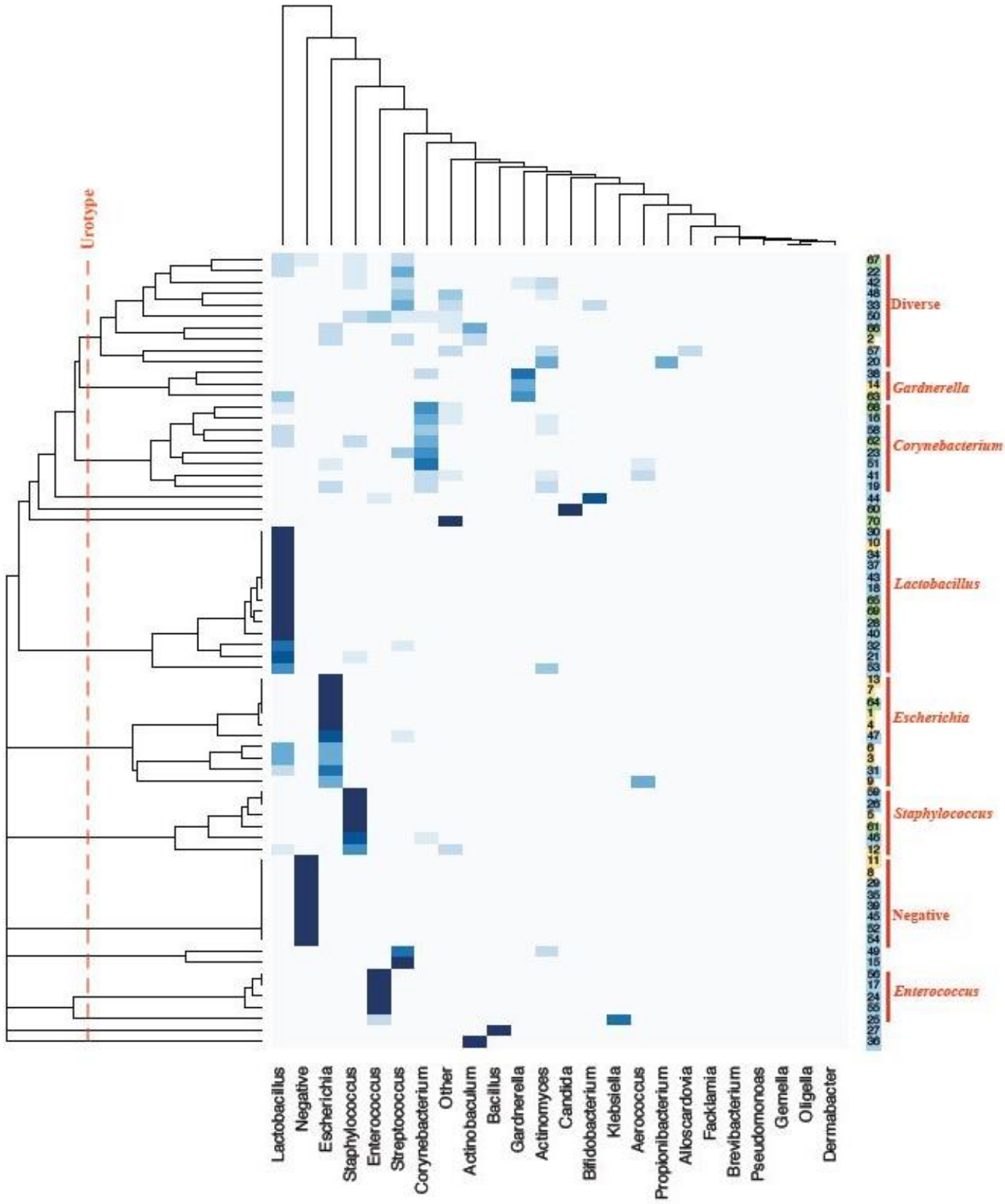


Figure 2: Dendrogram and heat map showing relationship between BUOT (mm Hg) and bacterial abundance. On the right-sided Y axis, color of each urine sample represents the BUOT category (low=yellow, middle=blue, high=green)



Disclosures
Funding: NONE **Clinical Trial:** Yes **Registration Number:** ClinicalTrials.gov NCT02868463 **RCT:** No **Subjects:** HUMAN **Ethics not Req'd:** we received Institutional Review Board (IRB) approval; no ethical concerns were present for this study. **Helsinki:** Yes **Informed Consent:** Yes