

research updates

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The urinary tract's microbiome

L Brubaker. The new world of the urinary microbiota in women. *Am J Obstet Gynecol.* 2015; 215(5):644-649.

B Foxman, AEW Cronenwett, C Spino, MB Berger, DM Morgan. Cranberry juice capsules and urinary tract infection after surgery: results of a randomized trial. *Am J Obstet Gynecol.* 2015; 215(2):194.e1-194.e8.

THE ONGOING HUMAN MICROBIOME Project has demonstrated that there are many microbial communities living throughout the human body in anatomical niches. Initially, the bladder was excluded from study because it was

assumed to be sterile based on commonly held beliefs that the healthy female urinary tract contains no bacteria. However, newer studies using DNA-based approaches clearly demonstrate that the bladder does have a resident bacterial community, a finding that makes sense given the urinary tract's proximity to birth, sex, and defecation.

The common bacterial urine culture, the gold standard for detecting urinary tract infections (UTIs), does not effectively detect bacteria species that are anaerobic, slow-growing, or that require nutrients other than those used in culture techniques. Since the 1950s when urine cultures were first used to identify and prevent sepsis in patients after kidney surgery, the threshold for a "positive" urine culture has been debated and shifted over the years. Findings of bacteria resembling vaginal microbiota have been assumed to be contamination of samples. However, new DNA sequencing techniques are able to detect many more organisms than standard bacterial culture techniques. Comparisons of DNA techniques show that, in fact, standard cultures have a 90% false-negative rate among women without symptoms of UTIs. This means that 90% of asymptomatic women have bacteria in their urine that is not detected by typical urine cultures, and suggests that the presence of bacteria in urine is not indicative of infection.

In fact, studies suggest that the resident bladder microbiota may be distinct from the typical bacteria causing UTIs. This finding is consonant with emerging evidence that microbial communities are associated with particular health statuses, and may render nonspecific terms like "asymptomatic bacteriuria" obsolete. Instead, expect terms like "dysbiosis," or unhealthy changes in a normal bacterial community, to become more common. Health-care providers should be on the lookout for new urinary bacterial assessment tools – DNA-based approaches rather than bacterial cultures – that may change how results are interpreted and treatment is approached.

Even as the landscape of describing bacteria in the urinary tract system changes with new DNA-based lab techniques, the efficacy of traditional supplements for preventing UTIs is being reaffirmed. A double-blind, placebo-controlled, randomized clinical trial of 160 women undergoing benign gynecological surgery requiring catheterization found a very significant benefit to taking cranberry capsules. In this study, nonpregnant women were randomized either to take 2 cranberry capsules twice daily (TheraCran, equivalent to two 8-oz glasses of cranberry juice) for 6 weeks during recovery from surgery (n=80), or to a placebo (n=80). Participants had no history of kidney stones or congenital urogenital anomalies, and did

not eat cranberry products or take vitamin C during the study. Groups were balanced by age to account for the increase in risk of UTI associated with increasing age.

Typically, 10% to 64% of women develop a UTI within 6 weeks of gynecological surgery; in comparison, 3% to 4% of women each year have a UTI. Although prophylactic antibiotics at the time of catheter removal decreases UTIs by 50%, antibiotic resistance among common UTI-causing bacteria is already quite high and increasing, so antibiotic prophylaxis is not routinely recommended. The goal of this study was to see whether prophylaxis with cranberry capsules prevented UTIs.

In the end, 28% (45/160) of participants developed a UTI. Only 19% (15/80) of participants taking cranberry capsules developed a UTI, compared to 38% (30/80) of those assigned to the placebo group (p=0.008). Additionally, the time to developing a UTI was significantly longer in the cranberry group compared to the placebo group (18 days versus 8.5 days, p=0.0005). The authors concluded that there was a significant benefit to taking cranberry capsules. In cases where catheterization is necessary during labor and/or the immediate postpartum, or where clients experience delayed bladder emptying (a risk factor for UTIs that is not uncommon after birth), prophylaxis with cranberry capsules may be a wise recommendation. ●

