

## The Bladder and the Bowel: More Than Just Neighbors

In the first year of medical school, anatomy students learn that the distal bowel and the urinary bladder share a common embryologic origin. They both develop from the primitive cloaca. These organs grow not only anatomically close to each other in the pelvis, they share common nerve pathways and smooth muscle physiology.

Our colleagues who specialize in Neurourology have long recognized the importance of bowel and bladder interactions and the clinical co-morbidity of genitourinary and GI tract dysfunctions.<sup>1</sup> One example of a commonly observed clinical scenario is in the setting of irritable bowel syndrome. These patients are more likely to have associated urinary frequency and urgency compared to control subjects. Bowel symptoms may be the first manifestation of a patient with acute cystitis. Rectal pain and pressure are common in acute prostatitis. Constipation can contribute to lower urinary tract symptoms including overactive bladder. Further solidifying the bladder-bowel connection, treating overactive bladder with antimuscarinics can worsen constipation.<sup>2</sup>

In children, the relationship between the bladder and the bowels has been recognized for many years. In pediatrics the condition is referred to as “bladder and bowel dysfunction” or BBD. This manifests as problems with bowel movements and urination in children. The bladder and bowel, aside from being neighbors, share the same pelvic nerves. A child with chronic constipation can have varying degrees of bladder dysfunction. Bladder problems may include the need to void frequently, urinary urgency and daytime wetting episodes. Further up the GI tract, avoiding certain foods such as chocolate, carbonated beverages and food colorings, as an example, recognized as bladder irritants can help along with an effective bowel regimen.

The human microbiota is estimated to consist of the 10-100 trillion symbiotic microbial cells, primarily bacteria, in the bowels of each individual. Rapidly developing analytical techniques and sequencing methods have greatly enhanced our ability to understand the human microbiome in health and disease. One area of related interest concerns the relationship between bowel microbial cells and bladder microbial cells causing urinary tract infections.

The majority of UTI's in women arise from intestinal tract bacteria. In the setting of treating a simple UTI, a single course of antibiotics may suffice to clear the bladder infection. However, in women with recurrent UTI's, treatment with repeated cycles of antibiotics is common. These patients risk of infections may be increased because the antibiotics used can disrupt the balance of normal gut microbiome resulting in a variety of different disease causing strains with variable antimicrobial sensitivity. In a recent study, women who experience recurrent UTIs had less diverse gut microbiomes that were deficient in an important group of bacteria that help regulate inflammation, and a distinct immunological signature in their blood indicative of inflammation.<sup>3</sup> In women with recurrent UTI's, there was decreased diversity of healthy gut microbial species providing more opportunities for disease-causing species to multiply and lead to further bladder infections. The researchers have suggested that it may be possible to manipulate the gut microbiome using probiotics or fecal microbial transplantation, as a way to prevent recurrent UTIs.

The relationship between bladder and bowel function should be considered when treating patients with urinary symptoms, bowel symptoms, or both. Clinically, lower urinary tract dysfunction often coincides with gastrointestinal dysfunctions and vice-versa. Therapeutic interventions in one system may be critical to improving the other system's function as research advances tell us more about the interactions between the bladder and bowel in health and disease.

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### References

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