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The Microbiome and Prostate Cancer Risk.

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Abstract

There is an abundance of evidence that the human microbiome plays an important and nuanced role in controlling human metabolism, immunity, and cancer. Herein we aim to review the most current research looking at prostate cancer and its link with the gut and genitourinary microbiome. There is now a host of evidence for a unique genitourinary (GU) microbiome. The prostate microbiota, to include viral, bacterial, fungal, and parasitic contributions, as assessed from formalin-fixed tissue is described nicely in the study by Banerjee et al. Further hierarchical analysis by this group found a unique microbiome signature for higher Gleason score cancers and validation PCR studies noted a marked number of viral genomic insertions into host DNA. Shretha et al. also recently established unique GU microbiomes in patients with prostate cancer or benign prostate pathology based on urine samples. The gut microbiome likely also has an indirect but significant role in prostate cancer development and treatment. Liss et al. and Golombos et al. found significant associations between specific gut microbiota and prostate cancer. Interestingly, the balance of inflammatory and anti-inflammatory bacterial lipopolysaccharides, production of bile salts, and metabolism of dietary fiber to short chain fatty acids all likely play important roles in creating systemic pro- or anti-carcinogenic states. In terms of prostate cancer treatment effects, Sfanos et al. noted a unique microbial signature in patients undergoing oral androgen deprivation therapy (ADT) as compared with prostate cancer patients not on ADT. Patients undergoing ADT also had enrichment of bacterial metabolic pathways promoting androgen synthesis. Together, these studies have identified a unique GU microbiome and linked both the GU microbiome and unique gut microbial signatures with prostate cancer and prostate cancer treatments. Whether this information can be used in cancer prevention, treatment, or diagnosis are areas of ongoing and active research.

KEYWORDS: Genitourinary microbiome; Gut microbiome; Microbiota; Prostate cancer

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