OncoBiome: The emerging frontier in cancer-microbiome interactions

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OncoBiome represents the complex interplay between the human microbiome and cancer biology – a rapidly evolving field investigating how microbial communities influence cancer development, progression, treatment efficacy, and patient outcomes.[1,2] This bidirectional relationship encompasses multiple dimensions of host-microbe interactions across various body sites and cancer types. Key mechanistic pathways by which the microbiome can influence carcinogenesis involve direct genotoxicity, chronic inflammation leading to persistent microbial dysbiosis, which can create pro-inflammatory environments conducive to cancer development (e.g., *Helicobacter pylori* in gastric cancer, *Fusobacterium nucleatum* in colorectal cancer).[3,4] Metabolic modulation involving microbial metabolites such as short-chain fatty acids, secondary bile acids, and trimethylamine N-oxide can influence cellular proliferation, apoptosis, and immune function. Further, microbiome composition shapes local and systemic immune responses, potentially affecting immune surveillance of cancer cells.[5,6] Future research directions include investigating the microbiome's role in cancer prevention strategies, enhancing immunotherapy response, reducing treatment-related toxicities, developing novel microbiome-based therapeutics, and mitigating cancer recurrence.

The OncoBiome represents a promising frontier in precision oncology, potentially offering new insights for cancer prevention, diagnosis, and treatment through the lens of the human microbiome.

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