

Assessing the Impact of Toxicants on the Microbiome

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Recent scientific breakthroughs with International Human Microbiome projects and technological advancements in next-generation sequencing, metagenomics, functional genomics and bioinformatics have increased our understanding of the important role that the microbiome plays in human health and disease. The microbiome has emerged as an important area to include in the modernization of the conventional approaches to toxicology testing methods for human health risk assessment. The human gastrointestinal tract ecosystem consists of diverse microbial communities and their genetic materials, which are now collectively termed the intestinal microbiome. The microbial community in the gastrointestinal tract provides beneficial relationships with the human host in maintaining physiological homeostasis and protecting the health of the individual. Acute or chronic exposure of the microbiome to toxicants in the gastrointestinal tract has the potential to disrupt the colonization barrier and alter other important functions of the host and the intestinal microbiota. NCTR scientists, in collaboration with NIEHS/NTP, are integrating systems biology and computational methods research approaches to evaluate the effects of residual and environmental exposure of antimicrobial compounds, nanomaterials, food contaminants and food additives for the safety evaluation and risk assessment of toxicants on the intestinal microbiome. These ongoing projects will support the NTP program to evaluate innovative emerging technologies to improve toxicological risk assessments in addressing critical knowledge gaps and establish standards for conducting microbiome-host interactions and hazard analysis of potential toxicants in support of human health.