

Diet-Related and Gut-Derived Metabolites and Health Outcomes: A Scoping Review

Yuanxi Jia,¹ Lisa Wilson,² Xuhao Yang,³ Noel Mueller,⁴ Cynthia Sears,⁵ Glenn Treisman,⁵ and Karen Robinson⁵

¹Johns Hopkins University School of Medicine, Department of Medicine; ²Johns Hopkins University Bloomberg School of Public Health, Department of Health Policy and Management; ³Johns Hopkins University, Center for Diversity in Public Health Leadership Training, Kennedy Krieger Institute; ⁴Johns Hopkins University Bloomberg School of Public Health, Department of Epidemiology; and ⁵Johns Hopkins University, Department of Medicine, School of Medicine

Objectives: To conduct a scoping review to map available evidence about the health impact of gut microbiota-derived metabolites in humans.

Methods: We searched PubMed and Embase for studies that assessed the health impact of gut microbiota-derived metabolites in humans. We included case-control studies, cross-sectional studies, cohort studies, and clinical trials. Any health condition was considered. Based on an initial prioritization phase informed by preliminary searching and expert input, we narrowed our scope to ten metabolites: deoxycholate or deoxycholic acid (DCA), lithocholate or lithocholic acid (LCA), glycolithocholate or glycolithocholic acid, glycodeoxycholate or glycodeoxycholic acid, tryptamine, putrescine, d-alanine, urolithins, N-acetylmannosamine, and phenylacetylglutamine. We used evidence

mapping to identify evidence gaps and associations that may permit future systematic reviews. The screening was conducted in PICO Portal aided by artificial intelligence.

Results: Overall, for these 10 metabolites, we identified 352 studies with 168,072 participants. Most (326, 92.6%) were case-control studies, followed by cohort studies (14, 4.0%), clinical trials (8, 2.3%), and cross-sectional studies (6, 1.7%). Most studies assessed the following associations: DCA on hepatobiliary disorders (64 studies, 7,976 participants), colorectal cancer (19 studies, 7,461 participants), and other digestive disorders (27 studies, 2,463 participants); LCA on hepatobiliary disorders (34 studies, 4,297 participants), colorectal cancers (14 studies, 4,955 participants), and other digestive disorders (26 studies, 2,117 participants); putrescine on colorectal cancers (16 studies, 94,399 participants) and cancers excluding colorectal and hepatobiliary cancers (42 studies, 4,250 participants).

Conclusions: The association of gut microbiota-derived metabolites and human health is being examined in an increasing number of studies, most of which are case-control studies. As these metabolites hold considerable potential for elucidating microbiome-disease associations, there is a need to conduct more prospective studies including clinical trials. Moreover, systemic reviews are needed to characterize the metabolite-disease associations.

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