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## Microbial endocrinology: the interplay between the microbiota and the endocrine system.

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### Abstract

The new field of microbiome research studies the microbes within multicellular hosts and the many effects of these microbes on the host's health and well-being. We now know that microbes influence metabolism, immunity and even behavior. Essential questions, which are just starting to be answered, are what are the mechanisms by which these bacteria affect specific host characteristics. One important but understudied mechanism appears to involve hormones. Although the precise pathways of microbiota-hormonal signaling have not yet been deciphered, specific changes in hormone levels correlate with the presence of the gut microbiota. The microbiota produces and secretes hormones, responds to host hormones and regulates expression levels of host hormones. Here, we summarize the links between the endocrine system and the gut microbiota. We categorize these interactions by the different functions of the hormones, including those affecting behavior, sexual attraction, appetite and metabolism, gender and immunity. Future research in this area will reveal additional connections, and elucidate the pathways and consequences of bacterial interactions with the host endocrine system.

KEYWORDS: endocrine system; germfree; hormones; immunity; microbiome; microbiota

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