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Titel des Beitrags: D-tryptophan from probiotic bacteria influences the gut microbiome and allergic airway disease.

Abstract: Chronic immune diseases, such as asthma, are highly prevalent. Currently available pharmaceuticals improve symptoms but cannot cure the disease. This prompted demands for alternatives to pharmaceuticals, such as probiotics, for the prevention of allergic disease. However, clinical trials have produced inconsistent results. This is at least partly explained by the highly complex crosstalk among probiotic bacteria, the host's microbiota, and immune cells. The identification of a bioactive substance from probiotic bacteria could circumvent this difficulty. We sought to identify and characterize a bioactive probiotic metabolite for potential prevention of allergic airway disease. Probiotic supernatants were screened for their ability to concordantly decrease the constitutive CCL17 secretion of a human Hodgkin lymphoma cell line and prevent upregulation of costimulatory molecules of LPS-stimulated human dendritic cells. Supernatants from 13 of 37 tested probiotic strains showed immunoactivity. Bioassay-guided chromatographic fractionation of 2 supernatants according to polarity, followed by total ion chromatography and mass spectrometry, yielded C11H12N2O2 as the molecular formula of a bioactive substance.
Proton nuclear magnetic resonance and enantiomeric separation identified D-tryptophan. In contrast, L-tryptophan and 11 other D-amino acids were inactive. Feeding D-tryptophan to mice before experimental asthma induction increased numbers of lung and gut regulatory T cells, decreased lung TH2 responses, and ameliorated allergic airway inflammation and hyperresponsiveness. Allergic airway inflammation reduced gut microbial diversity, which was increased by D-tryptophan. D-tryptophan is a newly identified product from probiotic bacteria. Our findings support the concept that defined bacterial products can be exploited in novel preventative strategies for chronic immune diseases.

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