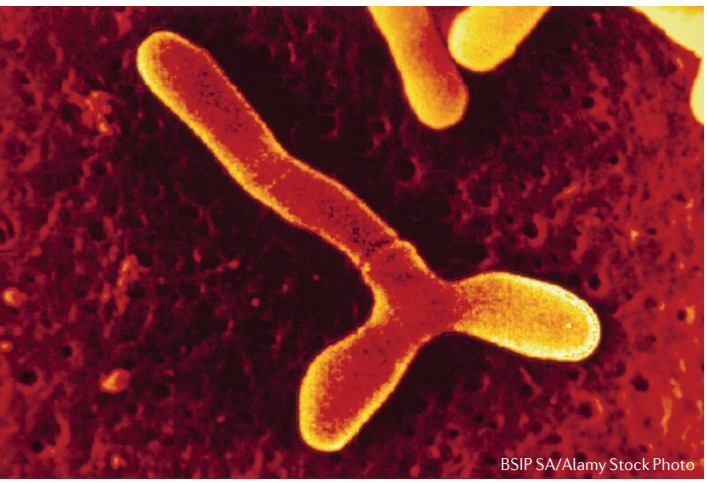
Nature Reviews Rheumatology | Published online 20 Dec 2016; doi:10.1038/nrrheum.2016.202

AUTOIMMUNITY

Human gut bacteria induce T_H17 cells

> Like SFB, *B. adolescentis* strongly induced intestinal T_H17 cells in mice

In mice, segmented filamentous bacteria (SFB) are strong inducers of type 17 T helper (T_H17) cells in the small-intestine lamina propria; moreover, induction of intestinal T_H17 cells by SFB has been shown to promote extra-intestinal autoimmune diseases such as inflammatory arthritis. Until now, however, microbes analogous to SFB had not been defined in the human gut. A new study identifies several species of symbiont bacteria from the human gut capable of inducing intestinal T_H17 cells in the small intestine of mice.



BSIP SA/Alamy Stock Photo

To identify novel immunomodulatory agents, the researchers evaluated the effects of monocolonizing germ-free mice with ~60 individual symbiont bacteria normally found in the human gut. "We identif[ied] certain bacterial species (notably, *Bifidobacterium adolescentis*) that are normal residents of the human gut and can induce a robust T_H17 cell compartment in the colonic lamina propria of mice," reports corresponding author Diane Mathis. "The mechanism by which they do this seems to be different from that of SFB in that it does not perturb epithelial cells so strongly."

Like SFB, *B. adolescentis* strongly induced intestinal T_H17 cells in mice without provoking intestinal or systemic inflammation and was found to be closely associated with the gut epithelium. Despite having similar effects on the host immune system, however, *B. adolescentis* and SFB induced distinct transcriptional programs.

The researchers next looked at the role of *B. adolescentis* in a mouse model of autoimmune arthritis. "*B. adolescentis* colonization promotes inflammatory arthritis in the K/B×N mouse model just like SFB does," says Mathis. Mice treated with *B. adolescentis* had more severe arthritis in association with increased numbers of small-intestine lamina propria T_H17 cells.

Interestingly, several off-the-shelf probiotic formulations containing Bifidobacterium strains induced accumulation of intestinal T_H17 cells but not type 1 T helper cells, suggesting that the ability to augment intestinal T_H17 compartments might be a feature common to many probiotics.

Elucidating the pathways by which T_H17-inducing bacteria promote inflammatory and autoimmune responses could help identify new therapeutic targets for diseases associated with T_H17 responses. The researchers plan to further define the mechanisms by which *B. adolescentis* induces T_H17 cells in mice.

Sarah Onuora

ORIGINAL ARTICLE Tan, T. G. *et al.* Identifying species of symbiont bacteria from the human gut that, alone, can induce intestinal Th17 cells in mice. *Proc. Natl Acad. Sci. USA* http://dx.doi.org/10.1073/pnas.1617460113 (2016)
FURTHER READING Van de Wiele, T. *et al.* How the microbiota shapes rheumatic diseases. *Nat. Rev. Rheumatol.* **12**, 398–411 (2016)