Commensal T cells: How a healthy microbiome reduces gut inflammation

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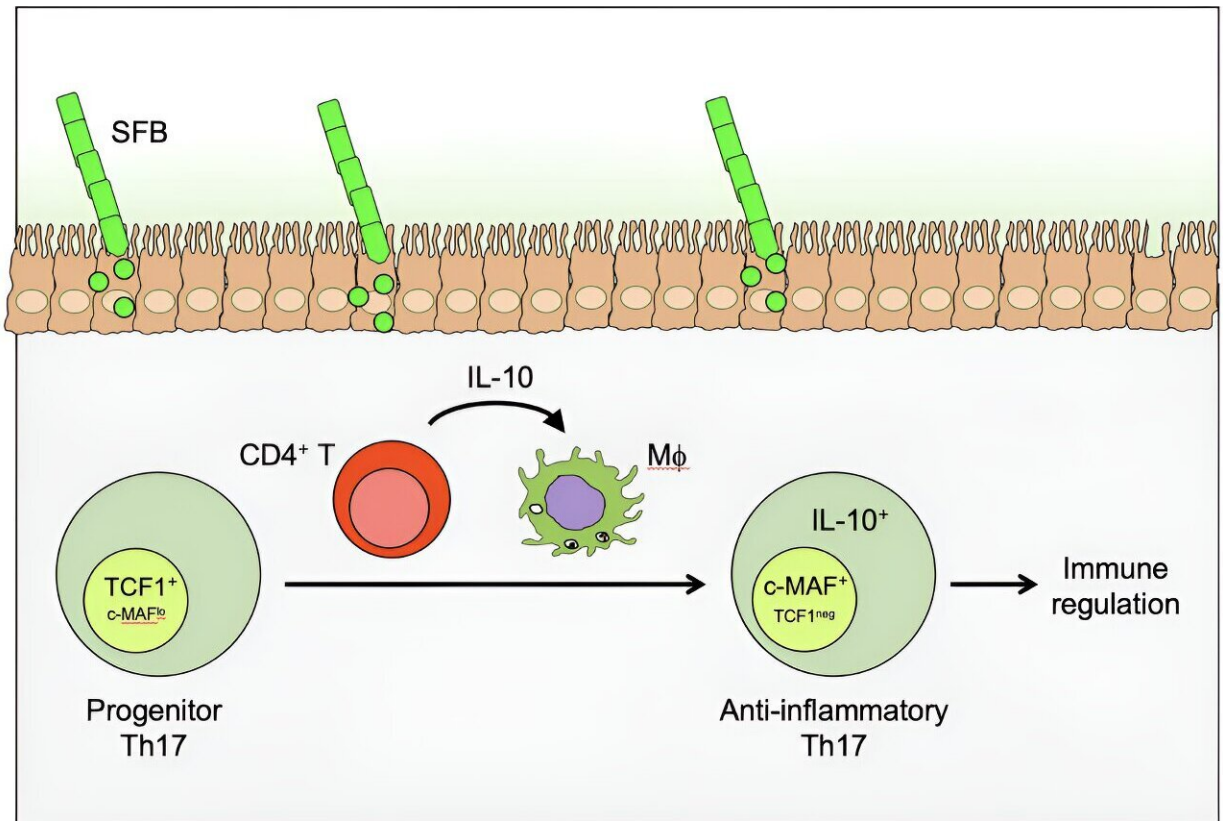

Graphical abstract. Credit: *Immunity* (2023). DOI: 10.1016/j.immuni.2023.11.003

The microbiome has a profound influence on our health, but exactly how our resident bacteria wield their power is still unclear. A type of T cell

appears to provide some answers for gastrointestinal health, a study of the mouse microbiome finds.

The study, appearing in the journal *Immunity*, found that when friendly, commensal microbes set up residence inside the gut, their host produces T cells that maintain the health of the gut by counteracting inflammation.

The finding could lead to new treatments for inflammatory bowel diseases (IBD).

"If we can replicate how friendly microbes induce anti-inflammatory commensal T cells, we might be able to develop new therapies to prevent intestinal inflammation related to IBD," says study leader Ivaylo Ivanov, Ph.D., associate professor of microbiology & immunology at Columbia University Vagelos College of Physicians and Surgeons.

Multitasking T cells

Ivanov had previously found that the host produces specific T cells when friendly, or commensal, microbes set up residence inside the gut. The T cells act to keep the microbes under control. "We wanted to know if these T cells had any additional functions," Ivanov says.

The study, conducted in tissue culture and in mice, determined that the commensal T cells reduce inflammation by producing a cytokine called IL-10.

The commensal T cells are unusual because they perform functions that counteract each other.

"Normally tissues contain two types of T cells: one that promotes inflammation and clears infection and another that suppresses inflammation and helps quench the immune response once infection is

cleared," Ivanov says. "We found that commensal-induced T cells have features of both, probably because commensal microbes do not need to be eliminated and the immune response to them has evolved to be less inflammatory."

The study also found that commensal T cells can suppress other types of T cells, which suggests they represent a backup, or additional, system to prevent autoimmunity, which occurs when excessive inflammation triggers the immune system into attacking the body's own cells.

Potential role in obesity, diabetes

In addition to suggesting therapies for IBD, the study may also show how the gut microbiome influences health in people with obesity, diabetes, or metabolic syndrome.

"We previously found that these T cells improve health in mice with obesity and diabetes, and these improvements could be due to the T cells' anti-inflammatory activity we describe here," Ivanov says.

The lab is now investigating this possibility.

More information: Leonie Brockmann et al, Intestinal microbiota-specific Th17 cells possess regulatory properties and suppress effector T cells via c-MAF and IL-10, *Immunity* (2023). DOI: 10.1016/j.immuni.2023.11.003

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