

Researchers discover a gene that controls the severity of colon cancer

7 September 2021, by Brittany Steff



Majid Kazemian and a team of scientists have discovered that the gene TCF-1 plays a key role in controlling TReg cells, affecting the severity of colon cancer. Credit: Purdue University / Rebecca McElhoo

Regulatory T cells (T_{Reg}) are essential to regulating the immune system. However, there are several different types of T_{Reg} cells, and scientists are only now beginning to differentiate among them and understand their functions and roles.

Researchers from Purdue University, including Majid Kazemian, an assistant professor of biochemistry and computer science, and a team of collaborators from Mayo Clinic and the University of Chicago, have discovered that the gene TCF-1 controls the functions of a specific set of T_{Reg} cells. Without TCF-1, these T_{Reg} cells keep their normal repressive function, but they gain additional properties and become inflammatory: They become more activated, increase the cancer signals, and gain a gut-homing feature, resulting in more drastic and dangerous colon cancers. Patients with colon cancer have these same T_{Reg} cells that lack TCF-1 in their [tumor](#). Before this research, scientists knew many of the main regulators, but this is the first time the link between

TCF-1 and colon cancer has been explored. Future drug development could focus on this pathway to treat or ameliorate certain kinds of colon cancer.

"It's extremely important to be able to manage the degree of immune response," Kazemian said. "That's why understanding these T_{Reg} cells is so important. If you have too much of a response, you get autoimmunity. If you have too little, you get cancer. Healthy systems need to strike a balance between autoimmune disease and cancer, and proper T_{Reg} cell function plays a key role in doing that."

Brief summary of methods

The scientists set out to study the link between TCF-1 and T_{Reg} cells. They discovered that when they removed TCF-1, the T_{Reg} cells changed their behavior, became gut-homing and more numerous. They studied T_{Reg} cell activity in mice that lacked the gene and compared the activity to T_{Reg} cells in human patients with colon cancer.

More information: Abu Osman et al, TCF-1 controls Treg cell functions that regulate inflammation, CD8+ T cell cytotoxicity and severity of colon cancer, *Nature Immunology* (2021). [DOI: 10.1038/s41590-021-00987-1](https://doi.org/10.1038/s41590-021-00987-1)

Provided by Purdue University

APA citation: Researchers discover a gene that controls the severity of colon cancer (2021, September 7) retrieved 6 December 2021 from <https://medicalxpress.com/news/2021-09-gene-severity-colon-cancer.html>

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