High-Fiber Diet Linked to Better Response to Immunotherapy

Low fiber consumption and use of probiotics were linked to poorer response to checkpoint inhibitors for melanoma patients.

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People with melanoma who ate a fiber-rich diet and received checkpoint inhibitor immunotherapy survived longer without cancer progression, according to findings published in Science. Conversely, probiotic supplements were linked to poorer treatment response.

Previous research has shown that the gut microbiome—the ecosystem of bacteria and other microorganisms in the intestines—can affect response to immune checkpoint inhibitors, but the effect of diet and supplements is not fully understood.

Jennifer Wargo, MD, of the University of Texas MD Anderson Cancer Center in Houston, and colleagues analyzed fecal microbiota profiles, diet and use of over-the-counter probiotic supplements in melanoma patients treated checkpoint inhibitor immunotherapy.

The researchers analyzed the gut microbiome of more than 400 people with melanoma, a majority of whom had advanced disease and received PD-1 checkpoint inhibitors. PD-1, a receptor on T cells that regulates immunity, can sometimes be commandeered by a tumor to turn off immune responses. Immunotherapy drugs that block PD-1 can release the brakes and restore T-cell activity.

At the start of treatment, 128 study participants completed a lifestyle survey and a dietary questionnaire. The team also conducted preclinical studies in parallel.

Wargo's team found that consuming more dietary fiber, including fruits, vegetables, legumes and whole grains, was linked to longer progression-free survival in people who received checkpoint inhibitors. The 37 individuals who met the criteria for high fiber intake (20 grams or more) saw a significant improvement in progression-free survival compared with the 91 patients who had low fiber intake. For every five-gram rise in daily fiber consumption, the risk of cancer progression or death dropped by 30%.

Confirming the group's previous findings, patients with a good response to immunotherapy had higher levels of Ruminococcaceae and Faecalibacterium prausnitzii, bacteria involved in the

digestion of fiber or starches.

In addition, people with a high-fiber diet who did not use probiotic supplements responded better to immunotherapy. When the researchers grouped participants based on their fiber and probiotic intake, they noted that 82% of people with both high fiber consumption and no probiotic use responded to treatment compared with 59% of those with either lower fiber intake or probiotic use.

Preclinical studies in mice supported these results. In preclinical models, probiotic intake was linked to a weaker response to immunotherapy, fewer T cells in tumors, larger tumors and a less diverse gut microbiome. In contrast, higher fiber intake was linked to higher tumor T cell levels and slower tumor growth in response to immunotherapy.

“Our study sheds light on the potential effects of a patient’s diet and supplement use when starting treatment with immune checkpoint blockade,” Wargo said in a press release. “These results provide further support for clinical trials to modulate the microbiome with the goal of improving cancer outcomes using dietary and other strategies.”

A clinical trial (NCT04645680) is now underway to explore how diets with varying fiber content affect the microbiome and immune response in people with advanced melanoma treated with immunotherapy.

Click here to read the study abstract in Science.
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