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Researchers say alcohol may cut anti-PD-1 cancer therapy’s effectiveness by half

Mouse experiments and a patient review linked heavier drinking to weaker tumor-fighting T cells and poorer survival

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Researchers said on Wednesday, November 18, that moderate-to-heavy alcohol exposure in mice and a retrospective review linking eight or more drinks a week in some patients to poorer survival suggest alcohol may weaken a widely used form of cancer immunotherapy.

The findings, described in a release from the American Association for the Advancement of Science, focused on anti-PD-1 treatment, a type of immune checkpoint inhibition used against several cancers. In mouse models of lung and bladder cancer, alcohol exposure reduced the treatment’s effectiveness by about 50% and increased the risk of tumor relapse, according to the researchers.

The team said the work helps explain, at a molecular level, how alcohol disrupts the immune response against tumors. That is significant because alcohol’s broad effects on the immune system are already well known, but the biological link to cancer immunotherapy has been less clear. Clinicians often advise cancer patients to avoid alcohol, yet earlier studies cited by the researchers found that as many as 76.4% of patients still drink.

In the animal experiments, the researchers gave mice what they described as a moderate-to-heavy amount of ethanol, roughly equivalent to three to six drinks a day in a person, while also treating them with anti-PD-1 antibodies. They found that alcohol suppressed tumor-infiltrating T cells and memory T cells, both of which are important for recognizing and attacking cancer. At the same time, alcohol increased a group of T cells carrying an immune-suppressing receptor called TIGIT.

That shift appeared to matter. When the researchers targeted TIGIT with antibodies in the mice, the anti-PD-1 therapy regained its effectiveness, suggesting a possible way to counter some of alcohol's harmful effects on treatment response. The release said those results could point to therapeutic strategies worth testing further, although findings in rodents do not always translate to patients.

The researchers also looked back at data from a cohort of patients with skin, lung, bladder, or head and neck cancer who had received immune checkpoint inhibition. In that analysis, people who reported drinking eight or more alcoholic drinks a week had poorer survival after starting treatment than those who drank less or not at all. The study, however, was retrospective, which means it can show an association but cannot by itself prove that alcohol directly caused the worse outcomes.

The combination of the mouse data and the patient review adds weight to a question that oncologists have been asking for years: whether alcohol can interfere with the body's ability to benefit from immunotherapy. The researchers said more study is needed, including better tracking of alcohol use in cancer databases, so doctors can determine whether the pattern holds across other tumors and other types of cancer treatment.

The work may also have broader implications beyond oncology clinics. If future clinical studies confirm the link, the findings could shape public health advice and more cautious communication around beer, wine, spirits, and other alcoholic beverages for people undergoing cancer care. For the beverage sector, that raises the prospect that alcohol use may need to be addressed more directly in responsible-drinking messages tied to serious medical conditions, especially for patients receiving immunotherapy.

The researchers described the study as an early step rather than a final answer. They said the results provide an initial basis for judging the risk that regular alcohol use poses to immune checkpoint inhibition and for identifying biological pathways, including TIGIT, that might be targeted to reduce that risk.