Hidden Blood Mutations May Drive Obesity, Liver Disease and Cancer

Study findings may lead to future blood tests that can identify high-risk people early on and prevent chronic illnesses and cancer.

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A study has found that hidden blood mutations may be linked to a higher risk of obesity, cancer and metabolic dysfunction-associated steatotic liver disease (MASLD, formerly known as fatty liver disease), according to a University of Florida (UF) news release.

As people age, silent changes occur naturally in the blood system. While most mutations do not cause issues, blood stem cells with a certain mutation can start making cells with the same genetic mutation due to clonal hematopoiesis, a condition that affects about 10% of older adults and is associated with an increased risk for obesity, diabetes, liver disease and blood cancers like leukemia.

“Most people don’t think about the blood as causing obesity and related diseases, but our surprising findings highlight that there’s a causal relationship between mutations in blood stem cells and metabolic diseases,” said lead author Bowen Yan, PhD, a research assistant professor in the Department of Pharmacology and Therapeutics in the UF College of Medicine.

For the study, published in the Journal of Clinical Investigation, researchers inserted a genetic mutation commonly involved in clonal hematopoiesis into the blood systems of healthy mice.

Those with the mutation ate more and gained weight faster compared with mice without the mutation. They also developed high blood sugar and were more likely to have liver problems. What’s more, mice that consumed a high-fat, high-sugar “Western” diet gained even more weight.

The study challenges previous research that showed that obesity and other chronic illnesses promote blood cell changes.

“We found that blood cell mutations don’t just show up because of poor health—they can cause it,” Yan said.

Findings may guide the development of health interventions such as simple blood tests to identify those most at risk early on. Individuals could then prevent or manage chronic illnesses and cancer through diet or lifestyle changes.

“Clonal hematopoiesis is usually a silent condition, but if you know you have it, you’re better aware of the risks it’s associated with,” said senior author Olga Guryanova, PhD, an associate professor in the department of pharmacology and therapeutics. “Our hope is that knowing these risk factors would allow us to manage chronic conditions more efficiently, either with drugs or personalized lifestyle and diet interventions.”

Researchers also emphasize the importance of addressing obesity as the most significant and preventable risk factor for cancer. In fact, over the past two decades, obesity-related cancer deaths have tripled in the United States.

“With the ability to predict the risk of obesity and metabolic disease and better manage it, we could also eventually mitigate the risk of developing cancer,” Guryanova said.

More research is required to confirm the correlation between clonal hematopoiesis and chronic diseases, according to researchers.

The team is now studying how the mutations drive disease. Next, the research team plans to test how drugs commonly used to treat diabetes and newly popular weight loss drugs might help reverse or prevent diseases caused by blood cell changes.

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