

Fat cells originating from bone marrow found in humans

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Researchers at the University of Colorado Anschutz Medical Campus have found that fat cells produced by stem cells from the bone marrow may be linked to chronic illnesses like diabetes, cardiovascular disease, kidney disease and some cancers.

"It has always been assumed that fat-storing cells are produced only from stem cells that live and self-renew in fat tissue," said the study's senior author Dwight Klemm, PhD, professor of medicine at the University of Colorado School of Medicine. "But our paper, along with one recently published by our colleagues in Sweden, shows for the first time [fat cells](#) produced by stem cells that originate in the bone marrow inside human fat tissue."

The study found that a significant number of fat cells are generated from bone marrow [stem cells](#).

That's important, Klemm said, because previous studies in mice have shown that these cells produce substances called cytokines, which promote inflammation and hinder the ability of other cells to respond to insulin, increasing the risk for diabetes.

"Our study suggests that it may be the type of fat-storing cell produced in our bodies that determines risk for disease, rather than the amount of fat," said Klemm, an expert on obesity and pulmonary hypertension. "This discovery highlights the possibility of new strategies to prevent and reverse fat-related chronic diseases by controlling the production of

different types of fat-storing cells."

The study was done using people who had received a [bone marrow transplant](#) from another donor. A small sample of their [fat tissue](#) was removed from just under the skin. The DNA from those fat cells was evaluated to determine if it came from the person who donated the bone marrow or the recipient.

"We detected the presence of donor DNA, which indicated that some of the fat cells had grown from cells that originated in the transplanted bone marrow," said Kathleen Gavin, PhD, postdoctoral fellow and lead author on the study.

If researchers can show that these cells are linked to [chronic diseases](#), they may be able to genetically modify and ultimately block their production, part of CU Anschutz's commitment to taking advances in research from the laboratory to the clinic.

Klemm believes it's possible to prevent or reverse fat-related chronic disease by controlling the type of fat-storing cells produced in the body.

"Even more exciting is the possibility of combining [bone marrow](#) or stem cell transplant technology with genetic engineering to tailor-make fat-storing cells with specific desirable functions," he said, stressing the importance of collaborative research in bringing the best new treatments to patients. "By preventing the production of harmful fat cells it may be possible to prevent or reverse fat-related chronic disease, even without weight loss."

The study was published in the latest *Journal of the Federation of American Societies for Experimental Biology*.

The other authors include Kathleen Gavin, PhD, Jonathan Gutman, MD,

Wendy Kohrt, PhD and Karen Shea, MD, all from CU Anschutz.

Provided by University of Colorado Denver

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