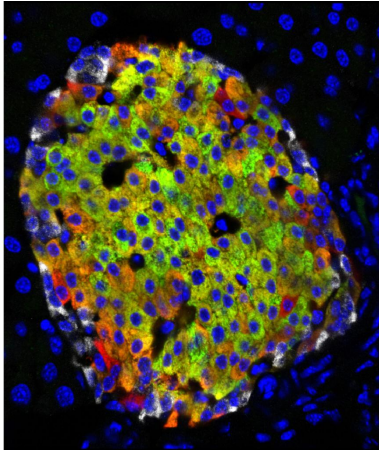


New type of insulin-producing cell discovered

4 April 2017, by Andy Fell



Insulin is made in pancreatic islets by beta cells. In type I diabetes, these cells are lost. Now UC Davis researchers have identified another type of insulin-producing cell in the islets, which appears to be an immature beta cell (shown in red in this image). The discovery shows unexpected flexibility in the system. Greater understanding could lead to better treatments and stem cell therapies for diabetes. Credit: Mark Huisling/UC Davis

In people with type I diabetes, insulin-producing beta cells in the pancreas die and are not replaced. Without these cells, the body loses the ability to control blood glucose. Researchers at the University of California, Davis have now discovered a possible new route to regenerating beta cells, giving insight into the basic mechanisms behind healthy metabolism and diabetes. Eventually, such research could lead to better treatment or cures for diabetes.

"We've seen phenomenal advances in the management of [diabetes](#), but we cannot cure it," said Mark Huisling, assistant professor of neurobiology, physiology and behavior in the UC Davis College of Biological Sciences. "If you want to cure the disease, you have to understand how it

works in the normal situation."

Huisling is senior author on a paper on the work published April 4 in the journal *Cell Metabolism*.

Working with both laboratory mice and human tissue, Huisling is studying how the [cells](#) in the islets of Langerhans in the pancreas work together to regulate [blood glucose](#). In both mice and people, the islets contain beta cells, which detect glucose and secrete insulin, and other cell types including alpha cells that produce glucagon, a hormone that raises blood sugar. The opposite effects of insulin and glucagon enable the body to regulate blood sugars and store nutrients.

Type I diabetes is a disease with two parts. Firstly, the beta cells are killed by the body's own immune system, and then they fail to regenerate (or those that do are killed). An effective cure for type I diabetes would involve dealing with both problems.

Accepted dogma, Huisling said, has been that new beta cells are generated by other beta cells dividing. But now by applying new techniques in microscopy, his team has discovered, scattered around the edges of the islets, another type of cell that looks a lot like an immature beta cell.

These new cells can make insulin, but don't have the receptors to detect glucose, so they can't function as a full beta cell. However, Huisling's team was able to observe [alpha cells](#) in the islet turn into immature beta cells and then mature into real beta cells.

"There's much more plasticity in the system than was thought," Huisling said.

Understanding Fundamentals of Metabolism and Diabetes

It's an exciting result for three reasons, Huisling said. Firstly, this is a new beta cell population in

both humans and mice that wasn't known before. Secondly, the new population could be a source to replenish beta cells killed off in diabetes. Finally, understanding how these cells mature into functioning beta cells could help in developing stem cell therapies for diabetes. Stem cells have the potential to develop into a wide range of other cells. So far, attempts to grow real beta cells from [stem cells](#) have made great strides, but these efforts have not yet reached their full potential because they get hung up at an earlier immature stage.

This basic understanding of cells in the islets could also help in understanding type II diabetes, where beta cells do not die but become inactive and no longer secrete/release insulin.

"JDRF is proud to have supported Dr. Huising in this work and extremely excited about the results shown in the paper. The concept of harnessing the plasticity in the [islet](#) to regenerate [beta cells](#) has emerged as an intriguing possibility in recent years," said Andrew Rakeman, Ph.D., director of discovery research at JDRF. "The work from Dr. Huising and his team is showing us not only the degree of plasticity in [islet cells](#), but the paths these cells take when changing identity. Adding to that the observations that the same processes appear to be occurring in human islets raises the possibility that these mechanistic insights may be able to be turned into therapeutic approaches for treating diabetes."

More information: Virgin Beta Cells Persist throughout Life at a Neogenic Niche within Pancreatic Islets, *Cell Metabolism*, DOI: [10.1016/j.cmet.2017.03.017](https://doi.org/10.1016/j.cmet.2017.03.017) , www.cell.com/cell-metabolism/f... 1550-4131(17)30169-9

Provided by UC Davis

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