

Fat-regenerating 'stem cells' found in mice

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Researchers have identified stem cells with the capacity to build fat, according to a report in the October 17th issue of the journal *Cell*, a Cell Press publication. Although they have yet to show that the cells can renew themselves, transplants of the progenitor cells isolated from the fat tissue of normal mice can restore normal fat tissue in animals that are otherwise lacking it.

The findings may yield insight into the causes of obesity, a condition characterized by an increase in both the size and number of fat cells.

"In obesity, there is an increase in fat cell number," said Matthew Rodeheffer of The Rockefeller University. "The question is: what are the events that lead to that increase? You need to know how fat cell number is normally regulated to know what goes wrong in obesity. Identifying fat cell precursors is a first step toward understanding this process"

Earlier studies identified cells with the capacity to differentiate into fat in lab dishes. However, those cells proved unable or extremely limited in their ability to form fat in living animals.

In the new study, the research team led by Jeffrey Friedman first removed fat tissue from mice and treated the tissue with an enzyme that broke it down into individual cells. Separating the mature fat cells from the rest is a simple proposition, Rodeheffer said, because the lipid-loaded cells float.

They then sorted the remaining cells based on the expression of proteins found at their surfaces, isolating those cells bearing proteins that are known to identify other types of stem cells. Two of the cell populations they isolated could produce fat in lab dishes, they found.

Just one of these two populations had the capacity to re-grow a normal fat pad in mice, they report. The researchers made that discovery by injecting the progenitor cells into the residual fat tissue of mice with a condition known as lipodystrophy. Those animals are unable to produce fat normally and they also have diabetes.

Injection with the newly discovered fat cell progenitors reversed the animals' diabetes and restored their fat levels within two weeks, they report.

Rodeheffer said that there are likely to be analogous cells in humans. If so, those cells might be used in a similar manner to treat people with lipodystrophy. The cells left over when you remove fat cells from fat tissue are also being explored for use in regenerating heart and other tissues, he noted.

"Fat is an attractive source for adult stem cells because it is readily available and easy to obtain via liposuction," Rodeheffer said. "You can imagine plenty of people would be willing donors."

The researchers also found that the specific precursor cells that were isolated in the new study, when placed under the proper experimental conditions, can also form bone, muscle, and cartilage in addition to fat. The cell therefore might also prove useful for a variety of other tissue-regenerating applications.

But the real key, according to Rodeheffer, comes back to fat biology. "We need to understand what controls the proliferation of fat cell

precursors as a prelude to understanding how the number of fat cells increases during the development of obesity."

Source: Cell Press

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