Three new classes of obesity-related adipocyte progenitor cells identified

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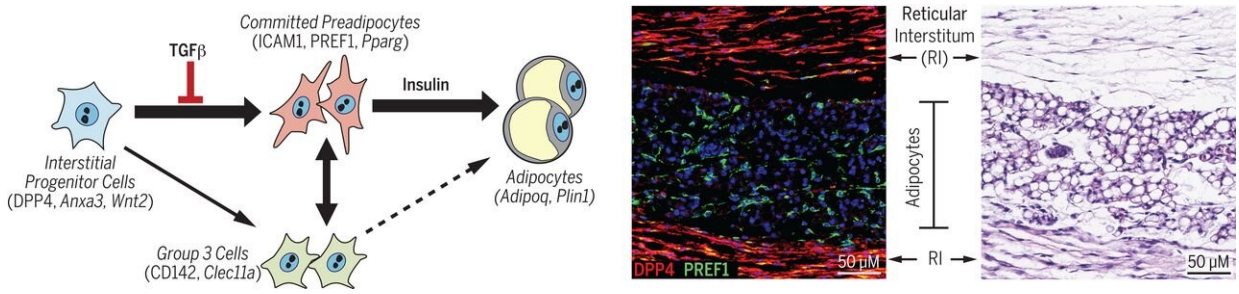

DPP4+ multipotent progenitor cells give rise to ICAM1+ and CD142+ committed preadipocytes, which are poised to differentiate into mature adipocytes (top). Committed preadipocytes (green) are intercalated between mature adipocytes, whereas DPP4+ progenitors (red) reside in the reticular interstitium, an anatomically distinct fluid-filled network of collagen and elastin fibers that encases many organs, including adipose depots. Credit: *Science* (2019). DOI: 10.1126/science.aav2501

A team of researchers with the Perelman School of Medicine at the University of Pennsylvania has identified three new classes of obesity-related adipocyte progenitor cells in humans. In their paper published in the journal *Science*, the group describes their study of new adipocyte formation from progenitor cells within fat tissue and what they found. You-Ying Chau and William Cawthorn with the University of Edinburgh have published a Perspective piece on the work done by the team at UoP in the same journal issue.

Chau and Cawthorn note that fat storage by the body is more than just a means of keeping an extra energy store around in case of lean times, it is also the means by which organs in the body are protected from ectopic lipid accumulation, which can lead to damage. They also note that one of the ways that scientists are looking to combat obesity is by better understanding the ways fat accumulates in the body. Prior research has shown that fat expansion happens in two ways: by fat cells increasing in size and by fat cells increasing in number. The first leads to obesity, the second helps to prevent it. Scientists also know that fat expansion is dependent on the creation of new adipocytes that come about from progenitor cells that live inside of fat tissue. Prior research has also shown that there are different kinds of adipocyte progenitor cells (APCs) in fat tissue, but until now the role they play in fat expansion has not been clear. In this new effort, the researchers have identified three new classes of APCs that play a role in the development of obesity.

In order to find the newly discovered APCs, the researchers had to use a new technique called fluorescence-activated cell sorting—it allowed for separating fat cells based on specific proteins in them. Once that was done, the team carried out single-cell RNA sequencing which allowed them to separate cells into groups based on similarities between them. The team reports that most of the cells they were studying fell into one of three previously unknown groups: interstitial progenitor cells, preadipocytes and group 3. Cells from each group were removed and isolated and allowed to grow cell cultures which showed them forming adipocytes. The researchers suggest more study of members of the newly defined classes of APCs could lead to new ways to battle obesity by promoting fat cell number increases instead of size increases.

More information: David Merrick et al. Identification of a mesenchymal progenitor cell hierarchy in adipose tissue, *Science* (2019). DOI: 10.1126/science.aav2501

You-Ying Chau et al. Fat cell progenitors get singled out, *Science* (2019). DOI: 10.1126/science.aax2967