Researchers catalog cell types present in white fat tissue in mice and in humans

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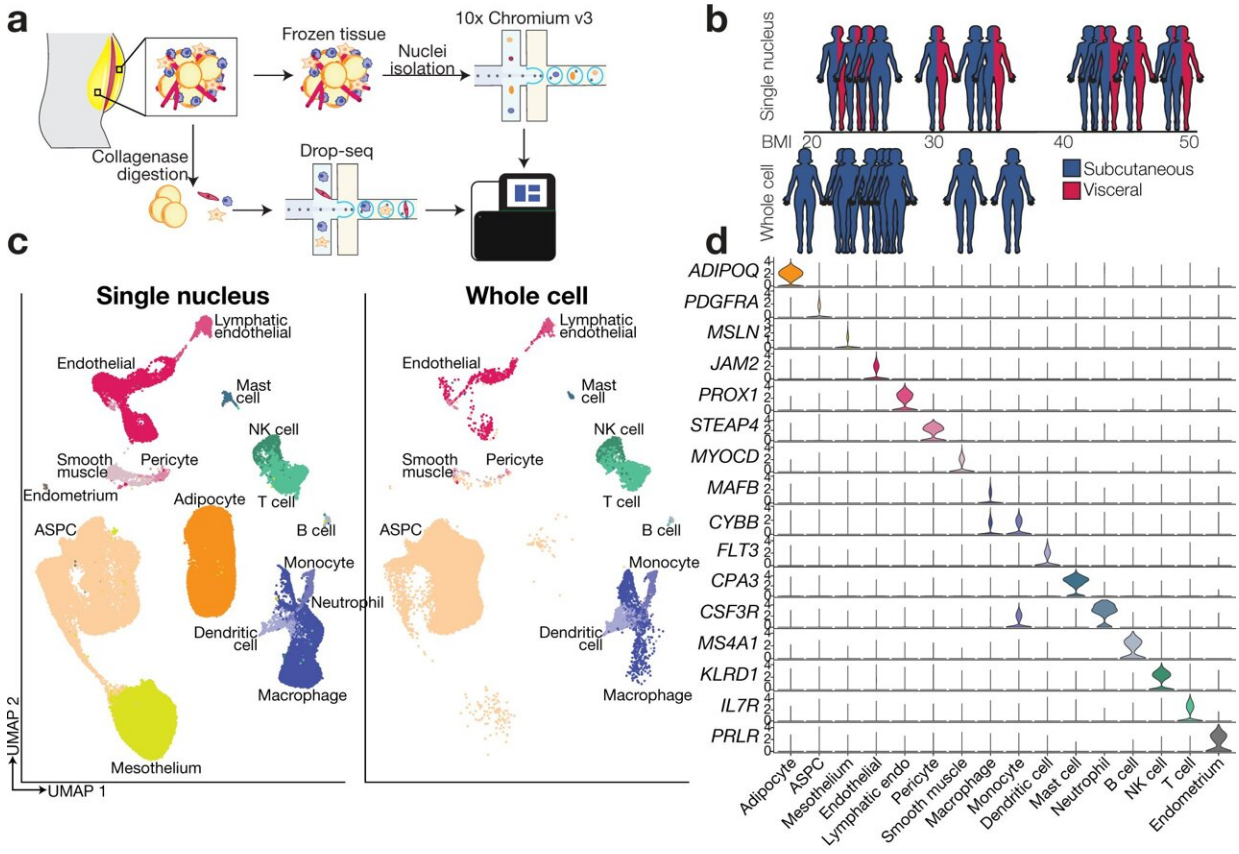

Fig. 1: A single-cell atlas of human white adipose tissue. Credit: *Nature* (2022). DOI: 10.1038/s41586-022-04518-2

Once considered to be inert, white adipose tissue is now recognized to be dynamic and to play an interactive role in a wide array of biological and

metabolic processes. Diet and energy expenditure can cause dramatic changes to the physiology, behavior and cellular make-up of white adipose tissue, and these changes, in turn, are linked with metabolic diseases, including type 2 diabetes.

Now, scientists at Beth Israel Deaconess Medical Center (BIDMC) have generated an atlas of the cell types present in the white adipose tissue of humans and in mice, allowing them to look at the composition of fat in unprecedented detail. Their work describes novel subpopulations of fat cells, and links specific cell types to increased risk of metabolic disease. The team's findings, published in the journal *Nature*, lay the groundwork for future studies exploring the complex underpinnings of body weight, metabolism and disease.

"We provide an initial blueprint for a comprehensive set of interactions between individual cell types in white adipose tissue, across individuals at different body weights," said Evan D. Rosen, MD, Ph.D., chief of the Division of Endocrinology, Diabetes, and Metabolism at BIDMC. "Our first-of-its-kind data set provides a rich resource to identify other disease-associated cell types and to better interpret genetic studies related to metabolic disease."

Rosen and colleagues identified cell types in adipose tissue taken from both men and women, across a wide range of body weight. Because adipose tissue can have differently properties depending on where in the body it is located, the team generated their atlas from fat located beneath the skin (subcutaneous fat) as well as from inside the body cavity (visceral fat). They were able to show that the composition of fat differs between these depots, and also changes considerably in obesity. Among the most striking findings was the discovery of new subtypes of human white adipocytes, some of which are associated with conditions like type 2 diabetes.

Because many adipose tissue research uses mice as a model, Rosen's team also generated a mouse adipose atlas, again looking at males and females, lean and obese, and visceral and subcutaneous fat. In general, mouse adipose tissue was very similar to human, with a few key differences.

"Our work provides a framework for mouse-human comparison in studies of adipose tissue that will be an important resource for groups hoping to translate mouse findings to human treatments," said Rosen, who is also a professor of medicine at Harvard Medical School and a member of the Broad Institute of Harvard and MIT. "Our data provide a lens of unprecedented acuity that better informs our understanding of white adipose tissue biology and enables a deeper exploration of its role in health and disease."

More information: Margo P. Emont et al, A single-cell atlas of human and mouse white adipose tissue, *Nature* (2022). DOI: 10.1038/s41586-022-04518-2

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