

Healthy fat impacted by change in diet and circadian clock

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Changing your eating habits or altering your circadian clock can impact healthy fat tissue throughout your lifespan, according to a preclinical study published today in *Nature* by researchers with The University of

Texas Health Science Center at Houston (UTHealth).

Healthy fat tissue helps provide energy, supports [cell growth](#), protects organs, and keeps the body warm. A good quality [diet](#) and one that is consumed in a rhythmic manner (i.e., during our active cycle) is important in maintaining healthy fat, the researchers found.

Adipocyte progenitor [cells](#) mature into adipocytes—the healthy fat cells that make up our adipose tissue, which stores energy as fat. Researchers discovered that adipocyte progenitors undergo rhythmic daily proliferation throughout the 24-hour cycle under normal patterns of energy intake.

However, when investigators introduced a [high fat diet](#), or changed the temporal patterns of food consumption so that mice ate equal increments of food during both the sleep and the wake phase, this 24-hour pattern of pre-adipocyte proliferation was destroyed.

"We found that when we fed mice a [high-fat diet](#), it increased the proliferation of preadipocytes and destroyed its rhythmic pattern," said Kristin Eckel-Mahan, Ph.D., assistant professor with the Center for Metabolic and Degenerative Diseases at the Brown Foundation Institute of Molecular Medicine for the Prevention of Human Diseases at UTHealth and lead author on the study. "What we project is that over the course of our lifetime, these 24-hour variations in the proliferation of these cells is really important in maintaining healthy fat."

Throwing off the circadian rhythm and eating a high-fat diet over time will deplete healthy fat cells, and the study suggests that this disruption may be difficult to reverse. Depletion of [adipocyte](#) progenitor cells will not allow for healthy new adipocytes to be made within the tissue, ultimately causing defects in fat storage and excess lipid spilling over into other organs, such as the liver and muscle. Eckel-Mahan says having

fat in these areas can lead to Type 2 diabetes and insulin resistance.

"In an ideal world, everyone would maintain a normal sleep-wake cycle, and not eat during the wrong hours of the day, so not too late before bed or into the early morning. You should also steer away from high-fat diets, which we have now shown destroys the rhythmic proliferation of our preadipocytes. The 24-hour clock we have is important when it comes to our healthy fat, and we need to protect it as much as we can," said first author Aleix Ribas-Latre, Ph.D., with the Helmholtz Institute for Metabolic, Obesity and Vascular Research (HI-MAG) of the Helmholtz Zentrum München at the University of Leipzig and University Hospital Leipzig in Germany.

More information: Aleix Ribas-Latre et al, Cellular and physiological circadian mechanisms drive diurnal cell proliferation and expansion of white adipose tissue, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-23770-0](https://doi.org/10.1038/s41467-021-23770-0)

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