

Scientists discover a new healthy role for fat

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Too much body fat may be a bad thing, but there is increasing evidence that too little fat also may have some surprisingly negative consequences.

Researchers at UC Irvine have found that fat droplets – tiny balls of fat that exist in most cells – appear to have an intriguing role to play when it comes to regulating excess proteins in the body. In a study with fruit flies, developmental biologist Steven Gross and colleagues found that these fat droplets served as storage depots for a type of protein used primarily by the cell to bind DNA and organize it in the nucleus. The fat keeps this extra protein out of the way until it is needed so that it does not cause harm within the cell. The findings imply that fat droplets could also serve as storage warehouses for other excess proteins that might otherwise cause harm if not sequestered. The study appears in the current issue of *Current Biology*.

“We were surprised to find that these droplets appear to be a mechanism for cleaning up excess proteins before they cause trouble,” said Gross, associate professor of developmental and cell biology. “Obviously, everything in the body should be balanced. There is no doubt that huge amounts of fat tax your system in a lot of ways. But there now appears to be growing evidence that fat is also important for keeping us healthy.”

Researchers used fruit flies in their experiments because of strong similarities between the fat droplets in the flies and in mammals. They purified the droplets in fruit fly embryos and used mass spectrometry to look at what, if any, proteins were associated with the droplets. They were surprised to find histones, a protein that is used by the cell to fold

DNA within the nucleus. Even though histones appear to serve no purpose outside the nucleus, the scientists found that 50 percent of all the histones present in the cell were in the fat droplets. Interestingly, the amount of histones in the droplets dropped as the embryo moved from early development to later stages, indicating that the histones moved from the droplets to the nucleus as they were needed. In essence, the fat droplets acted as a warehouse where the proteins could be stored until needed by the nucleus of the cell.

Gross and his colleagues believe the droplets serve this purpose not just for histones, but for other excess proteins, as well. This has implications for how fat may be helping fight certain diseases when too much of certain proteins are produced.

“In prion diseases, such as Mad Cow Disease, for example, proteins in the brain are misshapen,” Gross said. “They become abnormal, clump together and accumulate on brain tissue. Although we have no evidence yet that fat droplets could help with this, prion diseases are one area in which we can explore further to see if these droplets are helping keep excess bothersome proteins out of the way.”

Gross emphasized that clinical trials would be needed to evaluate whether storage of proteins on fat droplets is important for human health.

Collaborating on the study with Gross were Silvia Cermelli of UCI, and Michael Welte and Yi Guo of Brandeis University. The study was funded by National Institute of General Medical Sciences and the National Institutes of Health.

Source: UC Irvine

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