Cutting calories might help you live longer, but not without increased physical activity

July 3 2012

Dietary restriction can slow age-related diseases and extend the lifespan of all species tested to date. Understanding this phenomenon might help people live longer, preferably without having to drastically limit calories. Now, investigators reporting in the July 3 issue of the Cell Press journal *Cell Metabolism* have found that in flies, dietary restriction causes enhanced fat metabolism in the muscle and increased physical activity, both of which are critical for extending lifespan. The findings suggest that dietary restriction may cause changes in muscle that can lead to a more active and longer life.

In fruit flies, restriction of yeast, the major source of protein in the fly diet, robustly prolongs life. To see what specific effects dietary restriction has on the body, investigators cut yeast from flies' diets and then conducted various biochemical tests. They found that following dietary restriction, the flies became more physically active, and this increased physical activity was required for extending the flies' lifespan. Flies on a restricted diet that could not move did not live longer.

The researchers also found that this increased physical activity was due to a shift in the flies' metabolism so that they increased both fat synthesis and breakdown. Blocking fat synthesis specifically in the muscle tissue negated the lifespan-extending effects of dietary restriction.

These results suggest that simply restricting nutrients without increasing physical activity may not be beneficial in humans. "Ours is the first study to suggest that for dietary restriction to enhance lifespan, you need

increased fat turnover in the muscle and an associated increase in physical activity. Furthermore, it also suggests that dietary changes may enhance motivation to exercise and help derive maximal benefits of exercise," says senior author Dr. Pankaj Kapahi, from the Buck Institute for Research on Aging.

The researchers also found that overexpression of the hormone AKH, the fly equivalent of glucagon, enhanced flies' fat metabolism, boosted their activity, and extended their lifespan even though their diet was unrestricted.

"Our data suggest that dietary restriction may induce changes in muscle similar to those observed under endurance exercise and that molecules like AKH that enhance fat breakdown could serve as potential dietary restriction mimetics," the authors wrote. This indicates that medical interventions that enhance fat metabolism in muscle might have the potential to prolong life.

More information: Katewa et al.: "Intra-myocellular fatty acid metabolism plays a critical role in mediating responses to dietary restriction in Drosophila melanogaster." *Cell Metabolism* - July 3, 2012 print issue print issue, DOI:10.1016/j.cmet.2012.06.005

Provided by Cell Press