Researchers identify why diabetes risk increases as we age

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(PhysOrg.com) -- A new study led by researchers from Yale School of Medicine shows that enhancing activity of a gene in the mitochondria, the power plant of the cell, prevents damage that can trigger type 2 diabetes. The study appears in the December 1 issue of *Cell Metabolism*.

Type 2 diabetes, which is an outgrowth of insulin resistance, affects around 40 percent of the American population over age 65. But the underlying mechanism for the increased prevalence as we age has been unknown until now.

The Yale team found that overexpression of the human catalase gene prevented mitochondrial damage and an excessive buildup of muscle lipids, and preserved mitochondrial function in aging mice. This in turn

protected the aging mice from developing muscle insulin resistance, which is the major underlying factor that leads to type 2 diabetes.

Previous studies by the Yale group had shown that elderly individuals, even when healthy, had a 35% reduction in muscle mitochondrial activity, associated with a 30% increase in the fat content in muscle cells and severe muscle insulin resistance.

According to senior author Gerald I. Shulman, M.D., Ph.D., a Howard Hughes Medical Institute investigator, the George R. Cowgill Professor of Physiological Chemistry, and professor of medicine and cellular and molecular physiology, "This transgenic mouse study builds on our previous human studies and allowed us to directly test the hypothesis that age-associated reductions in muscle mitochondrial function can lead to intramuscular fat accumulation and insulin resistance — something that would be virtually impossible to do in human studies. These results also suggest that reducing mitochondrial oxidative stress may be a novel therapeutic target to prevent age-associated insulin resistance and type 2 diabetes, which is now reaching epidemic proportions in this country and abroad."

Provided by Yale University