Mechanism of smoking-induced insulin resistance elucidated

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(HealthDay)—Smoking-induced insulin resistance, which improves with smoking cessation, may be due to activation of mammalian target of rapamycin (mTOR), according to a study published online Sept. 10 in *Diabetes*.

To investigate the mechanism of smoking-induced insulin resistance, Bryan C. Bergman, Ph.D., from the University of Colorado Denver, and colleagues studied insulin sensitivity in 12 healthy sedentary nonsmokers and 10 smokers.

The researchers found that the smokers were less sensitive to insulin, but sensitivity improved after they stopped smoking for one or two weeks.

The improvement was associated with normalized phosphorylation of insulin receptor substrate-1 (IRS-1) at serine 636. Treatment of muscle cells with nicotine reduced insulin sensitivity and was associated with increased phosphorylation of IRS-1 at serine 636. One of the two possible pathways known to stimulate IRS-1 phosphorylation, mTOR, was stimulated by nicotine; mTOR also prevented IRS-1 phosphorylation during nicotine exposure and normalized insulin sensitivity when inhibited.

"These data indicate nicotine induces insulin resistance in skeletal muscle by activating mTOR," Bergman and colleagues conclude. "Therapeutic agents designed to oppose skeletal muscle mTOR activation may prove a novel strategy for individuals who are at increased risk of diabetes and cardiovascular disease because they cannot stop smoking or are exposed to secondhand smoke."

More information: Abstract
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