

# Fetal exposure to nicotine increases long-term risk of obesity

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Many women are encouraged to quit smoking when they become pregnant using nicotine replacement therapy (NRT) whether as gum, transdermal patches, nasal spray or lozenges. But new research from Western University in London, Canada, has shown that nicotine from either smoking or NRT causes a wide range of long-term adverse reactions for the offspring, including an increased risk of obesity and metabolic syndrome by influencing the liver to produce more triglyceride. The research, led by Daniel Hardy, PhD, of the Schulich School of Medicine & Dentistry is published online in the journal *Toxicology and Applied Pharmacology*.

"We knew smoking was bad during pregnancy. But the problem is one fifth of pregnant women in Canada continue to smoke, and 30 prospective studies have shown us that that babies born to smoking mothers have a 47 per cent increase in the odds of becoming overweight. And here's the interesting thing, that's even after adjusting for mom's diet and socioeconomic status," says Hardy, an assistant professor in the Departments of Obstetrics and Gynaecology, and Physiology and Pharmacology "Our studies were designed to find if there is a biological basis between nicotine exposure from either NRT or smoking, and obesity and [metabolic syndrome](#) later in the [offspring's](#) life."

Working in collaboration with Alison Holloway, PhD, of McMaster University, Hardy gave pregnant laboratory rats the same amount of nicotine, adjusted for weight, that an average smoker receives (1 mg per kg a day). The offspring were born smaller in size, but six months later

when they reached adulthood, the rats had developed an increase in liver and circulating triglycerides, a hallmark of obesity. The study also demonstrated that the nicotine-exposed liver, long-term, is making more triglycerides via transcriptional and epigenetic changes.

Hardy is also interested in finding out if increased perinatal doses of folic acid would prevent or reverse the nicotine damage to the developing liver. Folic acid has been shown to reduce circulating triglycerides in animal studies, and smoking moms have been found to have low levels of folate so he says, it is conceivable. He is also studying the long-term effects of nicotine on nursing babies.

Hardy agrees that, compared to [smoking](#), NRT is the lesser of two evils, but he says clinicians may need to look more closely at the long-term safety and efficacy of nicotine in pregnancy on postnatal health and well-being.

Provided by University of Western Ontario

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