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Nanotherapeutic technology could safely, effectively convert bad fat to good fat, treat obesity

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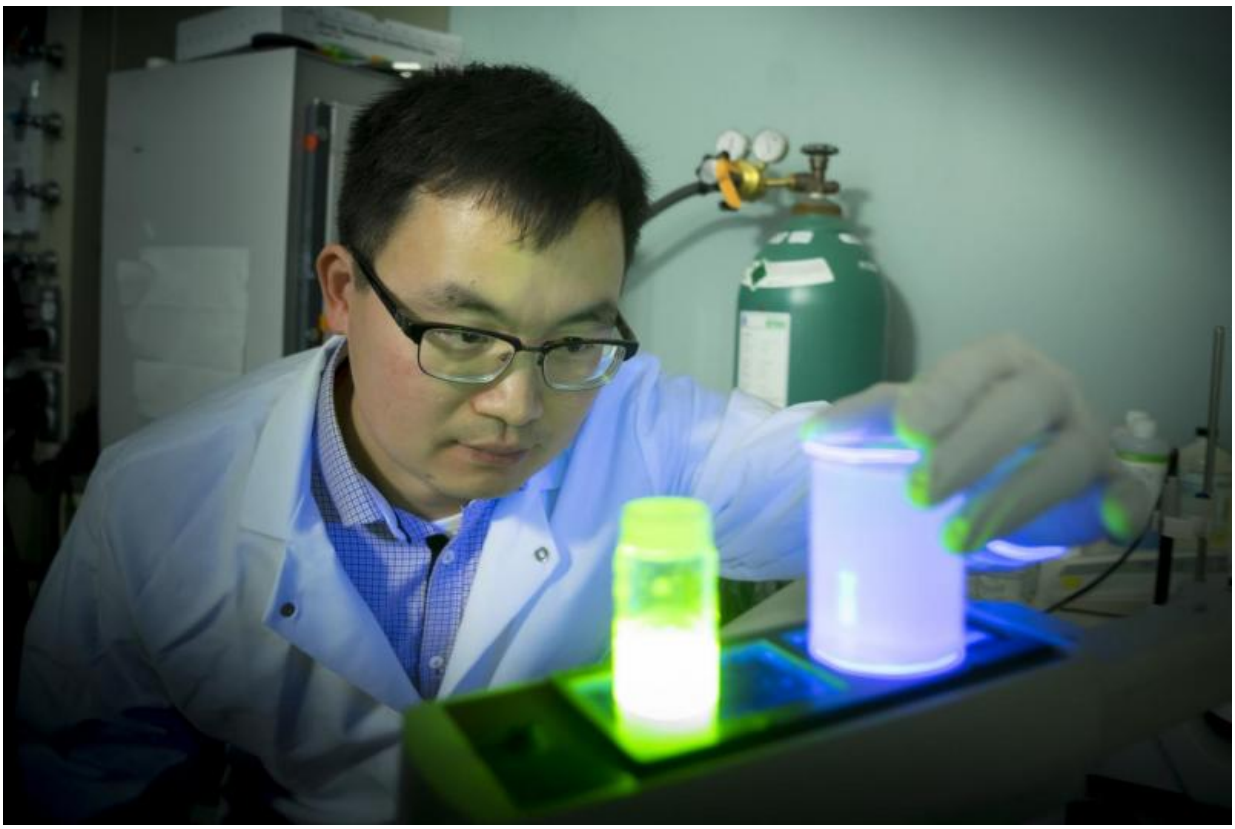

Meng Deng, founder of Adipo Therapeutics and assistant professor in Purdue's College of Engineering and College of Agriculture, compares two samples in the development of a nanotherapeutic platform that could induce conversion of bad fat to good fat. The company is commercializing the innovation in an effort to provide a safe and effective way to treat obesity and diabetes. Credit: Purdue Research Foundation / Vince Walter image

A Purdue-based startup is developing a disruptive nanotherapeutic platform that could induce conversion of bad fat to good fat in an effort to provide a safe and effective way to treat obesity and diabetes.

Meng Deng, an assistant professor in Purdue's Department of Agricultural and Biological Engineering, Weldon School of Biomedical Engineering, and School of Materials Engineering founded Adipo Therapeutics LLC to further develop, test and commercialize the technology. Shihuan Kuang, Purdue professor of animal sciences is also involved in the development of the technology.

Deng said obesity is a nationwide epidemic in dire need of a safe and effective solution.

"More than one-third of adults in the U.S. are affected by obesity, which results from the lack of balance between energy intake and energy expenditure," he said. "There are approved anti-obesity drugs on the market that focus on decreasing energy intake by either suppressing appetite or reducing lipid absorption, but they have only produced limited success and are usually accompanied with unpleasant side effects."

Adipo Therapeutics integrates two platform technologies to develop polymer-based nanotherapeutics that act directly on fat tissue and maintain weight loss.

"The first platform is based on the discovery of adipocyte browning which is the conversion of energy-storing bad fat cells into energy-burning good fat cells in the body. In particular, we harness the role of Notch signaling in adipocyte plasticity to induce browning and "burning" of bad fat by using small molecule Notch inhibitors," Deng said. "The

second platform technology that we incorporate is polymer-based nanoparticle delivery. We can control the delivery of those Notch inhibitors to bad fat cells and convert them to good fat cells."

Adipo Therapeutics is working toward proving the safety and efficacy of the technology in human fat cells. Promising results were presented at the NIDDK Adipose Tissue Niche workshop last November.

"Preclinical proof of concept of this technology in inducing fat cell conversion and exerting anti-obesity effects has been successfully demonstrated in obesity models. The nanoparticle delivery platform not only bypasses the potential off-target effects of systemic delivery, but also provides continuous drug release that minimizes periodic drug injections," Deng said. "This method could ultimately provide an easier and safer treatment for obese patients"

Deng said the technology has great potential for clinical translation.

"Notch signaling is highly conserved in the animal kingdom," he said. "We also use an already FDA-approved polymer, which has shown significant progress in the clinical setting. The combination of these two components is expected to facilitate the translation of the technology."

Adipo Therapeutics recognizes the potential of this technology for patients with diabetes.

"Obesity has been a big contributor to type 2 diabetes. What's significant about our technology is that through local delivery of the nanoparticles into bad fat cells in obesity models, the glucose homeostasis is considerably improved," Deng said. "In other words, this local fat cell conversion has beneficial effects on improving systemic metabolic profiles."

Provided by Purdue University