

Innovative semaglutide hydrogel could reduce diabetes shots to once a month

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French researchers have developed a new drug delivery system that could cut the dosing schedule for type 2 diabetes and weight control drug semaglutide to just once a month, according to new research to be presented at this year's annual meeting of the [European Association for the Study of Diabetes \(EASD\)](#), Madrid (9-13 Sept).

"Glucagon-like peptide-1 agonist (GLP-1) drugs have transformed type 2 diabetes care, but weekly injections can be burdensome for patients. A single shot a month could make it much easier for people living with diabetes or obesity to stick to their drug regimens, improving quality of

life and reducing side effects and diabetes complications," said lead author Dr. Claire Mégret from ADOCIA, Lyon, France, the biotechnology company who developed the hydrogel.

Semaglutide works by mimicking the hormone glucagon-like peptide 1 (GLP-1), and is currently authorized for the treatment of type 2 diabetes patients with insufficient glycemic control and long-term weight management.

Clinical studies suggest that adherence to injected [semaglutide](#) is 39-67% for type 2 [diabetes](#) patients at one year, and 40% for patients who take the drug for weight loss. Similarly, adherence to daily oral pill formulations is around 40% at one year.

Long-acting delivery formulations could increase drug efficacy and safety by maintaining steady drug levels in the body at optimal concentrations.

The new hydrogel delivery platform uses two innovative degradable polymers that are chemically bound to one another to form a gel, but allow slow, sustained release of soluble peptides over 1 to 3 months.

"A small dollop of gel—known as a 'depot'—of the semaglutide-laden hydrogel is injected under the skin," explained Dr. Mégret. "The challenge is to formulate the hydrogel to entrap the peptides to limit initial burst ([early release](#)) of semaglutide molecules, and at the same time, to allow smooth release and controlled dissolving of the gel over one month, without generating toxic molecules."

Several formulations of the hydrogel were tested in vitro to investigate the drug release rate, duration of action, and semaglutide load to define the best candidate.

The researchers found that the hydrogel could be easily injected using an off-the-shelf needle. Additionally, the gel started forming within minutes of mixing, ensuring sufficient time for the injection while minimizing spread at the injection site, so that the depot is small enough to be comfortable and inconspicuous.

In vitro drug release assessments for all formulations showed extended and constant release rates over 1 to 3 months. The researchers also found that the release duration could be tailored through optimization of the hydrogel properties and loading.

The hydrogel-semaglutide formulation was also tested in six laboratory rats. In the rats, a single injection of the hydrogel-based therapy showed limited burst (early release) and a regular release over a one-month period.

Importantly, the hydrogel was well tolerated with no inflammatory reaction over the treatment period.

"Our pre-clinical results demonstrate that the regular, slow release of semaglutide over one month after administering a single dose, with limited early release, is achievable. Next we will be testing the [hydrogel](#) platform in pigs, whose skin and endocrine systems are most similar to those in humans. If that goes well, we will move forward the platform development by expecting [clinical trials](#) within the next few years," said Dr. Mégret.

Provided by Diabetologia

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