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Gel forming polymers for improved oral peptide formulations

A novel formulation strategy uses a gel-forming polymer to synchronize the release of a peptide and a permeation enhancer, enhancing the bioavailability and absorption efficiency of oral peptide drugs.

With the recent approval of several oral peptide products notably Rybelsus (semaglutide) in 2019, Mycapssa (octreotide) in 2020, Lupkynis (voclosporin) in 2021, there is a resurgence of interest in oral formulation strategies. This interest is also driven by the large number of peptides currently in clinical development. However, one key obstacle of oral peptide drugs has not been resolved: low efficiency of absorption from oral peptide formulations.

Researchers at Purdue University have developed a technology by adding a gel-forming polymer to a mixture of a peptide and a permeation enhancer in order to increase the efficiency of absorption and bioavailability. With the addition of the gel-forming polymer, the release of peptide and permeation enhancer becomes synchronous, and the release rate can be controlled. This simultaneous and modifiable release rate is expected to optimize the temporary disruption of the gastrointestinal membrane by the permeation enhancer ensuring that the peptide is present at the membrane surface, allowing more peptide to be absorbed. It is believed that this technology has the potential to enhance oral peptide bioavailability, for both hydrophilic and hydrophobic peptides.

Technology Validation:

Results from surface area normalized dissolution rate experiments show the release rate of the hydrophilic peptide, octreotide, is coupled to the release rate of the permeation enhancer, SNAC, as well as the gel forming polymer. Likewise, the release rate of octreotide and the gel forming polymer are synchronized when sodium decanoate, another permeation enhancer is included. Complete release of all components can be achieved within 10-25 minutes using this approach.

Advantages:

Technology ID
2025-TAYL-70925

Category
Pharmaceuticals/Pharmaceutical Packaging & Delivery Systems
Pharmaceuticals/Computational Drug Delivery & Nanomedicine
Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies
Pharmaceuticals/Drug Delivery & Formulations

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-Can modify existing peptide formulations

-Can be worked with new peptide drugs

-Improved bioavailability of peptides

Applications:

-Oral peptide formulations

-Peptide drugs

TRL: 4

Intellectual Property:

Provisional-Patent, 2024-10-18, United States | PCT-Patent, 2025-10-16, WO

Keywords: Oral peptide formulation, gel-forming polymer, permeation enhancer, synchronous release, controlled release rate, enhanced bioavailability, octreotide, SNAC, sodium decanoate, hydrophilic peptides