TECHNOLOGY

Platform for Oral Delivery of Peptide and Biological Therapies

OVERVIEW

Background

Oral administration of nutritional supplements, therapeutics, and other agents represents the most desirable route of delivery to the systemic circulation. Its advantages over the invasive intravenous delivery include increased patient compliance, reduced costs and flexible dosing regimen. However, in many cases, implementation of oral delivery needs to overcome crucial challenges of bioavailability. The concept of bioavailability refers to the fraction of an administered drug that reaches the systemic circulation and can then access organs, cells and cellular compartments. Bioavailability is influenced by several factors including the degree of gastrointestinal (GI) degradation, adhesion to the mucosa, transport across the GI tract into the blood, and transport from the blood into tissues and cells. Currently, there is need for an orally administrable drug delivery system that can overcome the obstacles involved with bioavailability.

Innovative Technology

The inventors at University of Maryland, College Park have developed a novel strategy to use the gastrointestinal trans-epithelial pathway providing transfer of orally administered exogenous molecules (therapeutic or diagnostic). This technology strategically and effectively targets the GI epithelial cells providing a biologically safe and speedy transport across the GI cell body with no negative effect on the GI permeability. The inventors have designed drug delivery systems and short peptides derived from a naturally occurring protein(s) that can act as drug or molecule carrier(s). These carriers target a molecule which is expressed on the surface of many cells in the body, including epithelial cells and any cell affected by a disease. The inventors found that GI epithelial cells supported: (1) efficient and specific targeting of carriers both as non-activated healthy cells and also as pathologically altered cells, as well as (2) safe, fast, and efficient transport of such carriers across their cellular body in both healthy and pathological conditions, via a pathway involving vesicular endocytosis with no damaging opening of cell junctions.

Advantages

• Oral drug delivery means less discomfort for patients
• Speedier pharmokinetics & bioavailability of drugs.
• Safe targeting of drug delivery carriers across the GI cells compared to other drug delivery technologies.
• Supports the targeting and endocytosis of both drug carrier particles and small targeting moieties in the absence of carrier particles, which offers the opportunity for delivery of therapeutic and/or diagnostic agents directly coupled to such targeting moieties.

Applications

• A method of orally delivering reporter probes, biosensors, markers, antibody, peptide or protein, enzyme, recombinant enzymes, chaperones, inhibitors, ligands, genetic material (DNA- and RNA-based), drug or chemical, imaging or therapeutic agent, cell or modified cell, small molecules or any combination of the above.
• General platform with great potential for applications in terms of gastrointestinal delivery into the circulation and also treatment of gastrointestinal epithelial cells involved in infarctions/infections, inflammatory conditions and cancer.
• Oral delivery for the following: enzyme replacement and other therapeutics for lysosomal storage disorders (LSDs), protein-based therapeutics for Alzheimer’s treatment, carriers for intracellular (cytosolic, nuclear, etc.) delivery, small molecular drugs for treatment of genetic conditions and treatments against inflammation, thrombosis and oxidative

stress.

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Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Patent(s) pending

LICENSE STATUS

Available for exclusive or non-exclusive license

CATEGORIES

- Drug delivery devices

EXTERNAL RESOURCES

- US Patent 8,778,307
- US Patent 9,358,305

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