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A Smart Capsule with GI-tract-location-specific Payload Release

A magnetically activated smart capsule enables targeted, location-specific drug delivery within the gastrointestinal tract, allowing patients to receive therapy outside of a clinical setting.

In recent years, smart capsules, which once ingested, can perform endoscopy and biopsy, have been the focus of intense research and development. Site-specific delivery can optimize the therapeutic efficacy of many drugs with preferential absorption sites. Although many smart capsules have been developed that are suitable for drug absorption studies in clinical settings, they cannot be used for actual therapy in larger populations that can benefit from smart capsules, which releases the drug at an optimum location in the gastrointestinal tract. This is mainly due to the problems associated with the need for real-time tracking of the capsule location. In addition, all these systems require active participation by the patient/volunteer in the form of triggering the RF transmitter once the capsule is in the target position.

Researchers at Purdue University have developed a smart capsule for location-specific drug release in the gastrointestinal tract. Once activated through a magnetic proximity fuse, the capsule opens and releases its powdered payload in a location specified by an implanted miniature magnetic marker or an externally worn larger magnet. The capsule (9 mm x 26 mm) has two compartments, one contains a charged capacitor and a reed switch, while the other houses the drug reservoir capped by a taut nylon thread intertwined with a nichrome wire. The nichrome wire is connected to the capacitor through the reed switch. The capacitor is charged to 2.7V before ingestion, and once within the proximity of the permanent magnet, the reed switch closes, discharging the capacitor through the nichrome wire, melting the nylon thread, detaching the cap, and emptying the drug reservoir.

Advantages:

-Enables targeted delivery of drugs to a specific location in GI track

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Category

Pharmaceuticals/Pharmaceutical Packaging & Delivery Systems

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-Patient does not have to be in a hospital or clinic to use

-Preferred capsule size (9 mm x 26 mm)

Potential Applications:

-Medical/Healthcare

-Medical testing

-Pharmaceutical industry

-Supplement industry

TRL: 5

Intellectual Property:

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