Docket #: S24-095

G-I-ntelligent pill (GIntellipill) for active sample collection in the gastrointestinal tract

Researchers at Stanford University have developed an ingestible smart pill to sample biomarkers from the gastrointestinal (GI) tract.

The GI tract plays an important role in maintaining overall health, as it is responsible for digesting food, absorbing nutrients, and eliminating waste. Sampling from the GI tract, particularly its mucous layer, is essential in understanding gut health and disease. Bioanalytes from the mucus can provide insights into inflammation, metabolic function, and immune response. Currently, invasive procedures like endoscopy and colonoscopy are used to sample from the GI tract. There is a need for a non-invasive method. Smart pills have recently emerged as non-invasive sampling platforms. However, to date, they have relied on passive diffusion and thus are not suitable for viscous mucus.

Stanford researchers have designed a smart pill that can be swallowed and docked at a desired location in the GI tract for active sampling of the mucus. After confirming the pill's location within the GI tract, its hydrodynamic screw is remotely actuated. The rotational motion facilitates the collection of mucus samples along its spiral path, directing them towards a dedicated collection chamber. This technology could enable easy, simple, affordable, and repeat sampling of GI tract regions of interest.

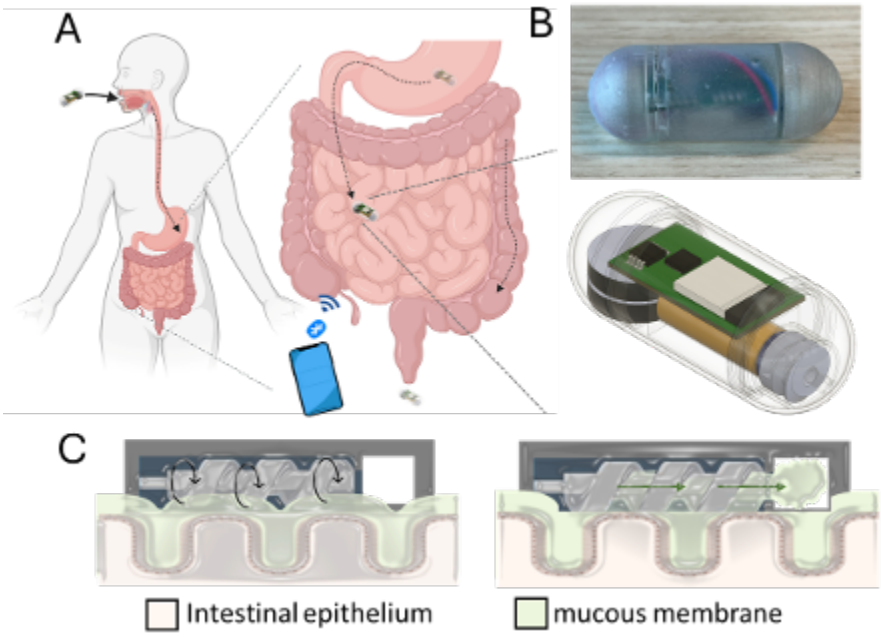

Figure 1. A) The pill can be introduced in the GI tract by ingestion to travel through different sections of the GI tract for sample collection. B) Pill design and prototype. C) Screw conveyor mechanism for collection and transport of viscous biological sample.

Stage of Development
Prototype

Applications

- Precision medicine
- Early disease detection
- Health monitoring
- Disease management

Advantages

- Can collect high viscosity samples
- Multiple sampling locations
- Cost-effective
- Non-invasive
- Enables frequent high quality data collection

Patents

- Published Application: 20250331829

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