

Inexpensive Disposable Hydro-Jet Capsule Robot for Gastric Cancer Screening in Low-Income Countries

Summary

Gastric cancer is the second leading cause of cancer death worldwide. While screening programs have had a tremendous impact on reducing mortality, the majority of cases occur in low and middle-income countries (LMIC). Typically, screening for gastric and esophageal cancer is performed using a flexible endoscope; however, endoscopy resources for these settings are traditionally limited. With the development of an inexpensive, disposable system by Vanderbilt researchers, gastroscopy and colonoscopy can be facilitated in areas hampered by a lack of access to the appropriate means.

Addressed Need

- Size and costs of capsule robots or magnetically guided endoscopic capsules (MGEC) are not scalable to remote areas, ruling out the sustained implementation and use of such technologies in LMIC
- Swallowable and endoscopic composition of the system involves ability to maneuver throughout the esophagus and stomach, enabling a more thorough examination
- As opposed to previous operational methods centered on the magnetic guidance, this system incorporates vision acquisition and regulation by utilizing a internally sealed, yet reusable endoscopic camera

Technology Description

This system examines and screens the upper gastrointestinal (GI) tract using a capsule connected to external water distribution and visual transmission systems of a soft, single-use tether. This process is effectively operated through the control of the endoscopic device by an external joystick. The orientation and position of the capsule is managed

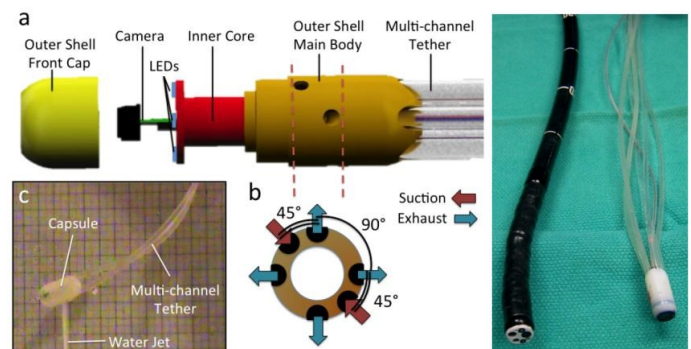
externally by a multi-channel water-jet nozzles. The capsule also consists of an internal camera, along with a water pump and relief and solenoid valves that continuously gauge the transport of the capsule throughout the body.

Advantages

- Capsule endoscopic materials provide a sanitary, less harmful way to screen upper GI tract cancer, as the plastic outer shell of the instrument can be disposed of without further reprocessing and spread of disease
- Ultimately, the targeted cost per procedure, ranging between 2-5 USD, will help deliver at minimal costs and better accessibility to individuals living in LMIC
- Compared to MGEC, the Hydro-Jet design was molded using portability as a focal point as the control of water, relatively inexpensive and available in LMIC, is a key functional component of the pressurized system

Intellectual Property Status

- Pending PCT Application
- Video: <https://youtu.be/EGux5HWUlb5w?t=132>



- R. Caprara et al., "A Platform for Gastric Cancer Screening in Low and Middle-Income Countries", IEEE Transactions on Biomedical Engineering, 2015

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