The tadpole endoscope—new diagnostic device in the fight against cancer

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Engineers have developed a new medical device aimed at improving diagnostic procedures for various cancers: the tadpole endoscope (TE).

The new device comes as a result of work published in the journal HKIE Transactions entitled 'Tadpole endoscope: a wireless micro robot fish for examining the entire gastrointestinal (GI) tract' by Dr Yong ZHONG, Ir Prof Ruxu DU and Prof Phillip W Y CHIU, which takes inspiration from the mechanics that tadpoles use to swim. With its 3D printed body, the so-called Tadpole EndoscopeTE is like a micro-robot fish with a camera which is swallowed by the patient. The Tadpole EndoscopeTE stands out from existing wireless capsule endoscopes with its addition of a soft tail that allows it to be guided around the stomach remotely by a doctor, allowing for more comprehensive imaging and accurate location of problems within the body.

Cancers of the gastrointestinal (GI) tract, including oesophagus cancer, stomach cancer and colon cancer, rank as the second most prevalent among all types of cancers in the world. Three procedures are required for the traditional method of diagnosing cancers in the GI tract: oesophagus cancer and stomach cancer can be diagnosed using gastroscopy; intestinal cancer can be diagnosed using capsule endoscopy; and colorectal cancer can be diagnosed using colonoscopy. All of these diagnostic procedures are expensive and put a lot of stress on the human body.

The TE attempts to improve these existing methods by offering a

reliable, non-invasive diagnosis procedure for the GI tract. The process will work by the patient going to the hospital and swallowing the TE which starts working immediately. Once the TE is in the stomach, the doctor can control the TE to swim around to gather images. By adjusting the posture of the patient, the doctor can view the whole stomach. The TE will then move into the lower GI tract depending on natural peristalsis. The patient can then be sent home wearing a sensor pad to record these images which the doctor can subsequently use to make a diagnosis.

So far, the TE has been tested in a stomach model and a pig stomach without the image system. The authors hope that the viability of the propulsion model will take one step closer to the next stage of experiments before the device can be used in a working medical context.

More information: "Tadpole endoscope: a wireless micro robot fish for examining the entire gastrointestinal (GI) tract," *HKIE Transactions* Volume 22, Issue 2, 2015. DOI: 10.1080/1023697X.2015.1038320

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