Novel imaging approaches for gastric cancer early detection

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Novel advanced imaging

Molecular Imaging

Tethered Capsule Endoscopy

OCT-Video Capsule
Confocal Capsule
Intestine Capsule
Imaging/Biopsy Capsule
OCT-Fluorescence Capsule
OCT Capsule
Standard of care detection of precancers

Visual identification of suspicious lesion
Standard of care detection of precancers

Visual identification of suspicious lesion

Surgical resection or biopsy

Nodule

1 cm
Standard of care detection of precancers

Visual identification of suspicious lesion

Surgical resection or biopsy

Pathologic Assessment

Nodule
Standard of care detection of precancers

Visual identification of suspicious lesion

Surgical resection or biopsy

Pathologic Assessment

What if we could more sensitively identify this here instead?
Near infrared imaging of cathepsin activatable probes in mice

Gastrointestinal cancers overexpress proteases, a type of protein, on tumor surfaces.
Near infrared imaging of cathepsin activatable probes in mice

Gastrointestinal cancers overexpress proteases, especially cathepsins, on tumor surfaces

Colon Cancer

A. Tumor Appearance

B. White light

C. Bright Field + NIRF

Near infrared imaging of cathepsin activatable probes in mice
11 adults with CDH1 mutations undergoing gastrectomy

* Inject LUM015 IV prior to tumor resection
  * Collect blood
  * Capsule imaging

* Ex vivo imaging for LUM015 signal in resection specimens

Correlate LUM015 signal and capsule images with histopathology
OCT Tethered Capsule Endomicroscopy (TCE)

- Rapid scan of entire upper GI tract at microscopic level
- No sedation required
- Procedure takes a few minutes
- Much better tolerated than endoscopy
- Over 500 subjects imaged
Stomach Polyps

Fundic gland polyp

Juvenile polyp

polyp

mucus

stomach

1 mm
**Fluorescence (FL)-OCT TCE**

- Can detect fluorescence (LUMO15) and obtain OCT structural images of gastric cancer
- Procedure easier than endoscopy
- No sedation required

Aligned OCT and FL images using the same capsule