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Integrated Ultrasound And Optical Coherence Tomography (OCT) Endoscope For Image Guided Cancer Biopsy

Tech ID: 24818 / UC Case 2015-221-0

BRIEF DESCRIPTION

Gastrointestinal cancers are very difficult to diagnosis due to poor biopsy and diagnosis techniques. The invention is a device that is minimally invasive and improves biopsy technique by enabling the physician to visualize a tissue in real time prior to its biopsy. This allows for improved biopsy collection and thereby increases the diagnosis accuracy.

FULL DESCRIPTION

Gastrointestinal (GI) cancers cause 140,000 deaths and more than 290,000 new cases in the US in 2014. These include esophageal, colorectal cancer and many others. The current standard for early diagnosis of GI cancers is to perform histological analysis based on biopsy samples taken from abnormal tissues. These areas are identified by endoscopy or random biopsy sample over a large area. In addition to inadequate sampling, chronically inflamed tissues make it difficult for the endoscopist to distinguish lesions from inflamed mucosa.

Another devastating cancer is cholangiocarcinoma (CCA), which is an epithelial cancer of the bile ducts. CCA has the devastating prognosis of a median survival <24 months. The gold standard of CCA diagnosis is to perform a bile duct biopsy by using a catheter-based brush to collect cells from the lesion area for cytological analysis. This approach is very invasive and harmful to the patients and is less than 50% accurate. Lastly, cystic neoplasm of the pancreas is another type of disease that is difficult to diagnose. Currently, the diagnosis can only be made at the time of surgical resection because no other diagnostic tool exists. Therefore finding a technology that can assist the physicians' ability to diagnosis prior to surgery will be greatly beneficial to the patient's overall healthcare. These serious limitations to cancer diagnostic tools demonstrate a great need for developing more advanced medical imaging technologies that provide higher sensitivity and improved safety.

University of CA researchers have created a device that is a minimally invasive imaging system that enables the physician to visualize the tissue prior to its biopsy. The device is located within the imaging catheter and gives the physician additional information during the biopsy procedure that will increase the diagnosis accuracy. The invention combines an integrated ultrasound-optical coherence tomography imaging system and endoscopic catheters for imaging guided biopsy. Overall, the invention creates an imaging device that enables physicians to visualize the tissue prior to during the biopsy procedure, which improves the diagnosis accuracy and healthcare for the patient.

SUGGESTED USES

The invention should be used as an imaging device to assist the physician when identifying and collecting biopsies of abnormal tissue. These procedures are performed as standard of care for diagnosis of many types of GI cancers. The specialized component of our device allows the doctor real time visualization of the tissue, which was not available before. Overall, this device will increase the physicians' diagnosis accuracy and improve the patients' healthcare.

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OTHER INFORMATION

CATEGORIZED AS

- » **Agriculture & Animal Science**
 - » Devices
- » **Biotechnology**
 - » Health
- » **Engineering**
 - » Engineering
- » **Imaging**
 - » 3D/Immersive
 - » Medical
- » **Medical**
 - » Devices
 - » Disease: Cancer
 - » Disease: Kidneys and Genito-Urinary System
 - » Imaging

ADVANTAGES

- Visualize GI tract in both the near field (<2mm) and far field (2-10mm) simultaneously
- Minimally invasive and can be embedded into a catheter
- Biopsy areas of the digestive system include esophagus, bile duct, stomach, pancreatic duct, duodenum and other GI tract areas
- Many types of imaging catheter may use used
- Back-back probe design
- Imaging probe can be made by multiple strategies
- OCT sub probe can be lens based
- Additional modalities can be added such as photoacoustic imaging, fluorescence or electrography imaging modality
- Medical imaging device for non-invasive detection of cancer.

The imaging catheter, which combines ultrasound and optical coherence tomography imaging modalities, can visualize tissue within the GI tract in both the near field and the far field simultaneously. This allows the physician to visualize tissue and simultaneously direct a tissue sampling aperture to a specific location to capture a tissue sample. By enabling the physician to visualize the tissue before determining where to sample the tissue, this image-guided tissue biopsy catheter can assist with earlier diagnosis of cancerous tissue.

PATENT STATUS

| Country | Type | Number | Dated | Case |
|--------------------------|---------------|------------|------------|----------|
| United States Of America | Issued Patent | 10,182,791 | 01/22/2019 | 2015-221 |

STATE OF DEVELOPMENT

Currently have a prototype of the US-OCT imaging catheter. It has produced co-registered OCT images of ex vivo animal and human tissue. They are in development of a new catheter

RELATED CASES

2015-221-0

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