

Flexible and capsule-based endoscopy: from current achievements to open challenges

Colorectal cancer (CRC) is responsible for >600.000 deaths worldwide. The survival rate increases for early stages, which recommends regular screening over 50 years old. To date, conventional colonoscopy is considered to be the most effective method for CRC diagnosis and screening. However, take-up of screening colonoscopy is limited due to a variety of factors including invasiveness, patient discomfort, fear of pain, and the need for sedation. The technology behind standard optical colonoscopy basically consists of a long semirigid tube with a steerable head, relatively stiff compared with the compliant nature of the colon; as a result of this “back-wheel drive” approach, looping occurs during insertion leading to pain and potential tissue damage or even perforation. Colon capsule endoscopy (CCE) and innovative robotic colonoscopes solve the drawbacks of pain and discomfort, but lack in reliability and diagnostic accuracy and fail due to inability to combine therapeutic functionalities with the common screening purposes. Key factors for success are: 1. The capability to reproduce a painless procedure for high acceptance by patients in mass screening; 2. ease to perform (due to robotic teleoperated guidance, diagnosis and therapy and embedded control capabilities, – reduction of required skills and thus standardization of procedure); 3. tremendous social benefit and reduced cost for the public healthcare systems.

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International Patents:

- A miniature robotic device applicable to a flexible endoscope for the surgical dissection of gastro-intestinal tract surface neoplasms (WO 2014147556 A1)
- A connecting device for creating an anastomosis between a hollow organ and a conduit (WO 2013004263 A1)
- A device for transluminal diversion of bile (WO 2012007044 A1)
- System and method for modifying the location at which biliopancreatic secretions interact with the gastrointestinal tract (WO 2012007050 A1)