

ABSTRACT

**New Frontiers in Capsule Endoscopy: Active Locomotion and Wireless
Therapeutic Intervention**

Capsule endoscopy has become a clinical reality since a number of years for the inspection of the small bowel. It has revolutionized the way small-bowel disease is diagnosed. Given its little impact on patient comfort and the missing pain associated with the examination “capsule endoscopy” can also be of great value in the upper and lower GI tract. For that purpose, however, capsule endoscopes have to provide a similar diagnostic quality as conventional endoscopic procedures. The two biggest limitations of today’s capsule endoscopes are the missing capability of active locomotion inside the organ and of missing therapeutic options.

The VECTOR Project, funded by the European Union in FP 6, is aiming at overcoming these limitations by the developing actively driven diagnostic and therapeutic capsule endoscopes. The VECTOR Project Consortium has developed a number of different locomotion options such as on-board-locomotion actuators (e.g. legs) and external magnetic forces to be used for moving capsules inside the GI tract. These technologies are currently at a prototype level and are assessed in ex-vivo and in-vivo experiments. The first preliminary results show that active propulsion and positioning of capsules can be achieved in all sectors of GI tract including the esophagus, the stomach, the small and large bowel. The clinical focus of VECTOR is on developing painless endoscopic procedures that enhance screening and early diagnosis for the prevention of gastrointestinal cancers.

A further hallmark of the VECTOR Project are actuators and devices for therapeutic interaction with pathologies. This includes the release of endoscopic clips or taking biopsies with wireless capsules. The ability to deliver an effective haemostatic clip to a desired location inside the GI tract has been shown on an experimental basis.

Authors:

Schurr M. O.; Menciassi A.; Dario P.

Acknowledgement:

The VECTOR Project is carried out by a consortium of 18 institutions. All contributors from these various institutions are acknowledged with gratitude.