

Review of: "Ingestible capsule for detecting labile inflammatory biomarkers in situ"

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Potential competing interests: The author(s) declared that no potential competing interests exist.

In their work Inda et al. presented an innovative device monitoring the level of compounds related to inflammation in the gastrointestinal (GI) tract. Authors combined biosensors based on bacteria expressing fluorescent/bioluminescent proteins in response to agents present in the lumen of the intestine with microelectronics that detects light waves and wirelessly transmits the information to the outside device (e.g. PC). Interestingly, it was showed that biosensors can discriminately detect 3 different levels of measured compounds (referred to as: mild, moderate, and severe). This feature suggests the possible use in early recognition of disease flares that accompany inflammatory bowel diseases (IBD). In summary it is a promising, well designed and clearly presented report paving the way for future non-invasive diagnostic tools that may guide therapeutic decisions.

The following questions/issues should be taken into consideration and improved before this tool can be clinically applied:

1. How to properly correlate the localization of the sensor in the GI tract with obtained data? Intestinal transit is affected by GI diseases. It would be of great value to establish whether readouts come from jejunum, ileum or the colon.
2. Oxidation-related markers are of low specificity. They can be affected by various factors such as diet, age and environment or illnesses of other organs. Hence this kind of readout may not be useful in making decisions about treatment or diagnosing specific diseases.
3. Validation in models that better recapitulate human conditions in which inflammation is induced by immune cells (e.g. T cell transfer model) is lacking.
4. The device could be improved by adding sensors able to detect proteins e.g. calprotectin. This could be achieved by replacing bacteria with antibodies that bind to proteins of interest and generate BRET signal.