Use of gas sensors and FOBT for the early detection of colorectal cancer.

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Use of gas sensors and FOBT for the early detection of colorectal cancer â˜†

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Abstract

Among the major challenges of medicine today there is the early detection of tumors, in order to prevent their degeneration into malignant stages and/or metastases. In particular, the colorectal cancer shows a high curability rate, up to 90%, if identified when in stage I. This is the reason why a reliable screening protocol is strictly necessary to avoid colorectal cancer progression. The Protocol discussed here is proposed to implement the clinical validation of a device, consisting of an array of chemoresistive semiconductor gas sensors, capable of identifying the difference between fecal exhalation of healthy subjects and of subjects suffering from high-risk colorectal adenomas or cancers. The analysis done are compared to the results of fecal occult blood test and colonoscopy as a gold standard. The difference among the two classes of fecal samples is due to the presence of tumor gaseous biomarkers, produced by cancerous cells through membrane peroxidation process and metabolic alterations. Our

method combines a specific algorithm appositely created for data acquisition with principal component analysis and support vector machine. The test resulted capable of recognizing all the colorectal cancer plus high risk adenomas and the 98% of healthy subjects. The recognition capability of low-risk adenomas is progressively increasing (45%) along with statistics.

Keywords

Gas sensors; Nanostructures; Colorectal cancer; Screening; FOBT; Clinical validation

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a,† Presented at the Eurosensors 2017 Conference, Paris, France, September 3â€"6, 2017.

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