On-line breath analysis of volatile organic compounds as a method for colorectal cancer detection

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Abstract

Background: Analysis of exhaled volatile organic compounds (VOCs) in breath is an emerging approach for cancer diagnosis, but it is less known about its potential use as biomarker for colorectal cancer (CRC). We investigated whether a combination of VOCs could distinguish CRC patients from healthy volunteers.

Methods: In a pilot study, we prospectively analyzed breath exhalations of 36 CRC patient and 43 healthy controls all scheduled for colonoscopy or with a diagnostic colonoscopy. After a minimum of 30 minutes fasting, volunteers deeply inhaled into the system and then kept breath-holding for 45 seconds. The exhalation mixture of each volunteer was diluted in air, filtered, and analyzed to collect the breath volatiles for measurement. Mass spectrometry was performed at 2.500 and 3.500 m/z.

Results: 245 VOCs, with masses ranging from 30 to 431 Dalton have been identified in the exhaled breath. Diagnostically relevant VOCs were identified in 36 CRC patients and in 43 healthy volunteers. The mass spectrometry analysis was confirmatory and reproducible. Among the investigated VOCs, 133 were increased in CRC patients. No CRC-related VOCs were decreased. In CRC patients, the average concentration of VOCs was 72 times higher than that of healthy patients.

Conclusions: Despite the small sample size, our results indicate that the analysis of VOCs in exhaled breath could be a useful tool for CRC detection.

Objectives

To determine whether a combination of VOCs could distinguish CRC patients from healthy volunteers. It was our hypothesis that a combination of VOCs could be a useful tool for CRC detection.

References