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Volatile organic metabolites as novel, non-invasive diagnostic biomarkers in colorectal cancer

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Colon cancer (CRC) is the third most common type of cancer worldwide with 1.4 million cases reported every year and causes approximately 30,000-50,000 cancer related deaths every year. Its incidence continues to increase worldwide, predominantly in Eastern Europe, Asia and South America although varies from region to region affected by life style and age. Screening can identify the CRC at the early stage leading to effective treatment and reduction in cancer related mortality. A number of studies have shown that early detection of CRC followed by successful treatment increases the 5 years survival rate from 8.1% for patients treated as stage IV, up to 93.2% for patients diagnosed and treated in stages I-II Recently, there is growing scientific interest in the investigation of volatile metabolites as non-invasive biomarkers for screening and diagnosis of CRC. The development of sophisticated analytical techniques has enabled the study and interpretation of changes in the faecal and breath volatile organic metabolites (VOMs) and its correlation with the pathophysiological mechanisms in CRC. VOMs are the chemicals that are the products and intermediates of metabolism and may be altered during the diseases process. Changes in the signature of VOMs could potentially provide diagnostic information about health and disease. Multiple studies have reported the differences in VOM profiles of healthy controls vs. patients with CRC other GI disorders. VOM profiles have been used to segregate patients by type and stage of cancer. The correlation of VOMs with microbiota is interesting and supports the hypothesis of gut microbial dysbiosis in the etiology of CRC and other GI disease. This provides an important platform to explore the role of dysbiosis in the pathogenesis of CRC and development of novel therapeutic targets. In future, further understanding of faecal VOMs may lead to the development of a rapid and simple point of care screening of CRC.

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