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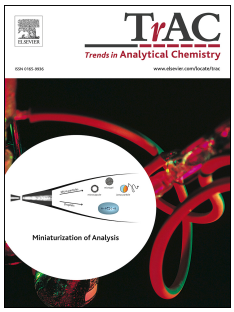

Review article: Sample preparation and recent trends in volatolomics for diagnosing gastrointestinal diseases

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Review article: Sample preparation and recent trends in volatolomics for diagnosing gastrointestinal diseases

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ABSTRACT

The analysis of the human volatilome can be successfully used for rapid and non-invasive diagnostics of gastrointestinal diseases. However, the introduction of techniques based on detection of volatiles is limited, among other factors, by difficulties which arise during the sampling stage and instrumental analysis. The aim of this article was to review and discuss medical and analytical literature on the analysis of volatiles in diagnostics of gastrointestinal disorders and to elaborate on technical aspects of sampling and analysis of volatile organic compounds in this context. The easily overlooked technical aspects of the sampling and analysis of volatiles can have a significant impact on the outcome of the classification. In order to introduce headspace analysis into clinical practice, it is necessary to standardise upon the best available techniques and to introduce external validation of the results.

KEYWORDS: gastrointestinal diseases; medical diagnostics; volatolomics; non-invasive diagnostics; breath analysis; sampling; faeces; urine

ABBREVIATIONS

ANNs- artificial neural networks
CA- cluster analysis
CP- conducting polymer
CD- Crohn's disease
CRC- colorectal cancer
DFA- discriminant function analysis
DHS- dynamic headspace sampling
DI- direct injection
DMS- differential ion mobility spectrometry
DMAC- N,N-dimethyl acetamide
FAIMS- field asymmetric ion mobility spectrometry
FS- full scan
GC- gas chromatography
GCxGC- multi-dimensional gas chromatography
GI- gastrointestinal
IBD- inflammatory bowel diseases
IBS- irritable bowel syndrome
IMR-MS- ion-molecule reactions mass spectrometry
IMS- ion mobility spectrometry
MIM- multiple ion monitoring
MOS- metal-oxide semiconductors
PCA- principal component analysis
PTR-MS- proton transfer reaction mass spectrometry
QCM- quartz crystal microbalance
SCFAs- short-chain fatty acids
SESI-MS- secondary electrospray ionisation mass spectrometry
SHS- static headspace sampling