

How microextraction can help in clinical analysis

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A biopsy is a routine medical procedure of collection of small tissue sample followed by staining and microscopic analysis. It allows to determine if the given tissue is healthy or it carries the histological signs of pathology. Recently, solid phase microextraction (SPME) was proposed as the alternative or complementary strategy. Direct extraction of small molecules from intact tissue with a probe of a size of acupuncture needle enables to avoid tissue collection. The protocol is fully compatible with medical environment as the extraction is solvent-free, the probes sterilizable and the strategy has potential to be used for rapid diagnostic tool on-site.

When coupled to LC-HRMS, the approach offers untargeted tissue profiling, both healthy and pathological, and identification of molecular species which can be used as potential biomarkers.

Moreover, low invasiveness of this “chemical biopsy” permits repeated sampling, therefore temporal and spatial resolution analysis is possible. The mentioned features of the method will be presented in the studies on determination of drug biodistribution and concentration in lungs during chemotherapy in vivo and on assessment of kidney graft quality in peritransplant period.

The selected examples will show that chromatography is the MUST in global screening and identification of the extracted features, but also that it becomes a bottleneck when fast analysis on-site (in the operating or emergency room) is needed. Strategies based on direct SPME-MS/MS coupling will be presented as a potential avenue to be explored for that purpose in clinical practice in the near future.