

## Metabonomics in Diabetes Research

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### Abstract

Metabonomics has been defined as “quantitative measurement of the dynamic multiparametric metabolic response of living systems to pathophysiological stimuli or genetic modification” and can provide information on disease processes, drug toxicity, and gene function. In this approach many samples of biological origin (biofluids such as urine or plasma) are analyzed using techniques that produce simultaneous detection. A variety of analytical metabolic profiling tools are used routinely, are also currently under development, and include proton nuclear magnetic resonance spectroscopy and mass spectrometry with a prior online separation step such as high-performance liquid chromatography, ultra-performance liquid chromatography, or gas chromatography. Data generated by these analytical techniques are often combined with multivariate data analysis, i.e., pattern recognition, for respectively generating and interpreting the metabolic profiles of the investigated samples. Metabonomics has gained great prominence in diabetes research within the last few years and has already been applied to understand the metabolism in a range of animal models and, more recently, attempts have been done to process complex metabolic data sets from clinical studies. A future hope for the metabonomic approach is the identification of biomarkers that are able to highlight individuals likely to suffer from diabetes and enable early diagnosis of the disease or the identification of those at risk. This review summarizes the technologies currently being used in metabonomics, as well as the studies reported related to diabetes prior to a description of the general objective of the research plan of the metabonomics part of the European Union project, Molecular Phenotyping to Accelerate Genomic Epidemiology.

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**Abbreviations:** (ESI) electrospray ionization, (GC) gas chromatography, (HPLC) high-performance liquid chromatography, (MolPAGE) Molecular Phenotyping to Accelerate Genomic Epidemiology, (MS) mass spectrometry, (NAFLD) nonalcoholic fatty liver disease, (NMR) nuclear magnetic resonance, (PLS) partial least squares, (UPLC) ultraperformance liquid chromatography

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