

Talk Abstract

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MR metabonomics and personalised medicine

C. Luchinat¹

¹Magnetic Resonance Center (CERM), University of Florence, Italy

Metabonomics is a new “omic” science that is now emerging with the purpose of elaborating a comprehensive analysis of the metabolome, which is the complete set of metabolites in a biofluid, cell or tissue. Statistical analyses performed on NMR spectra of human urine samples reveal an invariant part characteristic of each person¹. This individual phenotype is relatively stable over a 2-3 years period². This finding provides evidence that individual metabolic phenotypes (metabotypes) exist and opens new perspectives for personalized medicine, ultimately allowing, together with other –omic techniques, the definition of a “virtual patient” that could be followed over the individual’s lifespan (see: <http://www.itfom.eu/>).

A few examples: using a combination of statistical techniques we are able to discriminate celiac disease (CD) patients from healthy controls with high accuracy³. Interestingly after 12 months of gluten free diet all but one patients were classified as healthy, with metabolic profiles reverting to normal. Potential CD patients largely share the metabonomic signature of overt CD⁴, allowing us to hypothesize that CD exists as such before intestinal damage occurs. A metabolic discrimination between early and metastatic breast cancer is also apparent⁵, and in metastatic breast cancer metabonomics may play a role in sub selecting patients with HER2 positive disease with greater sensitivity to paclitaxel plus lapatinib⁶. Serum metabolic profiles of third line colorectal cancer patients indicate that NMR metabonomics can predict the overall survival of these patients better than any other biochemical and clinical prognostic tool⁷.

In summary, metabonomics, jointly with the power of information technology, may be the basis for a future new paradigm in personalized medicine and prevention, allowing us to really switch from classical reactive medicine to a true predictive and preventive medicine.

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