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Nutritional Metabolomics

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In this review, we define nutritional metabolomics as “use of small molecule chemical profiling to integrate diet and nutrition in complex bio systems”. This explicitly defines nutritional metabolomics as an experimental approach that uses chemical profiling during a global manner, i.e., as a component of a posh systems approach to diet and health. With this definition, profiling of chemicals, whether targeted or non-targeted, is important but insufficient for the transformation to personalized nutrition. Progress in nutritional metabolomics is measured by steps to support facile use of chemical profiles to reinforce practice at the extent of a private . as an example , a manageable system for a mean practitioner could also be a series of nutrition forecasting models, very similar to meteorology systems wont to predict occurrence, paths, time-course and severity of hurricanes. Such nutritional models would use metabolic profiles alongside genomic, epigenetic and health phenotyping to predict health outcomes and relevant time frames from dietary and nutritional practices. The practitioner of the longer term will evaluate results of computer-based models and develop interventional plans based upon these results.

Three important conceptual developments have occurred during recent years that impact the transition from targeted nutritional biochemical studies describing population averages to nutritional metabolomics studies describing personalized nutritional needs. These include the concept of 1) the exposome, during which cumulative exposures throughout life are incorporated into models of health (99) 2) predictive health, during which nutritional guidance to stop disease is replaced by nutrition designed to optimize vitality and well-being (60) and 3) individual complexity during which models include multiple interacting functional networks instead of unrealistic “reductionist” cause-effect models

This review describes how metabolomics analysis has been utilized in support of nutritional research in companion animals that specialize in healthy dogs and cats and highlights issues which will help those considering metabolomics to support traditional nutritional studies in other mammalian species. Factors that influence the plasma and urinary metabolome in companion animals are known, and include the individual, breed, gender, neuter status, life stage and environment, including diet. Many of those effectors are often controlled or accounted for and it's possible to think about metabolomics as an approach to research nutritional status using appropriate study designs. Whilst some research objectives may enjoy taking a discovery approach, the investment in time and resource to get hypotheses using metabolomics must be justified through an honest study design with clear objectives and a long-term commitment to the research area to take a position within the necessary follow-up studies. As such, whilst metabolomics has immense potential value, the strategic application of it to best serve nutritional sciences requires further development. Different metabolomics study designs and therefore the collection of relevant metadata is discussed to help those considering nutritional metabolomics.

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