MODERNIZING DIETARY ASSESSMENT

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Background and objectives
A cornerstone of governments' policies to reduce the risk of non communicable diseases is to encourage population change towards healthier diet and lifestyle. However, monitoring dietary changes in response to policy recommendations is based on self-reported dietary assessment tools, which are known to have high misreporting rates. We have developed a novel analytical pipeline capable to independently of recorded food intake, classify people into consumers of a healthy or unhealthy diet based on urinary metabolic patterns (Garcia-Perez et al., Lancet Diabetes Endocrinology, 2017). Here we aim to apply this methodology based on metabolic profiling to improve the accuracy of monitoring dietary intake and adherence to diet guidelines for free living people and evaluate its utility for establishing inter-individual variation in response to diet.

Methods
We used a randomised controlled trial in 19 volunteers to develop metabolite models of eating patterns. Volunteers were admitted to a clinical research unit for four day periods. Participants were provided with all food and drink representing 25, 50, 75 and 100% of healthy eating recommendations to increase fruits, vegetables, carbohydrates, dietary fibre and to decrease total fats, sugars, and salt. A cohort of 20 volunteers collected spot urine samples once a week for six months and a matching 24-hours food diaries for each day of the sample collection. Metabolic profiles were measured by 1H-NMR spectroscopy. MetaboNetworks has been used to investigate the metabolic coverage based on inter-individual variation.

Results
Analysis of 1H-NMR spectroscopy data indicated significant differences in the urinary metabolic profiles of the four diets. These were used to predict the healthiness of the dietary habits of free-living people and tracking adherence to healthy eating recommendations over time. Missreporting of dietary data has been investigated using dietary biomarkers against the food records. In addition, significant differences in metabolite concentrations were investigated to assess individual's variability in response to diet.

Conclusions
This study demonstrates the utility of applying our methodology to monitor adherence to healthful diets and assess individuals' variability in response to dietary changes.

Keywords

metabolic profiling, dietary patterns, dietary assessment, dietary adherence