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Diversity in metabolic profiles in response to dietary interventions

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Understanding individual variability to dietary interventions is emerging as an important consideration in dietary interventions. Prior research has demonstrated ranging success of interventions. For example, Gardner and colleagues (2007) compared 4 weight loss diets in participants over a 12-month period[(1)], noting the range of weight loss was between 3.1kg to 6.3kg depended on individual and diet. Song and colleagues (2023) examined post prandial glucose response (PPGR) to four different carbohydrate meals. Dependent on the meal, the PPGR varied significantly between individuals[(2)]. As such, it is inappropriate to assume that there is one dietary pattern appropriate for all individuals. Understanding the driving factors behind individual variation to specific foods and dietary patterns will allow us to tailor interventions to create optimal health outcomes for each individual. The aim of our study is to examine individual responses to different diets promoted for health. In our study, we investigated the biological diversity in response to the same dietary inputs among 23 participants at risk of type 2 diabetes and chronic disease over a two-week period. All participants completed four days on three dietary interventions (Mediterranean, Australian and low carbohydrate diets). Urine, serum, plasma, and faecal samples were collected, alongside the use of continuous glucose monitoring data, to explore the metabolic and glycaemic responses. Our findings reveal significant individual differences in blood glucose levels and metabolic outcomes. When examining fasting blood glucose levels, the low carbohydrate and Australian diets were optimal for 8 participants each, while the Mediterranean diet was optimal for 7 participants. However, this did not always correlate with post prandial blood glucose level optimisation. While blood, urine and faecal samples are yet to be analysed, these are expected to provide further understanding of individual biological responses. These results underscore the limitations of a universal dietary approach for optimising glycaemic control and highlight the necessity of personalised dietary recommendations that consider individual metabolic profiles. Our study provides crucial insights for future advances in precision nutrition, suggesting that personalised nutrition plans could lead to more effective management and prevention of T2D.

References

1. Gardner CD, Kiazand A, Alhassan S *et al.* (2007) *JAMA* **297**(9), 969–977.
2. Song J, Oh TJ, Song Y (2023) *Nutrients* **15**(16), 3571.