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Modelling the replacement of red and processed meat with plant-based alternatives and the estimated effect on insulin sensitivity in a cohort of Australian adults

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Dietary guidelines are increasingly promoting plant-based diets, limits on red meat consumption, and plant-based sources of protein for health and environmental reasons[1]. It is unclear how the resulting food substitutions associate with insulin resistance, a risk factor for type 2 diabetes. Here, we modelled the replacement of red and processed meat with plant-based alternatives and the estimated effect on insulin sensitivity. We included 783 participants (55% female) from the Childhood Determinants of Adult Health (CDAH) study, a population-based cohort of Australians. In adulthood, diet was assessed at three time points using food frequency questionnaires: CDAH-1 (2004–06), CDAH-2 (2009–11), and CDAH-3 (2017–19). The median follow-up duration was 13 years. The cumulative average intake of each food group was calculated to reflect habitual consumption. Insulin sensitivity (%) was estimated from fasting glucose and insulin concentrations at CDAH-3 (aged 39–49 years) using homeostasis model assessment. Applying the partition model[2], we simulated the replacement of one food group with another by including both in the model simultaneously (e.g., red meat and legumes), along with potential confounders and energy intake. The difference between parameter estimates (i.e., regression coefficients and variances) and their covariance were used to estimate the "substitution" effect. We report the simulated percentage point change in log-transformed insulin sensitivity for a 1 serve/day lower intake of one food group with a 1 serve/day higher intake of another food group. Replacing red meat with a combination of plant-based alternatives was associated with higher insulin sensitivity ($\beta = 0{\cdot}10$, 95% CI 0·04–0·16). Adjustment for waist circumference attenuated this association by 61·4%. On an individual basis, replacing red meat with legumes ($\beta = 0{\cdot}12$, 95% CI 0·02–0·21), nuts and seeds ($\beta = 0{\cdot}15$, 95% CI 0·06–0·23), or whole grains ($\beta = 0{\cdot}11$, 95% CI 0·04–0·17) was likewise associated with higher insulin sensitivity. Point estimates were similar when replacing processed meat with plant-based alternatives, but more uncertain due to wide confidence intervals. Our modelling suggests that habitually replacing red meat, and possibly processed meat, with plant-based alternatives may associate with higher insulin sensitivity, and thus, a lower risk of type 2 diabetes. Abdominal adiposity was identified as a potentially important mediator in this relationship. In relation to insulin sensitivity, our findings support the recommendation to choose plant-based sources of protein at the expense of red meat consumption.

Keywords: cohort studies; insulin resistance; meat; substitution analysis

Ethics Declaration

Yes

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References

1. Blomhoff R, Andersen R, Arnesen EK *et al.* (2023) Nordic Nutrition Recommendations. Copenhagen, Denmark: Nordic Council of Ministers.
2. Song M & Giovannucci E (2018) *Eur J Epidemiol* **33**, 137–140.

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