


Abstract

# Circulating NMR Metabolites in White and British Indian Vegetarians and Non-Vegetarians in the UK Biobank <sup>†</sup>

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**Abstract:** Background and objectives: Metabolomics is influenced by diet and may inform underlying mechanisms for diseases. We aimed to assess differences in circulating metabolites between people of different habitual dietary groups. Methods: The UK Biobank recruited 500,000 adults aged 40 to 69 years throughout the UK between 2006 and 2010. Plasma samples were collected from almost all participants at recruitment, and metabolomics assays (249 metabolites, 168 directly measured and 81 ratios) were performed using nuclear magnetic resonance (NMR) metabolic profiling in a randomly selected subset of 120,000 participants. Participants were asked to report their ethnicity and consumption of red and processed meat, poultry, fish, dairy and eggs. Based on this information, we defined six diet groups among the White British participants (42,963 regular meat eaters, 44,170 low meat eaters, 1051 poultry eaters, 2290 fish eaters, 1521 vegetarians and 102 vegans) and two diet groups among the British Indians (725 meat eaters and 250 vegetarians). We compared adjusted geometric mean levels of the metabolites by diet group. Results: Significant differences in the levels of many plasma metabolites were observed by diet group, with the biggest differences overall for fatty acids. Compared with regular meat eaters, low meat, poultry and fish eaters all had higher omega-3 and docosahexaenoic acid concentrations, while vegetarians and vegans had substantially lower concentrations of these fatty acids and their ratios to total fatty acids. Vegetarians and vegans had significantly higher ratios of omega-6 to both omega-3 and total fatty acids, as well as higher percentages of monounsaturated fatty acids and linoleic acid to total fatty acids. Of the amino acids, vegetarians and vegans had notably higher concentrations of glycine, but lower concentrations of total and individual branched-chain amino acids compared with regular meat eaters. Higher concentrations of citrate but lower concentrations of creatinine in vegetarians and vegans, higher acetate in vegans, as well as differences in many lipid fractions by diet group were also observed. The observed differences were similar for the White British and the British Indian participants. Discussion: The markedly different plasma metabolic profiles between people of different diet groups may impact on their long-term health.



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**Informed Consent Statement:** All participants gave informed consent to participate using a signature capture device at the baseline visit.

**Data Availability Statement:** This research has been conducted using UK Biobank Resource under application 67506. Bona fide researchers can apply to use the UK Biobank data set by registering and applying at <http://ukbiobank.ac.uk/register-apply/>.

**Conflicts of Interest:** The authors declare no conflict of interest.

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