INPLASY PROTOCOL

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Review Stage at time of this submission: **Piloting of the study selection process.**

Conflicts of interest:
None declared.

How genetic variations (such as SNPs) affect the metabolism of healthy adults, especially with regard to personalized nutrition - Systematic review

Bösch, E[1]; Scherr, J[2].

Review question / Objective: **1. What genetic variations (such as SNPs) have been found to affect the nutrient metabolism in healthy adults? 2. What is known about the mechanisms with which these genetic variations affect nutrient metabolism (such as bioavailability, requirements, intolerances, or interactions)? The objective of this review is to systematically review the literature with respect to personalized nutrition and SNPs and to derive an evidence-based recommendation sheet ('Entscheidungsbaum') for clinically relevant associations.**
Condition being studied: **This study examines the influence of genetic variations such as SNPs on the healthy human metabolism with special regard to personalized nutrition.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 July 2022 and was last updated on 12 July 2022 (registration number INPLASY202270068).

INTRODUCTION

Review question / Objective: **1. What genetic variations (such as SNPs) have been found to affect the nutrient metabolism in healthy adults? 2. What is known about the mechanisms with which these genetic variations affect nutrient metabolism (such as bioavailability, requirements, intolerances, or interactions)? The objective of this review is to systematically review the literature with respect to personalized nutrition and SNPs and to derive an evidence-based**

recommendation sheet ('Entscheidungsbaum') for clinically relevant associations.

Rationale: Personalized (or precision) nutrition has been on the rise for over a decade now, growing technology facilitating its realization increasingly. By tailoring an individual's or a group's nutrition to fit them based on their traits, personalized nutrition (PN) aims to improve public health as well as performance for professional athletes. Factors such as the microbiome, meal content and timing, clinical and biochemical parameters but also genetics, metabolomics and nutrigenomics all play a role in how individuals or homogenous groups of individuals process food and its nutrients (Kirk et al., 2021). Growing scientific knowledge on the links between modern lifestyles and non-infectious diseases emphasize the importance of nutrition and its potential to prevent diseases through personalization and optimal nutrient supply. The goal of this systematic review is to summarize the current scientific knowledge on nutrigenomics, in an effort to make personalized nutrition become a safe and viable reality in the near future.

Condition being studied: This study examines the influence of genetic variations such as SNPs on the healthy human metabolism with special regard to personalized nutrition.

METHODS

Search strategy: Initial search terms and concepts were devised and applied to multiple scientific databases. The search employs a sensitive search strategy, using a combination of database-specific thesaurus terms and free-text terms in the title and abstract related to personalized/ precision nutrition and SNPs. Searched sources: MEDLINE, Cochrrane Library
Last date searched: 30.05.2022
Restrictions: no studies older than 15 years (2007), no animal studies, no children or adolescent subjects, no languages other than English and German, no conference abstracts
Search terms include: Single nucleotide polymorphisms, nutrigenomics, nutrigenetics, personalized nutrition, precision nutrition, gene variations, genetic association.

Participant or population: healthy adults of any physical fitness, ethnicity or socio-economic status.

Intervention: This study examines health adults with genetic variations such as SNPs known to have an effect on the human metabolism. The exposure is therefore having such SNPs.

Comparator: People who do not have SNPs identified to affect the metabolism.

Study designs to be included: We will include primary studies of any study design to identify genetic variations (specially SNPs) and their mechanisms on the human metabolism. This includes observational and/or interventional studies.

Eligibility criteria: Primary studies on healthy adult subjects with SNPs found to link to the function of the human metabolism. Studies ought to include effect sizes as an outcome, to be compared to the wild type.

Information sources: Electronic databases: MEDLINE, Cochrane Library, Emboss.

Main outcome(s): Any kind of outcome measure and any length and follow-up. Any outcome with implications of how genetic variations (specially SNPs) can be used to improve personalized nutrition as a means of disease prevention or treatment. The mean effect sizes of the polymorphisms compared to the wildtype will be used as an outcome measure.

Data management: Study Selection:
-Two reviewers applying eligibility criteria and selecting studies for inclusion based on title and abstract. In case of uncertainty a full-text analysis will be conducted
-Disagreements will be resolved through discussion

-Software systems: Endnote for storing papers, Rayyan for screening and selecting papers, Prisma flowchart for recording decisions.
Data extraction:
-Extracted data: research question, data collection method(s), method of analysis, characteristics of study participants, Nutrition, study outcome
-one person extracts data
-Disagreements will be resolved through discussion
-Data will be extracted and collected by means of an excel spreadsheet.

Quality assessment / Risk of bias analysis: All relevant studies will be assessed for methodological quality independently by two reviewers following the PRISMA and Cochrane Handbook guidelines. The assessment will be done at study level and disagreements will be resolved through discussion.

Strategy of data synthesis: Data (specifically mean effect sizes) will be collected from all relevant existing studies, to summarise the most up-to-date scientific knowledge.

Subgroup analysis: Not applicable.

Sensitivity analysis: Not applicable.

Language: English, German.

Country(ies) involved: Switzerland.

Other relevant information: Additionally to the two authors, two collaborators are involved in several steps of this systematic review: Dr. Jörg Spörri, Sports Medical Research Universitätsklinik Balgrist, Zürich Belinda Rüttimann, Sports Medical Research Universitätsklinik Balgrist, Zürich.

Keywords: Personalized nutrition; Nutrigenomics, Single Nucleotide Polymorphism, Genetic variation.

Dissemination plans: The review is to be published in internationally recognised scientific journals.

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