

## Abstract Title

Introduction of a web-based application to generate personalized nutrition recommendations based on metabolomic, proteomic and genetic data.

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## Abstract

Introduction: Analysis of molecular measures, i.e. genetics, metabolomics, and proteomics, have enabled a more preventive and personalized approach to healthcare. Personalized healthcare may mitigate disease risk through early diagnosis and the potential for personalized lifestyle, e.g. nutrition, interventions based on molecular data. Advanced tools combining and visualizing multiple molecular data and their association with dietary intake are required to generate personalized nutrition (PN) recommendations.

We aimed to develop a web-based application for generating PN recommendations based on genetic, metabolomic, and proteomic data.

We employed text mining tools (Ovid for Medline, PolySearch2 for PubMed) to search the scientific literature on associations between nutrient intake or dietary patterns and genetic variants (>100,000), or blood levels of metabolites (>150) or proteins (>200) in human studies alone. Nutrients were linked to specific foods using the Canadian Nutrient File. Machine learning algorithms were developed for ranking based on scientific evidence, nutrient content and across multiple molecular measures. We used interactive data visualization strategies to visualize PN recommendations for healthcare professionals and their clients.

We curated knowledge databases on the associations between abnormal levels of molecular measures and nutrient intakes or dietary patterns, e.g. omega-3 fatty acids or Mediterranean diet. Employing machine learning ranked food items across abnormal levels of multiple molecular measures and grouped them into food categories, to efficiently determine PN recommendations with the potentially highest benefit. Our custom web-based application displayed links between abnormal molecular measures and nutrient intakes or dietary patterns for easy communication of PN recommendations. The smart-phone tracking app allowed clients to easily see PN recommendations and record their actions to monitor and capture adherence longitudinally.

We developed a user-friendly, web-based tool to determine PN recommendations, based on metabolomic, proteomic and genetic data, which may be most beneficial to a client.

Our tool may aid dietitians in providing PN recommendations based on multiple molecular data.