The suitability of dietary recommendations suggested by artificial intelligence technology via a novel personalised nutrition mobile application

K.H. Hart¹, S. Wilson-Barnes¹, K. Stefanidis², D. Tsatsou², L. Gynopoulos², K. Dimitropoulos³, K. Rouskas⁴, N. Argirious⁵, R. Leoni⁶, D. Russell⁷, J. Konstantinouva⁸, N. Merry⁹, E. Lalama³, A. Pfeiffer³, M. Hassapidou⁶, I. Pagkalos⁶, E. Patra⁶, R. Buys⁷, V. Cornelissen⁷, S. Balula Dias⁸, A. Batista⁹, E. Mantovani¹⁰, B. Brkic¹¹ and S. Lanham-New¹

¹University of Surrey, Surrey, Guildford, UK,
²Centre for Research & Technology Hellas, Thessaloniki, Greece,
³Datavizard, Rome, Italy,
⁴OCADO Technology, Hatfield, London, UK,
⁵Department of Endocrinology, Charité-Universitätsmedizin Berlin, Germany,
⁶Department of Nutritional Sciences and Dietetics, International Hellenic University, Thessaloniki, Greece,
⁷Department of Rehabilitation Sciences; Katholieke Universiteit Leuven, Belgium,
⁸Faculdade de Motricidade Human, Universidade de Lisboa, Lisbon, Portugal,
⁹Sport Lisboa Benfica Futebol, Lisbon, Portugal,
¹⁰Research Group on Law, Science, Technology and Society, Faculty of Law & Criminology, Vrije Universiteit Brussel, Belgium and
¹¹BioSense Institute, Research and Development Institute for Information Technology in Biosystems, Vojvodina, Serbia

A healthy lifestyle is essential to prevent non-communicable diseases¹ and new advances in information computer technology and artificial intelligence (AI) offer the possibility to create personalised tools to better support healthy living. This analysis aims to assess the appropriateness of AI recommended dietary goals as part of the EU PROTEIN project², which combines the latest AI technology with expertise in nutrition to develop an advanced and dynamic personalisation tool.

A knowledge base to underpin the PROTEIN application was generated by nutrition experts, creating a novel evidence-based set of EU-relevant dietary technology with expertise in nutrition to develop an advanced and dynamic personalisation tool.

The PROTEIN app generated iron intakes were conservative for the male ID group (15.7 ± 2.3 mg/d) but not the female (13.0 ± 2.8 mg/d) when contrasted to the expert-established targets (16 and 11 mg/d respectively). PROTEIN app-suggested daily protein intakes were non-significantly higher than recommendations for all groups (1.1 ± 0.3 g/kg/BW ‘v’ 0.66 g/kg/BW). Whilst mean fat recommendations were within target ranges for all groups (OW: 28.6 ± 1.8, ID: 29.7 ± 1.3, PQD: 29.5 ± 1.2) proposed intakes for individual users exceeded the <30%EI upper limit. Qualitative analysis of meal plans identified some inappropriate items not adhering to the user restrictions or preferences entered at set up.

Pilot testing of the personalised nutrition application via ‘extreme’ virtual users has proved essential in confirming system adherence to the established rule set, the feasibility of that rule set across multiple goals and in identifying safety issues. Ongoing development work will identify the foods contributing to total fat intake, as the only sub-optimal aspect of the app-generated nutrient profile. Further training of the system, human trials of which will subsequently assess its ability to support behaviour change.

Acknowledgments
This project has received funding from the [European Union’s Horizon 2020 research and innovation programme] [European Research Council (ERC) under the European Union’s Horizon 2020 research and innovation programme][Euratom research and training programme 2019-2020] under grant agreement No 817732

References