Nutrition for Precision Health, powered by the *All of Us* Research Program—A Common Fund Proposal

Background

Research is needed to provide more precise and dynamic nutritional recommendations than currently possible through population-wide guidance. This in turn will facilitate a deeper understanding of how human biological systems and molecular pathways interact with or mediate the relationships among dietary patterns, environmental, social, and behavioral factors to influence health status. Through advances in omic technologies and mobile devices—combined with the large and diverse participant sample and existing infrastructure of the *All of Us* Research Program, innovations in artificial intelligence, machine learning, computational and mathematical modeling of complex biological systems—an unprecedented opportunity exists currently to predict dietary responses and design targeted dietary interventions aimed at improving health and quality of life.

Program Goal

The program will catalyze precision nutrition research and aims to improve health and reduce chronic diseases in diverse populations by establishing predictive algorithms to inform targeted dietary approaches. If successful, a second stage of the program would support studies to validate those algorithms that predict responses to diet.

Initiatives

The proposed initiatives are based on the input and recommendations gathered from Request for Information (RFI) responses and targeted workshops.

- Data and Study Coordination: Administrative management and data coordination across all sites
- Clinical Centers (*in coordination with the* All of Us *Health Care Provider Organizations)*: Recruit, consent, and enroll participants
- Data Generation Centers: a) Perform microbiome metagenomic analyses and transcriptomic analyses; b) Perform metabolic and proteomic phenotyping; c) Address dietary assessment challenges
- Artificial Intelligence, Bioinformatics & Data Modeling Center: Establish mathematical and computational modeling, develop algorithms and enhance data visualization
- Biobank: Receive, process and store biosamples and metadata.

Deliverables

- Extensive characterization of the physiological and metabolic responses to meal challenges and different diets and the factors associated with inter-individual variability in those responses.
- Development of algorithms that predict response to multiple nutrients and/or dietary practices.
- Personalize dietary recommendations to reduce, moderate, and/or optimize acute dietary responses and chronic disease biomarkers, such as postprandial glycemia and blood pressure, respectively.
- Bioinformatic identification and characterization of nutrition related genes and diet interactions with the gut microbiome for future predictive studies.

Budget

Numbers are ($1000s). The reduced budget in FY 2022 reflects a planning year.

Initiatives	**FY2022**	**FY2023**	**FY2024**	**FY2025**	**FY2026**	**Total**
Program Management/RMS	$650	$650	$650	$650	$650	$3,250
(1) Data & Coordination	$6,000	$6,000	$5,500	$5,500	$5,000	$28,000
(2) Clinical Centers	$7,220	$12,220	$12,220	$12,220	$12,220	$56,100
(3) Data Generation Centers	$2450	$10,700	$10,700	$10,700	$10,000	$44,550
(4) AI & Modeling Center	$2,000	$2,000	$3,000	$3,000	$3,000	$13,000
(5) Biobank	$2,000	$2,500	$2,500	$2,500	$1,500	$11,000
Total	**$20,320**	**$34,070**	**$34,570**	**$34,570**	**$32,370**	**$155,900**