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Editorial

Upgraded Model of Healthcare Services at the crossroads of Personalized Nutrition, Precision Foodomics and Molecular Gastronomy

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Introduction

The theory behind *personalization* of nutrition is supported by multiple factors including advances in *personalized and precision healthcare services (PPHS),* nutrition-based diseases, gene-diet interaction and personalized nutrition-guided diets, precision foodomics, physical exercises and environmental/social context, and bioinformatics-driven algorithms in nutrition science, and growing consumer capacity or concern by better and healthy foods. The advances in OMICS tools and related analytical techniques have resulted into tremendous scope of their application in nutrition science. As a consequence, a better understanding of underlying interaction between diet and individual is expected with addressing of key challenges for successful implementation of this science, being integrated with IT tools, creates a new branch in the

field of *personalized and precision medicine (PPM).* Illustrating application of sets of the different tools of the model at the population, communities and persons, by keeping safe and maintaining health of human beings throughout the life. In this sense, disease risk assessment could be defined as the systematic evaluation and identification of risk factors responsible for a disease, estimation of risk levels and finding possible ways to counter the onset and progression of a disease within the population.

Therefore, biomarker-based screening and monitoring are much valuable and fruitful to monitor a chronic disorder process and progress and to manage the risks. In this context, determination of the human nutritional status is becoming an important component to understand the physiologic health of a person, whilst requiring the usage of specific biomarkers. Nutritional marker should quickly acknowledge the variations caused owing to consumption of nutrients, be unaffected by presence of other diseases, must be easily and accurately tested with easily available equipment in the hospitals, and should be affordable for the patients. Therefore, to explore the impact of nutrients at molecular level and devising a sensitive biomarker, OMICS portfolio is becoming a central technology as one of the most promising source of *nutritional biomarkers*.

The best decision being based on biomarker-driven testing, would be developing a *Personalized Health Plan,* addressing lifestyle, risk modification and disease management. In this context, personalized diet requires matching human genotypic and phenotypic features to foods that enhance the chance of achieving a desired physiological health outcome. New insights and technologies will help to decipher the intricacies of diet-health interactions and create opportunities for breakthroughs in dietary interventions for health management. In this context, OMICS technologies have made great progress in understanding how genetic variants affect macronutrient and micronutrient levels and the individual's response to dietary intake. Those variants hold significant value in facilitating personalized nutritional strategies development, enabling the shift from traditional dietary guidelines to genome-guided nutrition. Moreover, that dietary factors play a critical role in influencing health and disease, and there is now strong evidence that, for susceptible individuals, adopting a healthy lifestyle, including a balanced diet, can prevent disease more effectively than medication. It is standard practice to provide generalized food and lifestyle recommendations to encourage individuals to make healthy decisions.

Along with nutritional genomics, in food sector, proteomics-based techniques has bright future for its wide spared use in food (safety and nutrition) and other allied fields. Proteomics also helps to enhance the quality of food products by studying the effect of different processes on food proteins, thus improving the food processing line. Current advances in food and nutritional proteomics and their main applications may contribute to the development and innovation of personalized nutrition, precision foodomics, molecular gastronomy and food industry. These challenges are focused on food quality and safety as well as the search of principally new protein biomarkers and proteomic approaches of classical issues as allergenicity, or authentication among others.

Metabolomics involves the investigation of small molecules produced by cellular and organismal metabolism, providing insights into the outcomes of the complex network of biochemical reactions in living systems. Metabolomics is maturing as a design-driven translational approach in nutrition science, and it is a useful analysis for revealing systems biology outcomes associated with changes in diet. Metabolite profiles in tissue, serum, urine, or stool reflect changes in metabolic pathways that respond to dietary intervention, which makes them accessible samples for revealing metabolic effects of diet.

Technological advances, including multi-OMICS and IT resources, have advanced the field of personalized nutrition. Specifically, these approaches reveal promise in the ability to develop objective biomarkers of specific foods (via bioactive constituents) and nutrient intake to complement current self-reported dietary recall measures. Proper implementation of the guiding principles could lead to a standardized definition of personalized nutrition and consensus on how to apply these tools in a clinical setting. As the nutrition experts, dietitians must understand the basics of these advances and stay up-to-date with ongoing research to continue to position themselves as leaders in the provision of personalized nutrition therapies.

Personalized nutrition is a multidisciplinary branch that explores how nutrients interact with the body to promote health and wellness, encompassing the application of "OMICS" technologies such as nutrigenomics, metagenomics, and metabolomics to the prescription of individualized diets for health and wellbeing, and aiming to leverage human variability to design tailored dietary interventions to improve health. And personalized nutrition being integrated with precision foodomics are thus becoming more than a tendency as a new generation of consumers are demanding personalized nutrition to re- place the confusion driven by mass marketing of "one size fits all" nutritional products. The convergence of technology and increasing consumer interest in nutrition and wellness combined with increased access to nutrition and wellness information is leading to new health products and services focused on personalized diet and convenience. By utilizing simple online tools like questionnaires assessments of personal lifestyle factors, along with comprehensive data from wearable devices, DNA analysis, blood biomarkers, and microbiome profiling, personalized nutrition strategies are evolving to deliver products that are more precisely tailored to an individual's lifestyle, genetic predisposition, and metabolic needs than ever before.

Going forward, digital disruption will further take personalized nutrition-based therapy to a level more accessible, personal, and precise than ever before. Technologies like machine learn- ing and big data analytics are ingredients for a go-to recipe transforming the medical nutrition segment. Their integration into wearables, mobiles, smart devices will make such services more accessible to patients.