Developing Novel Strategies for Health Research

Jim Kaput
Head, Systems Nutrition and Health Unit
Nestle Institute of Health Research
Lausanne, Switzerland

The progress in and success of biomedical research over the past century was built on the foundation outlined in R.A. Fisher's *The Design of Experiments* (1935), which described the theory and methodological approach to designing research studies. A key tenet of Fisher's treatise, widely adopted by the research community, is randomization, the process of assigning individuals to random groups or treatments. Comparing outcomes or responses between these groups yields “risk factors” called population attributable risks (PAR), which are statistical estimates of the percentage reduction in disease if the risk were avoided or in the case of genetic associations, if the gene variant were not present in the population.

High throughput metabolomics, proteomic and genomic technologies provide 21st century data that humans cannot be randomized into groups: individuals are genetically and biochemically distinct. Gene – environment interactions caused by unique dietary and lifestyle factors contribute to heterogeneity in physiologies observed in human studies. The risk factors determined for populations (i.e., PAR) cannot be applied to the individual. Developing individual risk or benefit factors in light of the genetic diversity of human populations, the complexity of foods, culture and lifestyle, and the variety of metabolic processes that lead to health or disease are significant challenges for personalizing dietary advice for healthy or medical treatments for individuals with chronic disease. We describe the results of the Delta Vitamin pilot study and emerging data from an essential nutrient intervention study in Brazil that analyzes individual responses to interventions. The strengths, weaknesses, and implications of the results and approach will be discussed.


Jim Kaput Biosketch

Jim is the Head of the Systems Nutrition and Health Unit at the Nestle Institute of Health Sciences. He is Professeur Visiteur in the Service d'endocrinologie, diabetologie et metabolisme du CHUV. University of Lausanne, Visiting Professor at the Adinovo Center for Genetic & Genomic Medicine Zhejiang University (Hangzhou, China), and Adjunct Assistant Professor of Genetics, University of Arkansas for Medical Sciences (USA). His immediate past position (11.2007 to 7.2011) was as Director of the Division of Personalized Nutrition and Medicine at the U.S. FDA’s National Center for Toxicological Research (Jefferson, AR). He received his PhD from Colorado State University in Biochemistry and Molecular Biology. He spent 5 years as a postdoctoral fellow and assistant professor at the Rockefeller University in the laboratory of Günter Blobel, the 1999 Nobel Laureate in Physiology and Medicine. Jim was a staff and Biochemistry faculty member at the University of Illinois College of Medicine and Director of the Northwestern University Biotechnology Laboratory for 2 years. He also was science advisor for international activities at the European Nutrigenomics Organization (NuGO), Coordinator of Science and Administrative Activities for the National Center for Minority Health and Health Disparities Center of Excellence in Nutritional Genomics at the University of California Davis, and Assistant Professor in the Department of Surgery at the University of Illinois Chicago (UIC). He co-founded 2 nutrigenomic biotechnology companies, one of which merged with a publically traded company. He is a member of the Executive Committee of NuGO (Nutrigenomics Organization – www.nugo.org) and its Micronutrient Genomics Project Committee (http://www.nugo.org/micronutrients). He contributes to the international Human Variome Project (www.humanvariomeproject.org) and is an Editor of the Human Variome Section of the journal Genes&Nutrition. He received a Fulbright Senior Specialist Program in Public/Global Health for 2006 through 2011. He was a committee member reviewing Food Science Australia (2009) and will participate in a review of France’s Human Nutrition Research Centers (2014).

Jim is a member of the Nestlé R&D Food and Nutrition Sustainability Council. His research focuses on defining health and developing research methods for defining optimal nutrition and health. He and his team have developed a biomedical community based participatory research program to analyze essential nutrient levels and physiological responses to defined dietary interventions. Two manuscripts describing the results from a rural Arkansas (USA) study conducted at a community summer camp program for children aged 6 to 14 are in revision. His collaborators in Brazil have completed the first year of a 2-year project in children/teens (aged 9 to 13). Clinical data demonstrated improvements in metabolic health in response to a 6 week, multiple vitamin–multiple mineral intervention. This research program will be extended to communities in rural and urban Rwanda in 2014 testing the same MV/MM intervention in a different genetic and environmental background. The goals of these programs are to assess nutrient status and response to essential nutrients and to develop sustainable change in the food environment to improve and maintain health.