Researchers develop new framework for human nutrition

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Credit: Wikipedia.

Existing models for measuring health impacts of the human diet are limiting our capacity to solve obesity and its related health problems, claim two of the world's leading nutritional scientists in their newest research.

In the latest edition of *Annual Review of Nutrition*, Professor David Raubenheimer and Professor Stephen Simpson from the University of Sydney's Charles Perkins Centre call for a radical rethinking of human nutrition science through a new framework called 'nutritional geometry' - the culmination of more than 20 years of research in the field.

'Nutritional geometry' considers how mixtures of nutrients and other dietary components influence health and disease, rather than focusing on

any one nutrient in isolation. It is hoped this new model will assist health professionals, dietitians and researchers to better understand and manage the complexities of obesity.

"Our framework throws down the gauntlet to the whole field of human nutrition. It shows that the prevailing focus on single nutrients is not able to help us understand complex chronic diseases, and that an approach based on nutrient balance can help solve the problem," said Professor Stephen Simpson, Academic Director of the Charles Perkins Centre.

Human nutrition science has historically focused on a single-nutrient approach, which is predicated on a lack of resources or micronutrient deficiency. For instance, the absence of vitamin C in human diets is a known cause of scurvy.

But this traditional approach is no longer useful in the face of modern nutrition-related diseases, the authors argue, which are driven by an overabundance of food, an evolved fondness for foods containing particular blends of nutrients, and savvy marketing by the packaged food industry which exploits these preferences.

"Conventional thinking which demonises fat, carbohydrate or sugar in isolation as causes of the obesity crisis - dubbed the single nutrient approach - has now run its course. We've provided a framework for not only thinking about but also experimentally testing issues around dietary balance. Much like the invention of the telescope or microscope, this framework offers a new tool with which to look at complex dietary problems and bring them into focus," said Professor Simpson.

"Our new approach provides a unique method to unify observations from many fields and better understand how nutrients, foods and diets interact to affect health and disease in humans," said Professor David Raubenheimer, who heads the Nutrition Theme at the Charles Perkins

Centre.

"The 'nutritional geometry' framework enables us to plot foods, meals, diets and dietary patterns together based on their nutrient composition, and this helps researchers to observe otherwise overlooked patterns in the links between certain diets, health and disease."

The new model enables complex problems like obesity to be viewed from a variety of perspectives, from the impacts of nutrients on metabolism and the health of individuals, through to the sustainability of global food systems.

"Although at face value more complex than the single-nutrient model, our 'nutritional geometry' framework can simplify the study of human nutrition in the long run by helping to identify those subsets of factors and their interactions that are driving negative health and environmental outcomes in our rapidly changing environments," said Professor Simpson.

To illustrate the power of the approach, Professor Raubenheimer and Professor Simpson plotted data for the composition of 116 diets, compiled from previous published studies examining macronutrient ratios (carbohydrate, fats and protein) and energy intake in humans.

Their model shows that protein was the strongest driver influencing diet, regulating the intake of fat and carbohydrate. This finding is consistent with the previously observed 'protein leverage' phenomenon, in which the strong human appetite for protein leverages the intake of fats, carbohydrates and total energy.

More information: David Raubenheimer et al, Nutritional Ecology and Human Health, *Annual Review of Nutrition* (2016). DOI: 10.1146/annurev-nutr-071715-051118

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