

Protein and carbohydrates outweigh calorie counting: major research from Charles Perkins Centre

March 5 2014, by Katie Szittner,

Food intake is regulated primarily by dietary protein and carbohydrate, and not by the number of calories consumed, according to the most comprehensive study of macronutrient balance ever undertaken.

Conducted by the University of Sydney's ground-breaking Charles Perkins Centre and published in *Cell Metabolism*, the world-first research examines the effects of protein, [fat](#) and carbohydrate on [energy intake](#), metabolic health, ageing and longevity in mice.

The research demonstrated in mice that calorie restriction, achieved by [high protein diets](#) or dietary dilution, has no beneficial effects on lifespan, a phenomenon researchers predict will apply in humans.

While a high protein, [low carbohydrate diet](#) resulted in reduced [body fat](#) and [food intake](#), it also led to a shorter lifespan and poor cardiometabolic health.

By contrast, a high carbohydrate, [low protein diet](#) resulted in longer lifespan and better cardiometabolic health, despite also increasing body fat.

A low protein, [high fat diet](#) provided the worst health outcomes, with fat content showing no negative influence on food intake.

"This research has enormous implications for how much food we eat, our body fat, our heart and metabolic health, and ultimately the duration of our lives," said Professor Steve Simpson, Academic Director of the Charles Perkins Centre and corresponding author of the study.

"We have shown explicitly why it is that calories aren't all the same - we need to look at where the calories come from and how they interact."

"This represents an enormous leap in our understanding of the impact of [diet](#) quality and diet balance on food intake, health, ageing and longevity," said co-author Professor David Le Couteur, from the University's Charles Perkins Centre and Professor of Geriatric Medicine at Concord Hospital.

"We now face a new frontier in nutrition research."

By examining mice fed a variety of 25 diets, the research team used an innovative state-space nutritional modelling method to measure the interactive effects of dietary energy, protein, fat and carbohydrate on food intake, cardiometabolic health and longevity.

The results suggest that lifespan could be extended in animals by manipulating the ratio of macronutrients in their diet - the first evidence that pharmacology could be used to extend lifespan in normal mammals.

Although mice were the subjects of this study, Professor Le Couteur said the results from the study accord with previous research in humans, but with a much larger number of dietary treatments and nutritional variables.

"Up until this point, most research has either concentrated on a single nutritional variable, such as fat, carbohydrate or calories, so much of our understanding of energy intake and diet balance is based on one-

dimensional single nutrient assessments," he said.

"The advice we are always given is to eat a healthy balanced diet, but what does that mean? We have some idea, but in relation to nutritional composition we don't know terribly well. This research represents an important step in finding out."

In terms of practical advice, the researchers predict that a diet with moderate amounts of high quality protein (around 15 to 20 percent of total calorie intake), that is relatively low in fat and high in good quality complex carbohydrates will yield the best metabolic health and the longest life.

Provided by University of Sydney

Citation: Protein and carbohydrates outweigh calorie counting: major research from Charles Perkins Centre (2014, March 5) retrieved 19 November 2023 from <https://medicalxpress.com/news/2014-03-protein-carbohydrates-outweigh-calorie-major.html>

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