Diet key to lifespan and fertility

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Credit: Wikipedia.

It may be possible to live longer and increase fertility by manipulating diet, according to world-first research in mice from the University of Sydney's Charles Perkins Centre.

Researchers showed for the first time in mammals that there is an ideal balance of macronutrients (protein, carbohydrates and fat) for reproduction and another, different ideal balance for increasing lifespan.

The research, published in the *Proceedings of the National Academy of Sciences* (*PNAS*), calls into question the long-standing theory that animals are forced to trade-off between reproduction and longevity when resources are limited. According to the researchers, it is possible to manage diet at different life stages to both optimise fertility and extend lifespan, rather than sacrificing either.

"This study takes a very big step in explaining why trade-offs between reproduction and longevity are not inevitable in mammals," said Dr Samantha Solon-Biet from the Charles Perkins Centre, who co-led the research with Dr Kirsty Walters from the Charles Perkins Centre and ANZAC Research Institute.

"Rather than a trade-off, we now know that each evolutionary function has different nutrient requirements. That means that as our nutrient requirements change with our life stage, we can change our diet to suit our current requirements, for example by increasing our protein to carbohydrate ratio when in our reproductive prime and lifting our carbohydrate to protein ratio in later life.

"Animals don't have to choose between high fertility and a long life. By managing diet throughout our life cycle, we can have both."

The findings open the door for the development of dietary treatments for infertility in humans.

"As the findings based on insects are now shown to be true in mammals, we are hopeful that they will be equally true in humans," said Dr Solon-Biet.

"As women increasingly delay child-bearing, the demand for assisted reproductive technologies increases. With further studies, it's possible that instead of women with subfertility resorting immediately to invasive IVF techniques, an alternative strategy may be developed to change the ratio of dietary macronutrients to improve female fertility. This would avoid the need for medical intervention, except in the most severe cases."

The study is the most comprehensive nutritional trial ever conducted in mammals exploring the relationship between macronutrients,

reproduction and lifespan.

Researchers placed 858 mice on one of 25 ad-libitum diets with varying levels of protein, carbohydrate, fat and energy content. At 15 months, they measured the male and female mice for reproductive function. In both male and female mice, they found that lifespan was enhanced on a high carbohydrate, low protein diet, and reproduction was enhanced on a high protein, low carbohydrate diet.

More information: Macronutrient balance, reproductive function, and lifespan in aging mice, *PNAS*, www.pnas.org/cgi/doi/10.1073/pnas.1422041112

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