

# Scientists reverse aspects of ageing in lab rats

‘Those old rats got up and did the Macarena’

BY JOSEPH BREAN

A set of experiments on ageing lab rats has shown that two common dietary supplements, when taken together in the right proportions, restore the animals' youthful vigour and mental clarity.

The scientists who did the research at the University of California, Berkeley, describe their cocktail of an antioxidant and an amino acid as the chemical fountain of youth, which may one day improve quality of life in elderly humans.

Their research, which they present today in a series of three articles in the peer-reviewed journal *Proceedings of the National Academy of Sciences*, describes how acetyl-L-carnitine and alpha-lipoic acid offset the declining performance of mitochondria, the tiny bodies inside cells that process fat with oxygen and are the source of cellular energy.

Mitochondrial dysfunction is the only aspect of ageing that can be successfully targeted, effectively treated and ultimately cured — for a while, at least —

said Dr. Tory Hagen, a co-author on the reports. It is the “Achilles heel” of the ageing process, he said.

When the team treated the rats with the amino acid to increase the mitochondria's energy output, and with the antioxidant to get rid of the harmful by-products of metabolism that float around in the cell like spent batteries, “those old rats got up and did the Macarena,” Bruce Ames, the lead researcher, said.

Alpha-lipoic acid, an antioxidant found in such leafy greens as spinach and broccoli, is often used by AIDS patients to treat several HIV-related symptoms, including liver damage. It has very few side effects and has been used in Germany for years to treat type 2 diabetes.

Acetyl-L-carnitine, an amino acid found in red meat, is sold as a weight-loss aid because it speeds up fat burning and is sometimes given to race horses to increase their speed. It is sold in doses of up to 4 grams, and trials in Italy have suggested that doses as high as 2 grams a day have no observable side effects.

In Canada, acetyl-L-carnitine is restricted for sale only as a prescription drug. Alpha-lipoic acid does not have a Health Canada drug identification number but

the federal agency has no concerns about its safety, according to spokeswoman Tara Madigan. Both are widely available on the Internet.

The researchers have patents pending on the drug cocktail, and clinical trials on humans are underway to determine the effective dosage.

Over the course of one month, Dr. Hagen and his team gave two-year-old rats the two drugs, then compared their physical and mental abilities to those of much younger rats, around three months old, and also to other elderly but untreated rats.

“Young ones learn [to succeed at the tests] very quickly but the old ones are fairly senile,” Dr. Hagen said.

After the month, the treated rats were placed under constant video surveillance, which digitized their movements for computer analysis. Their speed and the distance of their daily wanderings around the cage more than doubled, which suggested the lethargy associated with mitochondrial dysfunction was abating.

They also performed dramatically better at two tests of short-term memory and brain power, Dr. Hagen said.

One of those tests, the Morris water maze, involved remembering where a platform was located in a pool of water, and another, the Skinner box test, involved remembering a visual cue that would reward the rat with a piece of food.

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