



## Glucosamine extends lifespan, mimics low-carb diet

Awhile back I posted on the fact that [the OTC supplement glucosamine extends lifespan](#) in both *C. elegans* and in mice. The mechanism resembles that of a low-carb diet.<sup>(1)</sup> The study's main author, Michael Ristow, who is one of the leading lights in aging research, started taking glucosamine after this research. From the abstract:

d-Glucosamine (GlcN) is a freely available and commonly used dietary supplement potentially promoting cartilage health in humans, which also acts as an inhibitor of glycolysis. Here we show that GlcN, independent of the hexosamine pathway, extends *Caenorhabditis elegans* life span by **impairing glucose metabolism that activates AMP-activated protein kinase (AMPK/AAK-2)** and increases mitochondrial biogenesis. Consistent with the concept of mitohormesis, GlcN promotes increased formation of mitochondrial reactive oxygen species (ROS) culminating in increased expression of the nematodal *amino acid-transporter 1 (aat-1)* gene. Ameliorating mitochondrial ROS formation or impairment of *aat-1*-expression abolishes GlcN-mediated life span extension in an NRF2/SKN-1-dependent fashion. Unlike other calorie restriction mimetics, such as 2-deoxyglucose, **GlcN extends life span of ageing C57BL/6 mice, which show an induction of mitochondrial biogenesis, lowered blood glucose levels, enhanced expression of several murine amino-acid transporters, as well as increased amino-acid catabolism.** Taken together, we provide evidence that GlcN extends life span in evolutionary distinct species by mimicking a low-carbohydrate diet.

Impaired glucose metabolism means that the organism must upgrade its fat-burning machinery, and it does so by increasing the numbers of mitochondria.

Another study determined that there was [an association in humans between glucosamine consumption and lower mortality rates](#).

Current (baseline) glucosamine and chondroitin use were associated with a decreased risk of total mortality compared to never use. The adjusted hazard ratio (HR) associated with current use of glucosamine (with or without chondroitin) was 0.82 (95% CI 0.75–0.90) and 0.86 (95% CI 0.78–0.96) for chondroitin (included in two-thirds of glucosamine supplements). Current use of glucosamine was associated with a significant decreased risk of death from cancer (HR 0.87 95% CI 0.76–0.98) and with a large risk reduction for death from respiratory diseases (HR 0.59 95% CI 0.41–0.83).

So about a 20% decrease in mortality rates with glucosamine, and around 40% decrease in death from respiratory diseases. This looks to be solid data, since many risk factors were adjusted for, such as BMI, smoking, etc., and there were more than 77,000 participants.

What I would like to know is whether [glucosamine](#) extends lifespan even in the presence of a low-carb diet, or whether it would be superfluous in that case.

This also tells us that a low-carb diet is a healthy one, and probably extends lifespan on its own.