The slower you grow, the longer you live: Growth rate influences lifespan, research finds

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(Phys.org)—New research from the University of Glasgow suggests that lifespan is affected by the rate at which bodies grow early in life.

A paper published today in the journal *Proceedings of the Royal Society B* outlines how manipulating growth rates in stickleback fish can extend their lifespan by nearly a third or reduce it by 15 percent.

A team from the University's Institute of Biodiversity, Animal Health and Comparative Medicine altered the growth rate of 240 fish by exposing them to brief cold or warm spells, which put them behind or ahead their normal growth schedule.

Once the environmental temperature was returned to normal, the fish got back on track by accelerating or slowing their growth accordingly. However, the change in growth rate also affected their rate of ageing.

While the normal lifespan of sticklebacks is around two years, the slow-growth fish lived for more than 30 percent longer, with an average lifespan of nearly 1000 days. In contrast, the accelerated-growth fish had a lifespan that was 15% shorter than normal.

These effects occurred despite all fish reaching the same adult size, and were even stronger when the rate of growth was increased by artificially manipulating the length of daylight the fish were exposed to, 'tricking'

their bodies into growing faster to reach their target size before the start of the breeding season.

Professor Neil Metcalfe, who worked on the study, said: "You might well expect a machine built in haste to fail quicker than one put together carefully and methodically, and our study suggests that this may be true for bodies too.

"The results of the study are striking. It appears that bodies which grow quickly accumulate greater tissue damage than those that grow more slowly and their lifespan is substantially reduced as a result. The study also demonstrates the surprising ways in which a slight change in environmental conditions in early life can have long-term consequences.

"These findings are likely to apply to many other species, including humans, since the manner in which organs and tissues grow and age is similar across very different kinds of animal. It has already been documented in humans, for example, that rapid growth in early childhood is associated with a greater risk of developing ailments later in life such as cardiovascular disease in middle or old age, possibly because of the way in which the tissues of a fast-grown heart are laid down.

"Our work reveals for the first time that slowing the rate of growth below the normal rate can have long-term benefits."

Earlier attempts to test links between growth rates and lifespan by altering diet have been inconclusive, as results could be affected by the diet itself rather than its effect on growth. The Glasgow team avoided that problem by keeping the fish on identical diets; all that changed were the temperatures to which they were exposed.

The paper, titled 'Experimental demonstration of the growth rate – lifespan trade-off', is published in Proceedings of the Royal Society B.

More information: rspb.royalsocietypublishing.or … 52/20122370.abstract

Provided by University of Glasgow