

Aging, the new frontier for science

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Madam, improved control over infectious diseases in developing countries has allowed contemporary science to shift its focus to the lesser understood domain of cellular aging. Over the past few years, several studies have sought to understand the plausible mechanisms of aging. Amidst the potential anti-aging agents, three candidates (sirtuins, the concept of calorie restriction and mammalian TOR protein inhibitors) appear very promising.

Sirtuins are silencing information regulating enzymes which are activated under low cellular energy signals.¹ These NAD⁺-dependent deacetylases are activated when the cellular ratio of NAD⁺/NADH is high. These enzymes have been implicated in the induction of anti-oxidative enzymes which help mitigate the oxidative damage to cells.² This has been shown to increase the life span of cells. Activation of sirtuins by Resveratrol has been demonstrated in vivo in lower animals.³ However, further work is required before clinical trials can be safely conducted on humans.

Caloric restriction as an anti-aging measure appears promising. The mechanisms of action proposed for this modality are threefold. It has been proposed that decreased consumption of calories will lead to decreased oxidative damage within the cells, creating a favourable balance between glycaemia and insulinaemia and hormesis. The concept of hormesis is not new to the scientific community. It is the application of mild stressors to the body with the aim of encouraging it to adapt to those stressors for favourable outcomes.^{4,5}

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The mammalian targets of Rapamycin (mTOR) proteins are regulators of both anabolic and catabolic pathways.⁶ However, in insects and lower mammals it has been demonstrated that inhibition of TOR proteins increased the life of organisms. There is a role between caloric restriction and these proteins as decreased intake of nutrients reduces the aging effects mediated by them.⁷ Clinical indications of mTOR inhibitors are, for the time being, restricted to anti-neoplastic use. However, further research is needed before it can be approved for anti-aging therapies.

Controlling vulnerability for aging is a dream come true for humans. The prospects of such advancements are fascinating and have allowed us to stand on the verge of achieving practical immortality today. How can science be better utilised in serving the humanity to provide a long and healthy life? Although this seems to be an unachievable goal, science has a history of proving things wrong. Whatever the future holds would surely be exciting.

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