The Effect of Eustress on Sirtuin 2 Levels in Saccharomyces cerevisiae as a Potential Solution to Aging, Cancer, and Epidemic

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Hormesis refers to an amount of stress in a threshold between average and bio-negative results that has been shown to increase life span, decrease cancer rates, and boost the immune system of organisms receiving the stress (eustress). Hormesis has the potential to be used as a proactive treatment to many common ailments, and also to be a “longevity pathway” if the processes through which it functions can be better understood and mapped. We reveal the first scientific evidence that a possible mechanism for hormetic benefits of calorie restriction, acetic acid, and combination stress in the simple eukaryote Saccharomyces cerevisiae is an increase in sirtuin 2 (sir2) expression. Compared to the control, a sir2 expression increase of 99% was found in cells stressed by calorie restriction, 12% in those stressed by acetic acid, and 25% in those stressed by a combination of these and carbon dioxide. We also show that carbon dioxide hormetic stress decreases sir2 expression in S. cerevisiae by 15% compared to the control. In addition, we conclude that varying expression rates for similar hormetic growth (determined using a spectrophotometer of wavelength 600 nm) indicates the possibility of multiple hormetic stimulation and restriction pathways. Finally, we propose that these diverse hormetic pathways can be examined and manipulated to create “engineered longevity pathways” by examining the causes of limitations in restriction pathways and determining how they are avoided in their stimulation counterparts.

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