



ABSTRACT

Hormesis: Why it is important to biogerontologists

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Hormesis is a fundamental component of adaptability, neutralizing many endogenous and environmental challenges by toxic agents, thereby enhancing survival. Hormesis is highly conserved, broadly generalizable, and pleiotrophic, being independent of biological model, endpoint measured, inducing agent, level of biological organization and mechanism. The low dose stimulatory hormetic response has specific characteristics which defines both the quantitative features of biological plasticity and the potential for maximum biological performance, thereby estimating the limits to which numerous medical and pharmacological interventions may affect humans. Age-related changes in the brain reflect a dynamic interaction of genetic, epigenetic, phenotypic, and environmental factors that can be temporally restricted or more longitudinally present throughout the lifespan. Fundamental to these mechanisms is the capacity for physiological adaptation through modulation of diverse molecular and biochemical signaling occurring from the intracellular to the network-systemic level throughout the brain. A number of agents that affect the onset and progression of Parkinson's disease (PD)-like effects in experimental models exhibit temporal features, and mechanisms of hormetic dose responses. These findings have particular significance since the hormetic dose response describes the amplitude and range of potential therapeutic effects, thereby affecting the design and conduct of studies of interventions against PD (and other neurodegenerative diseases), and may also be important to a broader consideration of hormetic processes in resilient adaptive responses that might afford protection against the onset and/or progression of PD and related disorders.

More in general, the concept of hormesis has direct application to biogerontology not only affecting the quality of the aging process but also experimental attempts to extend longevity.