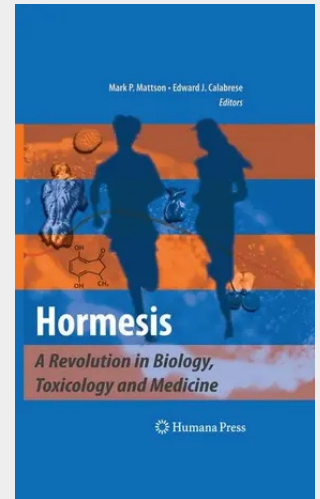


Hormesis

A Revolution in Biology, Toxicology and Medicine

The term hormesis is defined as "a process in which exposure to a low dose of a chemical agent or environmental factor that is damaging at higher doses induces an adaptive beneficial effect on the cell or organism" (Calabrese et al., 2007; Mattson, 2008). To survive and reproduce in harsh competitive environments, organisms and their cellular components have, through evolution, developed molecular mechanisms to respond adaptively to various hazards or "stressors" that they encounter. Examples of such stressors include chemicals ingested in food and water (metals, phytochemicals, etc.), increased energy expenditure (running, fighting, cognitive challenges, etc.), and reduced energy availability (food scarcity), among others. In most cases, the response of the cell or organism to the stressor exhibits a biphasic dose response, with beneficial/adaptive responses at low doses (improved function, increased resistance to damage and disease) and adverse/destructive effects (dysfunction, molecular damage, or even death) at high doses. The prevalence of the biphasic (hormetic) dose response characteristic of biological systems merits consideration of hormesis as a fundamental principle of biology.

Hormesis: What it is and Why it Matters.- Hormesis: Once Marginalized, Evidence Now Supports Hormesis as the Most Fundamental Dose Response.- The Fundamental Role of Hormesis in Evolution.- Transcriptional Mediators of Cellular Hormesis.- The Devil is in the Dose: Complexity of Receptor Systems and Responses.- Exercise-Induced Hormesis.- Dietary Energy Intake, Hormesis, and Health.- Couch Potato: The Antithesis of Hormesis.- Hormesis and Aging.- The Hormetic Pharmacy: The Future of Natural Products and Man-Made Drugs in Disease Prevention and Treatment.



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