

Understanding Adaptogenic Activity: Specificity of the Pharmacological Action of Adaptogens and Other Phytochemicals

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Abstract

Adaptogens are stress-response modifiers that increase an organism's nonspecific resistance to stress by increasing its ability to adapt and survive. The classical reductionist model is insufficiently complex to explain the mechanistic aspects of the physiological notion of "adaptability" and the adaptogenic activity of adaptogens. Here, I demonstrate that (1) the mechanisms of action of adaptogens are impossible to rationally describe using the reductionist concept of pharmacology, whereas the network pharmacology approach is the most suitable method; and (2) the principles of systems biology and pharmacological networks appear to be more suitable for conceptualizing adaptogen function and are applicable to any phytochemical. Molecular targets, signaling pathways, and networks common to adaptogens have been identified. They are associated with stress hormones and key mediators of the regulation of homeostasis. In this context, the mechanisms of action of adaptogens are specifically related to stress-protective activity and increased adaptability of the organism. Consequently, adaptogens exhibit polyvalent beneficial effects against chronic inflammation, atherosclerosis, neurodegenerative cognitive impairment, metabolic disorders, cancer, and other aging-related diseases. Current and potential uses of adaptogens are mainly related to stress-induced fatigue and cognitive function, mental illness, and behavioral disorders. Their prophylactic use by healthy subjects to ameliorate stress and prevent age-related diseases appears to be justified. It is very unlikely that the pharmacological activity of any phytochemical is specific and associated only with one type of receptor, particularly adaptogenic compounds, which affect key mediators of the adaptive stress response at intracellular and extracellular levels of communication.

Keywords: adaptability; adaptogens; network pharmacology; specificity.

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- [Evidence-based efficacy of adaptogens in fatigue, and molecular mechanisms related to their stress-protective activity.](#) Panossian A, Wikman G. *Curr Clin Pharmacol*. 2009 Sep;4(3):198-219. doi: 10.2174/157488409789375311. Epub 2009 Sep 1. PMID: 19500070 Review.

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