

Adaptogens Exert a Stress-Protective Effect by Modulation of Expression of Molecular Chaperones

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Abstract

Adaptogens are medicinal plants that augment resistance to stress, and increase concentration, performance and endurance during fatigue. Experiments were carried out with BALB/c mice taking ADAPT-232 forte, a fixed combination of three genuine (native) extracts of *Eleutherococcus senticosus*, *Schisandra chinensis* and *Rhodiola rosea*, characterised for the content of active markers eleutherosides, schisandrins, salidroside, tyrosol and rosavin and in doses of about 30, 90 and 180 mg/kg for seven consecutive days followed by forced swimming test to exhaustion. ADAPT-232 forte strongly augments endurance of mice, increasing the time taken to exhaustion (TTE) in a dose-dependent manner from 3.0±0.5 to 21.1±1.7 min, approximately seven fold. Serum Hsp72 was measured by EIA both in normal and stressful conditions before and after swimming test. Repeated administration of adaptogen dose dependently increases basal level of Hsp72 in serum of mice from 0.8-1.5 to 5.5-6.3 pg/ml. This effect is even stronger than the effect of stress, including both physical (swimming) and emotional impacts: 3.2±1.2 pg/ml. Cumulative effect of stress and adaptogen was clearly observed in groups of animals treated with adaptogen after swimming to exhaustion, when serum Hsp72 increased to 15.1±1 pg/ml and remained at almost the same level during the 7 days. It can be concluded that adaptogens induce increase of serum Hsp72, regarded as a defense response to stress, and increase tolerance to stress (in our model combination of physical and emotional stresses). It can be suggested that increased tolerance to stress induced by adaptogen is associated with its stimulation of expression of Hsp70 and particularly with Hsp72 production and release into systemic circulation, which is known as a mediator of stress response involved in reparation of proteins during physical load. Our studies suggest that this could be one of the mechanisms of action of plant adaptogens.

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