



Rhodiola rosea

Description

Rhodiola rosea (also known as golden root and Arctic root) has been categorized as an adaptogen by Russian researchers due to its observed ability to increase resistance to a variety of chemical, biological, and physical stressors. It is a popular plant in traditional medical systems in Eastern Europe and Asia, with a reputation for stimulating the nervous system, improving depression, enhancing work performance, improving sleep, eliminating fatigue, and preventing high altitude sickness.¹

Active constituents

Rhodiola species contain a range of antioxidant compounds, including p-tyrosol, organic acids (gallic acid, caffeic acid, and chlorogenic acid), and flavonoids (catechins and proanthocyanidins).^{2,3}

The stimulating and adaptogenic properties of *Rhodiola rosea* are attributed to p-tyrosol, salidroside (synonym: rhodiolide and rhodosin), rhodioniside, rhodiolin, rosin, rosavin, rosarin, and rosiridin.^{1,4} Rosavin is the constituent currently selected for standardization of extracts.⁵

p-Tyrosol has been shown to be readily and dose-dependently absorbed after an oral dose;^{6,7} however, pharmacokinetic data on the other adaptogenic compounds found in *Rhodiola rosea* is unavailable.

Mechanisms of Action

The adaptogenic properties, cardiopulmonary protective effects, and central nervous system activities of *Rhodiola rosea* have been attributed primarily to its ability to influence levels and activity of biogenic monoamines such as serotonin, dopamine, and norepinephrine in the cerebral cortex, brain stem, and hypothalamus. It is believed the changes in monoamine levels are due to inhibition of the activity of enzymes responsible for monoamine degradation and facilitation of neurotransmitter transport within the brain.⁸

In addition to these central effects, Rhodiola has been reported to prevent both catecholamine release and subsequent cyclic AMP elevation in the myocardium, and the depletion of adrenal catecholamines induced by acute stress.⁹

Rhodiola's adaptogenic activity might also be secondary to induction of opioid peptide biosynthesis and through the activation of both central and peripheral opioid receptors.¹⁰⁻¹³

Clinical Indications

Chronic Stress

In a physical endurance test, Rhodiola administration increased rat swimming time 135-159 percent.¹⁴ When Rhodiola-treated rats were subjected to a four-hour period of non-specific stress, the expected elevation in beta-endorphin was either not observed or substantially decreased, leading researchers to the conclusion that the characteristic stress-induced perturbations of the hypothalamic-pituitary-adrenal axis can be decreased or totally prevented by Rhodiola supplementation.¹⁰

It is suggested that this plant has great utility as a therapy in asthenic conditions (decline in work performance, sleep disturbances, poor appetite, irritability, hypertension, headaches, and fatigue) developing subsequent to intense physical or intellectual strain, influenza and other viral exposures, and other illness.¹⁵ Supplementation favorably influenced fatigue and mental performance in physicians during the first two weeks on night duty.¹⁶

Students receiving a standardized extract of *Rhodiola rosea* demonstrated significant improvements in physical fitness, psychomotor function, mental performance, and general well-being. Subjects receiving the Rhodiola extract also reported statistically significant reductions in mental fatigue, improved sleep patterns, a reduced need for sleep, greater mood stability, and a greater motivation to study. The average exam scores between students receiving the Rhodiola extract and placebo were 3.47 and 3.20, respectively.¹⁷

Cancer

All of the anticancer research on Rhodiola has been conducted in animal models. In these models, administration has resulted in inhibition of tumor growth and decreased metastasis in rats with transplanted solid Ehrlich adenocarcinoma and metastasizing rat Pliss lymphosarcoma¹⁸ and transplanted Lewis lung carcinomas.¹⁹

Combining *Rhodiola rosea* extract with the anti-tumor agent cyclophosphamide in animal tumor models resulted in enhanced anti-tumor and anti-metastatic efficacy of drug treatment, as well

as reduced drug-induced toxicity.¹⁹ Animal experimental data notes the addition of *Rhodiola rosea* extract to a protocol with Adriamycin results in improved inhibition of tumor dissemination (as compared to that found with Adriamycin alone). The combined protocol also prevented liver toxicity.²⁰

Side Effects and Toxicity

Clinical feedback indicates, at doses of 1.5-2.0 grams and above, *Rhodiola rosea* extract standardized for 2% rosavin might cause some individuals to experience an increase in irritability and insomnia within several days.

Evidence on the safety and appropriateness of *Rhodiola rosea* supplementation during pregnancy and lactation is currently unavailable.

Dosage

Dosage varies depending upon standardization. For chronic administration, a daily dose of 360-600 mg Rhodiola extract standardized for 1% rosavin, 180-300 mg of an extract standardized for 2% rosavin, or 100-170 mg of an extract standardized for 3.6% rosavin is suggested. Administration is normally begun several weeks prior to a period of expected increased physiological, chemical, or biological stress, and continued throughout the duration of the challenging event or activity.

When using *Rhodiola rosea* as a single dose for acute purposes (e.g., for an exam or athletic competition), the suggested dose is three times the dose used for chronic supplementation.

Rhodiola rosea has been administered for periods ranging from as little as one day (acute administration) up to four months. Until more specific information is available, a dosing regimen following the established patterns used with other plant adaptogens – with periodic intervals of abstinence – seems warranted when *Rhodiola rosea* is being used chronically.

References

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