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## Rosenroot (*Rhodiola rosea*): traditional use, chemical composition, pharmacology and clinical efficacy.

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### Abstract

The aim of this review article was to summarize accumulated information related to chemical composition, pharmacological activity, traditional and official use of **Rhodiola rosea** L. in medicine. In total approximately 140 compounds were isolated from roots and rhizome - monoterpene alcohols and their glycosides, cyanogenic glycosides, aryl glycosides, phenylethanoids, phenylpropanoids and their glycosides, flavonoids, flavonlignans, proanthocyanidins and gallic acid derivatives. Studies on isolated organs, tissues, cells and enzymes have revealed that **Rhodiola** preparations exhibit adaptogenic effect including, neuroprotective, cardioprotective, anti-fatigue, antidepressive, anxiolytic, nootropic, life-span increasing effects and CNS stimulating activity. A number of clinical trials demonstrate that repeated administration of **R. rosea** extract SHR-5 exerts an anti-fatigue effect that increases mental performance (particularly the ability to concentrate in healthy subjects), and reduces burnout in patients with fatigue syndrome. Encouraging results exist for the use of **Rhodiola** in mild to moderate depression, and generalized anxiety. Several mechanisms of action possibly contributing to the clinical effect have been identified for **Rhodiola** extracts. They include interactions with HPA-system (cortisol-reducing), protein kinases p-JNK, nitric oxide, and defense mechanism proteins (e.g. heat shock proteins Hsp 70 and FoxO/DAF-16). Lack of interaction with other drugs and adverse effects in the course of clinical trials make it potentially attractive for use as a safe medication. In conclusion, **Rhodiola rosea** has robust traditional and pharmacological evidence of use in fatigue, and emerging evidence supporting cognition and mood.

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