

Rhodiola: Memory, Immunity & Energy

A wide array of human health benefits related to mental health and physical performance has been clinically demonstrated using the unique phytomedicine form of *R. rosea* extract specifically standardized to rosavins. *Rhodiola rosea* possesses valuable anti-fatigue, anti-stress, and anti-depressant properties; it stimulates the bioelectrical activity of the brain and improves memory and mental performance. In addition, it also increases stamina and accelerates the physical recovery processes after intense training workloads; it stimulates muscle energy status, improves glycogen synthesis in the muscles and liver and increases muscle protein synthesis and anabolic activity.

The right product from the right place at the right time

While *Rhodiola* as a genus may have originated in the mountainous regions of Southwest China and the Himalayas, botanists have established that *Rhodiola rosea* naturally display a circumpolar distribution in mountainous regions in the higher latitudes and elevations of the Northern Hemisphere. In central and Northern Asia, the genus is distributed from the Altai Mountains across Mongolia into many parts of Siberia.

Rhodiola rosea used for the production of RhodiLife® is wildcraft collected from this part, under the Russian Government License. Altai Mountains represents a pristine area free from contamination in of the most well preserved and remote natural environments.

Nektium is involved from the early beginning in the collection practices, with SOPs describing the stage of the plant growth, best time of collection and ecologically non-destructive systems.

Active Ingredients

Activities related to *Rhodiola rosea* have been traditionally attributed to the presence of four principal active ingredients: salidroside, rosin, rosavin and rosarin (Sokolov, 1985; Furmanowa, 1998).

The root of *R. rosea* shows six distinct groups of chemical compounds. The Phenylalkanoïds are the main contributors, incl.:

- **Phenylpropanoid** : Rosavins are products of the phenylpropanoid metabolism. Rosavins (ie. rosavin, rosin and rosarin) are specific to the root from *Rhodiola rosea*. The rosavins are the constituents currently most often selected as the marker compounds for standardization of extracts, although they are not necessarily the only pharmacologically active ingredients for its medicinal properties.
- **Principal phenylethanoids** consist of glycosides and salidroside has been reported as the most active tyrosol glycoside, being associated, together with rosavins, to the anti-depressive and anxiolytic effects (Maslowa, 1994; Tolonen, 2003). Other phenylethanoids have also been isolated but with today limited scientific literature concerning the bioactivity (Jiménez 1994).



All Rhodiola extracts are not equal

Nektium is one of the very few Nutra-ceutical companies which has been granted an Export License by the Russian Government for the exportation of *Rhodiola rosea* roots from the Altai (Altay) region (Siberia). Nektium closely collaborates with its supplier implementing operating procedures that provide general technical guidance for the sustainable collection and processing of *Rhodiola rosea* roots, following the overall context of quality assurance and the WHO guidelines on Good Agricultural and Collection Practices (GACP). This includes the collection of the plants in the wild, as well as primary processing of the plant material, such as drying, packaging in bulk, storage and transport of the raw materials until it arrives to the Nektium factory. The impact of collection on the environment and ecological processes, and the welfare of local communities are also considered.

Then the salidroside and the 3 actives rosavins only are controled (rosavin, rosin, rosarin) by Ultra HPLC, and no other molecules as rosiridin or tyrosol for instance.

Grades are from 3% Rosavins (and related 1/3 salidroside), to 15%.

Rhodiola rosea, also known historically as “Golden Root” from the “Golden Montains” (Mongolian word ‘Altan’), is the most popular phyto-medicine traditional used to increase physical endurance, work productivity, longevity, memory and attention, resistance to high altitude sickness, fatigue, depression, and disorders of the nervous system.

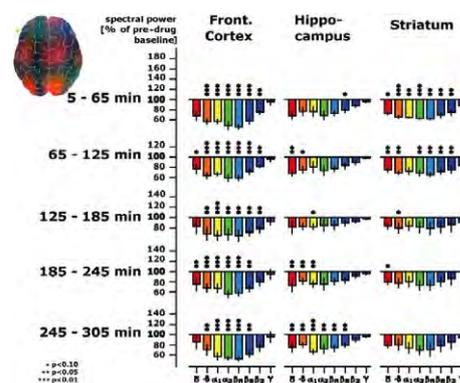
Attention and Memory Cerebral activity

Rhodiola rosea is know to improve attention and cerebral performances.

On 2017, Nektium has conducted new studies: Electroencephalic studies (EEG) showed that animal supplemented with RhodiLife® have an increased neurotransmitter production in the studied areas.

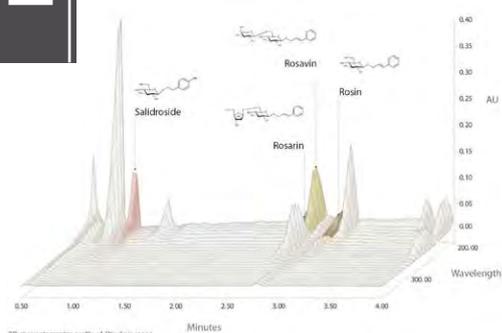
This effect lasts at least for 5 hours until the end of measurements, and so even more.

Besides of a stimulatory effect, the results indicate an improve of memory and an increased activity in brain regions related to motivation and reward.



R. Rosea increases the bioelectrical activity of the brain which improves memory and brain energy. Another study also described the Acetylcholine Esterase Inhibitors in *Rhodiola rosea*. It helps the body adapt to stress by affecting the levels and activity of serotonin, dopamine, and norepinephrine, neurotransmitters found in different structures in the brain and influencing the central nervous system. *Rhodiola* inhibits the breakdown of these chemicals and facilitates the neurotransmitter transport within the brain. In addition to its impact on the central nervous system, it increases the chemicals that provide energy to the muscle of the heart and prevent the depletion of adrenal hormones induced by acute stress. (Tori Hudson, 2006)

FOCUS HINTS



Immune System

The *Rhodiola* extract Rhodiolife® has clearly demonstrated its ability to protect cells from viral infection. This is the first time shown to be effective in the activation of the human immune system (launch and human in-vivo study April 2015 - Ahmed M, et al (2015) «*Rhodiola rosea* Exerts Antiviral Activity in Athletes Following a Competitive Marathon Race». Front Nutr. Jul 31;2:24).

It stimulates and protects the immune system (homeostasis), and increases the natural killer cells (NK) in the stomach and spleen. This action may be due to its ability to normalize hormones.

Cardiovascular : Linked to the anti-stress action (and decrease of catecholamines and corticosteroids released by the adrenal glands during stress), *R. rosea* decreases the amount of cyclic-AMP (c-AMP) released into cardiac cells, and so assist the uptake of intracellular calcium for greater heart muscle contraction (regular beat).

ATP & Energy

The effect of *Rhodiola rosea* (RR) supplementation on ATP content in muscles was studied in Sprague-Dawley rats, where 24 adult rats were divided 3 groups equally: control group, RR (50mg/Kg) and *Rhodiola crenulata* (50mg/kg). Two sessions of forced swimming with 30-min intervals were carried out every day.

The decrease in ATP content in rats receiving *R. rosea* extract was statistically significantly less pronounced than the other groups (1). In a human trial, a total of 36 healthy untrained volunteers (21-24 years of age) were randomly, equally divided in 3 groups (control, placebo and RR extract). Individuals in the placebo and RR extract groups received 2 capsules a day of each treatment (placebo or 340 mg of RR extract) for 30 days before and 6 days after exhausting physical exercise was performed (computer aided bicycle ergometer with gradual

increases of workload). Changes in biochemical markers of muscle damage and inflammation were significantly less pronounced in those taking RR supplementation.

Rhodiola rosea balance the body's stress-response system. *Rhodiola* extract one hour before exercise significantly increases capacity for endurance exercise. It also shortens recovery time after long workouts, to increase strength, and anti-toxic action.

Rhodiola extract reduces levels of C-reactive protein, an inflammatory marker, and creatinine kinase, a marker of muscle damage (Abidov M & al., 2004). An other study from Nektium suggests that *Rhodiola* extract protects against peroxide-induced oxidative stress through the modulation of HSP70 (heat shock protein) in C2C12 muscles cells.

Response to Stress

Rhodiola rosea balance the body's stress-response system. Adaptogenic plants naturally increase the body's non-specific resistance and normalise the functions of the body, with a more resourceful manner when facing stressful situation. *R. rosea* impacts central monoamine levels.

R. rosea is said to assist the transport of serotonin precursors, tryptophan and 5-HTP into the brain. (Studies shows that serotonin brain neurotransmitter is involved in many functions such as pain perception, behavior, smooth muscle contraction, temperature regulation, appetite, etc...

Case studies have reported that *R. rosea* helps with depressive syndromes, memory loss, anxiety, cognitive dysfunction and menopause related symptoms.

Oxidative stress

Rhodiola rosea root extract protects skeletal muscle cells against chemically induced oxidative stress by modulating heat shock protein 70

(HSP70) expression. «The aim of this study was to analyze the efficacy of a *Rhodiola rosea* extract (Rhodiolife) in protecting murine skeletal muscle cells (C2 C12 myotubes) from chemically induced oxidative stress and to establish whether modulation of HSP70 expression is observed. C2 C12 cells treated with Rhodiolife did not experience any loss of viability ($p > 0.05$) at concentrations of 1-100 µg/mL for up to 24h. In control cultures, viability decreased 25% following exposure to 2mM H₂O₂ (1 h). However, no significant decrease in viability in cells pre-treated with extract at concentrations as low as 1 µg/mL was observed. HSP70 mRNA levels were up-regulated two-fold in cell cultures treated with Rhodiolife (10 µg/mL), and expression was further enhanced by exposure to H₂O₂ (six-fold, $p < 0.05$). HSP70 protein levels were maintained in pre-treated cell cultures compared to controls but was significantly lower (-50%) in cells lacking treatment exposed to H₂O₂. The present results indicate that Rhodiolife protects C2 C12 myotubes against peroxide-induced oxidative stress through the modulation of the molecular chaperone HSP70.». Hernández-Santana et al (2014), Phytother Res. 2014 Apr;28(4):623-8.

Anti-inflammatory

Studies in healthy volunteers demonstrated that supplementation with Rhodiolife® has an anti-inflammatory and protective effect on muscle tissue during exercise. Abidov M, et al (2004), Bull Exp Biol Med. Jul;138(1):63-4.

ESSNA award: Best Targeted Sports Nutrition Product
Doping free (BCSG certified)
ID & DNA Testing

Rhodiolife®