

Summary:

Provides medical information on Siberian ginseng (*Eleutherococcus senticosus*). Active constituents of the plant; Clinical indications; Pharmacological actions associated with the plant's root, including the prevention of bone resorption during experimental, steroid-induced osteoporosis; Effects on the immune response.

Eleutherococcus senticosus

Description

Eleutherococcus senticosus (also known as *Acanthopanax senticosus* or *Ciwujia*, and previously known as Siberian ginseng) is an approximately two meter high, hardy shrub native to the far eastern areas of the Russian taiga and the northern regions of Korea, Japan, and China.'

Active Constituents

The active ingredients of this plant are typically concentrated in the root and mainly consist of chemically distinct glycosides called eleutherosides A-M.- Other phytochemicals found in the root structure include ciwujianosides (minor saponins), eleutherans (polysaccharides), beta sitosterol, isofraxidin (a coumarin derivative), syringin, chlorogenic acid, sesamin (lignans), and friedelin (triterpene).- Eleutherosides I, K, L, and M have also been identified and isolated from the leaf of the plant.'

Mechanisms of Action

Eleutherococcus is primarily known as an adaptogen. This term, coined by researcher I.I. Brekhman, suggests such a plant has four general properties: (1) it is harmless to the host; (2) it has a general, rather nonspecific, effect; (3) it increases the resistance of the recipient to a variety of physical, chemical, or biological stressors; and (4) for the user, it acts as a general stabilizer/normalizer.* Using animals to test this theory, researchers found *Eleutherococcus* decreases adrenal hypertrophy and the subsequent depletion of adrenal vitamin C levels in stressed rats.^ Moreover, animals treated with an aqueous extract from the stem bark of this herb were able to increase their swimming time to exhaustion, confirming original research that mice exposed to *Eleutherococcus* have more stamina.^" In addition to its anti-fatigue and anti-stress effects, the plant also exhibits immunomodulatory effects. One study found intraperitoneal (i.p.) administration of an extract (primarily eleutherosides B and D) increased the cytostatic activity of natural killer cells by 200 percent after one week." Another in vitro study confirmed a liquid extract of the root inhibits replication of RNA viruses (human rhinovirus, respiratory syncytial virus, and influenza A virus), but not cells infected with DNA viruses such as adenovirus or Herpes simplex, type 1.^ *Eleutherococcus* affects cytokine expression. A fluid extract, at doses of 0.1-1.0 mg/mL and 0.03-1.0 mg/ mL, induced and enhanced the actions of IL-1 and TNF- α , respectively, but not IL-2 //; vitro." Studies using an animal model of cerebral ischemia demonstrated an anti-inflammatory and neuroprotective effect. *Eleutherococcus* markedly inhibited cyclooxygenase-2 (COX-2) expression and decreased cerebral ischemia in rats with induced cerebral artery occlusion." Other pharmacological actions associated with *Eleutherococcus* root include prevention of bone resorption during experimental, steroid-induced osteoporosis," protection against experimentally-induced fulminant hepatic failure (possibly via apoptosis or antioxidant mechanisms).'- radioprotection of the hematopoietic system in mice Alternative Medicine Review * Volume 11, Number 2 * 2006

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Eleutherococcus senticosus exposed to lethal radiation." inhibition of histamine release from rat peritoneal cells, and inhibition of systemic anaphylaxis in rats."* Other research has noted the stem bark not only increases the concentration of biogenic amines (noradrenalin and dopamine) in the rat brain' but also prevents stress-induced gastric ulcerations in rats"" and induces apoptosis in human stomach cancer KATO III cells.^

Monograph taken daily for seven days prior to a simulated 10 kilometer time trial. Supplementation did not significantly alter the physiological responses of the athletes (e.g. oxygen consumption, respiratory exchange, heart rate, plasma lactate, plasma glucose, or perceived exertion) compared to placebo.-'

Immune Deficiency

A few studies have examined the effects of *Eleutherococcus senticosus* on the immune response. In a controlled trial, 36 subjects were randomized to receive 10 mL *Eleutherococcus senticosus* root extract or placebo three times daily after meals for one month. A flow cytometric evaluation of lymphocyte subpopulations was made before and after administration of the herb or placebo. After four weeks of therapy, those in the active group had a significant increase in total lymphocyte ($p < 0.0001$), T-helper ($p < 0.00001$), T-suppressor ($p < 0.0001$), natural killer ($p < 0.0001$), and B-lymphocyte ($p < 0.05$) cells compared to placebo. Russian research on *Eleutherococcus* confirms the herb's immunomodulatory effects in healthy controls. Compared to placebo, 538 children utilizing the fluid extract on a daily basis for two months had a 25-percent increase in T-lymphocytes, a 20-percent increase in B-lymphocytes, a 10-percent reduction in overall infections, and a 60-percent decrease in the incidence of pneumonia. However, this improvement in lymphocyte subsets was not confirmed in a subsequent placebo-controlled study in athletes using 8 mL of a 35-percent ethanolic extract (equal to 4 g crude *Eleutherococcus*) daily before breakfast for six weeks.

Clinical Indications Athletic Performance

Eleutherococcus has been touted as the herb that builds Russian athletes. In his review of the Russian scientific literature, Farnsworth notes a single 4 mL dose of a 33-percent ethanolic liquid extract given to five male skiers 1-1.5 hours before a 20-50 kilometer race increased skier resistance to hypoxemia and enhanced their ability to adapt to increased exercise demands. In another summary of the Russian studies, Halstead cites research on runners given either 2 mL ($n=34$) or 4 mL ($n=33$) of the extract 30 minutes before participating in a 10-kilometer race. The results were compared to 41 participants who did not take the herb (control). Those who took either 2 or 4 mL of the extract completed the race in an average time of 48.7 minutes and 45 minutes, respectively, compared to 52.6 minutes for the control group. After establishing baseline maximal work loads (control) using bicycle ergometry, six healthy male athletes (ages 21-22) were given 2 mL (150 mg of the dried material) of a 33-percent ethanol extract of *Eleutherococcus* or a comparable placebo in the morning and evening 30 minutes before meals for eight days. Compared to control, individuals who took the herb had significant ...