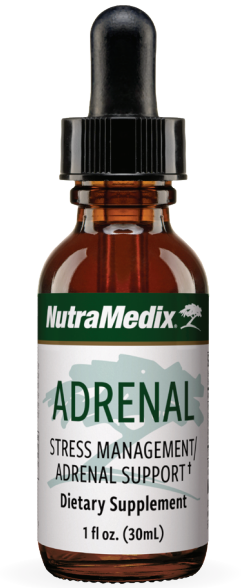
# ADRENAL

NutraMedix

## APPLICATIONS

- Stress Management and Adrenal Support
- Antioxidant Support
- Neurological Support
- Athletic Support




## INTRODUCTION

NutraMedix Adrenal consists of adaptogenic herbs Astragalus root (*Astragalus mongholicus*), Rhodiola root (*Rhodiola rosea*), American Ginseng root (*Panax quinquefolius*), and Schisandra berry (*Schisandra chinensis*). Adaptogens help to support a healthy stress response by facilitating adaptation to physical and mental stress, enhancing the ability to adjust and thrive in uncertain circumstances.* In traditional Chinese health practices, adaptogens are generally known as qi tonics.*

*Astragalus spp.* root has been used for centuries in traditional Chinese health practices where it is known as Huang Qi and considered a qi tonic, nourishing overall wellness and vitality.* The first known written mention of this herb is from the second century *Shen Nong Ben Cao Jing*.[2] Astragalus belongs to the Fabaceae family, and its constituents include astragaloside along with the flavonoids calycosin, quercetin, ononin, calycosin-7-glucoside, formononetin, and kaempferol.[3]

Rhodiola root (*Rhodiola rosea*) belongs to the Crassulaceae family and is native to Tibet, Mongolia, and China.[4] The first known written mention of this herb is from the first century *De Materia Medica* by the Greek physician Dioscorides.[5] The polyphenol content is approximately 41% and includes rosavin, salidroside and tyrosol.[4] *R. rosea* is also known as golden root or rose root, and is used in both Asia and Eastern Europe to support physical and mental performance.*[4]

American Ginseng root (*Panax quinquefolius*) is native to eastern North America and belongs to the Araliaceae family.[6] It is used in traditional Chinese medicine where it is known as *xi yang shen* and is considered a qi tonic.* The first known written mention of this herb is from the *Ben Cao Cong Xin* by Wu Yi-Luo in 1751.[7] Constituents include ginsenosides, polysaccharides, phenolic compounds, polyacetylenes, peptides, and essential oils.*[6]

Schisandra berry (*Schisandra chinensis*) has been used for centuries in traditional Chinese health practices where it is known as *wu wei zi*, or "five-flavored seed." It belongs to the Schisandraceae family. The first known written mention of this herb is from the second century *Shen Nong Ben Cao Jing*. Schisandra is considered to be balancing, containing the five different tastes of sweet, salty, pungent, bitter, and sour.*[8] Constituents include lignans, flavonoids, phenolic acids, triterpenoids, organic acids, and fatty acids.[9,10]

Adrenal is made at our U.S. manufacturing facility using a specialized proprietary extraction process that optimizes the constituents of the herbs in their original, unprocessed state to obtain broad-spectrum concentration. Because our extracts are made in our own facility, we control all aspects of quality, including stringent ID testing, microbial testing, and heavy metal testing. NutraMedix rigorously follows current good manufacturing practices (cGMP), as do our suppliers.

## STRESS MANAGEMENT AND ADRENAL SUPPORT

To understand how Adrenal may help to support a healthy stress response, we first need to understand how the nervous system responds to everyday stress.* The autonomic nervous system consists of two divisions, the sympathetic nervous system (fight or flight) and the parasympathetic nervous system (rest and digest). Ideally, there is a healthful balance between the sympathetic and parasympathetic responses. However, in occasional stressful times, the adrenal glands may work to keep up with secreting the epinephrine and norepinephrine that facilitate the sympathetic response.

Adaptogens may help to support healthy adaptation to both physical and mental everyday stress, aiding in healthy stress management.* A normal stress response avoids overworking the adrenals and helps to maintain levels of epinephrine and norepinephrine already within the normal range.* Through supporting these adaptive mechanisms, adaptogens help with both adrenal support and athletic support, nourishing healthy vitality and facilitating healthy stress management.* Additionally, NutraMedix Adrenal may help to support antioxidant activity and healthy neurological function.*

*Astragalus spp.* have been used for centuries in traditional Chinese health practices to support healthy vitality.*[11] Rhodiola (*R. rosea*) may help to support normal physical and mental energy as well as healthy stress management.*[12,13] Salidroside from *R. rosea* may help to support exercise tolerance,[4] as well as the normal capacity for mental work ($p<0.001$).*[14] American ginseng (*P. quinquefolius*) may help to support healthy energy levels.*[15] Schisandra (*S. chinensis*) may help to support healthy physical endurance.*[16]

## OTHER USES

### Antioxidant Support

Salidroside from *R. rosea* may help to maintain malondialdehyde (MDA), catalase, superoxide dismutase (SOD), and glutathione peroxidase levels already within the normal range.*[4] In vitro, *P. quinquefolius* root was found to support antioxidant activity as evidenced by DPPH and superoxide radical scavenging assays.*[17] In a mouse study, proteins from *P. quinquefolius* root helped to maintain MDA, SOD, and glutathione peroxidase already within the normal range.*[6] Schisandrins A and B from *S. chinensis* may help to support antioxidant activity.*[18,19] Schisandrin B may help to maintain ROS, MDA, SOD and glutathione levels already within the normal range, the latter two through Nrf2 pathways.*[20]

### Neurological Support

*Astragalus spp.* may help to support neurological health.*[11] *A. mongholicus* may help to support a healthy mood.*[21] Additionally, *A. mongholicus* may also help to maintain axonal and synaptic health, as seen in mice.*[22] Rhodiola (*R. rosea*) contains rosin and salidroside which may help to support neurological health.*[23] *R. rosea* may help to maintain MAPK function already within the normal range and help to support a healthy mood.*[23,24] Additionally, *R. rosea* may help to support normal working memory and concentration during mental performance.*[25,26]

Schisandra (*S. chinensis*) has been used in traditional Chinese medicine to support healthy cognition and may help to maintain neurotransmitters and BDNF already within the normal range.*[18,27] In a study with mice under mild and unpredictable everyday stress, Schisandra helped to maintain normal cognition and healthy mood.*[27] Schisandrin B may be particularly helpful in neurological support.*[19] Schisandrin B may help to maintain IL-1-beta and TNF-alpha already within the normal range.*[28] Schisandrin B may also help to maintain IL-6, PEG2,

and NO already within the normal range.*[29]

### Athletic Support

*R. rosea* and its constituent salidroside may help to support healthy exercise tolerance as well as exercise performance, for both aerobic and anaerobic exercise.*[4,30] In a study with mice, proteins from *P. quinquefolius* helped to maintain blood lactate, serum urea nitrogen, and hepatic glycogen already within the normal range.*[6] *S. chinensis* may help to maintain normal muscle strength and help to maintain lactate levels already within the normal range.*[31,32] Adaptogenic herbs, by nature, are useful in athletic support due to the facilitation of normal adaptation to physical and mental exertion.*

## SAFETY AND CAUTIONS

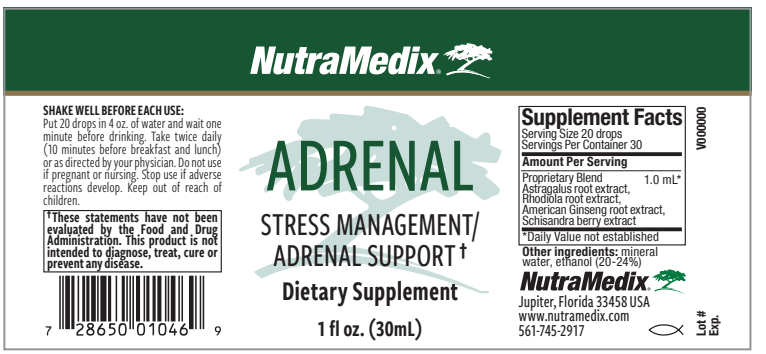
Astragalus root (*Astragalus spp.*) is generally well tolerated, and serious adverse effects are rare. A case of enterocolitis and nausea was reported in one study, though may not have been due to astragalus.[33] There has been one case of elevated CA19-9 levels with liver and kidney cysts in a 38-year-old female, which resolved after discontinuing astragalus.[34] Astragalus may theoretically interfere with cyclophosphamide, though animal studies are mixed.[35,36] It may theoretically interfere with immunosuppressants, due to immunostimulant effects.[37] Astragalus may also, due to effects on sodium and water retention, increase levels and adverse effects of lithium.[38]

Rhodiola root (*R. rosea*) is generally well tolerated. The most common adverse effects are dizziness and dry mouth.[39] *R. rosea* may have additive effects with hypoglycemics due to alpha-glucosidase.[40,41] It may also have additive effects with antihypertensives, due to angiotensin converting enzyme (ACE).[41] *R. rosea* may increase levels of medications that are CYP2C9 substrates, and may have additive effects with losartan.[42] *R. rosea* may theoretically increase the levels of P-glycoprotein substrates and may interfere with immunosuppressant therapy due to immunostimulatory effects.[43,44]

American Ginseng root (*P. quinquefolius*) is generally well tolerated. Adverse effects may include headaches.[45] *P. quinquefolius* should not be used concurrently with warfarin, as it may decrease its therapeutic effects.[46] It may have additive effects with hypoglycemic medications,[47] may interfere with MAOIs, and may oppose the effects of immunosuppressants.[48]

Schisandra berry (*S. chinensis*) is eaten as a food and is generally well tolerated.[49] Adverse effects may include acid indigestion, stomach pain, decreased appetite, allergic skin rashes, and urticaria.[49] *S. chinensis* may increase metabolism and decrease levels of warfarin, attributed to CYP2C9 metabolism.[50] It may decrease the bioavailability of talinolol, attributed to inhibition of P-glycoprotein drug transporter.[51] It may increase the bioavailability of tacrolimus.[52] It may raise levels and increase the effects of midazolam, attributed to CYP3A4 inhibition.[49] It may induce CYP2C9 enzymes, inhibit CYP3A4 enzymes, and inhibit P-glycoprotein carrier protein.[49]

Safety not documented in breastfeeding or pregnant women, or in children under 3 years of age due to insufficient safety research.

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