

Adaptogenic and Anabolic Botanicals Combined to Restore Metabolic Homeostasis and Support Recovery

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Allostasis and Cellular Metabolism

Allostasis, the adaptive response of our body's internal systems to seen and unseen factors, is the constant adjusting of our internal functions to maintain homeostasis and health. It is an ongoing process of achieving stability through change. With prolonged stress and when our stress load exceeds the body's ability to adapt (allostatic overload) and maintain homeostasis there is a decline in health as physiological function becomes impaired. When our physiology remains on constant alert due to overactivity of the arousal systems, the body is unable to fully recover or adapt. This erodes areas of constitutional weakness and leads to depletion of vital energy reserves with concomitant fatigue and possibly disease.

Biological aging and disease are associated with functional decline and with deficits at the cellular, tissue, organ and system levels of the body. Aging can be viewed as a process of shifting from a primarily anabolic metabolic balance to increasing levels of catabolic activity. This metabolic shift accounts for wear and tear, enzyme depletion, free radical expression, oxidative stress and other models of aging including expression of genetic errors.

Cellular metabolism, with its ongoing process of anabolic and catabolic activities, forms the dynamic basis of all physiological activity. Anabolic processes involve the synthesis of complex molecules and requires energy. Catabolic processes include the breakdown of nutrients and are associated with the manufacture and release of energy. Catabolic activity includes the breakdown of materials no longer needed by the cell that are subsequently removed from the cell.

Our lifestyle, aging and stress responses affect the balance of anabolic and catabolic activity. This influences our endocrine function, immunity, cell proliferation, bioenergetics and cell communication along with mood and behavior. Aging is associated with reduced anabolic hormone activity. The ratio of serum testosterone to cortisol is often used as an anabolic/catabolic index.

Cortisol and catecholamines mediate stress response and

adaptation in many physiological systems. While beneficial in the short-term, their prolonged activation results in pathological changes including immunosuppression, cardiovascular issues and metabolic imbalance.¹ A prolonged stress response leads to impairment of cellular metabolism, dysfunction in the HPA (hypothalamic-pituitary-adrenal) axis and depletion of the adrenal glands. Allostatic overload also causes excessive activity of inflammatory cytokines¹ and disruption of cellular metabolism.

The stress reaction is based on activation of the organism's energy supply by activating catabolic processes. The key trigger of this process is the stress-induced hyper-production and hyper-secretion of adrenal cortical glucocorticoid hormones. During prolonged stress, energy

HPA axis dysfunction can lead to:

- dysregulation of catecholamines (fight or flight stress hormones)
- dysregulation of glucocorticoids from the adrenals
- dysregulation of cytokines (disrupted immune response)
- atrophy of nerve cells in the amygdala and hippocampus of the brain
- bone mineral loss
- high lipids
- abdominal obesity
- chronic fatigue
- mild depression and anxiety
- poor sleep patterns
- altered cognitive performance
- decreased sexual behavior

metabolism at the cellular level is impaired along with the inflow of nutrients and outflow of waste materials through the cell walls. This, in turn, influences the balance of anabolic and catabolic metabolism resulting in a decrease in cellular energy and function. It also results in an accumulation of waste materials that interfere with cellular function. This leads to functional decline of the tissues, organs and systems that the cells comprise. Mitochondria are the energy production centers of the cell. Mitochondrial dysfunction is considered a leading cause of disease and bioenergetic decline.²

Adaptogens Enhance Anabolic Metabolism

Adaptogenic botanicals enhance cellular energy processes, restore mitochondrial function and build adaptive energy reserve. They enhance cellular metabolism and provide an anabolic, anticatabolic effect to reduce the loss of lean muscle mass and optimize anabolic metabolism. They also enhance the regulation of bio-rhythms.^{3,4}

By definition, adaptogenic botanicals normalize homeostasis, revitalize exhausted organ systems and improve resilience, vitality and resistance to adverse factors. They enhance appropriate immunological response and act in a nonspecific manner to strengthen physiological adaptation. Adaptogens support the body's natural processes and aid organ systems to work optimally, without side effects. A restorative agent is one that helps restore health, strength or consciousness, one that strengthens and invigorates the body, mind and spirit. Adaptogenic herbs are restorative and, at the same time, support the body's capacity for the ongoing process of adaptation that is referred to as allostasis.

Because they effectively enhance adaptive response and normalize neuroendocrine function, adaptogenic botanicals offer great potential for promoting wellness and longevity.

Adaptogens:

- non-specific, normalizing action
- support physiological adaptation
- enhance the body's normal processes
- nourish vital life force
- promote optimal function
- no side effects or toxicity
- normalize hypo- and hyper-conditions
- modulate neuroendocrine function

Adaptogenic herbs are ideally taken to support healthy function, enhance vitality, promote allostasis and help prevent disease. They are highly beneficial during the first stage of the stress response to support adaptation, a quick recovery and return to allostasis. They are also effective to facilitate recovery from depletion and exhaustion.

When multiple herbs are blended together to create harmonious formula, a synergistic effect is created that supports multiple systems and optimizes the healing response. It is often beneficial to use two or more formulas in tandem or in rotation to harmonize physiological systems, provide multiple actions and to address issues unique to the individual. Formulas may change as a person progresses on their healing path. Initially, when depletion is severe, the focus is on nourishing and restorative tonics. Once a person is stronger and can integrate more energy in their system, then dynamically stimulating herbs may be given.

Adaptogenic and Anabolic Botanicals that Restore Metabolic Homeostasis and Support Recovery



Eleuthero (*Eleutherococcus senticosus*)

Eleuthero is the perhaps the most widely researched adaptogen. The unique qualities of this herb led the Russian scientist Dr. Nikolai Lazarev to coin the term "adaptogen" in the late 1940s. Later, Israel I. Brekhman, MD used the remarkable properties of Eleuthero to define the parameters of "adaptogenic" herbs.

The most striking biological property of Eleuthero is its ability to prevent or alleviate the stress response by normalizing

function. It helps decrease the level of the alarm reaction and delay the onset of adrenal exhaustion (the third phase of Hans Selye's General Adaptation Syndrome). Eleuthero allows a more economical and efficient release of corticosteroids and adrenaline.⁵

Eleuthero is highly effective in improving the body's adaptive capacity to respond in a variety of situations from athletic performance to stress and illness. Eleuthero enhances mental acuity and work along with physical capacity and stamina.^{3,6-8}

It enhances capacity for work and exercise with long-term benefits. Eleuthero improves oxygen uptake during exercise – enabling longer workouts, increased stamina and quicker recovery time especially in performance athletes.^{7,9}

Eleuthero demonstrates anabolic activity^{3,9} and stimulates protein synthesis in the pancreas, liver and adrenal cortex.^{3,10} One of Eleuthero's bioactive compounds, Eleutheroside B, is the key compound that plays a significant role in the anti-stress and anabolic actions of Eleuthero.¹⁰⁻¹²

Eleuthero normalizes function more than any other adaptogenic agent.^{3,10} It increases biological resistance, normalizes individual physiological responses and enhances vital energy systems. Eleuthero supports and optimizes endocrine and adrenal gland function when the body is challenged by stress. It is found to normalize blood sugar levels^{10,13-15} and helps combat adverse effects of sleep deprivation¹⁶.

Schisandra (*Schisandra chinensis*)



Both Schisandra seed and fruit extract are utilized in adaptogenic formulations, as the seed extract contains powerful adaptogenic compounds including higher amounts of lignin compounds called schisandrins.^{6,17}

Schisandra seed extract paired with the fruit extract offers the unique property of stimulating the central nervous system without causing over-excitation. This supports improved physical and mental capacity, motor coordination and efficiency.^{18,19} Schisandra seed is widely used for the treatment of stress-induced nervous system exhaustion and fatigue, insomnia, weakness, depression, forgetfulness, vision problems, diarrhea and chemical toxicity.¹⁷ Studies show that Schisandra seed extract enhances physical performance and facilitates recovery time.^{18,20}

The orange-red Schisandra berry has a long history of medicinal and food use in China, Japan, Korea, Tibet and Russia. Throughout time, hunters in the wilds of Siberia have used the dried berries chewed or prepared as a tea to provide energy, stave off exhaustion and improve night vision during long trips. Known as “Five Flavor Fruit” in Chinese medicine, it is considered a tonic that benefits all five energetic/organ systems according to Chinese medical principles, where each flavor relates to a specific energetic system. However, Schisandra was used particularly to nourish the lungs, support liver function and benefit the eyes.

In modern research, it is found to improve visual acuity, increase adaptation to darkness and widen the borders of the visual field.²¹ In multiple studies, Schisandra is reported

to increase mitochondrial glutathione redox status²²⁻²⁴, which suggests a role in preventing oxidative stress.



Rhodiola (*Rhodiola rosea*)

The active constituents unique to *Rhodiola rosea* and thought to be responsible for its adaptogenic qualities are two glycosides, particularly a group called “rosavins.”²⁵ Other compounds in *R. rosea* include flavonoids, volatile essential oils and triterpenes. It also includes 17 amino acids along with vitamins, minerals and trace elements.²⁶⁻²⁹

Known as Golden or Artic Root, this perennial plant has red, pink or yellow flowers and grows prolifically in the colder north of Russia. Chinese emperors sent expeditions to Siberia to bring back the “golden roots” prized for medicinal use. Rhodiola is used in Tibetan medicine to promote circulation and prevent hypertension.

Rhodiola is valued for its ability to enhance mental and physical performance and stamina.³⁰ It exerts profound protective effects on the nervous and endocrine systems. *R. rosea* extract is found to enhance immune function, improve resistance to stress, and help eliminate fatigue. It benefits concentration, focus, memory and learning capacity.³¹⁻³⁴ Rhodiola demonstrates the ability to reduce stress-induced depression and decrease levels of anxiety. It harmonizes the neuroendocrine system and improves HPA axis response to stress.

Studies find that extracts of Rhodiola stimulate ATP (adenine triphosphate) and synthesis of creatine phosphate and glycogen in the muscles and liver along with anabolic activity in muscles such as protein synthesis.³⁵ Rhodiola is cardio-protective and helps normalize the heart rate after intense exercise. Some studies indicate it can normalize a system in conditions of stress and arrhythmia.³⁶⁻³⁹ Several human and animal studies found that *R. rosea* increases physical work capacity and dramatically shortens recovery time between rounds of high-intensity exercise.⁴⁰⁻⁴²

Another study reported it enhances mental performance and helps reduce fatigue in physicians working night shifts.⁴³ Rhodiola is also reported to exert antioxidant activity, helping cells to withstand oxidative stress.^{44,45}



Panax ginseng

This highly-revered herb has been used as both food and medicine in Asian countries for over 4,000 years. The genus name “Panax” is derived from the Greek word “pan”, meaning all and “axos” (medicine or remedy) –

reflecting the root's reputation as a panacea. Because the root is shaped like a man it is believed to embody a human's three essences (body, mind and spirit) and to also contain the essence of the earth. It is highly esteemed in Oriental medicine as an herb of longevity that nourishes all the viscera and benefits the mind.

Fresh, unprocessed ginseng has a cooling, calming and quiescent effect and is known as White Panax Ginseng. When fresh ginseng is specially prepared and steamed with herbs, it becomes more warming in nature and is known as Red Panax Ginseng. Red Panax Ginseng is recognized for its ability to restore dynamic vigor and vitality to the body.

Ginseng is high in saponins, the most studied of which are the group of ginsenosides. Red Ginseng is said to be higher in ginsenosides due to the conversion of naturally-occurring compounds during the steaming process to ginsenosides. The outer skin, which is naturally high in ginsenosides, is retained for the making of Red Ginseng. *Panax ginseng* is also high in polysaccharides, peptide glycans and flavones.⁴⁶

Ginseng is well-known for its ability to enhance vital energy and benefit physical performance and stamina. It also benefits mental cognition and concentration. Ginseng enhances recovery from exertion and muscle fatigue.⁴⁷⁻⁵⁰ It has been used for thousands of years to help resolve serious illness, combat fatigue and promote longevity. It is beneficial for neurasthenia and mild depression.

Ginseng exerts modulating activity on the central nervous system. It facilitates the stress response, acts on the hypothalamus and modulates the activity of the adrenal cortex. It helps normalize glucocorticoid levels to enhance recovery time after stress. It modulates healthy blood glucose levels.⁵¹⁻⁵⁴

Ginseng is reported to be neuroprotective and enhance cognitive ability.⁵⁵ Ginsenosides from Ginseng have antioxidative properties and enhance the antioxidative defense system, including glutathione. It promotes the activity of the antioxidant enzymes GSH-Px (glutathione peroxidase) and SOD (superoxide dismutase).⁵⁶ At the same time, it helps decrease levels of proinflammatory cytokines,^{55,57} while it modulates and enhances immune system response, NK (natural killer) cell activity and interferon production.⁵⁸



Rhaponticum carthamoides

R. carthamoides (RC) grows in the pristine alpine and subalpine zones and alpine meadows of Southern Siberia. The root and underground stems of Rhaponticum are valued as powerful medicines in Siberian

folk medicine where RC has been used for centuries to treat fatigue, anemia and impotence. Noted for its ability to support recovery from disease,⁵⁹ it was also used to strengthen those suffering from weakness after illness or from overwork.⁶⁰

This plant has been researched for over 30 years and acknowledged for its powerful adaptogenic benefits. It is noted for its ability to increase protein biosynthesis and to enhance physical and mental work capacity along with physical performance and endurance. It modulates immune function, exerts antioxidant activity and enhances cardiovascular functions.^{60,61}

Rhaponticum is high in flavonoids and contains lignans, carotenoids, tannins, resins, vitamin C and glycosides.⁶²⁻⁶⁴ It is especially studied due to its naturally-occurring steroids, particularly ecdysteroids which are anabolic.^{60,65} The biological activity of RC is attributed to the phytoecdison content, which influences metabolic processes.⁶⁶

Rhaponticum extract (RE) increases protein anabolism to build lean muscle and reduces body fat.^{60,67} This has led to its use by athletes to increase muscle mass and support strength and endurance.⁶⁰ RE improves the capacity for physical work, motor coordination and enhances athletic performance.⁶⁷

Researchers find that RE helps prevent fatigue by increasing non-specific resistance and supporting mental and physical performance.^{68,69} It also facilitates recovery after intensive activity.^{67,70}

Rhaponticum normalizes the central nervous system and the cardiovascular system and improves vascular perfusion of the muscles and brain.⁷¹ The flavonoids in RE are thought to enhance their ability to enhance vascular wall strength and to inhibit platelet aggregation.⁶⁰

Rhaponticum powerfully improves adaptive capacity and normalizes function in many physiological systems. It is found to enhance sleep, appetite, mood and both physical and mental work performance under stressful conditions.⁷¹



Ashwagandha (*Withania somnifera*)

Ashwagandha, or Winter Cherry, is a woody shrub in the Solanaceae family that grows in diverse areas including Africa, India and the Mediterranean. This powerful herb has been revered in Ayurvedic medicine for over five thousand years. Often called Indian Ginseng, it belongs to an elite class of Ayurvedic restorative, tonic herbs, known as Rasayana. The name Ashwagandha means "the smell of a horse," referring to the strong smell of the root. It also refers to the traditional belief that Ashwagandha root

confers the vigor, virility and strength of a stallion.

Active compounds in Ashwagandha root include alkaloids, steroidal lactones, saponins and iron.⁷² Ashwagandha extract can prevent depletion of vitamin C and cortisol in subjects under stress. Its anti-stress and anabolic activity is considered similar to that of *Panax ginseng*.⁷³ It normalizes biological markers induced by stress including blood sugar, cortisol levels and adrenal function.⁷⁴ Ashwagandha is found to exert antioxidant and anti-inflammatory activity. One study found that an extract of Ashwagandha significantly suppresses production of pro-inflammatory cytokines in both normal individuals and in rheumatoid arthritis patients.⁷²

Ashwagandha is known for its neurocognitive benefits including nervous system restoration.⁷⁵⁻⁷⁷ Studies demonstrate that Ashwagandha benefits cognition and offers significant brain- and neuro-protective qualities. One study found 80% reduction in cell degeneration in the brain of stressed animals.⁷⁸ Another discussed the ability of an isolate of Ashwagandha to positively influence regeneration of neurons and synapses in damaged neurons and neural circuits – vital components of the nervous system and brain.^{79,80} Ashwagandha may be protective of brain cells and support healthy brain function in degenerative brain conditions.⁸¹ It was found to increase acetylcholine receptor activity which may partially explain its ability to enhance cognition and memory.⁸²

Ashwagandha supports healthy anabolic activity and nourishes those in a weakened physical or mental condition. Chinese medicine reveres it as a Kidney Yang (metabolically-warming) tonic to promote longevity and health. Modern studies find that Ashwagandha helps to normalize glucose levels, supports healthy aging and enhances male sexual function.⁸³⁻⁸⁵

Pantocrine (*Cervus elaphus*)



Deer antler is the only mammalian organ that regenerates itself in an annual rhythm. Each spring, male deer cast off the hard antler from the previous year and the growth of a new antler begins. It starts as a soft, velvet material that regenerates at an amazing pace. It's not surprising that ancient cultures in the Far East were fascinated by this yearly miracle and intuited that deer antler may offer rejuvenative qualities to help slow the aging process. Deer antler velvet has an amazing nutrient profile including collagen, amino acids, essential fatty acids, enzymes, vitamins, minerals and trace minerals. It also contains high concentrations of somatostatin, an important growth hormone.^{86,87}

A vast array of literature on deer antler exists in Asia. Natura uses a humanely-harvested extract of deer antlers known

as Pantocrine. Studies find Pantocrine improves athletic performance of healthy athletes and increases work capacity, strength and stamina. It helps enhance sexual health and supports healthy heart function.⁸⁸

Pantocrine decreases the rate of muscle fatigue, enhances muscular strength and possesses anti-catabolic activity. It also increases red and white blood cell production and accelerates healing and recovery.⁸⁹⁻⁹² Pantocrine has an anabolic/anti-catabolic effect in elderly animals, stimulating lean muscle, bone, cartilage and nerve growth.⁹² Pantocrine is anabolic – it promotes protein synthesis, building lean muscle and tissue.⁹²⁻⁹⁴

American Ginseng (*Panax quinquefolius*)



American Ginseng is more prized by many than Asian Ginseng because of its deeply “Yin”-nourishing properties, which allows for deep, restorative tonification without any heating effects such as happens with “Yang” tonics (including Red and Korean Ginseng). American Ginseng is particularly known as a lung tonic.

The Eclectic physicians were a branch of American medicine in the latter half of the 19th and first half of the 20th centuries. They used botanical remedies extensively and valued American Ginseng as a tonic to support energy, stamina and endurance. It was considered a soothing nervine energy tonic beneficial for cerebral anemia, nervous dyspepsia and in mental exhaustion from overwork.⁹⁵

Found to modulate the HPA axis, it increases endurance and reduces fatigue after exercise.⁹⁶ A large amount of research supports American Ginseng's traditional use as a nervine and tonic as it shows multiple beneficial neurocognitive effects. Extracts are found to be neurotrophic, neuro-regenerative and neuro-protective.⁹⁶

Constituents include ginsenosides (which are triterpene saponin glycosides) in ratios different than those found in Asian Ginsengs. American Ginseng also contains polysaccharides, proteins and proteoglycans.⁹⁶

Studies demonstrate a positive influence on the cardiovascular system with antioxidant effects. Extracts are found to exert both antioxidant and anti-inflammatory activity. American Ginseng benefits the immune system and promotes immune cytokine production.⁹⁷⁻¹⁰¹ It demonstrates cytoprotective and hepatoprotective capacity.⁹⁷ Extracts of American Ginseng are found to normalize blood sugar⁹⁶ and to protect against renal damage in diabetics.¹⁰² Studies find it reduces inflammation in the colon and may exert a beneficial influence on the colon microbiome.¹⁰³



Cordyceps (*Cordyceps sinensis*)

Known in China as “winter worm summer grass” or the “caterpillar mushroom,” Cordyceps is a parasite fungus that traditionally grows on the larvae of caterpillars and other hosts that provide a growth medium for the mycelia. Today, most Cordyceps is made from cultured mycelia. The Cordyceps CS-4 strain cultured on organic brown rice offers superior quality and therapeutic activity. The CS-4 strain is the most widely-researched and highly-regarded.

Li Chih Shen, a renowned sixteenth century herbalist, praised Cordyceps for its ability to invigorate and tone the entire body. Chinese herbalists revered it as a respiratory tonic. At the same time it deeply nourishes the deep reserve (Kidney) energy that supports healthy lung function and overall vitality and stamina. Cordyceps contains polysaccharides that contribute to its immunomodulating influence.¹⁰⁴

Cordyceps first gained international attention when it was discovered that Chinese Olympic athletes included Cordyceps as part of their daily herbal training formula. Studies confirm that Cordyceps increases endurance, vigor and athletic training and performance.^{105,106} Recognized for its liver- and kidney-protective qualities, Cordyceps is reported to be especially beneficial for those with chronic kidney disease.¹⁰⁷⁻¹¹⁰

Cordyceps extract is found to inhibit brain aging, modulate endocrine function,¹¹¹ and to restore sexual function with the ability to replenish sperm and support healthy testosterone levels.¹¹²



Fresh Wild Oat (*Avena sativa*)

Avena is a classic nerve tonic that builds energy and reduces stress. It is traditionally recognized as

a nourishing, restorative tonic for the nervous system.¹¹³⁻¹¹⁴ The milky seed of wild oats nourishes and harmonizes the sympathetic and parasympathetic nervous systems. It is one of the best herbs to restore vital energy especially in cases of adrenal exhaustion. The Eclectic physician Dr. Finley Ellingwood considered it a great remedy to alleviate nervous exhaustion due to stress, overwork and nervous anxiety.¹¹³ Modern research reports that oats exert a wide spectrum of activity including antioxidant, anti-inflammatory and immune-modulating.¹¹⁴ *Avena sativa* is a rich source of protein, minerals (including calcium and magnesium), flavones, saponins, sterols and tocopherols.¹¹³⁻¹¹⁵



Licorice (*Glycyrrhiza glabra*)

Licorice acts as a synergist because it moderates and harmonizes the characteristics of other botanicals in a formula. It is known as a special herb in Chinese medicine that carries the herbs in a formula throughout the body. Licorice is known as a demulcent (soothing to the mucus membranes of the body) and is noted for its anti-inflammatory, immune-modulating influence.¹¹⁶⁻¹¹⁸

Licorice extract is shown to increase immune function including production of interferon and NK (natural killer) cells.¹¹⁹ Multiple flavonoids have been isolated from licorice, many of which show broad-spectrum antibacterial effects.¹²⁰⁻¹²⁴ Licorice is hepatoprotective,¹³⁰⁻¹³² enhances adrenal function and supports the stress response through multiple pathways.¹²⁸⁻¹³¹

For more information on any of the ingredients listed here, including extensive research or individual monographs compiled by Donnie Yance, please email info@naturaedu.com.

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