

HEALTH AND STRESS

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ARE THERE SUPPLEMENTS THAT CAN REDUCE STRESS?

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Patients who seek medical advice because of anxiety, depression, insomnia or other stress related complaints usually wind up with a prescription for some popular drug. In many instances, patients may have already decided they would like to try a specific medication based on a TV commercial or other advertisement. Surveys show that the vast majority are usually successful, especially when free samples are readily available. Doctors tend to be reimbursed the same amount by fiscal intermediaries whether an office visit lasts 8-10 minutes or several times longer. It's much easier to write a prescription and move on to the next patient than spend time trying to determine the cause of the problem and discuss other treatment options that may be safer and often more cost effective. In addition, most physicians are not familiar with "alternative" or "complementary" approaches, or where to refer patients for such services, nor is there any financial incentive to do so.

Patients who are leery about taking drugs because of adverse side effects and unknown long-term consequences also tend to be confused because of the plethora of exaggerated claims for nonprescription products. This is a particularly perplexing problem with respect to numerous nutritional supplements, since these are not required to show proof of efficacy. In addition, regulation is so lax that there is no guarantee that the contents of the container have any of the active ingredient or other compounds listed on the label. The only time the FDA intervenes is when there is a question of safety, as happened with their embargo on ephedra. Nevertheless, not all States have imposed or enforced this ban and products containing ephedra are still available on the web. While nutritional supplements, bioelectromagnetic, "energy medicine" and other alternative approaches are also prohibited from making claims that they are effective in diagnosing or treating any disease or medical disorder, spin doctors are skilled in getting around this hurdle by using verbiage that implies such benefits.

ALSO INCLUDED IN THIS ISSUE

- **Are There Supplements That Promote Weight Loss By Reducing Stress?**
- **Exactly What Are Adaptogens And How Do They Reduce Stress?**
- ***Rhodiola rosea's* "Golden Root" To The Rescue?**

As a result, it can be very difficult for the public as well as health professionals to separate the wheat from the chaff. For the past three decades, The American Institute of Stress has served as an

ombudsman to help consumers differentiate products whose claims are authentic and have scientific support from spurious copycat and other worthless wares promoted by charlatans and unscrupulous entrepreneurs eager to cash in on the tidal wave of interest in alternative medicine. We plan to have a plenary session devoted to "Non-Drug Stress Reduction Approaches That Work" at our 2008 International Congress on Stress to demonstrate the dimensions of this growing problem. Additional details will be provided as the Congress program is finalized but the following examples of worthless and deceptive supplements, in contrast to others that may have merit, illustrate the difficulties in distinguishing between these two classifications.

Are There Supplements That Promote Weight Loss By Reducing Stress?

As noted in previous Newsletters, so many supplements have now jumped on the "Stress Causes Weight Gain" bandwagon, that this has now become more of a juggernaut. There is little doubt that some people gain weight because they tend to eat more when they are anxious or frustrated. Many find relief from chocolates, cookies, candies, chips or high fat, high carbohydrate fast foods and sweets that are particularly likely to pile on the pounds. A good example of this is the "Freshman 15" phenomenon that is frequently seen during the first year of college. Most teen-agers move out of their parents' home for the first time, often a great distance away and all are subjected to the stress of meeting a new set of peers. As a result of the relative lack of social support from family and close friends who are no longer readily available, many freshmen turn to food for comfort. Food can also become a focus for finding friends through pizza parties and midnight vending machine raids that are common and convenient ways to develop a sense of community. However, this type of social snacking, which is usually superimposed on regular meals, can also put on extra pounds. One study reported that **university women gained weight 36 times faster than controls the same age that did not attend college.**

Because of stress related hormonal influences such as increased cortisol secretion, surplus calories tend to be stored in fat depots deep in the abdomen. This is supported by studies in baboons as well as middle-aged men, showing that weight gain due to increased deposition of abdominal fat is greatest in those experiencing the most stress, as assessed by higher cortisol levels. Similar abdominal obesity is seen in Cushing's syndrome, where a pituitary tumor or adrenal cortical overactivity causes increased cortisol secretion. Patients on long-term treatment with similar synthetic steroids, like prednisone, also show weight gain due to increased abdominal fat. Proof that cortisol or its congeners are the cause comes from the observation that when the source of the increased cortisol is removed or treatment with prednisone is discontinued, abdominal fat deposits progressively diminish or disappear. In addition to unsightly cosmetic effects, pot bellies due to excess abdominal fat are associated with increased insulin resistance that leads to Type 2 diabetes, hypertension, heart attacks, accelerated atherosclerosis and other manifestations of metabolic syndrome. These cardiovascular and metabolic complications are not due to excess weight per se, since **peripheral adiposity involving the buttocks and thighs has been shown to inhibit the development of atherosclerosis.**

That sets the stage for manufacturers to state that their supplements will produce dramatic weight loss by reducing stress and blocking the production of cortisol that causes big bellies. Bear in mind that they are not required to prove these claims. One of the most fraudulent and profitable of these scams has been CortiSlim, which raked in over \$200 million in 2004 due to deceptive advertising. CortiSlim contains vitamin C, calcium and chromium but differs from similar supplements because of three proprietary "Blends". These allegedly act in some synergistic fashion to produce weight loss and reduce stress by blocking cortisol, "the fat hormone", as follows: "Cortiplex Blend" (Magnolia bark extract, beta sitosterol, theanine), "Leptiplex Blend" (green tea extract, bitter orange peel extract) and "Insutrol Blend" (vanadium, banana leaf extract).



The names of these three **CortiSlim** "Blends" had been carefully selected to suggest that they a) lower cortisol, b) increase leptin, a hormone secreted by fat cells shown to cause weight loss in some strains of rodents, and c) reduce insulin resistance, which is largely responsible for the development of Type 2 diabetes and metabolic syndrome. Some of the CortiSlim claims include "causes weight loss of 10 to 50 pounds for virtually everyone, **causes users to lose as much as 4 to 10 pounds per week over multiple weeks, causes weight loss specifically from the abdomen, stomach and thighs**, eliminates cravings, controls appetite, burns calories more efficiently and naturally through thermogenesis, and diminishes hunger and stress eating." The manufacturers also offer allied products that have a particular focus on what the consumer might be most interested in, such as **CortiStress**, "which controls cortisol", described as "underlying cause of every modern lifestyle disease." This panacea should probably be taken by everybody to "reduce the risk of or prevent conditions such as obesity, diabetes, cancer, and cardiovascular disease." There is also **CortiSlim Burn**, that "turns up the heat" in your body's fat-burning furnace, **CortiSlim Control**, to "reduce your hunger cravings and feel full by lowering the Glycemic index of high sugar foods", and the "revolutionary energy delivery system" provided by **CortiSlim Energy Punch**. Four of these chewable tablets a day "provide the same lift as a typical energy drink," but one cup of coffee seems to have more caffeine than this daily dose of tablets.

The manufacturers claim that a clinical study attests to CortiSlim's remarkable weight loss effects but this is not provided and their web site only describes an unpublished study by the product's founder. The only ingredient that could conceivably contribute to losing weight is bitter orange peel extract (*Citrus aurantium*), which contains synephrine. This is the only known ephedrine-like natural product that has not yet been banned by the FDA, although it has been associated with hypertension and cardiac arrhythmias in healthy athletes. However, any supplement containing bitter orange peel extract is prohibited by some sports organizations, including the National Collegiate Athletic Association (NCAA) and one such supplement was reported to have caused a myocardial infarction in a middle-aged woman with no history of heart disease. Synephrine should be avoided by anyone with hypertension or glaucoma or who is taking certain types of antidepressants or common cold remedies containing decongestants. Other CortiSlim ingredients conflict with chemotherapy medications.

The tremendous success of CortiSlim is due to deceptive advertising that refers to very valid articles published in respected peer reviewed medical journals that confirm the role of stress and increased cortisol in promoting weight gain due to the deposition of deep abdominal fat. There is no evidence that the usual daily stresses most people are subjected to can cause even a transient rise in cortisol that bears any resemblance to the markedly elevated and sustained levels reported in these papers. More importantly, there is nothing in these publications that refers to the contents of CortiSlim nor have any of these ingredients ever been shown to reduce stress or cortisol. Consumers are understandably confused because they believe that such ludicrous claims are supported by solid scientific research that is entirely unrelated to the products advertised. This same ruse was reinforced by TV infomercials that had been cleverly designed to appear like an independent talk show called "Breakthroughs". These featured Drs. Greg Cynaumon and Shawn Talbot in an interview format without revealing that they were principals in a joint venture to create, manufacture and market CortiSlim and its related products. Cynaumon claims to be a psychologist and certified marriage/family counselor even though he has no such credentials and has been warned on several occasions as well as fined by both the California Boards of Psychology and Behavioral Sciences for making false statements. Shawn Talbott, Ph.D., an adjunct assistant professor of nutrition at the University of Utah who formulated CortiSlim, has authored works on calcium metabolism in rats but has published nothing on cortisol or obesity.

The FTC was able to file suit in October 2004 because of the numerous false and unsubstantiated claims noted above, especially for "risk reduction or prevention of such conditions as osteoporosis, obesity, diabetes, Alzheimer's disease, cancer and cardiovascular disease." The suit demanded that consumers be reimbursed and an immediate cessation of the deceptive TV ads and other promotional efforts. In a partial settlement in 2005, three defendants agreed to give up \$4.5 million in cash and other assets, including an investment partnership and a related charitable foundation, a speedboat, a truck, and a variety of real estate interests. They were also prohibited from seeking a refund of any state or federal taxes that had previously been paid. Nothing much happened and although the advertising was toned down, there was little that could be done about their being replaced by lavish testimonials from others and sales continued to go through the roof. The suit, which was finally settled earlier this year, required Cynaumon to repay approximately \$3,000,000 and the manufacturer of CortiSlim to pay \$10,000,000 to customers who purchased the product under false claims of effectiveness. The agreement is for settlement purposes, only and although it does not constitute an admission of breaking the law, any subsequent violation could result in a civil penalty of \$11,000. That's just a drop in the bucket compared to the hundreds of millions that have been raked in. The company later filed bankruptcy to fend off creditors but the TV ads continue and so do record sales of CortiSlim, although CortiStress is no longer offered.

Relora, whose "patented blend of plant extracts is the result of screening more than fifty plant fractions from traditional medicines used around the world. It features magnolia bark extract that contains honiokol, a magical chemical that "controls cortisol levels in a healthy range to help reduce fat mobilization – especially fat stored around the midsection in the tough-to lose abdominal areaIt can help to de-stress you without making you sleepy. When compared to pharmaceuticals like Valium, honiokol appears to be as effective in its anti-anxiety activity, yet not nearly as powerful in its sedative ability". Also shown below is an ad for **Relacore**, whose manufacturer wants to know "Is Stress Making You Fat? Excess tummy flab is not your fault! Relacore is the solution to excess abdominal fat and stress reduction!"



All-Natural "Feel Good Pill" Weight Loss Breakthrough

Is Stress Making You Fat?

Excess tummy flab is not your fault! That's the startling conclusion reached by scientists who discovered stress is the likely cause of belly bulge. But instead of simply identifying the problem... this time, they may have found the solution!

And that's just the tip of the iceberg. There is also **Cortitrol Stress Control Formula**, "a unique dietary supplement that helps you cope with stress by modulating healthy levels of cortisol." You might want to consider **CortiDrene**. This "Breakthrough Product Solves Stubborn Fat as well as delivering Dual Action Anti-Aging Antioxidants." It contains green tea extract, St. John's wort and other common supplements in a proprietary formula that is able to "absorb fat, control the effects of cortisol overproduction, provide energy, relieve stress, control cravings and promote weight loss." **CortiLean** similarly "suppresses appetite, boosts metabolism, melts abdominal fat away and blocks cortisol levels induced by stress. The only thing you have to lose is Stress Related Fat." It contains magnolia bark extract but its alleged superiority comes from very high amounts of B complex vitamins that "could save 300,000 lives a year from heart attacks." The source of this quotation was a *Journal of The American Medical Association* article that was not pertinent and had nothing to do with CortiLean. I was particularly intrigued by **TheraStress**, "the most scientifically advanced stress reducing, fatigue fighting, fat reducing, health enhancing natural product available. " It contains "adaptogens", described as exotic Oriental herbs that "stimulate the body's own regenerative process" and "balance the secretions of the adrenal cortex." All this from just 20-40 drops in a glass of water once a day. My interest in this was kindled by a presentation on adaptogens over a decade ago at one of our International Congresses on Stress in Switzerland by Ben Tabachnik, a former Russian Olympic Track and Field coach. He cited various impressive testimonials as well as several supportive published reports of stress reduction and improved physical performance. However, these were from older studies in Russian and other foreign journals that were not readily available. Nevertheless, the rationale behind these claims appeared to have some validity and I was anxious to learn if there had been any new developments.

Exactly What Are Adaptogens And How Do They Reduce Stress?

According to the makers of TheraStress, "Adaptogens are natural substances that help the body to combat particular stresses put upon it by stimulating the body's own self-regeneration process. They are plant substances that normalize body processes and improve overall health by supporting the body's immune system. By balancing the secretions of cortisol and other hormones of the adrenal cortex, these multipurpose agents modify a wide range of positive responses, proving especially helpful in shielding the body from impacts of stress and increasing energy levels." In addition, "adaptogens not only defuse the effects of emotional stress but also help the body recover from physical stress such as heavy manual labor, running long distances, lack of sleep, surgical recovery and high-altitude sickness." To be considered a true adaptogen, a plant must conform to the following criteria:

1. The plant must be nontoxic and totally harmless to the body.
2. It must allow the continuing physiological function of the body.
3. The action it exerts must increase the body's resistance to adverse influences.
4. It must normalize body functions irrespective of existing pathological conditions.

Sounds like a pretty tall, if not impossible order, especially the part about normalizing body functions, no matter what the problem is. It was therefore not surprising to learn that only one in 4,000 plants could be considered to be true adaptogens. The eight herbal extracts found in TheraStress were considered to be the best adaptogens and their varied and numerous health enhancing properties are described as follows:

Eleuthero Root - An Adaptogenic herbal extract that helps normalize body systems including cortisol levels and improves cellular function disrupted by stress. Increases energy and physical endurance. Helps regulate blood sugar. Supports immune function. Anti-oxidant.

Schizandra Berry - An Adaptogenic herbal extract that combats fatigue and enhances fatigue related recovery. Provides nutritional support in managing gastrointestinal disease. Anti-oxidant.

Green Tea Extract - A bioflavonoid rich herbal extract that slows carbohydrate absorption and aids in the metabolism of fat. Works without increasing the heart rate most often found in diet aids. It is also a potent extract used for fighting free radicals which helps protect against digestive and respiratory infections. Anti-oxidant.

Rhodiola Root - An Adaptogenic herbal extract that provides important immune support during stressful periods. Improves physical stamina and mental concentration. Helps regulate blood sugar. Supports immune function and cortisol balancing. Anti-oxidant.

Garcinia Cambogia - Cambogia Inhibits the conversion of excess calories to body fat. Suppresses appetite by promoting synthesis of glycogen. Increased glycogen production and storage is the body's normal way of signaling the brain's satiety centre that enough food has been eaten.

Chinese Ginseng - An Adaptogenic herbal extract that enhances concentration, endurance, physical performance and adaptability. Supports immune function and helps regulate cortisol levels. Anti-oxidant.

Reishi Mushroom - An Adaptogenic herb that helps control fatigue, enhance performance endurance and improves respiratory function. Also helps reduce hypertension.

Stevia - This non-caloric herb helps to improve blood sugar levels and assists in the reduction of caloric intake."

The above are all combined in a proprietary liquid formulation designed to increase energy, reduce stress, promote weight loss and prevent diabetes through synergistic effects. Unfortunately, no references were cited to back up any of these claims and I was curious about the criteria that led to selecting these specific adaptogens as the cream of the crop. The term "adaptogen" was invented in 1947 by Nicolai Lazarev, a Russian scientist who had been researching chemicals and plants whose constituents might possibly improve the body's ability to adapt to adverse environmental conditions. After graduating from medical school in 1928, he began investigating ways to prevent the damaging health effects of new industrial chemical compounds being generated in factories that had sprung up following the Russian revolution. He eventually found that even mild and seemingly harmless chemicals that had no immediate adverse effects could eventually produce various illnesses and accelerate aging. This was consistent with Selye's stress research and by the late thirties, Lazarev had switched his emphasis from toxicology to pharmacology to pursue this. All Russian scientists were drafted to work on military projects during World War II and Lazarev was assigned to finding substances that could help soldiers overcome fatigue and improve performance. Many such stimulants, like amphetamines, had short-term benefits but proved harmful when taken for prolonged periods.

In 1947, Dibazol, a synthetic corticosteroid, was shown to improve both physical and mental performance and increase resistance to a wide variety of stressors in laboratory animals including radiation, toxins and viruses and to protect humans during flu epidemics. Dibazol was the first adaptogen, but Lazarev believed that the solution for increasing resistance to stress was not in drugs but rather in preventive substances found in certain herbs that had been used for centuries in traditional Chinese medicine. Lazarev stimulated many others to conduct similar research and especially Israel Brekhman, a physician with a strong interest in pharmacology. Brekhman conducted numerous studies on Siberian plants that presumably possessed special properties which enabled them to survive by adapting to the harsh winter climate. His initial focus was on *Panax ginseng*, also called Asian, Korean or Chinese ginseng. (Panax refers to any illness, and ginseng plants have been used for many centuries in different cultures as a "cure-all" or panacea.) Being a long distance runner, Brekhman selected stamina to evaluate ginseng's adaptogenic properties. On a cold winter morning in 1948, prior to a three-kilometer race involving 100 soldiers, he gave half an extract of *Panax ginseng* and half received a placebo. He was delighted to find that on average, the ginseng group finished almost a minute ahead of the others. After *Panax ginseng* was found to produce disturbing side effects in some individuals, Brekhman started to study similar plants like American Ginseng, (*Panax quinquefolius*) and especially Siberian Ginseng (*Eleutherococcus senticosus*). He found that the active ingredients in American and Asian ginsengs were chemicals called ginsenosides that stimulate immune system defenses and have other actions believed to provide benefits in conditions ranging from ADHD and Alzheimer's to cancer and diabetes. Siberian ginseng, although part of the same *Araliaceae* plant family was quite different. It did not contain any ginsenosides but provided similar benefits because of chemicals called eleutherosides. Brekhman's first published work in 1960 dealing with these compounds stimulated numerous studies showing that they improved performance and significantly reduced the number of cases during a flu epidemic in thousands of Siberian mine workers and long distance truck drivers, a 40% reduction in high blood pressure and heart disease in 14,000 auto factory workers, and resulted in 50% less immune system damage and reducing drug requirements by half in over 100 patients receiving chemotherapy for gastric cancer. These and other results in sailors on long voyages and military personnel under severe stress were so impressive that his *Eleutherococcus* extract was approved in 1962 by the U.S.S.R. Ministry of Health for clinical use as a "stimulant." Brekhman later published hundreds of papers, monographs and books, obtained several dozen patents and received numerous government awards and honors for breaking the genetic codes of different adaptogen plants and uncovering the molecular structures of their phytochemicals. He was generally recognized as the leading expert on adaptogens and his research stimulated other Eastern scientists and eventually thousands of papers.

However, little was known about adaptogens in the West until Ben Tabachnik, the Russian Olympic coach who spoke at our 1997 Congress, emigrated to the U.S. around 1990. He introduced Brekhman's proprietary blend of seven herbals that had been used by the Russian Olympic Committee for four of the ten Russian teams competing in the 1994 Winter Olympics. These four teams won all of Russia's eleven gold medals, more than any other country. Although Brekhman's formula was also credited for a variety of other athletic triumphs, I was surprised that only three of his herbal extracts had been retained in the TheraStress formulation and that their dosages were different. Other adaptogenic formulations currently available do retain most of the original herbals but some add as many as 12 more. The claims have also been expanded from simply improving immune system function and increasing resistance to infection, to include numerous other properties, such as, "Tonifies and balances the endocrine/hormonal system (adrenal/thyroid), Improves the body's ability to withstand stress and its accumulative effects, A potent redox/antioxidant, protects and vitalizes the liver, cardiovascular system, kidneys, immune system and brain –

relieves mental fatigue, Regulates and normalizes hormones, Reduces fatigue and jet lag, Enhances job productivity, mental performance, concentration, alertness and creativity, Improves metabolism, Increases lean muscle mass." Except for women who are pregnant or nursing, this is a "Broad-spectrum Super Tonic, suited for all types of people, intended to be taken as a daily tonic for an extended period of time." How much of this to give is less clear, since the recommended dosage varies from 30 to 60 drops taken 2 or 3 times daily for this "extended" but indefinite period.

I have gone into some detail about this since it is crucial to understand that because of the current lack of U.S. regulations, **any nutritional supplement can be labeled as an adaptogen. Manufacturers can make any claims they choose as long as these do not refer to treating or diagnosing a disease.** "Reduces stress, pain, fatigue and jet lag, improves mental performance, endurance, metabolism, concentration and resistance to infection, regulates and normalizes hormones" are all allowed, since none of these are diseases. Whether the extract comes from the root or the leaf of *Eleutherococcus* or the seed or the fruit of *Shisandra* determines its effects and potency and the optimal dosage varies for different demographic groups. Brekhman became disillusioned with *Panax ginseng* because men responded better than women, the elderly benefited more than those who were much younger or middle-aged and even minor variations in dosage could produce overstimulation in susceptible individuals. More importantly, even if these extracts were properly prepared according to the strict standards mandated in other countries and the correct dosage was prescribed based on age, gender and other criteria, **there is no guarantee in the U.S. that the contents of the container bear any relationship to what is listed on the label.** All of this is unfortunate because it seems very likely that certain adaptogenic herbs do have the potential to provide significant benefits if properly administered, particularly *Eleutherococcus senticosus*, *Shisandra chinensis*, and especially *Rhodiola rosea*. What needs to be done to avoid having the baby thrown out with the bathwater is to isolate the active ingredients so that they can be prescribed in accurate amounts rather than brewing teas and making imprecise extracts from roots, leaves and stems. There is little incentive to do this since it is not likely that it would be profitable because of the difficulty in patenting any natural substance but some progress has been made with certain Siberian *Rhodiola* extracts.

***Rhodiola rosea*'s "Golden Root" To The Rescue?**



Rhodiola rosea Golden Colored Roots



Yellow Blossoms of *Rhodiola rosea*

While serving in the Soviet Army in Afghanistan in 1979, Dr. Zakir Ramazanov became intrigued by the power of a tea brewed from the golden-yellow roots of a Siberian plant called *Rhodiola rosea* to reduce stress as well as boost mental and physical energy. He learned about this from Siberian soldiers who regularly received these roots in their mothers' packages from home and confirmed these benefits by personal use and later testing it on a variety of patients. He subsequently found out that the remarkable effects of this herb had been known for thousands of years. It was popular in ancient Greece and the Greek physician Dioscorides documented its medicinal properties in his 77 A.D. medical text *De Materia Medica*. It was then known as *rodia riza*, which was changed to *Rhodiola rosea* in 1725 by Carl Linnaeus, the famous Swedish botanist and taxonomist, who established the criteria for classifying and naming all living things. This name was selected because of the rose-like fragrance of the fresh cut root. Based on reports, he recommended it for everything from vaginal discharge to headache and hysteria and 50 years later, it was included in the first Swedish pharmacopoeia that listed all medicinal preparations.

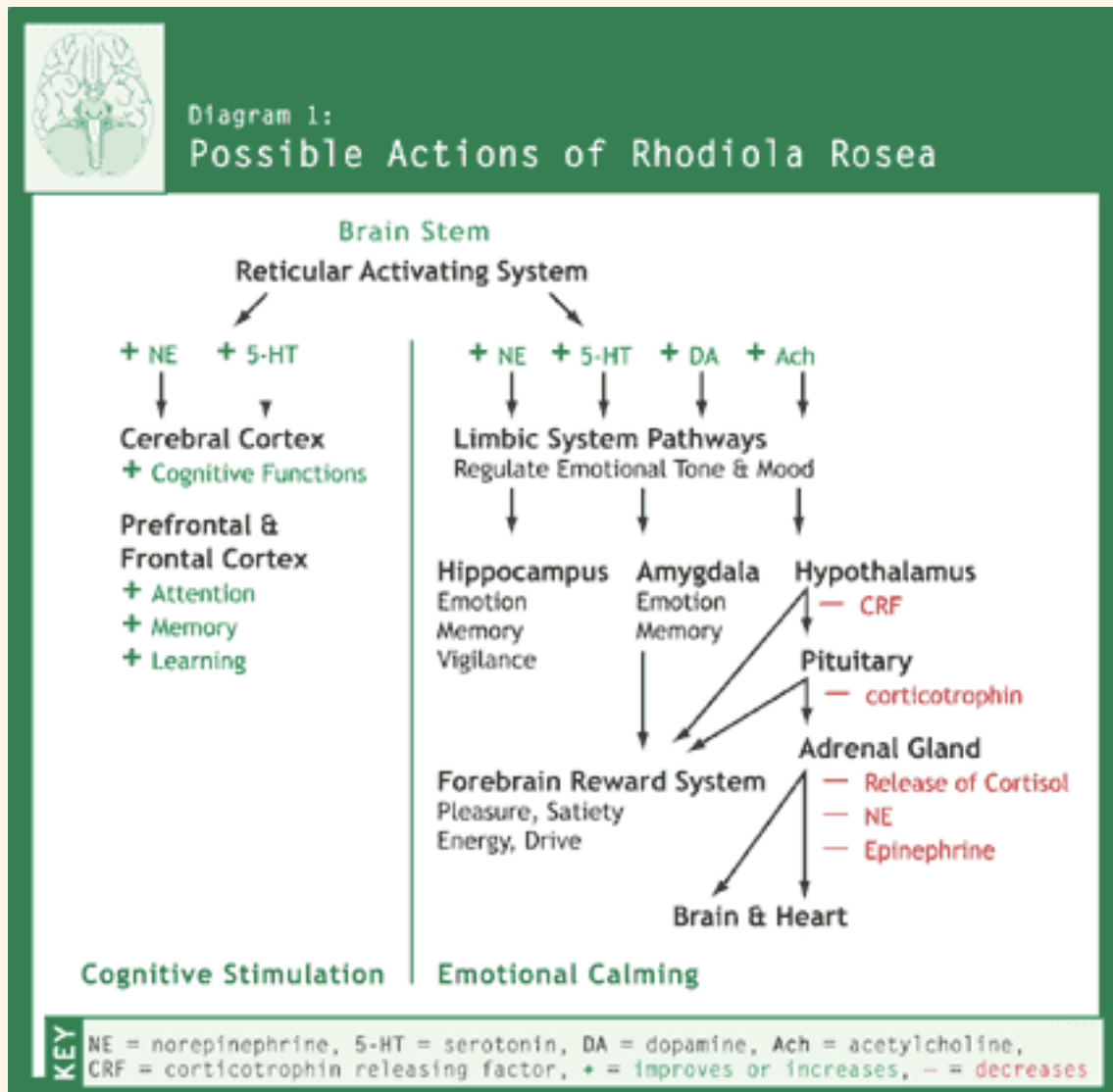
But how did rhodiola travel the thousands of miles from the remote mountains of Russia where it grew wild to Greece? One explanation dates back to the 13th century B.C., when trading expeditions crossed the Aegean Sea, the Hellespont, the Bosphorus, and the Black Sea to what is now the Republic of Georgia. It was popular there since Siberian traders frequently transported it down ancient trails in the Altai and Caucasus mountains to exchange for Georgian wine, fruit, and honey. The Vikings depended on *Rhodiola rosea* to enhance their physical strength and endurance and Chinese emperors sent expeditions to Siberia to bring back "the golden root" for medicinal preparations. Mongolian physicians prescribed it for tuberculosis and cancer and it was considered to be the most effective treatment for cold and flu in Central Asia. A bouquet of *Zolotoy koren*, (Russian for Golden Root) has traditionally been given for centuries in Siberian villages as a marriage gift to guarantee the birth of many healthy children. The prime locations, time of year to harvest the best roots and method of extraction were usually well kept family secrets that were passed down from generation to regeneration.

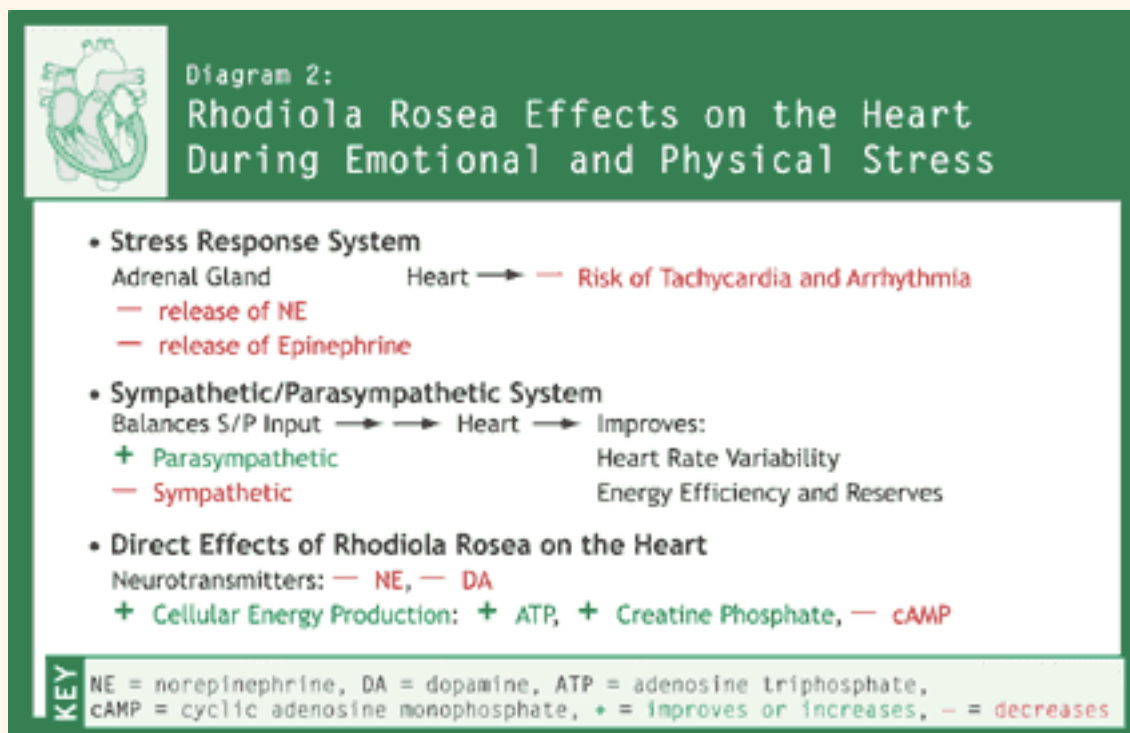
Between 1725 and 1960, academic articles in respected publications from Sweden, Norway, France, Germany, the Soviet Union, and Iceland reported that various *Rhodiola* herbal extracts improved physical endurance, work productivity, longevity, and resistance to high altitude sickness. They were also found to be effective in treating fatigue, depression, impotence, gastrointestinal ailments, infections, and a variety of nervous system complaints that are also often stress related. Over the last few decades, there has been an explosion in efforts to scientifically validate these benefits and to demonstrate the mechanisms of action that may be responsible by learning more about the chemical composition of *Rhodiola rosea* root. Although still a work in progress, phytochemical analysis has demonstrated at least six distinct classes of compounds, each of which has biologically active chemicals as follows:

1. Phenylpropanoids: rosavin, rosin, rosarin
2. Phenylethanol derivatives: salidroside (rhodioloside), tyrosol
3. Flavanoids: rodiolin, rodionin, rodiosin, acetylrodalgin, triclin
4. Monoterpenes: rosiridol, rosaridin
5. Triterpenes: daucosterol, beta-sitosterol
6. Phenolic acids: chlorogenic and hydroxycinnamic, gallic acids

There are some two dozen species of the *Rhodiola* genus and since all of these contain salidroside, it was assumed that this was the active ingredient in *Rhodiola rosea*. As a result, the initial standardization approved by the Russian Pharmacopoeia Committee in the 1970's mandated a minimum of 0.8 percent salidroside content. In the late 1980s, demand for *R. rosea*-based phytomedicines dramatically increased, and as the wild plants began to

disappear, it became increasingly clear that there was a steady decline in the efficacy of various preparations, even though they contained the required concentration of salidroside. Some had no pharmacologic effect and it was discovered that other plants containing salidroside were being substituted. In addition to *Rhodiola*, salidroside is present in numerous other species and *Rhododendron* plants have the highest concentrations of all. Salidroside was obviously not the answer and comparative analysis of these various preparations showed that it was primarily the phenylpropanoid components of *Rhodiola rosea* that were responsible for its consistently superior consistent efficacy. While all *Rhodiola* plants contain tyrosol as well as salidroside, it was demonstrated in 1986 that only *R. Rosea* has rosavin, rosin and rosarin. Since the properties of each of these and their synergism with salidroside seemed similar, they are generally referred to as "rosavins". The 1989 Soviet Pharmacopoeia changed the standards for *R. Rosea* extracts to contain a minimum of 3 percent rosavins and 0.8-1 percent salidroside to mimic the naturally occurring 3:1 ratio of these compounds. This has resulted in a marked improvement in the consistency of results in clinical trials and animal studies over the past decade, many of which have been impressive. These include a reduction in inflammation, promotion of weight loss, anti-cancer effects, relief of depression, prevention of stress-induced cardiac damage and arrhythmias and increased beta-endorphin production. The mechanisms of action responsible for some of these stress reduction benefits and *Rhodiola rosea's* effects on the heart are depicted below.





The above diagrams are taken from Brown, RP, Gerbarg PL, Ramazanov Z. *Rhodiola rosea: A Phytomedicinal Overview*. *HerbalGram*. 2002;56:40-52. As can be seen, there are numerous effects on the cerebral cortex, autonomic nervous system and endocrine glands that have been summarized by these three authors and some mention should be made about how they became interested in this. Richard P. Brown is a professor of psychiatry at Columbia University College of Physicians and Surgeons who has had a long interest in psychopharmacology and alternative medicine. His wife, Patricia L. Gerbarg, a professor of psychiatry at New York Medical College, had suffered an unexplained and incapacitating decline in her physical and mental energy. Based on various reports, her husband suggested trying *Rhodiola rosea*, which replenishes energy stores at the cellular level by increasing ATP. Within 10 days, she "felt like a different person", and it was subsequently discovered that her problem was due to undiagnosed Lyme disease. Since then, both doctors have immersed themselves in the study of *Rhodiola rosea*, including traveling to Russia to see the herb in its native habitat. They have successfully treated hundreds of patients for depression and other stress related disorders as described in their book, *The Rhodiola Revolution*, which is a scholarly introduction to this breakthrough in herbal medicine. Zakir Ramazanov, Ph.D., D.S., who stimulated much of this research based on his early experience in Afghanistan previously referred to, has served as Senior Scientist and Chief of the Department of Biotechnology at the Soviet Academy of Science. He has co-authored two books: *Arctic Root (Rhodiola rosea)*, *The powerful new Ginseng Alternative* and *Effective Natural Stress and Weight Management Using Rhodiola rosea and Rhododendron caucasicum* and is an authority on methods of extracting active compounds from Golden Root.

These and other investigators have emphasized the difficulty in obtaining authentic *Rhodiola rosea* in the U.S. because the public is bombarded with Tibetan and Indian "*Rhodiola*" products that purport to have the same properties but are inferior. Even those made from

the authentic Siberian plant may not be standardized correctly and there is no way to determine this, in contrast to other countries where supplements are regulated almost as strictly as prescription drugs. I discussed these issues with Dr. Ramazanov early last fall. Unlike Drs. Brown and Gerbarg, who have no affiliation with any *Rhodiola* supplement manufacturer, he was the President and CEO of National Biosciences Corporation located in nearby Chester, NY. He had just received a patent for "Novel composition for the treatment of obesity and effective fat loss promotion" with Aralox™ based on his research and he was invited to discuss this and explain his *Rhodiola rosea* formulation at our 2008 International Congress on Stress. He accepted enthusiastically but unfortunately died suddenly a few months later and his company no longer exists. It has been acquired by an overseas firm that apparently does not intend to market its products in the U.S. and we hope to find a suitable substitute for Dr. Ramazanov. In some instances, it is necessary for U.S. researchers to obtain the herb from abroad or to conduct their studies in conjunction with colleagues overseas to guarantee the accuracy of their results. The downside of this is that much of this exciting research is published in foreign languages or journals that are not readily accessible. For example, a recent report from the University of Massachusetts at Amherst and Hannam University in DaeJeon Korea, found that *Rhodiola rosea* significantly inhibited the activity of enzymes that contribute to the development of diabetes and hypertension, a finding with important clinical implications. (Young IK, Jang HD, Shetty K. Evaluation of *Rhodiola crenulata* and *Rhodiola rosea* for management of Type II diabetes and hypertension. *Asia Pac J Clin Nutr* 2006; 15 (3):425-432)

As noted in previous Newsletters, there are numerous supplements being promoted for stress reduction, including valerian, kava kava, lemon verbena, passion flower, ginseng, ginkgo, St. Johns' wort, chamomile and other teas. Although sales of these are apparently brisk, most have only anecdotal testimonials for support rather than solid scientific studies. While not strictly a supplement, chewing gum has been shown to reduce anxiety and stress in several well designed studies and one has only to look at the athletes, coaches and managers in a closely contested baseball game to see how many chew gum, tobacco or seeds to reduce their stress. Cranioelectrical stimulation, heart rate variability feedback and other bioelectromagnetic approaches can also provide very effective stress relief. We will devote a session to all the above and other "alternative" stress reduction approaches as well as pharmaceuticals that may be indicated in certain stress related complaints at our 2008 Congress – so stay tuned!

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