

## **Role of Novel Russian Adaptogenic Compounds in Restoration of Adrenal Function**

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Stress and stress-related disorders are a significant cause of disease in modern times, contributing to perhaps 75% of all illnesses. Western medicine has developed multiple approaches to coping with stress, including pharmaceutical drugs, exercise, and relaxation techniques like meditation. While these methods can provide some benefits, results are mixed and often unsatisfactory. In the East, researchers have also struggled to find solutions to stress-related problems. In Russia, after years of scientific investigation, scientists developed a unique approach to stress reduction and the prevention of stress-related symptoms.

Prior to the fall of the 'Iron Curtain,' information was a carefully regulated commodity in the Soviet Union. Ideas of a political or social nature were severely restricted from entering the USSR. On the other hand, Soviet scientists had unlimited access to the latest scientific ideas and breakthroughs from around the world. In fact, special Soviet scientific information centers were dedicated to the collection, analysis, and translation of a variety of international scientific publications. This dedication to the acquisition and dissemination of data meant that in many cases Soviet researchers had better access to Western science data than their western counterparts.

One important Western name that caught the attention of Soviet scientists was that of Hans Selye. Dr. Selye, a Canadian professor and leading pioneer in stress research, is internationally acknowledged as 'the father of stress.' Prior to his death in 1982, Dr. Selye had written more than 1,700 scholarly papers and 39 books on stress. Selye's research was to have a profound influence on Soviet scientists doing research for the military, sports and space programs.

Among the most memorable of Selye's contributions was his concept of the General Adaptation Syndrome (GAS). Selye first described GAS in 1936. The GAS involves three progressive stages. The first stage, the alarm reaction, is characterized by surprise and anxiety when a person is exposed to a new situation. During this stage the body reacts by producing epinephrine and norepinephrine, the 'flight or fight' hormones. Additionally, the adrenal cortex is stimulated to produce additional cortisol and related hormones.

The second stage, resistance, is characterized by adaptation, whereby the body learns to efficiently cope with the stressor. Selye noted that in humans, many of the diseases precipitated or caused by stress occur in the resistance stage. He refers to these as 'diseases of adaptation.' They include headaches, insomnia, high blood pressure, and cardiovascular and kidney diseases.

Ideally, the adaptive (resistance) stage continues until the stressful situation is resolved, leading to a rapid return to the resting state. Unfortunately, our capacity for adaptation is limited and highly individualized (i.e. what is stimulating to one person may be devastating to another). Just as a chain breaks at its weakest link, so too can exhaustion of our adaptive capacity result in stress-induced disease. In the presence of long-term exposure to the same stressor, we enter the third stage of GAS -- exhaustion. A depletion of energy reserves and loss of adaptational ability, leading to fatigue or other symptoms or diseases, characterize exhaustion.

This third stage is also sometimes referred to as adrenal maladaptation, or hyperadaptation (Dilman and Dean, 1992). Adrenal dysfunction may be manifested by (1) an excess or inadequacy of cortisol, DHEA, ACTH and/or CRF; (2) relative imbalances of these hormones and releasing factors, and (3) loss of sensitivity of the hypothalamus and pituitary to the normal inhibiting effects of these hormones.

Symptoms of patients suffering from adrenal maladaptation syndrome include:

- \* Fatigue
- \* Nervousness
- \* Severe PMS
- \* Salt craving
- \* Depression
- \* Inability to concentrate
- \* Carbohydrate craving
- \* Allergies (hay fever, asthma)
- \* Anxiety
- \* Headache
- \* Alcohol intolerance
- \* Muscular pain and tenderness
- \* Joint pains and tenderness (arthritis)
- \* Weakness

- \* Poor memory
- \* Palpitation
- \* Abdominal discomfort
- \* Alternate diarrhea and constipation
- \* Obesity
- \* Poor wound healing
- \* Glucose intolerance
- \* Moon face
- \* Purple striae
- \* Loss of bone density

(Tintera, 1955)

Dr. Nicholai Lazarev

Whereas Western scientists were slow to accept Selye's ideas of the General Adaptation Syndrome (GAS), his concept was readily accepted by leading Russian researchers. One of the first Soviet scientists to embrace Selye's adrenal maladaptation syndrome was Dr. Nicholai Lazarev, a pioneer in the then-emerging fields of toxicology and preventive medicine. Shortly after graduating from medical school in 1928, Lazarev started working on ways to prevent the damaging effects of new industrial chemicals on humans. In 1932, Lazarev discovered that different industrial chemicals, even in mild concentrations and small dosages, can cause similar alarm reactions, and that if exposure is prolonged, the body will adapt by altering its physiological response (resistance). This adaptive reaction tends to gradually disturb homeostasis, which is damaging to health.

Lazarev found that Selye's publication on stress confirmed his own findings. Selye proved that a variety of stressors -- not just chemical stressors -- can cause non-specific stress reactions. Selye's work was so influential, in fact, that Lazarev changed the direction of his work. He began looking not only for substances that could improve humans' general resistance to toxins, but could also correct the general adaptation reaction to all kinds of stressors, including both mental and physical stress.

From the beginning of the second World War, the Soviet government drafted all Soviet scientists -- including Dr. Lazarev -- to work on military projects. Lazarev's efforts again shifted, this time to finding substances that could help soldiers overcome fatigue and improve their performance on the battlefield. With the soldiers as unknowing guinea pigs for amphetamines and other stimulants, Lazarev learned that many drugs were very effective in improving performance in response to great challenges in extreme situations for very short terms. However, he realized that the stimulants were harmful when used for prolonged periods. When WWII ended, Lazarev switched his focus to natural alternatives.

### Traditional Herbs

Lazarev was especially intrigued by a group of herbs that ancient medical traditions referred to as 'elite' or 'kingly.' In Traditional Chinese Medicine these herbs were classified as effective for increasing physical and mental capacity, reducing fatigue, improving resistance to disease, and promoting life extension. In China, soldiers used these herbs before battle. In Siberia, hunters used the herbs before long and dangerous journeys. In 1948, Lazarev and his protege, Dr. Israel Brekhman, undertook the challenge of researching the utility and effectiveness of this group of plants that Lazarev named "adaptogens."

### Increased Stamina

A long distance runner, Brekhman chose stamina as an index of vitality. One cold morning in April 1948, 100 soldiers set out to run a 3-kilometer race. Prior to the race, half of them had been given an extract of ginseng, while the others received a placebo. Soldiers given the ginseng extract finished the race an average of 53 seconds ahead of the placebo group.

Unfortunately, ginseng had drawbacks, including its poor availability and high cost. Brekhman also found that its effectiveness varied among different people. For example, men responded to ginseng better than women, and the elderly benefited more when compared to the young and middle-aged. Furthermore, even a variation in dosing could lead to overstimulation.

Because of these factors, Brekhman and his team began to look for alternative plants. First they selected herbs able to survive in harsh environments. Russian scientists were convinced that the unique composition of biologically active substances of these herbs helped them to adapt and survive for millions of years through many cataclysmic changes in nature. Brekhman's scientific group determined that *Eleutherococcus sinensis*, commonly known as Siberian Ginseng, had even greater anti-fatigue properties than the better-known *Panax ginseng*.

### Synergistic Action

The mechanism by which adaptogens achieve their stressprotecting, normalizing action is well researched (mostly in the USSR and Japan). Adaptogens act to restore hypothalamic and peripheral receptor sensitivity to the effects of cortisol and other adrenal hormones. In this way, adaptogens enable the body to mount an appropriate stress response with lower amounts of cortisol than would otherwise be required. In addition, adaptogens help the adrenals return to normal more quickly. Brekhman's colleague, Dr. I.V. Dardymov, showed that adaptogens enhance utilization of glucose, resulting in lower levels of stress-induced hyperglycemia and hyperinsulinemia. These studies were confirmed by Professor Farnsworth's laboratory at the University of Chicago.

Clinicians have noticed that certain adaptogens act synergistically, and that they work best when combined. One of the leading researchers in adaptogen research today is Ben Tabachnik, PhD, who emigrated from Russia nearly a decade ago, bringing with him the accumulated knowledge of adaptogens, once guarded as a state secret by the Soviet government. Tabachnik pointed out that specific combinations of adaptogens are even more effective than when they are used separately. He also found that certain combinations were more effective at certain times, such as before competition or after competition, when they often speeded the recovery process.

Like Brekhman, Tabachnik found that adaptogens such as Siberian Ginseng (*Eleutherococcus sinensis*), Manchurian Thorn Tree, *Schisandra*, *Rhaponticum carthioides*, hawthorn extract, *Adjuga turkistanica*, and *Tribulus terrestris* act synergistically.

#### Eleutherococcus (Siberian Ginseng)

Brekhman and his colleagues were particularly impressed with their studies of *Eleutherococcus*. Preliminary studies soon led to a massive testing program with clinical trials conducted across the USSR. Researchers tested *Eleutherococcus* on factory workers, long distance truck drivers, sailors on long voyages, and military personnel under severe stress. The stress studies conducted with *Eleutherococcus*, included:

\* Soviet Olympic teams and other sports teams during training and competition. Result: Improved stamina and recovery, increased oxygen uptake, and better performance.

\* 1,000 Siberian miners. Result: Incidence of cases during influenza epidemic dropped by two-thirds.

\* 1,200 long distance truck drivers. Result: Improved productivity; incidence of influenza cases during an epidemic reduced by 30%.

\* 14,000 auto factory workers. Result: 30% decrease in total reported symptoms; 40% drop in symptoms of high blood pressure and heart disease.

\* 107 patients receiving anti-cancer drugs for gastric cancer. Result: 50% less impairment in immunity, 50% decrease in drug dosage.

In 1962, Eleutherococcus, the prototype adaptogen, was declared an official herbal medicine by the USSR Minister of Health and was included in the National Drug Guide, the pharmacopoeia of the USSR. Eleutherococcus was soon widely available, and patients, athletes, cosmonauts, and soldiers used it regularly as a restorative. The Soviet government realized that this new class of natural remedy could give the Soviets an advantage in many areas, including sports, the arts, space, military, and medicine. Consequently, they strongly supported the scientific projects of Lazarev and Brekhman.

### Schisandra

Schisandra is an herb widely used in ancient and modern China to treat a number of conditions. It is a powerful antioxidant and anabolic agent. Schisandra also promotes glycogenesis, the process that converts carbohydrates into glycogen. Glycogen is stored in the liver and muscles until it is needed and is then converted into glucose. This process helps spark the energy necessary to revitalize "stressed out" cells.

Research also indicates that Schisandra stimulates the central nervous system, possibly by increasing dopamine and its metabolites in the striatum and hypothalamus. Dopamine is a catecholamine synthesized by the adrenals and an immediate precursor in the synthesis of norepinephrine, which plays a pivotal role in helping the hypothalamus-pituitary-adrenal axis adjust to stress.

### Rhaponticum carthioides

Rhaponticum carthioides is an adaptogenic herb that helps prevent the catabolic state seen with stress. Components of Rhaponticum carthioides have demonstrated anabolic properties in clinical studies. Under conditions of daily aerobic and anaerobic training, patients who consumed a number of saponins isolated from Rhaponticum for three weeks lost fat and gained muscle mass. Similar results were achieved in animal experiments in which rats fed phytiexdizone-exdisterone (a component of Rhaponticum) for 7 days gained body weight. The amount of protein increased in the animals' liver, heart, and kidneys along with the weight of each of these organs.

### Tribulus terrestris

Much of the research on this herb has been conducted in association with the Bulgarian company Sopharma, which manufactures a Tribulus terrestris

supplement. In one of these studies, healthy males who took 750 milligrams of *Tribulus terrestris* daily for five days experienced a 72% increase in luteinizing hormone (LH) and a 40% increase in testosterone. Produced by the adrenal cortex in both males and females, testosterone is an important anabolic, anti-stress hormone. It accelerates growth in tissues on which it acts, stimulates blood flow and affects many metabolic activities.

## Manchurian Thorn Tree

(*Aralia manchurica*)

In any condition characterized by adrenal dysfunction, it is extremely important to stabilize blood sugar -- whether it is too high or too low--thereby alleviating a major metabolic stress on the body. Studies have shown that adaptogens help achieve extra stamina and energy by enhancing utilization of glucose. In oral glucose tolerance tests in rats, *Aralia* extracts have acted as hypoglycemic agents. Clinicians have found that *Aralia* can complement the adrenal-protective actions of other powerful adaptogens such as *Eleutherococcus*.

*Aralia* can work in conjunction with the herb Goat's rue (French Lilac), which contains guanadine, the herbal prototype of the anti-diabetic drug Metformin, a biguanide that restores insulin sensitivity. Goat's rue is one of the most effective natural ways to stabilize blood sugar, and can complement the action of adaptogens like *Aralia*.

## Diagnosis

Diagnosis of hyperadaptosis (Adrenal Maladaptation Syndrome) is usually based first on the presentation by a patient with a symptom spectrum from the table above. Often, treatment is initiated on an empirical basis, with no further testing, since the treatment is relatively benign and the likelihood of improvement so high. The "gold standard" in identifying adrenal dysfunction has been the long dexamethasone suppression test. Salivary hormone testing has made great advances in recent years, and is probably the least invasive and most convenient means of identifying adrenal dysfunction. Using multiple salivary samples, the time-related changes of the levels of DHEA and cortisol, as well as the DHEA/cortisol ratio can be evaluated. This test provides objective information on which to base an optimum therapeutic program, to restore proper balance and rhythm of cortisol and DHEA.

Therapeutic regimens could include short-term, low dose cortisone replacement as described by Dr. William Jefferies (licorice is also often used for this purpose) when cortisol is low, and appropriate doses of pregnenolone and/or DHEA. Although many adaptogens are often used individually with great benefit, a balanced combination of *Eleutherococcus*, Manchurian Thorn Tree,

Hawthorn Extract, Echinopanax Elatium and Schisandra that was developed specifically for the Soviet (now Russian) military, Olympic athletes, and cosmonaut program, was found to have a synergistic effect greater than when any of these substances were used individually. Each of these herbal adaptogens play a vital role in restoring hypothalamic and peripheral receptor sensitivity to cortisol, resulting in normalization of the diurnal rhythm and balance of adrenal hormones, increased energy, stamina and restoration of health.

Ward Dean, MD, is co-author of *The Neuroendocrine Theory of Aging*, with Vladimir Dilman, MD. Dr. Dean also has co-authored *Smart Drugs Nutrients* and is a speaker at many health-related conferences, including the annual Monaco Anti-Aging Conference in Monte Carlo. He is director of research and development for vitamin Research Products of Carson City, Nevada and oversees the company's Complementary Prescriptions program for physicians.

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