

RHODIOLA ROSEA MAY BE GOOD FOR YOUR HEART

The herb called golden root seems to reduce CRP,
a marker of systemic inflammation

Although the medical establishment has been notoriously slow to embrace the concept of preventive medicine, I'm finding that more of my patients are taking it seriously. Both men and women, even those in their 30s and 40s, are coming in for yearly physicals and the wide array of lab tests that usually accompany such workups. Probably the most requested test is for cholesterol levels, owing to the relentless barrage of warnings by the government and the media regarding the dangers—especially to our hearts—of high cholesterol.

I don't think getting the public worked up by hyping potential public health problems of questionable gravity is good preventive medicine. It does make sense, however, to heighten people's awareness of the grave dangers of high cholesterol and heart disease. Over 60 million Americans suffer from some form of cardiovascular disease, and a substantial minority of these people, about 13 million, have coronary artery disease, or CAD. This is the leading cause of death in the United States, and it's estimated that over 600,000 Americans will succumb to it this year. The impact of heart disease on health care costs is also staggering, running over \$200 billion a year.

Over 60 million Americans have cardiovascular disease, and of these, about 13 million have CAD, the leading cause of death in the USA. It will kill over 600,000 this year.

It is well accepted in the medical world that high levels of LDL-cholesterol (the "bad cholesterol") put us at high risk for cardiovascular disease, mainly because they foster the development of atherosclerosis, in which cholesterol-rich plaques build up in our blood vessels. This not only restricts the flow of blood but also damages the walls of the vessels themselves, and it sets us up for heart



attacks. LDL-cholesterol, however, is by no means the only culprit in CAD, which is a multistage process that takes years to develop and manifest. Other pathological processes, such as oxidation (caused by free radicals) and chronic inflammation, are thought to be major factors.

Elevated CRP = Inflammation = Disease

C-reactive protein (CRP) is a protein produced and released by the liver in response to acute or chronic inflammation. In acute episodes, such as pneumonia, it is released rapidly and can soar to several hundred times normal levels. We now know, however, that even very small,

Dr. Rosich is an attending physician and clinical assistant professor of medicine at Pennsylvania State University, where he specializes in preventive and alternative medicine. He also holds a master's degree in healthcare administration.

but chronic, increases in CRP above healthy levels are significant and ominous, because they signal a silent, asymptomatic inflammatory condition that may be associated with a number of diseases, including heart disease.¹

In fact, CRP levels are now being used to estimate the extent of heart damage during and after heart attacks. One recent study showed that high CRP in people who suffer their first heart attack is strongly predictive of future heart attacks, while low CRP suggests a reduced chance of having another attack.²

CRP May Be Better Than LDL as a Predictor

Another study compared CRP and LDL-cholesterol levels as predictors of heart disease.³ Both substances were measured in 27,939 women, who were then monitored for major cardiovascular events (heart attack, stroke, or cardiac death) for 8 years. After analyzing the data, the authors concluded that CRP is a better predictor of cardiovascular events than LDL-cholesterol.

Even in people whose cholesterol levels are normal, high CRP levels can help predict asymptomatic heart disease, since inflammation in the inner walls of arteries is a major factor in the disease process.⁴ It seems reasonable to hypothesize that medications or supplements that suppress this inflammatory process—thereby lowering CRP levels—might help prevent heart disease. (For more on this topic, see “Multivitamins Reduce Risk for Heart Disease and Diabetes” in the April 2004 issue.)



Rhodiola rosea—An Herbal Tonic

The herb *Rhodiola rosea*, also known as golden root, is used in Asia and Europe for combating fatigue and depression, enhancing work performance, and helping people to cope with stress.⁵ Although many species of *Rhodiola* are used in folk medicine in that part of the world, it is *R. rosea* that has garnered the most attention—and the most scientific scrutiny. The benefits of both the physiological and psychological effects of this herb-with-the-beautiful-name are thought to be mediated by the actions of chemical compounds called **rosavins** and **salidroside**, which are found in the root of the plant.

Can *Rhodiola rosea* Reduce Muscle Damage?

In a recent study in Moscow, Russian researchers examined the effects of a *Rhodiola rosea* extract on the blood levels of CRP and creatine kinase (CK) in a group of healthy but untrained young adults before and after a session of very strenuous physical exercise.⁶ CK is an enzyme found most abundantly in skeletal muscles, but also in the heart and brain. It plays a key role in cellular energy metabolism by catalyzing the production of phosphocreatine, a molecule that is one of the principal sources of energy for muscle contraction.

During strenuous physical activity, the levels of both CRP and CK are known to rise, which can indicate some degree of inflammatory muscle damage. The researchers hypothesized that *R. rosea* might be able to suppress this damage, the evidence for which would be less-than-normal increases in CRP and CK levels.

The 36 volunteers (aged 21–24) for this double-blind, placebo-controlled study were randomized into three groups of 12 each. For 30 days before and for 6 days after the exercise test, Group 1 received 340 mg of a *Rhodiola rosea* extract containing 30 mg of “active substances” twice daily (for a total of 680 mg/day), while Group 2 received 340 mg of placebo twice daily; Group 3 served as independent controls (for no stated reason) and did not receive either substance.

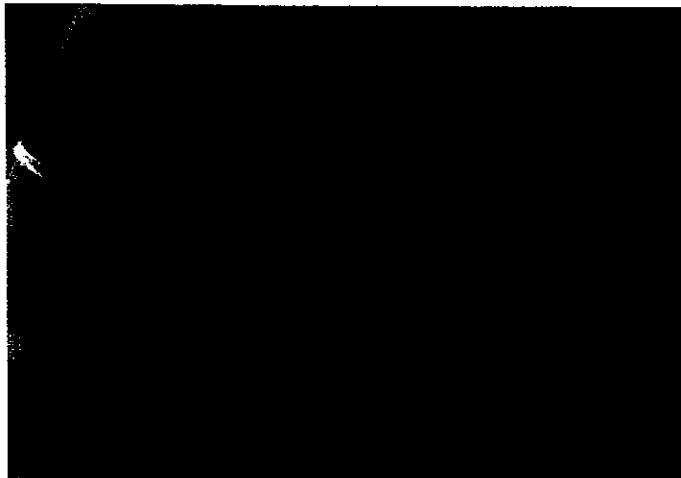
It seems reasonable to hypothesize that medications or supplements that suppress the inflammatory process—thereby lowering CRP levels—might help prevent heart disease.

The physical workout was conducted with a computer-aided bicycle ergometer, which can measure the amount of energy expended. The exercise was initially pegged at a puny power output of 20 watts, but this requirement was increased by 10 watts every minute until the volunteers became so exhausted that they could no longer pedal at the rate of 60 rpm. The researchers drew blood from the volunteers 5 hours later and again 5 days after that, to measure their CRP and CK levels. These data were then compared with similar measurements that had been made 30 days before the test, and again 30 minutes before the test.

***Rhodiola rosea* Reduced CRP and CK Levels**

As expected, the exercise raised the CRP and CK levels in all the volunteers—but not equally in the three groups. At the post-exercise 5-hour mark, CRP levels had increased about 4-fold in Groups 2 and 3, but only about 2-fold in Group 1, signifying less muscle inflammation with the *Rhodiola rosea*. After 5 days, the CRP levels in Groups 2 and 3 were still quite high, whereas in Group 1

they had returned to normal. With CK, the levels in all three groups had risen about 10-fold by the 5-hour mark. After 5 days, the CK levels in Groups 2 and 3 had risen further, to about 15-fold, whereas in Group 1 they had dropped to about 7-fold, signifying a marked tendency toward recovery with the *Rhodiola rosea*.



Unfortunately, although these results are intriguing and worthy of follow-up, our confidence in their validity is undermined by the very poor reporting in this study, which was sketchily written, with much vital information missing, e.g., the gender(s) of the volunteers, the quantitative composition of the “active substances” in the *Rhodiola rosea* extract, the blinding protocol, and the side-effects profile.

Can *Rhodiola rosea* Improve ATP Synthesis?

The same Russian research group studied the effects of *Rhodiola rosea* and *Rhodiola crenulata* extracts (the latter is a medicinal plant found in Uzbekistan, China, and other Asian countries) on the ATP content of muscle-cell mitochondria in laboratory rats before and after strenuous exercise.⁷ ATP (adenosine triphosphate) is the body’s principal energy molecule, acting as a reservoir for the chemical energy produced in mitochondria (our cellular “powerhouses”) by the metabolism of food.

The exercise test consisted of forced swimming to exhaustion in a small tank with no way out. The dosages of the two *Rhodiola* species used were very large—50 mg/kg, which is equivalent to 3750 mg for a 75-kg (165-lb) human—and they were administered via a gastric tube 30 minutes before each swimming session. A control group (no *Rhodiola*) was also tested. After six daily sessions, the rats were killed so that muscle samples could be taken for chemical analysis.

***Rhodiola rosea* Helped Maintain ATP Levels**

Compared with the control rats, the rats given *Rhodiola rosea* had significantly greater exercise capacity: their mean time until exhaustion in the swimming test was about 25% greater. By contrast, *Rhodiola crenulata* had no

effect. A similar benefit was seen for *R. rosea* (but again none for *R. crenulata*) in the measurements of the rats' mitochondrial ATP levels. In all three groups of rats, these levels decreased as a result of the exercise, but by only 10% with *R. rosea*, vs. 30% with *R. crenulata* and in the controls.

In the group receiving *Rhodiola rosea*, the CRP levels were much less elevated, signifying less muscle inflammation. The same was true of the CK levels, signifying a marked tendency toward recovery.

The researchers noted that *R. rosea* contains both rosavins and salidroside, whereas *R. crenulata* contains salidroside (about 2.5 times as much as *R. rosea*) but no rosavins. Hence it appears that the effects of *R. rosea* in this study were probably due to the rosavins and not the salidroside.

***Rhodiola rosea* in an Ideal World**

Although the medical establishment is embracing CRP testing as an important new diagnostic tool, there is some fear of a media-driven stampede of demand for it by patients. It would be a mistake to place too much faith in CRP (or anything else) as a predictor of risk for heart disease or other chronic diseases, and there are sound reasons for maintaining a healthy skepticism regarding its use when it's not clearly warranted.

Nonetheless, it seems likely that CRP testing will, justifiably, become increasingly common in the future. How nice it would be, though, if such testing became increasingly unnecessary because people took better care of themselves through sensible diet and exercise and, yes, nutritional supplements—including those, such as *Rhodiola rosea*, that may be able to suppress inflammation and protect the heart. *

REFERENCES

1. Elgharib N, Chi DS, Younis W, et al. C-reactive protein as a novel biomarker. *Postgrad Med* 2003;114(6):39-44.
2. Bazzino O, Ferreiros ER, Pizarro R, et al. C-reactive protein and the stress tests for the risk stratification of patients recovering from long-standing stable angina pectoris. *Am J Cardiol* 2001;87(11):1235-9.
3. Ridker PM, Rifai N, Rose L, et al. Comparison of C-reactive protein and low-density lipoprotein cholesterol levels in the prediction of first cardiovascular events. *NEJM* 2002;347(20):1557-65.
4. Ridker PM, Hennekens CH, Buring JE, Rifai N. C-reactive protein and other markers of inflammation in the prediction of cardiovascular disease in women. *NEJM* 2000;342:836-43.
5. Kelly GS. *Rhodiola rosea*: a possible plant adaptogen. *Alt Med Rev* 2001; 6(3):293-302.
6. Abidov M, Grachev S, Seifulla RD, Ziegenfuss TN. Extract of *Rhodiola rosea* radix reduces the level of C-reactive protein and creatine kinase in the blood. *Bull Exp Biol Med* 2004;138(7):63-4. [Transl from Russian]
7. Abidov M, Crendal F, Grachev S, Seifulla R, Ziegenfuss T. Effect of extracts from *Rhodiola rosea* and *Rhodiola crenulata* (Crassulaceae) roots on ATP content in mitochondria of skeletal muscles. *Bull Exp Biol Med* 2003;136(12):585-7. [Transl from Russian]

RHODIOLA

Rhodiola rosea can improve the ability to withstand physical and emotional stress, and enhance mental performance.

Rhodiola rosea has been extensively studied in Russia and in Scandinavian countries for over 35 years. It is categorized as an adaptogen because of its ability to increase resistance to chemical, biological, and physical stressors. Supplementation allows the person to pre-adapt in anticipation of physical, mental, or emotional stress. *Rhodiola* has been found to inhibit stress-induced depletion of adrenal catecholamines and to facilitate the transport of neurotransmitters within the brain. Experimental studies found *Rhodiola* prevented stress-induced cardiac damage.

Studies have found *Rhodiola* leads to improvements in learning and memory retention. Clinical studies have found supplementation benefited mental performance in physicians on night duty. Medical students given the herb during exam periods reported significant improvements in mental performance, general wellbeing, physical fitness, improved sleep patterns, reduced need for sleep, greater mood stability, and greater motivation to study. Russian

studies suggest a role for *Rhodiola* in asthenic conditions – defined as a decline in work performance, poor appetite, sleep disturbances, irritability, headaches, and fatigue.

Antitumor effects were noted in a number of animal tumor models. It was also noted to enhance the effect and decrease the side effects of chemotherapy drugs – cyclophosphamides and Adriamycin.

The adaptogenic properties, cardiopulmonary protective effects, and central nervous system activities of *Rhodiola rosea* have been attributed primarily to its ability to influence levels and activity of monoamines, and opioid peptides such as beta-endorphins. It is believed these changes in monoamine levels are a result of *Rhodiola rosea* inhibiting the activity of the enzymes responsible for monoamine degradation, monoamine oxidase and catechol-O-methyltransferase.

Dosage of a *Rhodiola* extract containing two-percent rosavins is 100 mg two to three times daily. Dosages of 200 mg three times daily may be used during periods of acute stress.