

Red Yeast Rice with Botanical and Nutritional Compounds to Modulate Lipid Metabolism

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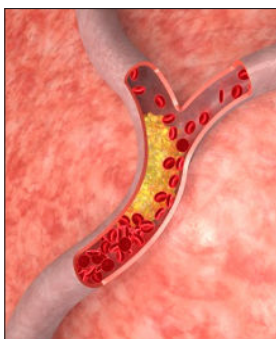
Discussion

HYPERLIPIDEMIA

Hyperlipidemia refers to elevated serum lipids. While most people with hyperlipidemia have no symptoms, it often occurs in tandem with other health issues including obesity and adult onset diabetes. High serum lipids are associated with cardiovascular disease as they contribute to blockage, thickening, or hardening of the arteries. According to 2012 data, over 100 million American adults over 20 years old have total cholesterol levels of 200mg/dL or greater and almost 31 million have levels of 240 mg/dL or greater. High cholesterol is associated with a two-fold increase in the risk for developing heart disease.¹⁻⁵

According to the CDC (Centers for Disease Control and Prevention), figures from the 2015 AHA (American Heart Association) report show that about 32% of adults in the US have high LDL cholesterol. The CDC estimates that only one out of every three adults with high LDL cholesterol has this condition under control.⁴

The AHA 2015 Statistical Update comments that it considers a suboptimal diet to be the leading risk factor in the U.S. for death and disability, including cardiovascular disease, and recommends improving diet, lifestyle, and physical activity parameters to positively influence cardiovascular health.³ Both AHA and CDC guidelines recommend regular exercise, a healthy diet, and not smoking to help prevent and reduce high cholesterol levels.



Cholesterol building up in the arteries, lessening the flow of blood. (See reference #1)

Cholesterol, a waxy lipid, is critical for the proper functioning and development of the body. It is used to build cell membranes, create hormones, and is

essential to immune health and tissue repair. Elevated LDL cholesterol (LDL-c) and low HDL cholesterol (HDL-c) in the presence of prolonged inflammation along with oxidation of LDL cholesterol is known to contribute to atherosclerosis, cardiovascular disease, and other degenerative conditions.⁶⁻⁹

SYNERGISTIC COMPOUNDS

Throughout history, traditional cultures have used herbs both medicinally and as part of their daily diet to promote health and to prevent disease. Asian and Mediterranean cultures knew that certain herbs, spices, and herbal teas ameliorate the influence of dietary fats and enhance health. Modern research finds that specific botanical and nutrient compounds are effective to help normalize lipid levels. Herbal and natural compounds are widely studied for their benefits to cardiovascular health, ability to enhance blood flow, and to promote healthy serum cholesterol and blood vessel integrity.

When combined, these premier compounds can enhance a healthy lifestyle program to restore lipid balance and support cardiovascular health. Red yeast rice, polyphenols, and policosanol are found to primarily inhibit cholesterol synthesis through their action on the HMG-CoA reductase enzyme. Plant sterols are found to reduce intestinal absorption of cholesterol. Herbs and compounds including artichoke leaf extract are found to be hepato-protective.

Studies find that natural compounds combined together provide a synergistic effect, which works to support health while calming inflammatory pathways and effectively lowering serum cholesterol.^{10,11} Combinations of compounds, each of which work through different or overlapping mechanisms of action, can enhance therapeutic actions and benefits.

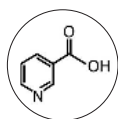
One group studied a product containing red yeast rice,

policosanols (from sugar cane), and artichoke leaf extract. They found both LDL-c and total cholesterol (TC) were effectively reduced.¹² Another study investigated the use of a similar combination product and found it effective to reduce LDL-c, TC and apolipoprotein B after 16 weeks of supplementation.¹³

DESIRABLE CHOLESTEROL LEVELS	
Total cholesterol	Less than 200 mg/dL
LDL (“bad” cholesterol)	Less than 100 mg/dL
HDL (“good” cholesterol)	60 mg/dL or higher
Triglycerides	Less than 150 mg/dL

Source: http://www.cdc.gov/dhdsp/data_statistics/fact_sheets/fs_cholesterol.htm

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Niacin (as Inositol Nicotinate)

Niacin (vitamin B3) is widely recognized as beneficial to both cholesterol and triglyceride levels. As nicotinic acid, it is found to exert a potent influence on lipids, encouraging healthy levels of both HDL-C (helping it to rise) and LDL-C (helping to lower unhealthy levels). It is also found to help normalize serum lipoprotein-a and triglycerides. Numerous clinical trials show that niacin helps reduce the risk of coronary artery disease and is considered to possibly be one of the most potent agents to help increase HDL-C to healthy levels.^{14,15}

Inositol nicotinate, a non-flushing form of niacin, is slowly metabolized by the body into niacin and inositol. This enhances sustained, increased serum and plasma levels of free nicotinic acid, which helps improve its therapeutic benefit.¹⁵ A study with animals found significant reduction of elevated serum lipids with inositol hexanicotinate.¹⁶



Red Yeast Rice (*Monascus purpureus*)

Red yeast rice is a fermented rice product used in Chinese cuisine for centuries as a medicinal food to promote healthy blood circulation. It contains naturally occurring monacolins, including monacolin K, along with

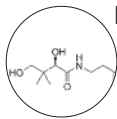
isoflavonoids, monounsaturated fats, and sterols (including beta-sitosterol, campesterol, stigmasterol, and sapogenin). Many studies report the effectiveness of red yeast rice's ability to help lower serum lipids. While red yeast rice may help lower lipids through a variety of pathways, the most well understood is the ability of monacolins to act as HMG-CoA reductase inhibitors.^{5,17-22}



Artichoke (*Cynara scolymus*)

Artichoke leaf, a favorite herb in European and American traditions, is traditionally used to enhance liver health. It is found to contain a variety of natural constituents including chlorogenic acid and cynarin, which offer strong antioxidant protection. Artichoke leaf extract has been shown to neutralize free radicals and support healthy levels of LDL and HDL cholesterol. It is also found to inhibit oxidation of low-density lipoprotein and to reduce cholesterol biosynthesis.^{23,24}

One proposed mechanism of action for Artichoke leaf extract is its ability to inhibit hepatic cholesterol biosynthesis.²⁵⁻²⁷ A study suggests that Artichoke leaf extract enhances an increase in HDL-c at the same time it supports a reduction in total cholesterol and LDL-c.²⁸



Pantethine

Pantethine, naturally synthesized in the body from pantothenic acid (vitamin B5), is found to exert a beneficial influence on lipoprotein metabolism. It works through various pathways including through increasing CoA (acetyl-coenzyme). CoA is involved in the transport of fatty acids to and from cells and the mitochondria.²⁹⁻³³

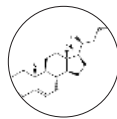
Pantethine is found to exert significant lipid-lowering activity. In several clinical trials it was shown to reduce serum triglyceride and cholesterol levels while increasing HDL-c. In one human study, pantethine was found to significantly reduce TC, LDL-c and apolipoprotein B after 16 weeks. This was a randomized, triple-blinded, placebo-controlled study with 32 subjects who had initiated therapeutic lifestyle changes and were considered at low to moderate risk of cardiovascular disease.²⁹ Another clinical trial, in Japan, with 57 participants also found significant reduction of LDL-c and TC.³⁰



Guggul (*Commiphora mukul*)

Guggul, a plant resin from the Mukul tree, has been valued and used for thousands of years in Ayurvedic and Chinese medicines. It is traditionally used to benefit health through its wide biological influence. Guggul is found to significantly lower serum lipids, influencing both total cholesterol and triglyceride levels. It also lowers VLDL and LDL-c, with the ability to elevate the beneficial HDL-c.³⁴⁻³⁸ These actions are attributed to a group of compounds in Guggul known as guggulsterones. It is believed that Guggul works directly to improve the liver's ability to process, metabolize, and excrete cholesterol.

Guggul also possesses antioxidant and anti-inflammatory attributes. In one recent study, it was found that Guggul and its cholesterol-lowering component guggulsterone effectively inhibited LDL oxidation.³⁶⁻³⁷



Beta-Sitosterol

Phytosterols, including Beta-Sitosterol, occur naturally in many foods and are found to be beneficial to overall health. Though these naturally-occurring plant sterols structurally resemble cholesterol, they are found to help lower serum cholesterol levels. This is attributed to their ability to block intestinal absorption of cholesterol and studies report they effectively reduce LDL-c and TC. Phytosterol consumption may also increase the activity of antioxidant enzymes and thereby reduce oxidative stress.³⁹⁻⁴³

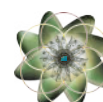


Policosonal

Policosonal is a natural waxy component of whole cane sugar that is comprised of a mixture of aliphatic long chain fatty alcohols - primarily octacosanol. Policosonal derived from whole cane sugar is found to contain around 60% higher octacosanol than honeybee wax and has undergone many clinical trials that confirm its cholesterol-lowering influence. Policosanol is found to significantly lower TC and LDL-c. Octacosanol is found to increase endurance and oxygen utilization during exercise.

Policosonal appears to work through the liver to decrease total serum cholesterol levels. It is also found to inhibit the development of atherosclerotic lesions and to improve peripheral blood flow. Policosanol is reported to benefit smooth muscle cell proliferation, inhibit platelet aggregation, and to help prevent LDL peroxidation.⁴⁴⁻⁴⁷

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.



References

1. <http://www.cdc.gov/cholesterol/facts.htm>
 2. http://www.cdc.gov/dhdsp/data_statistics/fact_sheets/fs_cholesterol.htm
 3. Mozaffarian D, Benjamin EJ, et al. *Heart Disease and Stroke Statistics—2015 Update: A Report from the American Heart Association*. Circulation. 2014 Dec 17.
 4. CDC. *Vital signs: prevalence, treatment, and control of high levels of low-density lipoprotein cholesterol*. United States, 1999–2002 and 2005–2008. MMWR. 2011. 60(4):109–114.
 5. Feuerstein JS, Bjerke WS. *Powdered Red Yeast Rice and Plant Stanols and Sterols to Lower Cholesterol*. J Diet Suppl. 2012 Apr 25.
 6. Li JJ, Chen JL. *Inflammation may be a bridge connecting hypertension and atherosclerosis*. Med Hypotheses. 2005. 64(5):925–929.
 7. Rifai N, Ridker PM. *Inflammatory markers and coronary heart disease*. Curr Opin Lipidol. 2002 Aug. 13(4):383–389.
 8. Blake GJ, Ridker PM. *Inflammatory mechanisms in atherosclerosis: from laboratory evidence to clinical application*. Ital Heart J. 2001 Nov. 2(11):796–800.
 9. Osiecki H. *The role of chronic inflammation in cardiovascular disease and its regulation by nutrients*. Alt Med Rev. 2004 Mar. 9(1):32–53.
 10. Barbagallo CM, Cefalu AB, et al. *Role of nutraceuticals in hypolipidemic therapy*. Frontiers in Cardiovascular Medicine. 2015 May. 2(22).
 11. Cicero AF, Colletti A. *Combinations of phytomedicines with different lipid lowering activity for dyslipidemia management: The available clinical data*. 2015 Nov 10. Phytomed. doi: 10.1016/j.phymed.2015.10.011.
 12. Ogier N, Amlot MJ, et al. *LDL-cholesterol-lowering effect of a dietary supplement with plant extracts in subjects with moderate hypercholesterolemia*. Eur J Nutr. 2013 Mar. 52(2):547–57. doi: 10.1007/s00394-012-0357
 13. Barrat E, Zair Y, et al. *A combined natural supplement lowers LDL cholesterol in subjects with moderate untreated hypercholesterolemia; a randomized placebo-controlled trial*. In J Food Sci Nutr. 2013 Nov. 64(7):882–889. 10.3109/09637486.2013.809405. Epub 2013 Jul 2.
- ### Niacin
14. Crouse JR. *New developments in the use of niacin for treatment of hyperlipidemia: new considerations in the use of an old drug*. Coronary Artery Disease 1996. 7:321–326.
 15. O'Hara JO, Jolly PN, Nicol CG. *The therapeutic efficacy of inositol nicotinate (Hexopal(R)) in intermittent claudication: a controlled trial*. Br J Clin Pract. 1988. 42(9):377–383.
 16. El-Enein A, Ahmed M, et al. *Role of nicotinic acid and inositol hexanicotinate as anticholesterolemic and antilipemic agents*. Nutr Reports Int. 1983. 28:899–911.
- ### Red Yeast Rice
17. Heber D, Yip I, et al. *Cholesterol-lowering effects of a proprietary Chinese red-yeast-rice dietary supplement*. Am J Clin Nutr. 1999. 69:231–236.
 18. Li C, Li Y, Hou Z. *Toxicity study for Monascus purpureus (red yeast) extract*. Information of the Chinese Pharmacology Society. 1995. 12(4):12.
 19. Li C, Zhu Y, et al. *Monascus Purpureus-Fermented Rice (Red Yeast Rice): A natural food product that lowers blood cholesterol In animal models of hypercholesterolemia*. Nutrition Research. 1998. 18(1):71–81.
- ### Artichoke Leaf
20. Ma J, Li Y, et al. *Constituents of red yeast rice, a traditional Chinese food and medicine*. J Agric Food Chem. 2000. 48:5220–5225.
 21. Qin S, Zhang W, et al. *Elderly patients with primary hyperlipidemia benefited from treatment with a Monascus purpureus rice preparation: A placebo-controlled, double-blind clinical trial*. American Heart Association. 39th Annual conference on Cardiovascular Disease Epidemiology and Prevention, Orlando, Fl. March 1999. [Abstract]
 22. Wang J, Lu Z, et al. *Multicenter clinical trial of serum lipid-lowering effects of a Monascus purpureus (red yeast) rice preparation from traditional Chinese medicine*. Curr Ther Res. 1997. 58(12):964–978.
23. Küçükgergin C, Aydin AF, et al. *Effect of artichoke leaf extract on hepatic and cardiac oxidative stress in rats fed on high cholesterol diet*. Biol Trace Elem Res. 2010 Jun. 135(1-3):264–274. doi: 10.1007/s12011-009-8484-9. Epub 2009 Aug 4.
 24. Dorn, M. *Improvement in Raised Lipid Levels with Artichoke Juice (Cynara scolymus)*. Brit J Phytotherapy. 1995. 4(1):21–26.
 25. Montini M, Levoni P, et al. *Controlled application of cynarin in the treatment of hyperlipemic syndrome. Observations in 60 cases*. Arzneimittelforschung. 1975. 25(8):1311–1314.
 26. Lupattelli G, Marchesi S, et al. *Artichoke juice improves endothelial function in hyperlipemia*. Life Sci. 2004 Dec 31. 76(7):775–782.
 27. Pittler MH, Thompson CO, Ernst E. *Artichoke leaf extract for treating hypercholesterolaemia*. Cochrane Database Syst Rev. 2002. (3):CD003335.
 28. Rondanelli M, Giacosa A, et al. *Beneficial effects of artichoke leaf extract supplementation on increasing HDL-cholesterol in subjects with primary mild hypercholesterolaemia: a double-blind, randomized, placebo-controlled trial*. Int J Food Sci Nutr. 2013 Feb. 64(1):7–15. Epub 2012 Jun 29.
- ### Pantethine
29. Evans M, Rumberger JA, et al. *Pantethine, a derivative of vitamin B5, favorably alters total, LDL and non-HDL cholesterol in low to moderate cardiovascular risk subjects eligible for statin therapy: a triple-blinded placebo and diet-controlled investigation*. Vasc Health Risk Manag. 2014 Feb 27. 10:89–100. doi: 10.2147/VHRM.S57116.
 30. Nomura H, Kimura Y, et al. *Effects of antihyperlipidemic drugs and diet plus exercise therapy in the treatment of patients with moderate hypercholesterolemia*. Clin Ther. 1996 May-Jun. 18(3):477–482.
 31. Arsenio L, Bodria P, et al. *Effectiveness of long-term treatment with pantethine in patients with dyslipidemia*. Clin Ther. 1986. 8(5):537–545.
 32. McCarty MF. *Inhibition of acetyl-CoA carboxylase by cystamine may mediate the hypotriglyceridemic activity of pantethine*. Med Hypotheses. 2001 Mar. 56(3):314–317.
 33. Gaddi A, Descovich GC, et al. *Controlled evaluation of pantethine, a natural hypolipidemic compound, in patients with different forms of hyperlipoproteinemia*. Atherosclerosis. 1984 Jan. 50(1):73–83.
- ### Guggul
34. Urizar NL, Moore DD. *Gugulipid: a natural cholesterol-lowering agent*. Annu Rev Nutr. 2003. 23:303–313. Epub 2003 Feb 26.
 35. Verna SK, Bordia A, *Effect of Commiphora mukul resin (gumguggul) in*

patients of hyperlipidemia with special reference to HDL. *Ind. J Med. Res.* 1988. 87:356-360.

36. Wang X, Greilberger J, et al. *The hypolipidemic natural product Commiphora mukul and its component guggulsterone inhibit oxidative modification of LDL.* *Atherosclerosis.* 2004 Feb. 172(2):239-246.
37. Singh V, Kaul S, et al. *Stimulation of low density lipoprotein receptor activity in liver membrane of guggulsterone treated rats.* *Pharmacol Res.* 1990 Jan-Feb. 22(1):37-44.
38. Singh RB, Niaz MA, Ghosh S. *Hypolipidemic and antioxidant effects of Commiphora mukul as an adjunct to dietary therapy in patients with hypercholesterolemia.* *Cardiovasc Drugs Ther.* 1994 Aug. 8(4):659-664.

Beta-Sitosterol

39. Lau VW, Journoud M, Jones PJ. *Plant sterols are efficacious in lowering plasma LDL and non-HDL cholesterol in hypercholesterolemic type 2 diabetic and nondiabetic persons.* *Am J Clin Nutr.* 2005 Jun. 81(6):1351-1358.
40. Cater NB, Garcia-Garcia AB, et al. *Responsiveness of plasma lipids and lipoproteins to plant stanol esters.* *Am J Cardiol.* 2005 Jul 4. 96(1A):23D-28D.
41. von Bergmann K, Sudhop T, Lutjohann D. *Cholesterol and plant sterol absorption: recent insights.* *Am J Cardiol.* 2005 Jul 4. 96(1A):10D-14D. Review.

42. Moghadasian MH, Frohlich JJ. *Effects of dietary phytosterols on cholesterol metabolism and atherosclerosis: clinical and experimental evidence.* *Am J Med.* 1999. 588-594.
43. Woyengo TA, Ramprasath VR, Jones PJH. *Anticancer effects of phytosterols.* *Eur J Clin Nutr.* 2009. 63:813-820. doi:10.1038/ejcn.2009.29

Policosanol

44. Mas R, Castano G, et al. *Effects of policosanol in patients with type II hypercholesterolemia and additional coronary risk factors.* *Clin Pharmacol Ther.* 1999 April. 65:439-447.
45. Arruzazabaia ML, Noa M, et al. *Protective effects of policosanol on atherosclerotic lesions in rabbits with exogenous hypercholesterolemia.* *Braz J Med Biol Res.* 2000. 33:835-840.
46. Castano G, Mas, R, et al. *Effects of policosanol 20 versus 40 mg/day in the treatment of patients with type II hypercholesterolemia: a 6-month double-blind study.* *Int J Clin Pharmacol Res.* 2001. 21(1):43-57.
47. Gouni-Berthold I, Berthold HK. *Policosanol: clinical pharmacology and therapeutic significance of a new lipid-lowering agent.* *Am Heart J.* 2002 Feb. 143(2):356-65.

