

## **Policosanol (saccharum officinarum): An Effective Natural Supplement to Lower Cholesterol**

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Policosanol is a natural health product that is principally used to reduce elevated blood cholesterol levels, aiding in the prevention of cardiovascular disease. It has been shown in many therapeutic trials to be an effective and safe cholesterol-lowering supplement, capable of reducing cholesterol equally as well as most statin drugs used for this purpose. Statin drugs, which inhibit the HMG-CoA reductase enzyme in the liver (thereby inhibiting cholesterol synthesis), are known to cause liver damage and other adverse side-effects in certain individuals. Policosanol shows a similar therapeutic effect to many cholesterol-lowering drugs, without any apparent risk of liver damage. As such, natural health practitioners should be aware of the scientific evidence pertaining to the cholesterol-lowering effects of policosanol and its safety profile, including potential drug-nutrient interactions. The following discussion highlights the important physiological and clinical considerations that should enable health care practitioners to recommend and/or dispense nutritional supplement products that contain policosanol, to help reduce high cholesterol in their patients.

### General Features

Policosanol, a natural compound derived from sugar cane wax, has been shown to significantly reduce high cholesterol in human and animal studies. It also has been shown to reduce platelet stickiness, improve blood flow and aid patients with intermittent claudication and non-insulin-dependent diabetes mellitus.<sup>1,2,3</sup> The efficacy, safety and lack of toxicity of this natural health product make it a very desirable supplement in the management of high cholesterol, as it has been shown to reduce cholesterol levels equally as well as many prescription medications, without producing significant side-effects.<sup>4,5</sup>

### Principal Active Constituents

Policosanol is a mixture of higher primary aliphatic alcohols isolated from sugar cane wax; its main component is octacosanol. Octacosanol is a long-chain fatty alcohol (similar in structure to cholesterol, which is also an alcohol). Policosanol is a combination of octacosanol and several other long-chain alcohols - hence the name: *poli-cosanol*. Keeping octacosanol together with other naturally occurring fatty alcohols makes it more stable and seems to enhance the efficacy of this supplement.<sup>1,4</sup>

### Clinical Application and Mechanism of Action

**Cholesterol Lowering** - Policosanol has been shown to reduce high levels of blood cholesterol to a significant degree (LDL cholesterol reduction by 20%) in human and animal studies. Its mechanism of action is not completely understood, but it is known to suppress cholesterol synthesis in the liver. This effect appears to be related to its modulation of the HMG-CoA reductase enzyme, a rate-

limiting enzyme in cholesterol synthesis. However, it is neither officially considered an HMG-CoA reductase inhibitor (as are statin drugs), nor does it produce the side-effects associated with the use of statin drugs, which include potential liver damage, muscle pain, fatigue, dizziness, skin rash, diarrhea, heartburn, and male impotence.<sup>4,6,30</sup> Large trials over long periods have demonstrated that policosanol supplementation can lower and maintain blood cholesterol levels as well as most conventional drugs, without producing untoward side-effects.<sup>1,4,7,8,9</sup>

**Human Trials** - A review of clinical trials using policosanol to lower cholesterol levels in humans appeared in the *American Heart Journal* in 2002. A review of the available peer-reviewed journal publications revealed that policosanol, administered at doses of 10 to 20 milligrams per day, lowers total cholesterol by 17% to 21% and low-density lipoprotein (LDL) cholesterol by 21% to 29%, and raises high-density lipoprotein (HDL, the good cholesterol) by 8% to 15%. The researchers state that because higher doses have not been tested up to now, it cannot be excluded that effectiveness may be even greater. Daily doses of 10 milligrams of policosanol have been shown to be equally effective in lowering total and LDL cholesterol as the same dose of simvastatin or pravastatin (two widely prescribed cholesterol-lowering statin drugs). Triglyceride levels are not influenced by policosanol supplementation. At doses of up to 20 milligrams per day, policosanol is safe and well-tolerated, as studies of greater than three years of therapy indicate.<sup>1</sup>

**Postmenopausal Women** - Policosanol was shown to reduce elevated total and LDL cholesterol levels in postmenopausal women by 17.3% and 26.7%, respectively, in 56 women who showed no cholesterol lowering from a six-week standard lipid-lowering diet that was followed prior to the administration of policosanol. This is of great clinical significance, as heart disease is the number-one cause of death in postmenopausal women. After menopause, the decline in estrogen levels is associated with a decrease in LDL cholesterol receptors on the cell surface. In turn, this reduces clearance of cholesterol from the bloodstream, permitting blood levels of LDL cholesterol to rise, predisposing women to heart attack and ischemic stroke.<sup>9</sup>

**Type II Hypercholesterolemia** - Patients with type II hypercholesterolemia are known to have a genetically based defect that encourages lifelong elevation of blood cholesterol - a condition that is difficult to manage through diet and exercise alone. Studies have shown in a convincing manner that policosanol supplementation significantly lowers cholesterol levels even in these more challenging patients. Total and LDL cholesterol can be expected to drop by up to 17.4% and 25.6%, respectively. HDL cholesterol levels have been shown to rise by 15.5% to 28.4% in these patients, which is a remarkable finding due to the fact that it is difficult to raise HDL levels, and that higher HDL levels are known to significantly reduce risk of heart attack. HDL cholesterol collects the cholesterol that has been deposited in the artery wall and transports it back to the liver, where it can be cleared from the bloodstream and eliminated from the body via its conversion to bile acids.<sup>10</sup>

Even in older patients with type II hypercholesterolemia presenting with more than one concomitant atherosclerotic risk factor, the administration of policosanol at 5 milligrams or 10 milligrams per day was shown to significantly reduce total and LDL cholesterol levels and raise HDL levels by up to 29.1%. The 10 milligram dose produced better results in all cholesterol parameters compared to the 5 milligram dose.<sup>11</sup>

**Head-to-Head Trials Against Statin Drugs** - A randomized, double-blind study involving older patients with type II hypercholesterolemia tested the efficacy of the statin drug Pravastatin against policosanol. The results showed that policosanol was more effective than Pravastatin in reducing total and LDL cholesterol and was able to raise HDL cholesterol by 18.4%, whereas Pravastatin showed no effect on HDL cholesterol levels. Policosanol more effectively reduced platelet

aggregation than did Pravastatin, another important risk factor in cardiovascular disease. Patients receiving Pravastatin over the six-week trial period experienced a rise in their serum levels of alanine amine transferase enzyme, which indicates potential damage to liver cells. This did not occur in the policosanol group. Two patients dropped out of the Pravastatin group due to adverse side-effects (myocardial infarction and jaundice, likely due to liver damage). The researchers concluded, "The effects of policosanol (10 milligrams per day) on lipid profile, platelet aggregation and endothelium in older patients with type II hypercholesterolemia and high coronary risk are more favorable than those induced by the same doses of Pravastatin."<sup>12</sup>

A second study tested the efficacy of policosanol against Lovastatin and Simvastatin (two popular statin drugs). The results showed that policosanol reduced LDL cholesterol by 24% on average, compared to a 22% and 15% reduction with Lovastatin and Simvastatin, respectively. HDL levels rose significantly in the policosanol group and no change was seen in the patients receiving Lovastatin or Simvastatin. This was a six-week trial involving patients with an LDL cholesterol level of over 160 mg/dl.<sup>13</sup>

Used in Conjunction With Fibrate Drugs - A study combining the use of Bezafibrate and policosanol demonstrated that these cholesterol- and triglyceride-lowering agents can be used together to produce a positive outcome on blood lipids, with no untoward side-effects. Fibrate drugs are often used to help lower triglyceride levels, an effect not produced to a substantial degree by policosanol. Thus, in patients with high cholesterol and high triglycerides, the combination of both agents has been shown to be effective and safe.<sup>14</sup>

Intermittent Claudication - Sixty-two patients with intermittent claudication were given either 10 milligrams of policosanol, twice per day, or a placebo for six weeks. The policosanol group realized a significant improvement on treadmill walking distance during the course of the study. No change was seen in the placebo group.<sup>15</sup>

Improved Exercise ECG Results in Coronary Patients - Policosanol supplementation was tested in patients with myocardial ischemia (severe bloodflow restriction to the heart muscle) versus placebo. The results showed that after 20 months, the policosanol group experienced an incremental improvement in ECG exercise testing (aerobic functional capacity percent) and a decline in blood cholesterol levels. The researchers state that policosanol-treated patients with coronary heart disease showed improved clinical evolution, and exercise-ECG responses, owing to the amelioration of myocardial ischemia. These results were even better when policosanol was combined with 125 milligrams of aspirin per day, indicating that the use of policosanol in conjunction with aspirin may be of greater benefit to certain heart patients than is aspirin alone.<sup>16</sup>

Coronary Heart Disease Patients - A randomized, single-blinded, placebo-controlled trial was conducted on 23 middle-aged outpatients with established coronary heart disease. The 12 patients given policosanol demonstrated a significant reduction in blood cholesterol levels and exhibited a clinical tendency toward improvement of their coronary heart disease, compared to no improvement in these parameters in the placebo group. "These findings show the effectiveness of a low dose of Policosanol lowering total cholesterol and LDL-cholesterol and suggest a coronary heart disease improvement in middle-aged patients with primary or marginal hyperlipidemia."<sup>17</sup>

Diabetic Patients With High Cholesterol - In a study of non-insulin-dependent diabetic patients with high cholesterol levels, policosanol supplementation at 10 milligrams per day was shown to reduce total cholesterol by 17.5% and LDL cholesterol by 21.8%, compared with baseline and placebo. HDL cholesterol levels rose by 11.3% and triglyceride levels fell by 6.6% in the policosanol group.

None of these changes occurred in the placebo group. Moreover, policosanol did not adversely affect glucose levels or glycemic control. The researchers conclude, "Policosanol is effective and safe in patients with non-insulin dependent diabetes mellitus and hypercholesterolemia."<sup>18</sup>

2. Anticoagulant Effects - Policosanol has been shown to exert anticoagulant effects on platelet function. However, this does not seem to be the case when administered at 5 or 10 milligrams per day. Anticoagulant effects appear to start at a dose of 20 milligrams per day, with increasing effects at 40 milligrams per day. Thus, patients taking other anticoagulants (warfarin, coumadin, aspirin) appear to be able to safely take up to 10 milligrams per day of policosanol to lower cholesterol without risk of potentiating the action of anticoagulant drugs.<sup>19</sup> A dose of 20 milligrams per day of policosanol has been shown to provide the same degree of anticoagulant activity as 100 milligrams of aspirin per day in human subjects.<sup>20</sup> This implies that if an anticoagulant effect is desired along with a cholesterol-lowering effect, policosanol can be used alone at a dose of 20 or 40 milligrams per day. If the patient is already on anticoagulant therapy, it is wise to limit the dose of policosanol to 10 milligrams per day, where a cholesterol-lowering effect is desirable.

Dosage and Standardized Grade - To lower cholesterol in patients not taking anticoagulant therapy (including aspirin), doses of policosanol from 5 milligrams per day to 40 milligrams per day have been used. Most typically, 10 milligrams, twice per day, is the most common dosage of policosanol used to treat hypercholesterolemia. In patients using anticoagulant drugs, it is best to limit the dose of policosanol to 5 milligrams, twice per day.<sup>1,4,7,8,9,19,20,21</sup>

Adverse Side-Effects, Toxicity and Contraindications - Long-term studies with policosanol in humans have not shown any significant side-effects; policosanol appears to have a safer profile than statin drugs (HMG-CoA reductase inhibitor drugs) that are commonly prescribed to lower cholesterol.<sup>1,4,7,8,9</sup> A case of erythema was reported in one trial with diabetics.<sup>18</sup> Animal studies reveal that policosanol is extremely safe even when administered to beagle dogs at 180 mg/kg for 52 weeks, which is 620 times higher than the therapeutic dose of 20 milligrams per day.<sup>22</sup>

Studies in mice showed no adverse effects or carcinogenicity at doses of 50-500 mg/kg administered orally for 18 months.<sup>23</sup> Overall, policosanol is considered to be an extremely safe therapeutic agent for lowering cholesterol.<sup>4,5,24</sup>

#### Drug-Nutrient Interactions

Anticoagulant Drugs - Policosanol has been shown to inhibit platelet aggregation and therefore, may potentiate the effects of anticoagulant drugs such as warfarin, coumadin and aspirin. Studies on humans and animals have not shown a significant enhancement of anti-platelet activity when policosanol has been combined with warfarin or aspirin. Nevertheless, in the interest of patient safety, it is best not to recommend a daily dosage of more than 5 milligrams, twice per day, in patients on concomitant anticoagulant therapy, and even then, their prothrombin time should be properly monitored.<sup>25,26,27,28</sup>

Beta-Blocker, Anti-Hypertensive Drugs - Human and animal studies reveal that policosanol can potentiate the effects of beta-blockers used to lower high blood pressure. Thus, blood pressure should be monitored in order to see if a dose reduction in beta-blocker medication is required once policosanol supplementation has been implemented.<sup>29</sup>

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