

Perioperative Implications

- The ASA recommends that all herbal medications be D/C 2–3 wk prior to elective surgery because it takes 5–6 half-lives for an agent to leave the body;

moreover, these substances lack uniform data regarding uptake, distribution, and elimination as they are not considered drugs by the USA FDA. Over 90 herbal products are associated with bleeding; this can be a specific problem intraop or when placement of

a regional anesthetic is being considered for postop pain management.

Phytosterols

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Uses

- Naturally occurring in human diet.
- Used as supplements, especially in margarines, to reduce cholesterol levels.
- May also possess anti-inflammatory, antipyretic, antineoplastic, and immune-modulating properties.
- Some recent evidence questions the beneficial effect of phytosterols and the potential for increased CV risk.

Perioperative Risks

- None known

Worry About

- Pts may be taking phytosterols because of hypercholesterolemia and occult CAD.

Overview/Pharmacology

- Phytosterols (including plant sterols and stanols) are natural components of edible vegetable oils such as

sunflower seed oil; as such, they are natural constituents of the human diet.

- It is difficult to incorporate free sterols into edible fats and/or oils because of their insolubility, whereas sterols esterified to fatty acids are more fat soluble.
- In the intestine, most sterol esters are hydrolyzed to free sterols as part of the normal digestive process.
- Plant stanols are hydrogenation products of the respective plant sterols (e.g., campestanol and/or campesterol, sitostanol and/or sitosterol) and are found in nature at very low levels.
- Enrichment of foods such as margarines with plant sterols and stanols is one of the recent developments in functional foods to enhance the cholesterol-lowering ability of traditional food products.
- May reduce the absorption of some fat-soluble vitamins. Randomized trials have shown that plant sterols and stanols lower blood concentrations of β -carotene by about 25%, concentrations of

α -carotene by 10%, and concentrations of vitamin E by 8%.

Drug Class/Usual Dose

- Consumption of plant sterols and stanols lowers blood cholesterol levels by inhibiting the absorption of dietary and endogenously produced cholesterol from the small intestine. Plant sterols and/or stanols are only very poorly absorbed themselves.
- This inhibition is related to the similarity in physicochemical properties of plant sterols and stanols and cholesterol and may be related to two mechanisms:
 - The greater the amount of plant sterols and/or stanols, the lower the solubility and perhaps the greater the amount of cholesterol precipitated. Cholesterol in the crystalline form cannot be absorbed.
 - Competition for space in mixed micelles.
- Being marketed in new margarine formulations.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
CV	Hypercholesterolemia	CAD, angina	Chest pain	ECG
GI	Malabsorption of some vitamins			

Key References: Weingärtner O, Böhm M, Laufs U: Controversial role of plant sterol esters in the management of hypercholesterolaemia, *Eur Heart J* 30(4):404–409, 2009; Rocha VZ, Ras RT, Gagliardi AC, et al.: Effects of phytosterols on markers of inflammation: a systematic review and meta-analysis, *Atherosclerosis* 248:76–83, 2016.

Possible Drug Interactions

- No known drug interactions

Anticipated Problems/Concerns

- None known

Red Yeast Rice (Cholestin)

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Uses

- Chinese traditional medicine for therapy of pts with cardiovascular diseases
- Hypercholesterolemia
- Prevention of coronary events, stroke, and TIA
- Treatment of dyslipidemia in statin-intolerant pts
- Prostate and colon cancer
- Possible diabetes treatment

Perioperative Risks

- Obtain adequate Hx to determine indication for taking red yeast rice.

Worry About

- Chemical composition of red yeast rice is not controlled by the FDA and may vary by manufacturer.
- Relatively contraindicated in liver disease. Hepatotoxicity is worsened in combination with other hepatotoxic drugs.

Overview

- Prepared by growing red yeast (*Monascus purpureus*) on rice to produce a red product.

- Contains 10 mevinic acids include monacolin K, also known as lovastatin.
- Popular in Asian countries.
- Available in several preparations in USA.

Drug Class/Mechanism of Action/Usual Dose

- HMG-CoA reductase inhibitor, essentially a natural statin and its homologues, additionally contains unsaturated fatty acids, flavonoids, plant sterols, and other biologically active substances.
- Inhibits conversion of HMG-CoA to mevalonic acid, an early precursor of cholesterol.
- Usual dose is 600–2400 mg daily.
- Xuezhikang (from red yeast rice) reduces expression of mediators of oxidative stress induced in diabetes mellitus and protects pancreatic islet cells from hyperglycemic injury. Xuezhikang, which is purified from cholestin, has been shown to decrease blood glucose levels by improving glucose tolerance and insulin secretion in db/db mice. Xuezhikang has also been shown to protect islets from hyperglycemic injury with conserved β -cell content and

microenvironment. Xuezhikang potently inhibits the expression of key factors in oxidative stress and causes an upregulated expression of glucose-sensing tissue.

- Reduces matrix metalloproteinases 2 and 9 and CRP levels involved in vascular remodeling.
- Red yeast rice can significantly increase adiponectin and can significantly lower LDL-C and total cholesterol levels. Adiponectin correlates positively with HDL-C while serum leptin correlates negatively with triglycerides. Therefore red yeast rice has a potentially protective effect in obesity-related and cardiovascular diseases.
- Xuezhikang from red yeast rice has been shown to upregulate eNOS expression in vascular endothelium and RBCs, increasing plasma nitric oxide and improving abnormal hemorheology in high cholesterol diet–induced atherosclerotic rats. Therefore the elevated eNOS/NO and improved hemorheology may be beneficial in atherosclerosis.