

- Usual recommended dose is 200–400 mg 2–3 times daily or 1000–1200 mg as a single daily dose. Higher doses have been used in clinical trials with no evidence of increased efficacy.
- Glucosamine 1500 mg is commonly combined with chondroitin in commercial preparations taken either once daily or in three divided doses. The optimal dose of CS, alone or in conjunction with glucosamine, is unclear from current literature.

Assessment Points

System	Drug Effect	Assessment by Hx	PE	Test
MS	Anti-inflammatory, reduction in joint degeneration	Assessment of pain and functionality scores	Joint tenderness and mobility	Radiologic loss of joint space
GI	Nausea or diarrhea (low incidence)	Subjective reporting of GI upset	Abdominal bloating	
CV	Arrhythmia, peripheral edema	Description of arrhythmia	Irregular pulse	ECG
DERM	Hair loss, periorbital swelling			

Key References: Singh JA, Noorbaloochi S, MacDonald R, et al.: Chondroitin for osteoarthritis, *Cochrane Database Syst Rev* 1:CD005614, 2015; Abe A, Kaye AD, Gritsenko K, et al.: Perioperative analgesia and the effects of dietary supplements, *Best Pract Res Clin Anaesthesiol* 28(2):183–189, 2014.

Anticipated Problems/Concerns

- Caution with anticoagulant medications

Chromium

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Uses

- Body building (ineffective)
- May aid in glycemic control of type II DM and gestational DM
- Hyperlipidemia
- Hypoglycemia (reactive)
- Obesity

Perioperative Risks

- Risks minimal
- Chronic ingestion associated in one case with thrombocytopenia, hepatic dysfunction, renal dysfunction

Worry About

- Nephrotoxicity

Overview

- A trace mineral
- Improves glucose tolerance in type II DM and gestational DM (in some studies)
- Shown to increase insulin sensitivity and decrease serum triglycerides
- Shown to alleviate symptoms of reactive hypoglycemia
- Popular as weight-loss and body-building supplement, but effect not supported in clinical trials

Drug Class/Mechanism of Action/Usual Dose

- Hypothesis: In normal functioning, it increases circulating insulin, resulting in binding of chromium to peripheral insulin-sensitive tissue; increases insulin receptor number; and activates insulin receptor kinase.
- Usual dosage recommended: 50–200 µg/d.
- Available orally or IV
- Taken as supplement of 200–1000 µg/d
- Mixed results in randomized clinical tests

Assessment Points

System	Effect	Test
RENAL	Nephrotoxicity	Cr
ENDO	Insulin sensitivity	Glucose

Key References: Hummel M, Standl E, Schnell O: Chromium in metabolic and cardiovascular disease, *Horm Metab Res* 39(10):743–751, 2007; Suksomboon N, Poolsup N, Yuwanakorn A: Systematic review and meta-analysis of the efficacy and safety of chromium supplementation in diabetes, *J Clin Pharm Ther* 39(3):292–306, 2014.

Perioperative Implications

- No known interaction

Cranberry

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Uses

- Many cranberry juice consumers are aware of a beneficial link between cranberry juice and the prevention of UTIs.
- High in polyphenol activity.
- Potentially beneficial for prevention of upper GI ulcers, reducing the risks of CV disease, and improving oral hygiene.
- Native Americans and early American sailors used cranberries for treating wounds and blood poisoning,

urinary illnesses, diarrhea, DM, and as an antiscorbutic agent.

Perioperative Risks

- Cytochrome P-450 inhibitor based on in vitro evidence, specifically CYP3A4 and CYP2C9.
- Based on in vivo studies, interaction with warfarin, midazolam, fluconazole, or drugs dependent on CYP enzymes appear unlikely, unless cranberry is consumed at large quantities or long durations, yet not excluded completely.

- There is some evidence for alteration in INR with administration of cranberry that warrants consideration.

Worry About

- Theoretical risk of oxalate urinary stone formation (if large volumes consumed daily).
- Consider potential interaction with anticoagulation effects of warfarin or other drugs dependent on CYP enzymes.