Focus on glucosamine

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Suggestions that glucosamine will give safe and effective relief from symptoms of osteoarthritis are readily embraced by the public. What is known about the use of glucosamine in osteoarthritis?

What is glucosamine?

Glucosamine is a naturally occurring aminomonosaccharide that is a major component of the glycosaminoglycans forming the connective tissue matrix. It is taken up by chondrocytes and incorporated into proteoglycans secreted into the extracellular matrix. Radioactively-labelled glucosamine is incorporated into many tissues (including cartilage) within four hours of ingestion.

Glucosamine is available as a sulfate or hydrochloride salt. Most research has used the sulfate salt, but both are well absorbed compared with sodium chondroitin sulfate (less than 10% of which is absorbed). The hydrochloride salt is purer and should therefore be more potent; however, the recommended dose is the same.

What is the evidence for efficacy in osteoarthritis?

Laboratory studies of animal models of arthritis have demonstrated that glucosamine has definite anti-inflammatory properties.[1] The anti-inflammatory properties are very much weaker than those of indomethacin; however, the toxicity of indomethacin is much greater.

Cultured human chondrocytes from patients with osteoarthritis show a dose dependent increase in proteoglycan synthesis with glucosamine.[2] Such results have led to claims that glucosamine may have a beneficial influence on cartilage metabolism and may thus alter the long term outcome in osteoarthritis. However, no clinical data support this.

The methodology of early clinical studies of glucosamine has been criticised; however, at least 12 randomised controlled trials have shown that glucosamine has favourable results on pain, swelling and range of movement when compared with placebo or an NSAID (usually ibuprofen).[3,4] In these trials, glucosamine seems to take at least four weeks to have full effect (so it is much slower to act than NSAIDs). Most of these trials were of relatively small size and short duration (less than eight weeks).

Is glucosamine safe?

No serious side effects of glucosamine have been described. In a recent meta-analysis of nearly 1500 subjects, only seven were withdrawn for glucosamine-related toxicity.[3] Approximately 12% of subjects reported minor side effects, usually affecting the gastrointestinal tract, that were reversible on withdrawal of glucosamine.

Glucosamine is derived from crustaceans; therefore, patients who are allergic to shellfish should not take it. Cost may be an issue (it is not reimbursed by the government).

How can glucosamine be used?

I recommend a three-month trial of glucosamine at 1.5 g/day to patients with an established diagnosis of symptomatic osteoarthritis who are either reluctant to consider NSAIDs or COX-2 specific inhibitors or do not tolerate regular use.

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Figure. X-ray of osteoarthritis of a wrist and first carpometacarpal joint.

It is reasonable to suggest a similar trial to patients with relatively mild osteoarthritis who do not require regular analgesics or NSAIDs but are keen to prevent deterioration in their condition. However, I explain that long term benefits have not been demonstrated, and I do not encourage continuation if no symptomatic improvement is noted after three months.

Various preparations of glucosamine are available as powders or capsules, with or without added minerals or sodium chondroitin sulfate, but none have been compared back to back. I suggest the cheapest, most palatable preparation that contains 1.5 g of glucosamine per day. When there has been a response, I think it is reasonable to reduce to a maintenance dose – maybe 750 mg/day (note: this suggestion is not evidence based).

Summary

An increasing number of well conducted but short term trials indicate that glucosamine has similar efficacy to milder NSAIDs in terms of symptom control, with no evidence for significant toxicity. However, evidence for long term efficacy or safety is lacking.

There are no published data to support the use of glucosamine as a disease modifying drug in osteoarthritis. MT

A list of references is available on request to the editorial office of Medicine Today.

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