Joint nourishment: nutrients for feeding joints





In young people, **CARTILAGE IS 85% WATER**²

Cartilage has NO blood supply NO nerves **NO lymphatics**³

JOINT AND CARTILAGE ANATOMY⁵⁻⁸



Joints are areas where two or more bones meet. Most joints are mobile, allowing the bones to move. Cartilage forms the articular surface and is avascular. It relies on diffusion from synovial fluid for its nutrition.

Chondrocytes secrete collagen and proteoglycans and are embedded in the cartilage. Chondrocytes migrate towards the joint surface along with the matrix they produce.

All connective tissues contain an extracellular matrix of macromolecules - collagens, elastins, non-collagenous glycoproteins and proteoglycans.

NUTRIENTS FOR HEALTHY JOINTS

GLUCOSAMINE

Bone health. Increase bone matrix deposition and decrease bone resorption.9

Chondroprotective. Stimulates synovial production of hyaluronic acid (lubricating and shock-absorbing properties of synovial fluid).10

Primary substrate and stimulant of proteoglycan biosynthesis by chondrocytes and inhibitor of proteoglycan degradation.¹¹ Source of sulfur which is essential for GAG synthesis.12

Anti-inflammatory. Inhibits cytokine intracellular signalling pathways and reverses pro-inflammatory and joint-degenerative effects by altering production of TNF-alpha, interleukins and PGE2 in macrophage cells.¹³

Restores proteoglycan synthesis and prevents production of inflammatory mediators such as: IL-1, TNF-alpha, NFkB, COX-2, inducible nitric oxide synthase, metalloproteinases, PGE2.^{11,14}

CHONDROITIN

Chondroprotective. Primary substrate and stimulant of proteoglycan biosynthesis by chondrocytes and inhibitor of proteoglycan degradation. Inhibits degenerative enzymes in synovial fliud such as elastase and hvaluronidase.15

Improves chondrocyte nutrition by increasing hyaluronic acid production⁷ and increasing fluid content of the extracellular matrix.¹⁶

Source of sulfur which is essential for GAG synthesis.12

Anti-inflammatory. Modulation of NFkB expression.¹⁷ Inhibit production of PGE2, nitric oxide and matrix metalloproteinases.18

GAG: glycosaminoglycan; TNF-alpha: tumour necrosis factor-alpha; PGE2: prostaglandin E2; IL: interleukin; NFkB: nucelar factor kappa-beta; COX-2: cyclooxygenase 2

Chondroprotective. Naturally occuring source of sulfur which is an essential component in connective tissue.¹⁹ Bone health. Inhibits bone degradation by promoting osteoclast activity.20

BORON, SILICA, VITAMIN D, CALCIUM, MAGNESIUM

Bone health. Essential nutrients for bone composition, structure and strength.16





Proteoglycans are comprised of protein chains, to which are attached glycosaminoglycan (GAG) side-chains of keratan and chondroitin sulfate. These molecules retain water and soluble molecules in the structure by producing dynamic tension between the retaining force of the collagen matrix and the expansive effect of osmotic pressure. Pressure from "loading" of the joint is essential to normal cartilage function and encourages movement of water, minerals and nutrients between the cartilage and synovial fluid.

METHYLSULFONYLMETHANE (MSM)

Anti-inflammatory and antioxidant²¹