Nutrition for Knee Health

Sue McGarrigle ND

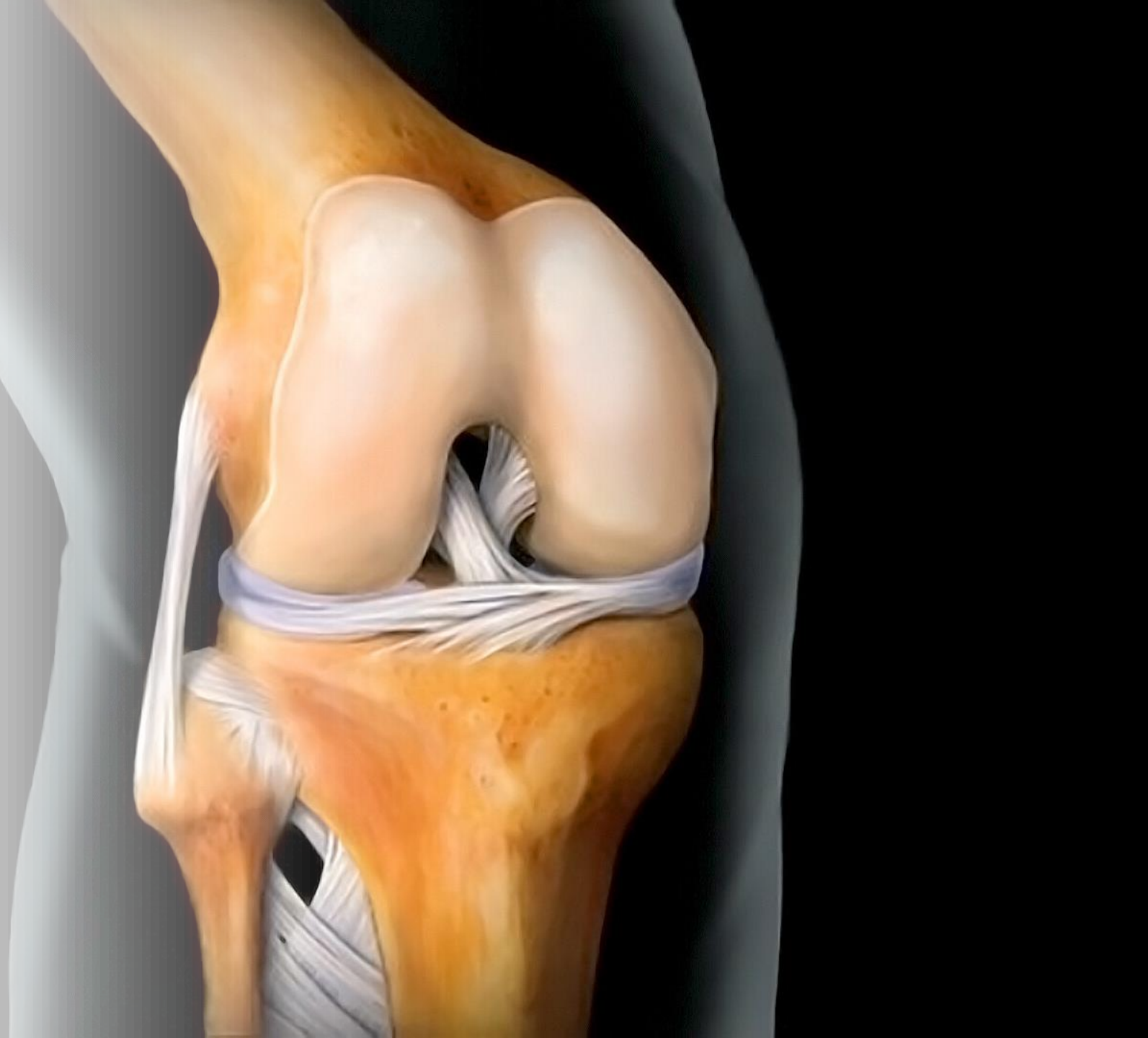


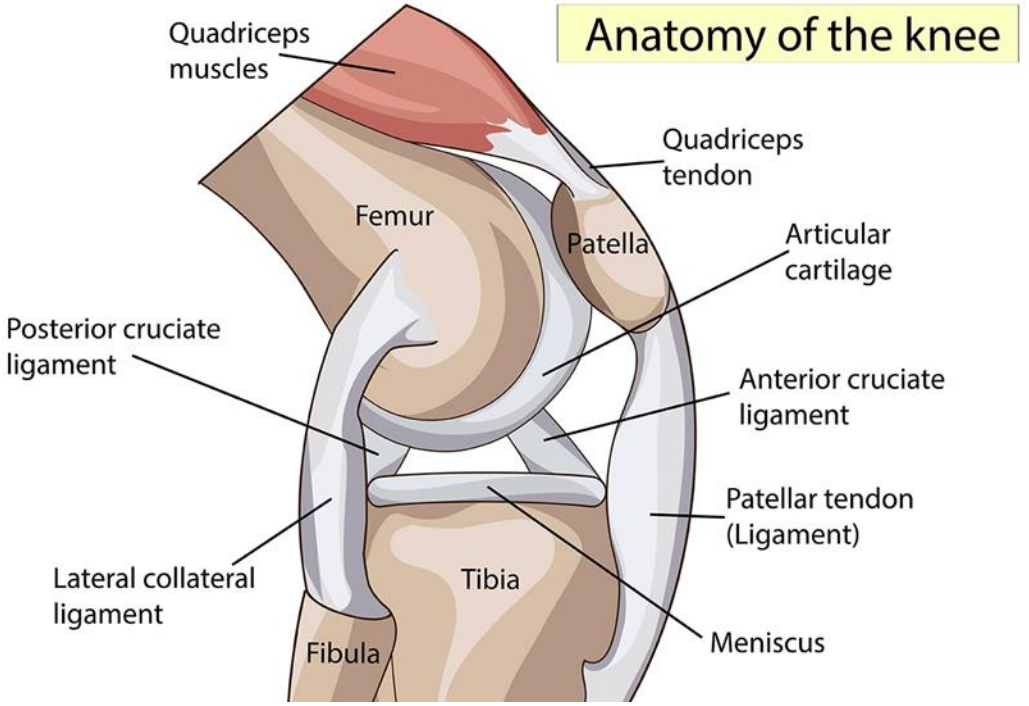
Image TheVisualMD

Knee joints

The largest joint in the body, the knee moves like a hinge, allowing you to sit, squat, walk or jump.

It has three articulations (joints).

- The femoropatellar joint is found between the patella and the distal femur. The medial tibiofemoral joint and lateral tibiofemoral joint are located between the medial and lateral condyles of the femur and the medial and lateral condyles of the tibia.



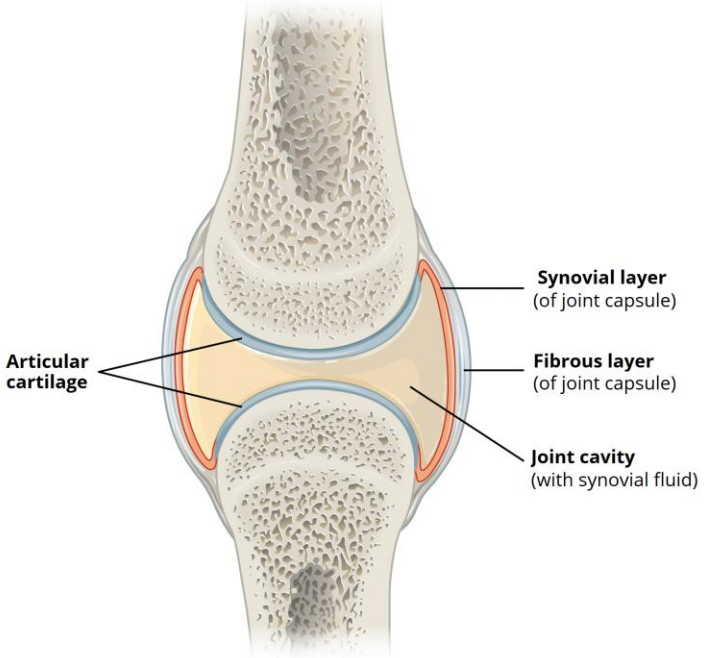
Tendons and ligaments

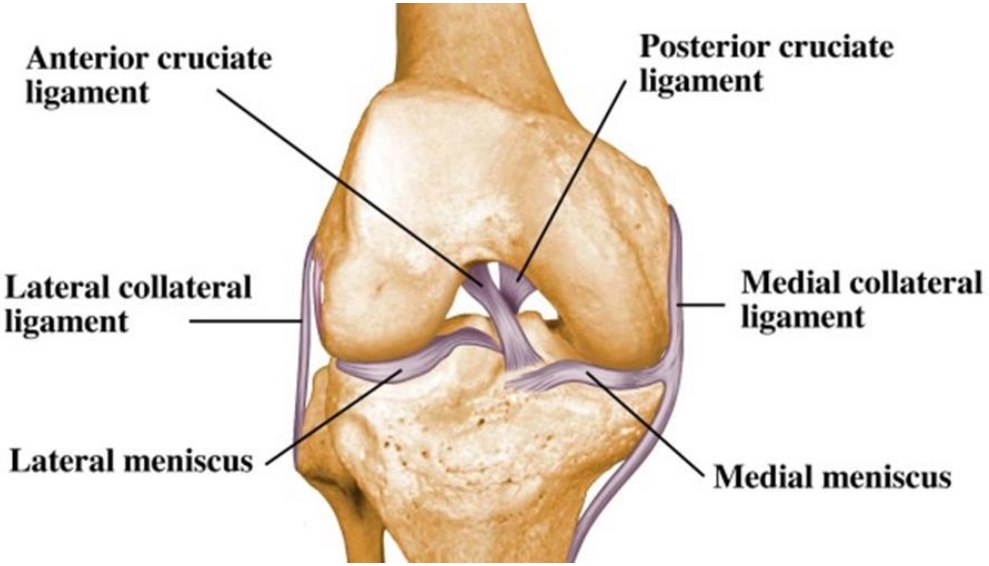
The bones are held together by a joint capsule, which consists of two distinct layers – an outer layer of dense connective tissue and an inner membrane, called the synovium, which secretes a fluid to lubricate the joint.

The outer layer of the capsule is attached to the ends of the bones and is supported by the tibial and fibular collateral ligaments located on the sides of the knee outside of the capsule, and the anterior and posterior cruciate ligaments found inside the capsule as well as the quadriceps tendon, which attaches the quadriceps to the patella.

- medial collateral ligament (MCL), gives stability to the inner part of the knee.
- lateral collateral ligament (LCL), stabilises the outer part of the knee.
- anterior cruciate ligament (ACL), which is in the centre of the knee prevents excessive forward movement of the tibia.
- posterior cruciate ligament (PCL), which is in the centre of the knee prevents excessive backward shifting of the knee.

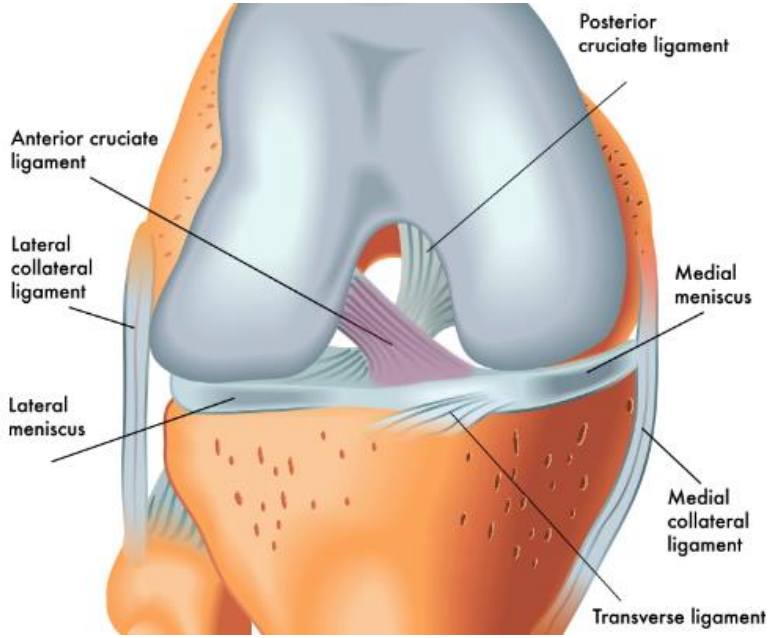
Arthritis Foundation





Cruciate ligaments

- The cruciate ligaments are named for the X-shape formed as they pass each other (cruciate means "cross").
- The posterior cruciate ligament is the stronger ligament. It serves to support the knee when it is flexed and weight bearing, as when walking downhill. In this position, the posterior cruciate ligament prevents the femur from sliding anteriorly off the top of the tibia.
- The anterior cruciate ligament becomes tight when the knee is extended, and thus resists hyperextension.

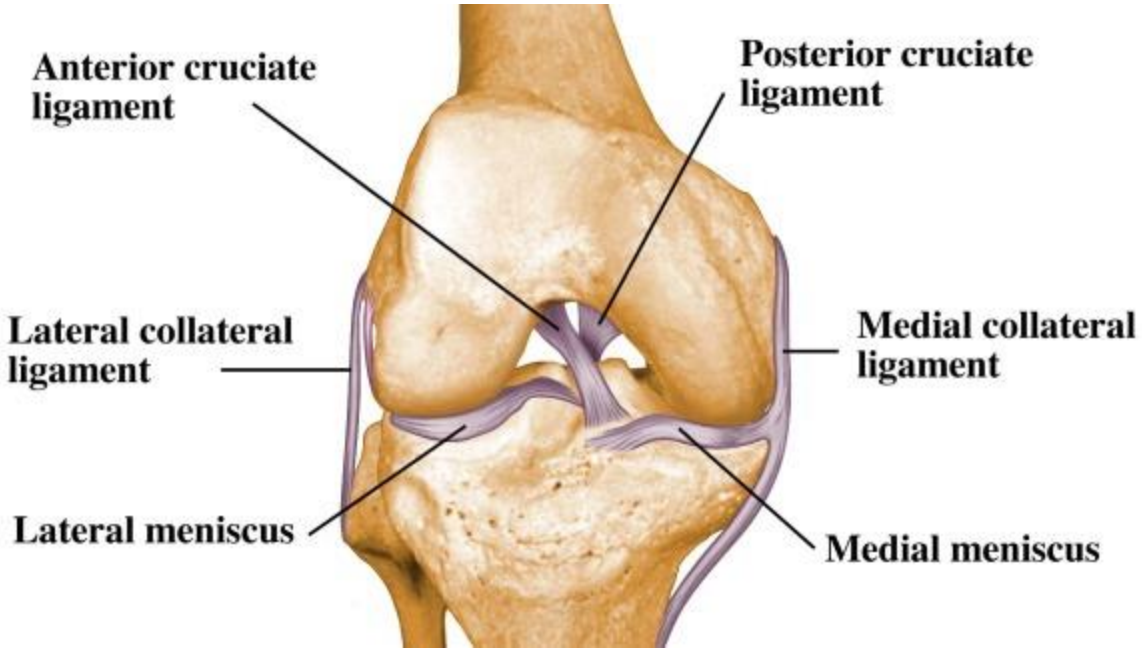


Cartilage

- Between the tibia and femur bone are two crescent-shaped pads of cartilage that reduce friction and disperse the weight of the body across the joint, absorb shock and allow the bones to glide easily against one another as they move.

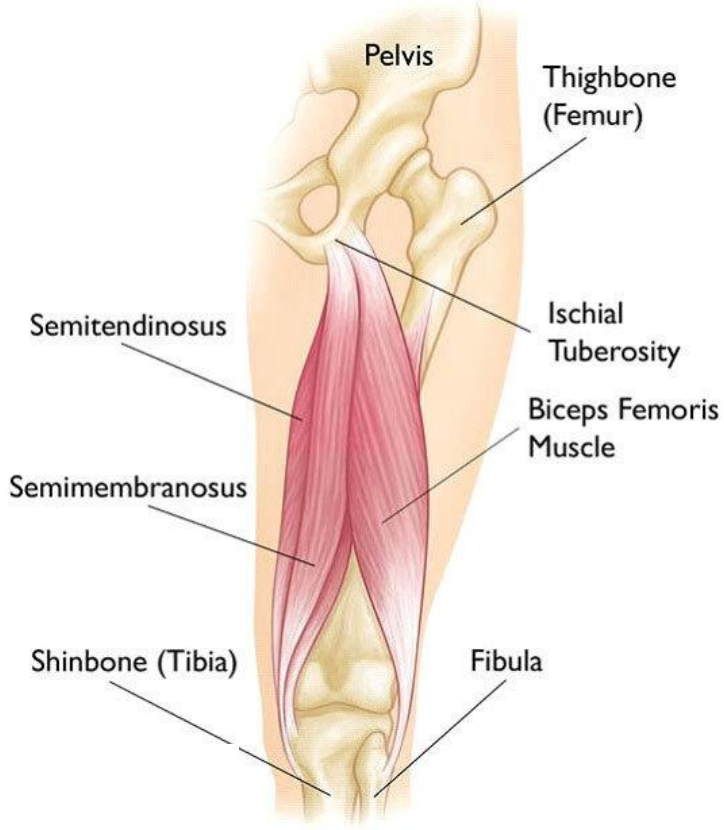
They are:

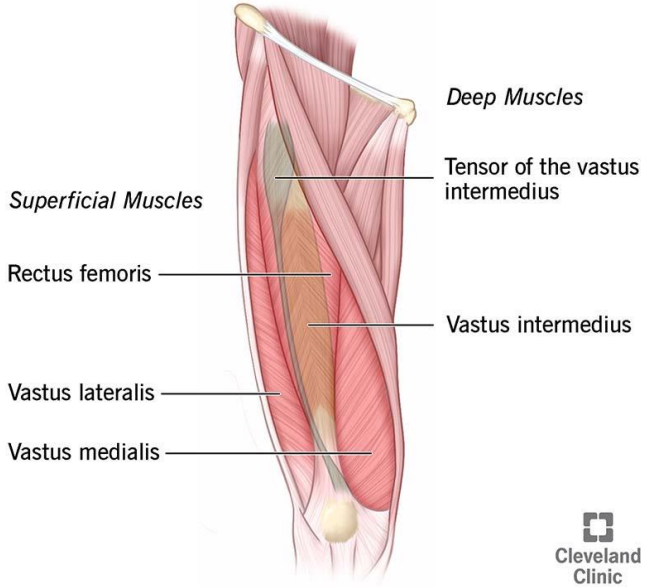
- The lateral meniscus, situated at the outside of the knee.
- The medial meniscus, situated on the inside of the knee.
- They provide padding and support between the femoral condyles and tibial condyles.

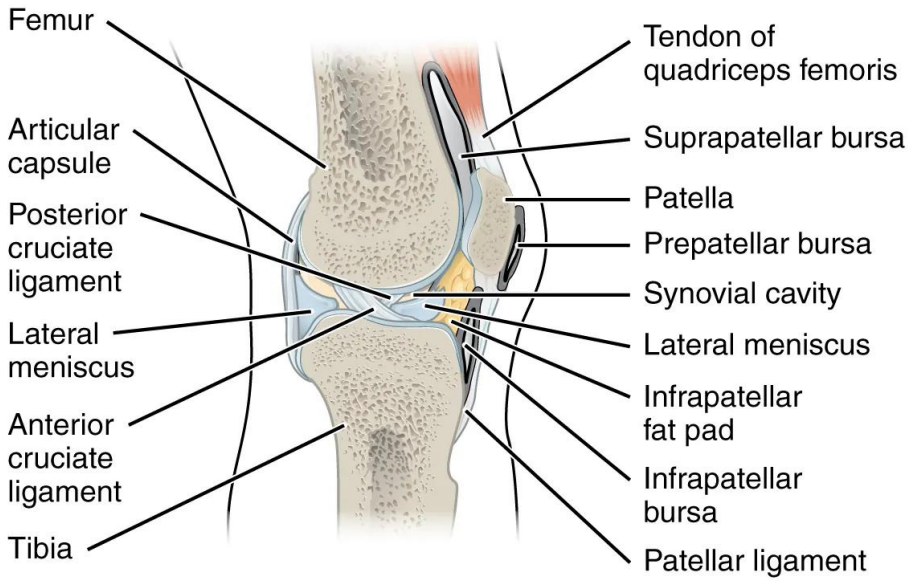


Knee muscles

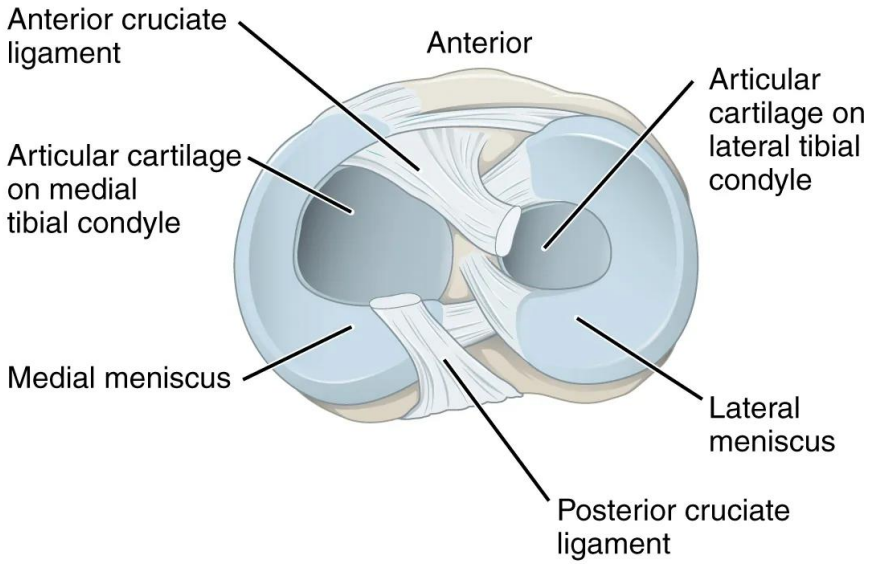
- Two groups of muscles support the knee. They are:
- Hamstrings – muscles on the back of the thigh, which run from the hip to just below the knee and work to bend the knee.
- Quadriceps – four muscles on front of the thigh that run from the hip to the knee and straighten the knee from a bent position.



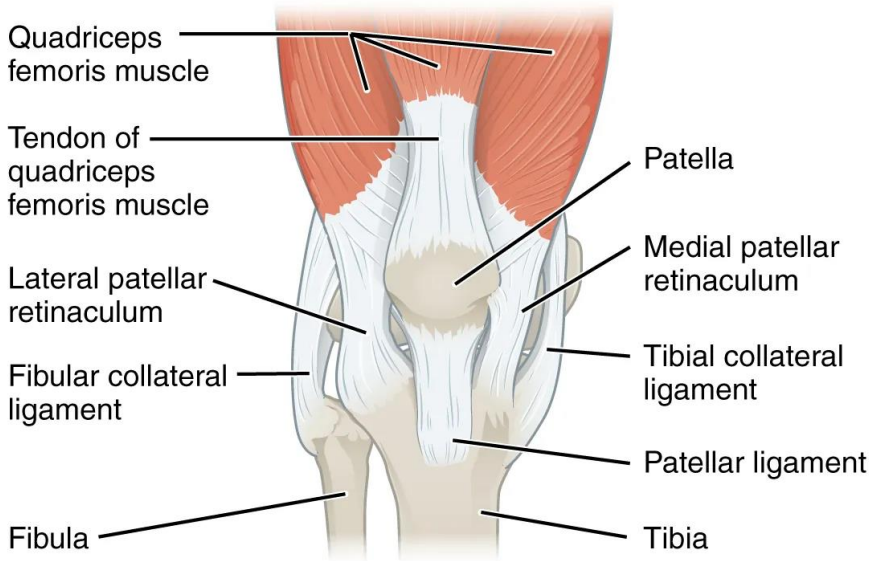




(a) Sagittal section through the right knee joint



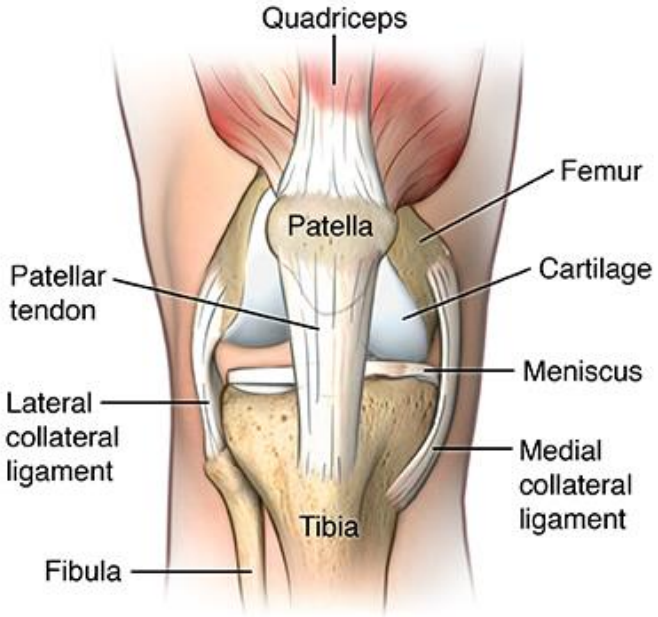
(b) Superior view of the right tibia in the knee joint, showing the menisci and cruciate ligaments



(c) Anterior view of right knee

Quadriceps tendon rupture and tendonitis

- Quadriceps tendon rupture most commonly occurs in middle-aged people who participate in sports which involve jumping and running. Quadriceps tear occurs by a fall, direct blow to the leg and when you land on your leg awkwardly from a jump.
- Other causes include tendonitis (inflammation of the quadriceps tendon), diseases such as rheumatoid arthritis, diabetes mellitus, infection, and chronic renal failure which weakens the quadriceps tendon. Use of medications such as steroids and some antibiotics also weakens the quadriceps tendon.
- When the quadriceps tendon tears, the patella may lose its anchoring support in the thigh as a result the patella moves towards the foot. You will be unable to straighten your knee and upon standing the knee buckles upon itself.
- Knee braces or surgery.



Hamstring tendonitis

- Hamstring tendonitis is swelling or tearing to one of the three hamstring tendons. It may cause pain around the knee and throughout the leg. Hamstring tendonitis may also lead to mobility impairment.

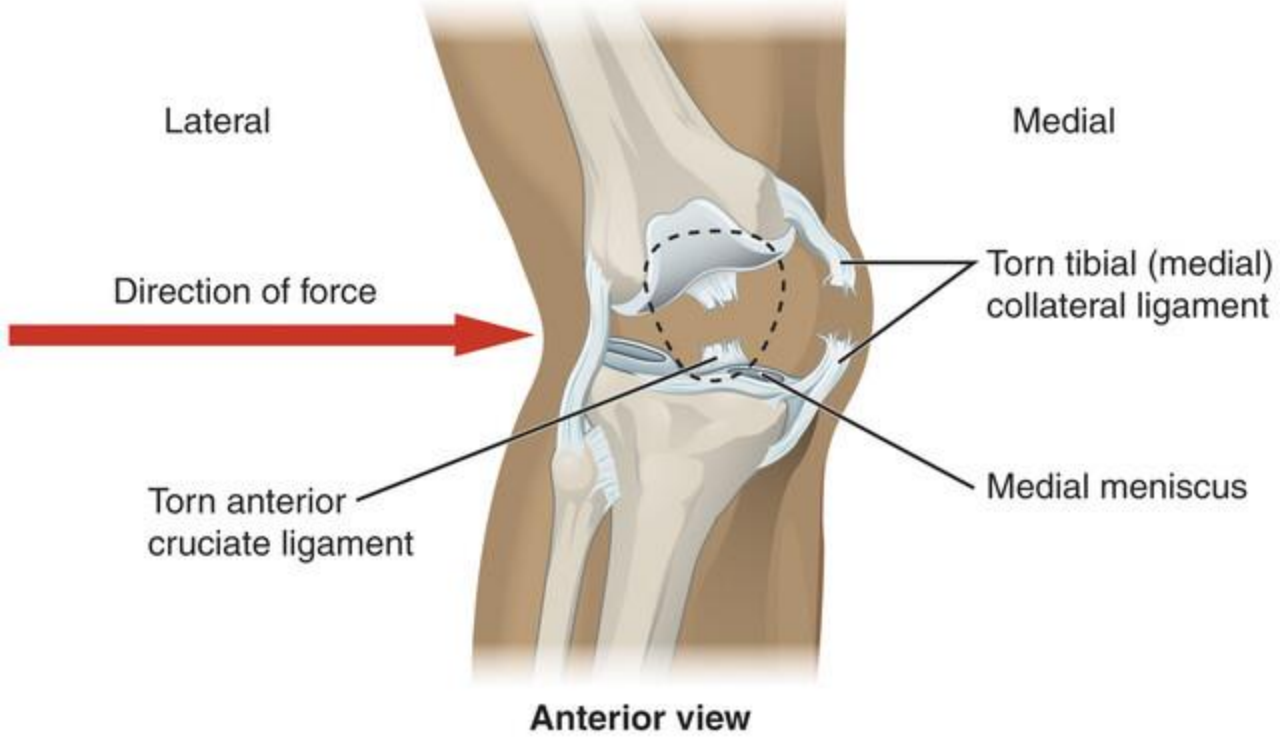
The most common symptoms of hamstring tendonitis include:

- pain in or close to the knee joint
- pain that radiates up the thigh and possibly into the hip or pelvis
- deep buttock pain
- swelling in or around the knee or thigh
- pain that gets worse with activity, especially repetitive motions
- difficulty moving or bending the knee or intense pain when trying to walk or bend the knee.

The hamstrings help control the knee's dynamic movement, tight hamstrings pull on the whole system, so that everything isn't moving quite as it needs to and can cause knee pain.

Knee injury

- A strong blow to the lateral side of the extended knee will cause three injuries, in sequence: tearing of the tibial collateral ligament, damage to the medial meniscus, and rupture of the anterior cruciate ligament.



Knee pain

- Knee pain is a common problem, especially for older adults. Over the years, knees endure a lot of wear and tear as we fight against gravity to move and walk.
- In addition to natural, inevitable ageing of the knee joints, other factors can make us more susceptible to pain.
- Knee pain can have many different causes, including sudden injury, such as a torn ligament; overuse; or an underlying condition. Injuries can affect many different parts of the knee: the bones, cartilage, and ligaments that form the joint as well as the tendons, ligaments, and bursae (fluid-filled sacs) that surround the joint.
- Injuries to the knee may result in a torn meniscus (shock-absorbing knee cartilage), bursitis (inflammation of the bursae), and patellar tendinitis (inflammation of knee tendons).
- Mechanical problems can include dislocated kneecap and loose pieces of bone or cartilage in the joint.
- Arthritis, including osteoarthritis (degenerative arthritis), gout, and rheumatoid arthritis, can also create knee pain.

Common causes of knee pain

Knee pain after an injury

Knee symptoms	Possible cause
Pain after overstretching, overusing or twisting, often during exercise	Sprains and strains
Pain between your kneecap and shin, often caused by repetitive running or jumping	Tendonitis
Unstable, gives way when you try to stand, unable to straighten, may hear a popping sound during injury	Torn ligament, tendon or meniscus, cartilage damage
Kneecap changes shape after a collision or sudden change in direction	Dislocated kneecap

Knee pain with no obvious injury

Knee symptoms	Possible causes
Pain and stiffness in both knees, mild swelling, more common in older people	Osteoarthritis
Warm and red, kneeling or bending makes pain and swelling worse	Bursitis
Swelling, warmth, bruising, more likely while taking anticoagulants	Bleeding in the joint
Hot and red, sudden attacks of very bad pain	Gout or septic arthritis
Teenagers and young adults with pain and swelling below kneecap	Osgood Schlatter's disease

Knee pain

- Risk factors include overweight or obesity, structural abnormalities, weak or inflexible muscles, certain sports, and previous injury.
- Diagnosis of knee pain involves physical inspection of the knee and its range of motion and structural integrity along with imaging tests. Treatment options include medication, physical therapy, injections, and surgery.
- Whether a previous trauma or repetitive stress from kneeling, running, etc., injury to the knee can result in acute, dull, recurring or chronic pain. The injury can eventually develop into osteoarthritis if left untreated.

Symptoms of knee problems

- Pain
- Lack of movement and can’t put weight on it
- Knee is badly swollen or has changed shape
- Knee locks, gives way or painfully clicks – painless clicking is normal
- A very high temperature, feel hot and shivery, and have redness or heat around the knee – this can be a sign of infection

NHS

Runners Knee

Any repetitive movement of your knee joints or wearing down of cartilage may cause runner's knee. Some of the most common activities include:

- Running
- Walking
- Cycling
- Playing soccer
- Skiing
- Squatting
- Kneeling
- Jumping

Runners Knee

Runner's knee may be caused by:

- Trauma (falling or being involved in an accident)
- Dislocation
- Muscles in the thighs and hips are weak
- Bones that aren't lined up
- Poor running form
- Poor biking mechanics
- Being overweight or obese

A person suffering from runner's knee will feel pain in their patella (kneecap), sides, or around the kneecap. The pain can either be continuous and dull or sharp and sudden.

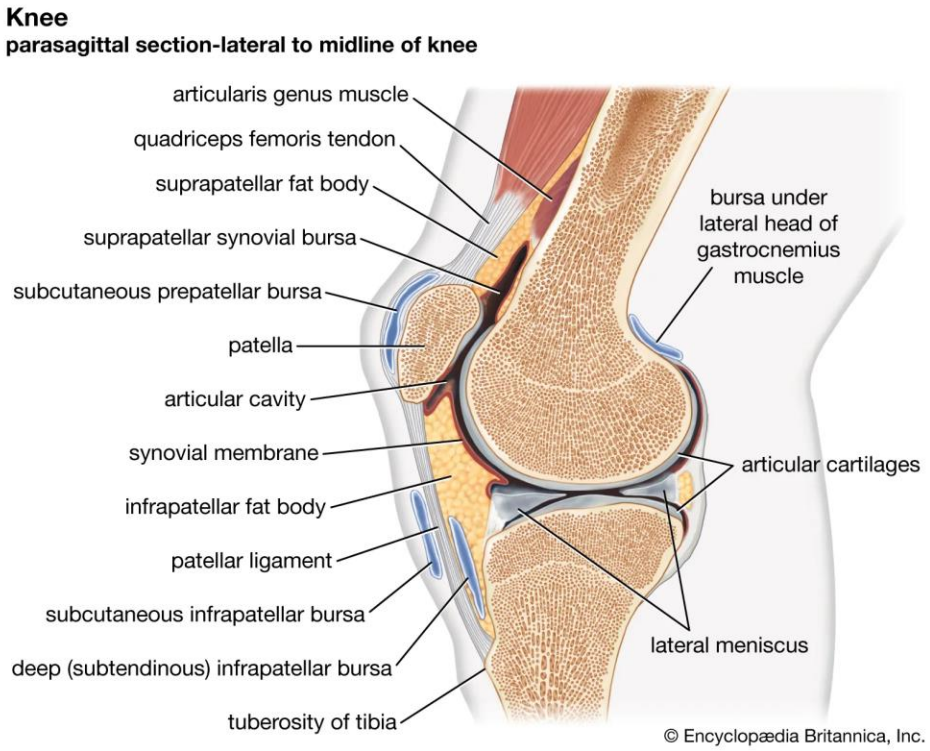
In addition, the person will experience the following symptoms of runner's knee:

- Pain that gets worse with movement
- Swelling of the knee
- Cracking sound of the knees when getting up
- Stiffness of the knee after extended periods of rest
- Limited mobility

Bone disorders

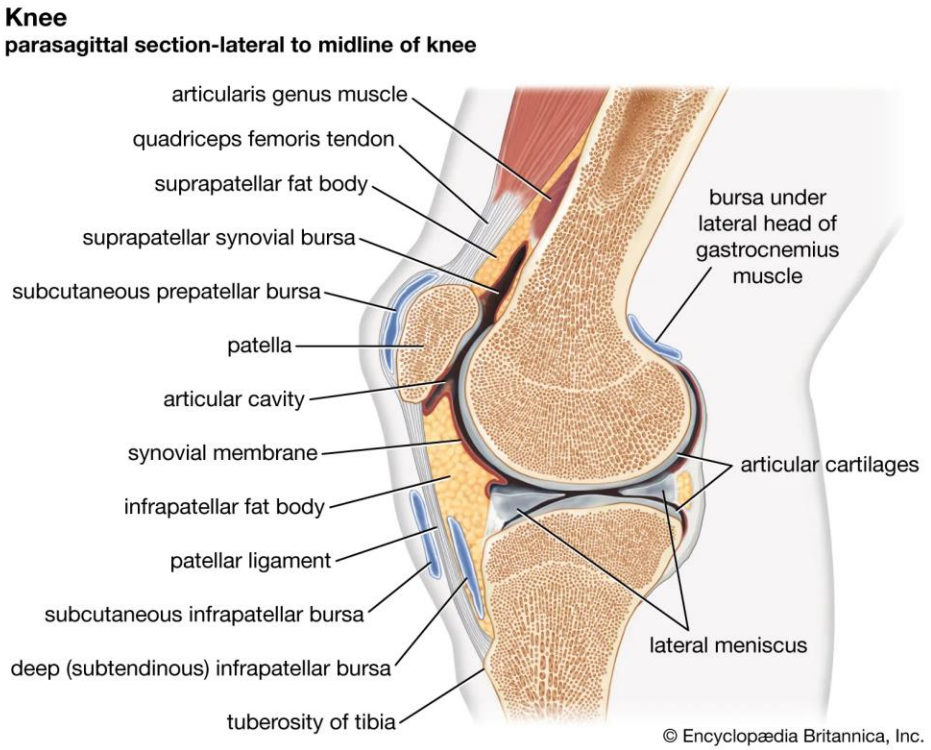
The arthritic diseases

- **Osteoarthritis**, also called osteoarthrosis or degenerative joint disease, disorder of the joints characterised by progressive deterioration of the articular cartilage or of the entire joint, including the articular cartilage, the synovium (joint lining), the ligaments, and the subchondral bone (bone beneath the cartilage). Osteoarthritis is the most common joint disease. Bone and cartilage can break off and cause pain and swelling. Weight loss can help.
- Osteoarthritis is not characterised by excessive joint inflammation as is the case with rheumatoid arthritis. The cause of osteoarthritis is not completely understood, but biomechanical forces that place stress on the joints (e.g., bearing weight, postural or orthopaedic abnormalities, or injuries that cause chronic irritation of the bone) are thought to interact with biochemical and genetic factors to contribute to osteoarthritis.



Bone disorders

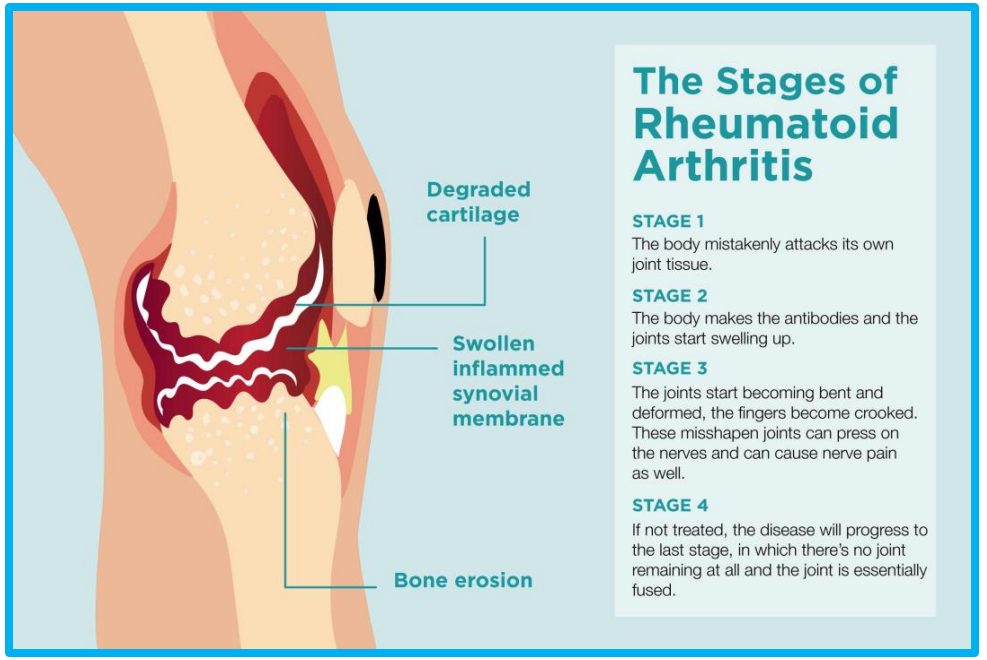
- Early stages of the condition are characterised by changes in cartilage thickness, which in turn are associated with an imbalance between cartilage breakdown and repair. The cartilage eventually becomes softened and roughened. Over time the cartilage wears away, and the subchondral bone, deprived of its protective cover, attempts to regenerate the destroyed tissue, resulting in increased bone density at the site of damage and an uneven remodelling of the surface of the joint.
- Thick bony outgrowths called spurs sometimes develop. Articulation of the joint becomes difficult. These developments are compounded by a reduction in synovial fluid, which acts as a natural joint lubricant and shock absorber.



Bone disorders

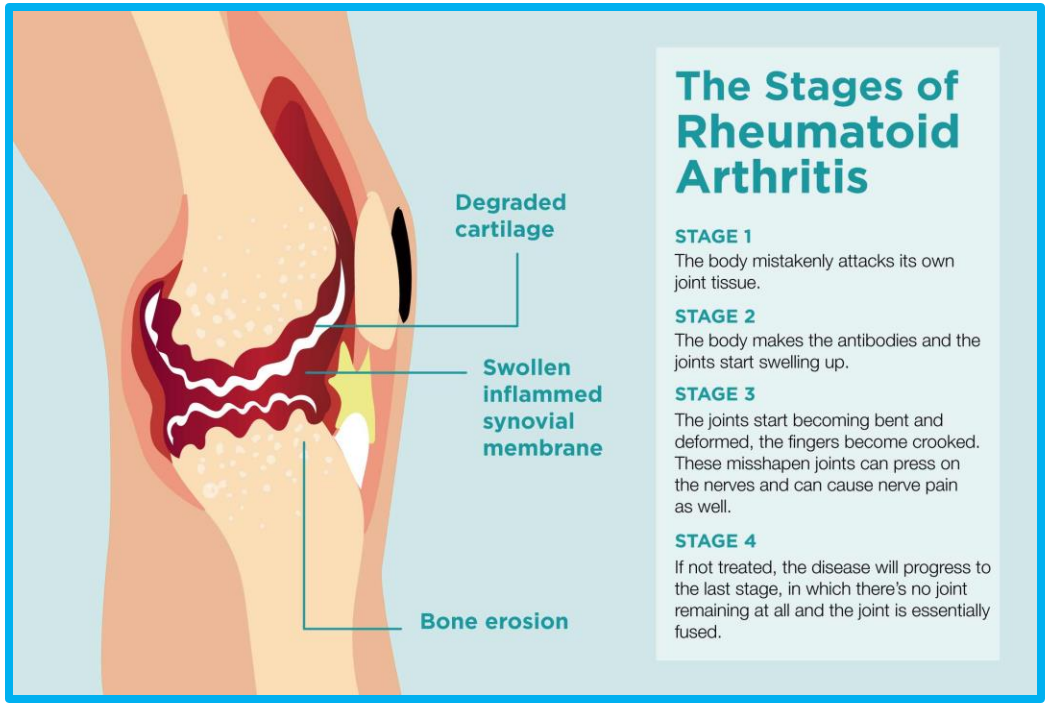
The arthritic diseases

- **Rheumatoid arthritis**, chronic, frequently progressive disease in which inflammatory changes occur throughout the connective tissues of the body. Inflammation and thickening of the synovial membranes (the sacs holding the fluid that lubricates the joints) cause irreversible damage to the joint capsule and the articular (joint) cartilage as these structures are replaced by scar like tissue called pannus.
- Rheumatoid arthritis is about three times as common in women as in men and afflicts about 1 percent of the adult population in the developed nations; it is much less common than osteoarthritis, which is associated with ageing. It primarily affects the middle-aged. (Children are affected by a similar disorder called juvenile rheumatoid arthritis.)



Bone disorders

- **Rheumatoid arthritis** usually first attacks joints of the hands and feet symmetrically before progressing to the wrists, knees, or shoulders; the onset of the disorder is gradual. Pain and stiffness in one or more small joints are usually followed by swelling and heat and are accompanied by muscle pain that may become worse, persist for weeks or months, or subside. Joint pain is not always proportionate to the amount of swelling and warmth generated. Fatigue, muscle weakness, and weight loss are common symptoms. Often, before prominent signs appear, the affected person may complain of coldness of hands and feet, numbness, and tingling, all of which suggest compression of the vasomotor nerve.
- Most people with rheumatoid arthritis have characteristic autoantibodies in their blood, one of the pieces of evidence implicating an autoimmune mechanism in the disease process.



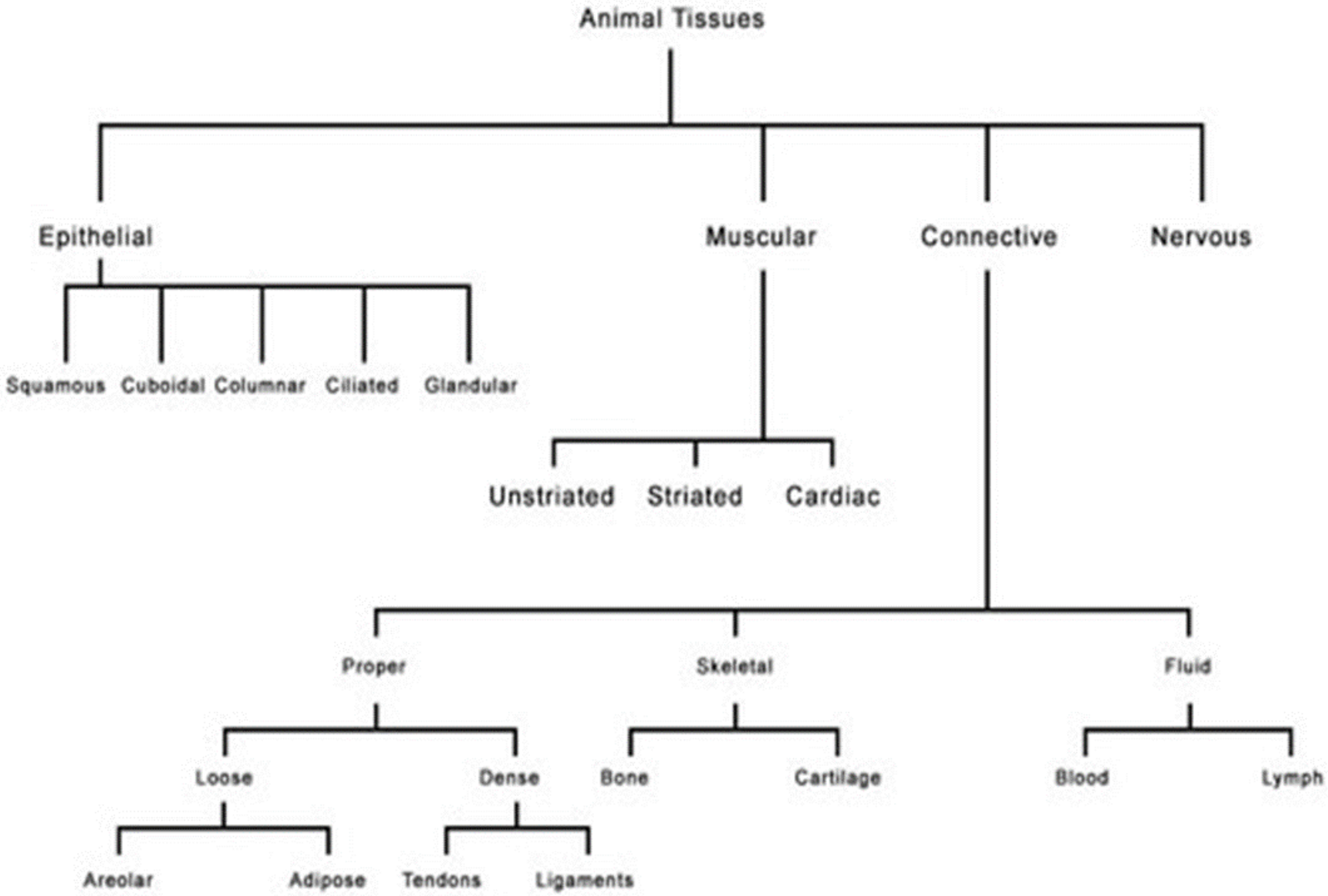
Bone Health

Sue McGarrigle ND

Shin splints

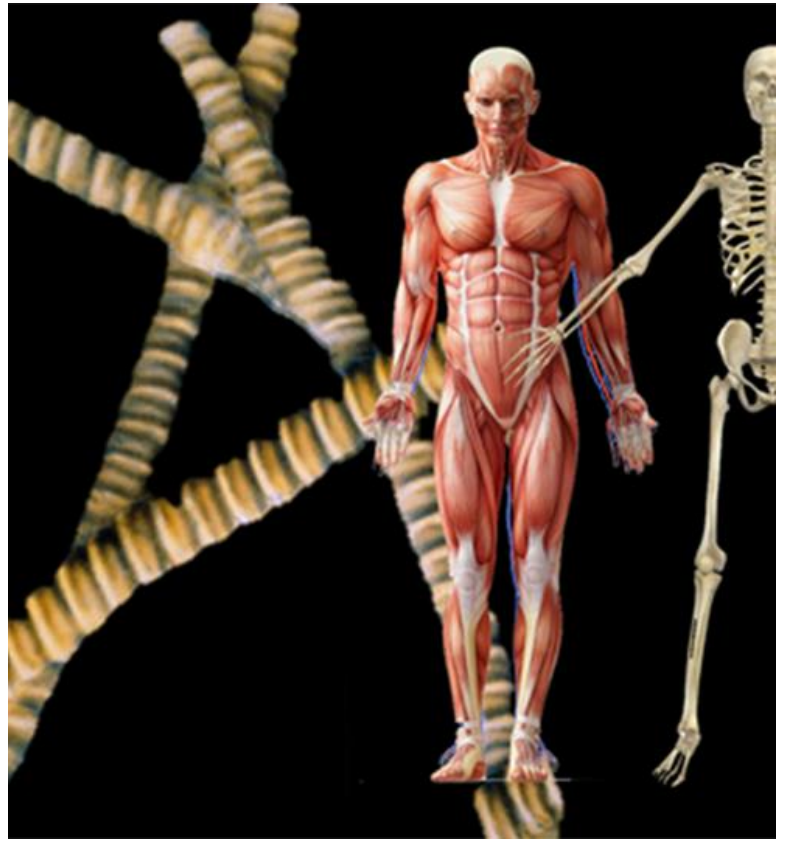
- Shin splints is the common term used to describe the pain felt along the tibia (shin bone), also known as medial tibial stress syndrome.
- Shin splints appear as radiating pain in the area between the knee and ankle.
- People who play sports that involve a lot of running are particularly prone.
- While shin splints should only cause pain in the shins, they may sometimes lead to knee pain due to the anatomical relationship between the lower leg muscles and the knee joint. Muscles attaching to the front of the tibia also cross the knee joint.
- Rest, icepacks and support inflammatory responses

Connective Tissue



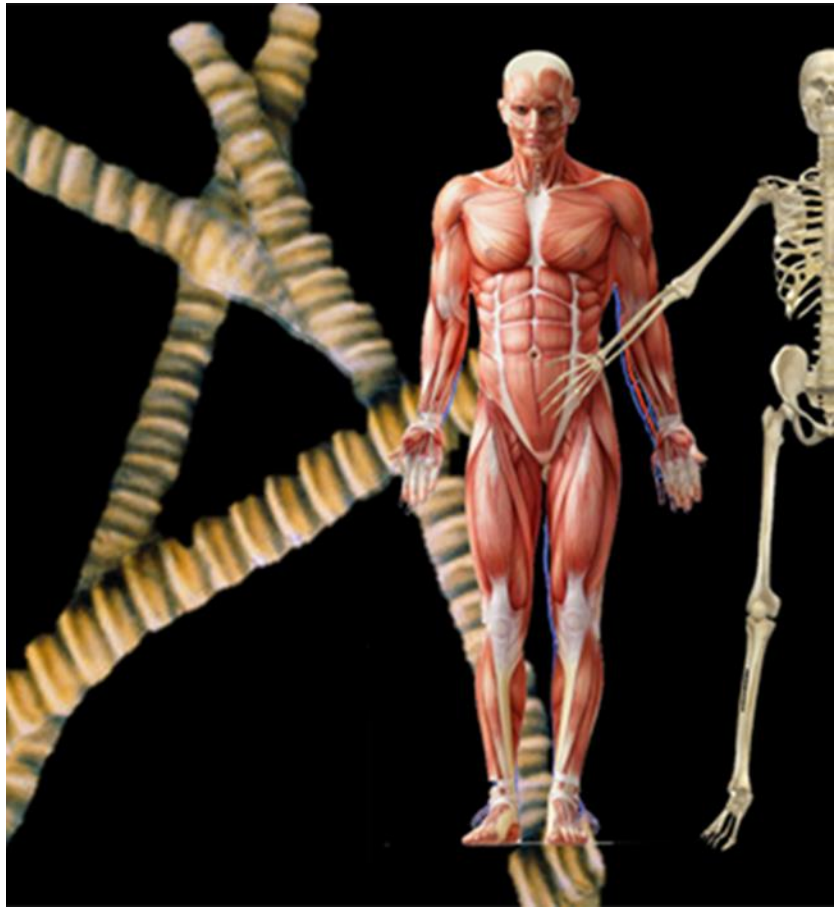
Connective Tissue

- Connective tissue constitutes the immediate environment of every cell in the body, wrapping and uniting all structures with its moist, fibrous, cohering sheets and strands (Juhan)
- All one primary organ of structure, large enough, complex enough, sophisticated enough in its varieties of forms and, important enough for survival to be regarded as one of the vital organs of the body, few vital organs fulfil as many functions. This most abundant body tissue protects and supports the body.
- Responsible for gluing cells into colonies, defining shapes, forming and suspending them into their correct relationships within us. Contains all our fluids. Connective tissue is both fluid and container, a sea and a retort, the medium in which chemical re-organization occurs (Juhan)



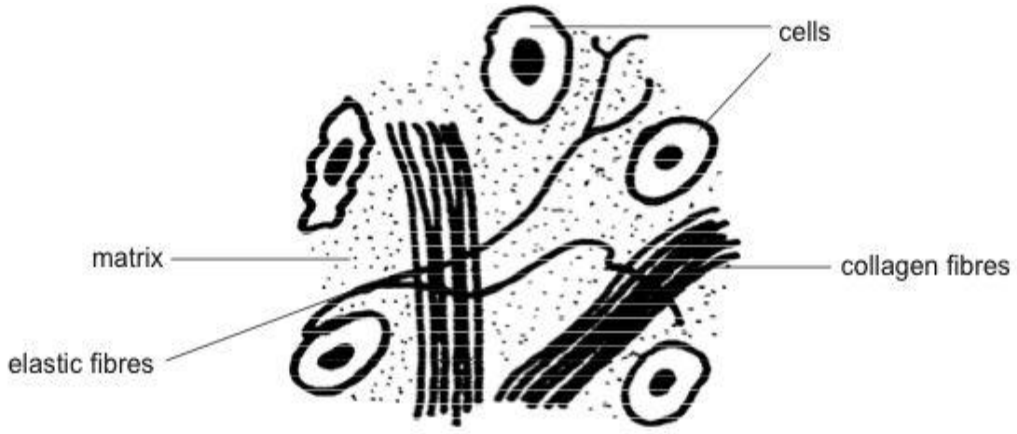
Connective Tissue

- Stress – cortisone weakens connective tissue, inhibits fibroblasts and mast cells which bears directly upon structural, metabolic and immunological function of the connective tissue



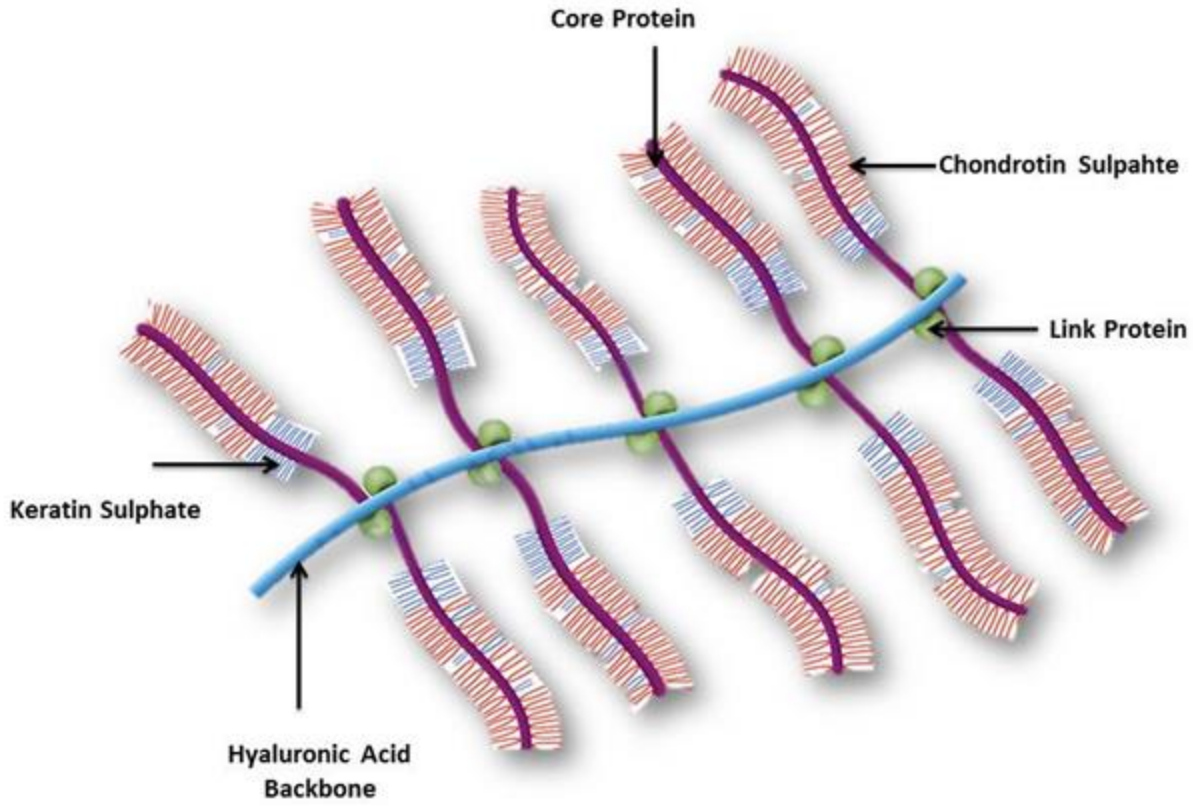
Connective Tissue

- Connective tissue has three main components: cells, fibres, and ground substance. Together the ground substance and fibres make up the extracellular matrix.
- The fibres include collagen, the chief fibrous content of skin, ligament, tendon, cartilage, bone, vessels, and all organs giving shape, tensile strength, resilience and structural integrity.
- Extracellular matrix is found just inside the cell membrane in all tissues, it sends branching collagen fibres between cells to connect them, and it transmits chemical information from the interior of one cell to the interior of adjacent cells.
- Connective tissues can have various levels of vascularity. Cartilage is avascular, while dense connective tissue is poorly vascularized. Others, such as bone, are richly supplied with blood vessels.



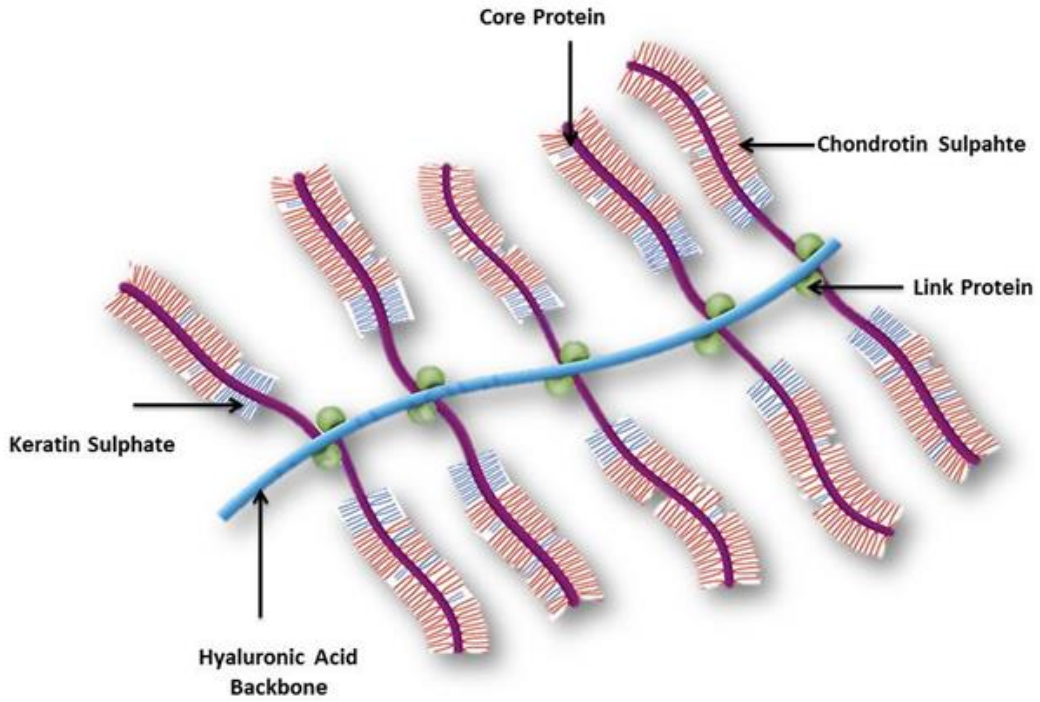
Proteoglycans

- Proteoglycans are a major component of the extracellular matrix of connective tissue (the fibrous tissue that gives support to the body structure), the "filler" substance existing between cells. Here they form large complexes, both to other proteoglycans, to hyaluronan and to fibrous matrix proteins (such as collagen).
- They are also involved in binding cations (such as sodium, potassium and calcium) and water, and regulating the movement of molecules through the matrix.
- Evidence also shows they can affect the activity and stability of proteins and signalling molecules within the matrix.
- Individual functions of proteoglycans can be attributed to either the protein core or the attached GAG chain and serve as lubricants.



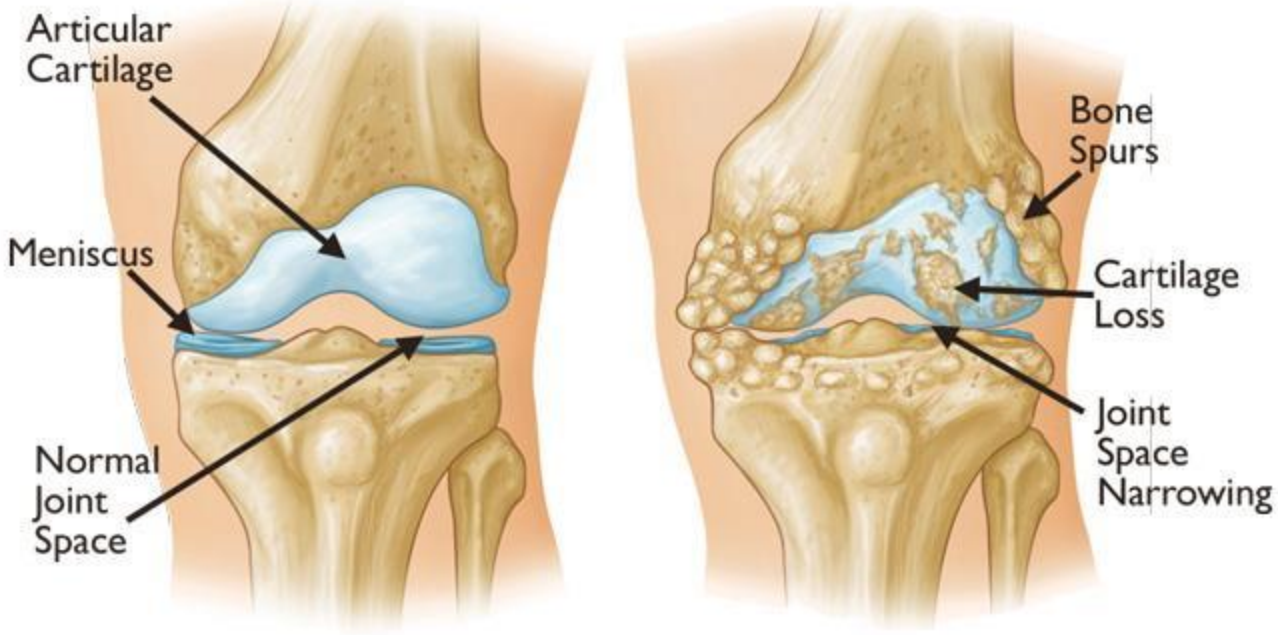
GAGS and Glucosamine

- Glycosaminoglycans (GAGs), formerly known as mucopolysaccharides, are long chains of modified disaccharides. They are the main component of proteoglycans. Their functions within the body are widespread and determined by their molecular structure.
- GAGS have widespread functions within the body. They play a crucial role in the cell signaling process, including regulation of cell growth, proliferation, promotion of cell adhesion, anticoagulation, and wound repair.
- There are six types of GAGS, four of which are involved in connective tissues. (chondroitin sulphate, dermatan sulphate, heparin sulphate, keratan sulphate).
- Glucosamine a key component of cartilage is vital for the synthesis of GAG's and proteoglycans.
- Glucosamine's ability to maintain joints, cartilage and collagen is well documented.
- Glucosamine Hydrochloride provides a highly available source of glucosamine



Osteoarthritis

- Based on preclinical and clinical data, it is obvious that chondroprotectives such as glucosamine, chondroitin sulfate, and other nutrients, such as antioxidants and PUFAs, can modulate osteoarthritis. In long-term use they exhibit, in contrast to NSAIDs, an excellent safety profile, with as few adverse events as placebo.



Jerosch J. Effects of Glucosamine and Chondroitin Sulfate on Cartilage Metabolism in OA: Outlook on Other Nutrient Partners Especially Omega-3 Fatty Acids. Int J Rheumatol. 2011;2011:969012. doi:10.1155/2011/969012

Inflammation-chronic muscle and joint

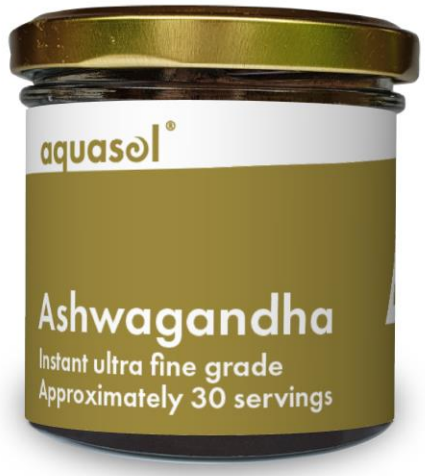
- Chronic muscle and joint pain problems, whether secondary to acute or repetitive stress develop primarily from improperly managed inflammation and oxidative stress.
- Anti-oxidant supplementation is helpful in neutralising free radicals in myofascial tissues, thereby reducing the presence of systemic inflammation.
- The extent and effects of chronic inflammation vary with the cause of the injury and the ability of the body to repair and overcome the damage.

Anti-inflammatory-Chronic inflammation has been shown to cause connective tissue degradation.

- Rosehip
- Fish oil
- Turmeric
- Pineapple
- Nettles
- Green leafy vegetables
- Ginger
- Rosemary
- Devils Claw
- Capsaicin

Anodyne foods-These are herbs that will relieve and soothe pain, relieve stress in the tissue (are synonymous with Analgesics)

- Ashwagandha
- Nettle
- Anise
- Ginger
- Ginseng
- St. John's Wort
- Peppermint
- Lemon Balm
- Chamomile
- Fennel
- Garlic



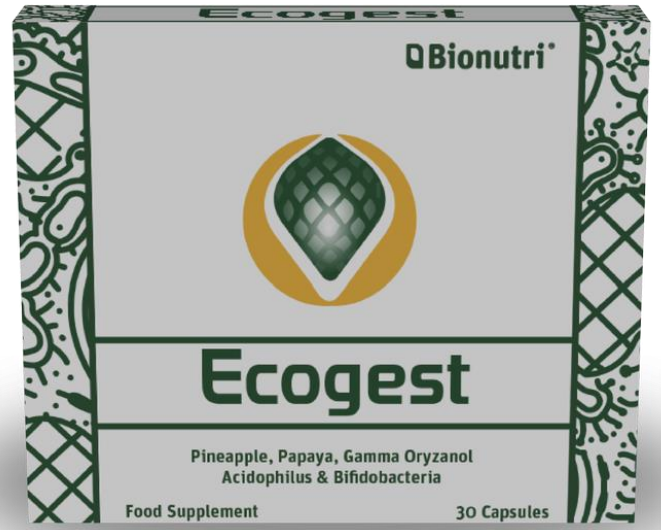
Tissue support

- Taken between meals enzymes work systemically, entering the bloodstream proteolytic enzymes support the inflammatory responses by a variety of mechanisms, including reducing the swelling of mucous membranes, decreasing capillary permeability, and dissolving blood clot-forming fibrin deposits and micro thrombi that prolong inflammation.
- Break down proteins in the blood that cause inflammation by helping their removal through the blood and lymphatic systems.
- Eliminate oedema fluid retention in areas of inflammation.
- General immune support
- Enzymes can help to dissolve and digest the outer coating of anaerobic bacteria or virus, leaving them to be mopped up by the immune macrophages.

Tissue support

- By reducing the viscosity (thickness) of the blood, enzymes improve circulation. This consequently increases the supply of oxygen and nutrients to and the transport of harmful waste products away from traumatised tissue.
- Proteolytic enzymes also help break down plasma proteins and cellular debris at the site of an injury into smaller fragments. This greatly facilitates their passage through the lymphatic system, resulting in rapid resolution of swelling.

Ecogest



Nutrition Information

Recommended Daily Intake
1 capsule with each meal (3 daily)

3 capsules provide

Pineapple Concentrate (*Ananas comosus* fruit) providing 900 mUHb	325mg
Papaya Concentrate (*Carica papaya* fruit) providing 2400 mUHb	270mg
Gamma Oryzanol	300mg
Lactobacillus acidophilus CUL60 *Lactobacillus acidophilus* CUL21 *Bifidobacterium bifidum* CUL20 *Bifidobacterium lactis* CUL34	$3x10^9$ (3 billion) Viable cells

Suitable for vegetarians and vegans

Product Code:7044
30 & 90 capsules

Bone building herbs

- **Nettles** are a nutritional powerhouse, containing an abundance of calcium in a form that is readily absorbed.
- Published in the medical journal Cell Proliferation, the study found that **horsetail** improves the bone-building ability of osteoblasts, cells that create bone by laying down a matrix to which minerals bind to form bone.
- **Dandelion** shoots (the stems, leaves, and flowers) are not only rich in calcium, but they also contain good amounts of boron, which is critical to strong bones. Dandelion shoots have one of the highest amounts of the mineral boron of almost any food. They are a good source of magnesium, phosphorous, Vitamin D and Vitamin K.

Nettle-regulation of inflammation

- Studies have investigated nettle's ability to decrease the body's inflammatory response, the control of blood flow, and reduction of pain.
- Nettle reduces inflammatory cytokine release and reduces inflammatory biomarkers like TNF-a, IL-1, IL-6, NF-kB and CRP.
- It also interferes with the way the body sends pain signals and decreases the sensation of pain
- Stinging Nettle appears to have the ability to act as a Cyclooxygenase inhibitor (1 and 2) and inhibiting Hematopoietic Prostaglandin D2 synthase; three anti-inflammatory actions.
- Herbalists have found nettle to be a reliable herb in the treatment of numerous systemic and dermatologic inflammatory conditions.

Roschek B Jr, et al. Nettle extract (Urtica dioica) affects key receptors and enzymes associated with allergic rhinitis. Phytother Res. (2009)

Nettle-regulation of inflammation

- These effects help to reduce the pain and stiffness of arthritis, gout and other soft tissue conditions such as bursitis and tendonitis. Ancient Egyptians used stinging nettle to treat arthritis and lower back pain.
- Two clinical treatment studies into pain produced encouraging results with improvement in pain at rest (55 per cent), pain on exercise (45 per cent), physical impairment (38 per cent) and reduction in consumption of non-steroidal anti-inflammatories in 60 per cent of patients, with onset of effectiveness occurring after 11 days.
- The topical application of fresh nettles as a counterirritant for patients with arthritis has a long history. Weiss mentions this approach for lower back pain, sciatica, chronic tendinitis, and sprains as well. Yarnell.
- Combine with Aquasol Ginger and Turmeric teas.

Riehemann K et al (1999). K. Plant extracts from stinging nettle (Urtica dioica), an antirheumatic remedy, inhibit the proinflammatory transcription factor NFkappaB. FEBS Lett . 442(1):89-94.

Chrubasik S et al (1997). Evidence for antirheumatic effectiveness of stewed Herba urticae dioicae in acute arthritis: a pilot study. Phytomedicine. 4:105.

Chrubasik S, Eisenberg E (1999). Treatment of rheumatic pain with medicine in Europe. Part 2. Urtica dioica
L. Pain Clinic. 11 (3): 179–185.

Weiss, R.F. (transi. Meuss, A.R.). Herbal Medicine, 6th ed. Gothenburg, Sweden: Ab Arcanum, and Beaconsfield, UK: Beaconsfield Publishers, Ltd., 1985 and 1988.

Nettle-regulation of inflammation

- A combination of stinging nettle leaf extract and devil's claw significantly reduced symptoms of arthritis compared to a placebo in a 12-week study of 92 arthritis patients.
- Arthritis relieving properties is due to nettle's ability to inhibit the activation of NF-κB, which would otherwise increase the production of inflammatory compounds.
- There is also evidence that using stinging nettle leaves topically can help relieve pain in those with:
- Lower back pain
- Thumb pain
- Knee pain


QBionutri
Nettle Plus
Nettle, Dandelion, Dong Quai &
Hibiscus with Blueberry,
Alpha Lipoic Acid & Vitaflavan.
Food Supplement
90 Capsule


aquasol
Nettle Root
Instant Organic Herb
Approximately 50 servings

Vitamin C

- Swollen and painful joints are one of the symptoms in Vitamin C deficiency and appear to be related to the weakening of blood vessels, connective tissue, and bone, which all contain collagen.
- As vitamin C deficiency progresses, collagen synthesis becomes impaired and connective tissues become weakened.

Vitamin C

- Antioxidant
- Synthesis of protein and cell replication
- Integrity and elasticity of connective tissue
- Immune health
- Circulation
- Detoxification of metabolic waste and ingested toxins
- Use with zinc for tissue healing

Bioflavonoids

- Formation of collagen
- Tissue integrity
- Wound healing
- Capillary permeability and blood flow
- Antioxidant
- Anti-inflammatory
- Enhances vitamin C function
- Anti-viral
- Inhibition of histamine
- Ease the overproduction of WBCs around the joint reducing inflammation, allowing vitamin C and glucosamine to repair damage

Blueberry

- A well-known source of polyphenol antioxidants and anthocyanins with proven benefits on micro circulatory health.
- Allows passage of vitamin C by opening up the microcirculation
- Daily incorporation of whole blueberries may reduce pain, stiffness, and difficulty to perform daily activities, while improving gait performance, and would therefore improve quality of life in individuals with symptomatic knee OA.

Plum

- A stone ‘super’ fruit containing phenols, neochlorogenic acid, chlorogenic acid
- Neutralisation of superoxide anion
- Prevents damage to neurons and fats that form a part of cell membranes
- Rich in vitamin C essential for metabolic processes for bone health
- Plums and prunes are high in polyphenol antioxidants, which may reduce inflammation and promote bone health
- Prunes have several properties that may benefit bone health by preventing or reversing bone loss, which may reduce the risk of conditions like osteoporosis and osteopenia. Prunes, have a unique nutrient and dietary bioactive profile and are higher in vitamin K.
- Prunes also contain several vitamins and minerals that have bone-protective effects, including vitamin K, phosphorus, magnesium and potassium.

Plum

Calcif Tissue Int. 2008 Jun;82(6):475-88.

Dried plum polyphenols inhibit osteoclastogenesis by downregulating NFATc1 and inflammatory mediators.

Bu SY, Lerner M, Stoecker BJ, Boldrin E, Brackett DJ, Lucas EA, Smith BJ.

Department of Nutritional Sciences, College of Human Environmental Sciences, Oklahoma State University, Stillwater, OK 74078, USA.

Pomegranate

- Having served as a symbolic fruit since ancient times, pomegranate has also gained considerable recognition as a functional food in the modern era.
- Pomegranate's healing qualities which have long been known by the ancients have been confirmed in numerous scientific studies. To date, over 1500 articles have been published on the subject “pomegranate”, of which 1259 articles were published between 2006 and 2016.
- This literature has linked pomegranate polyphenols, particularly anthocyanins and hydrolysable tannins, to the health-promoting activities of pomegranate juice and fruit extracts.
- Bioactive metabolites present in pomegranate fruit peel and juice have received considerably more attention than those found in other tissues.

Pomegranate

- Pomegranate can induce its beneficial effects through its various metabolites and are mainly relevant to these high polyphenol concentrations.
- The deep red arils have anthocyanins, while the rind and white pith surrounding the arils contain hydrolysable tannins or ellagitannins.
- Tannins-ellagitannins are not absorbed intact into the blood stream but are hydrolysed to ellagic acid in the intestine and punicalagin, gallagic acid and punicalin.
- Punicalagin is the largest known molecular weight polyphenol and is unique to pomegranate, it accounts for a lot of pomegranate's antioxidant activity.
- Punicalagins are extremely potent antioxidants found in the juice and peel-unique hydrolysable tannins which help Vitamin C and other water- soluble nutrients pass through the gut wall.
- The juice has been found to have three times the antioxidant activity of red wine and green tea.
- Also, there are various health-promoting activities of urolithins, a group of phenolic metabolites transformed from ellagic acid.

Urolithin A

- Polyphenolic compounds such as ellagitannins and ellagic acid-the bioavailability of these compounds is limited, and the compounds must be metabolised by the gut microbiota to produce bioactive molecules that can be easily absorbed.
- The right flora needs to be present which breaks down Pomegranate Juice to produce ellagitannins which produces ellagic acid.
- The gut microbiota metabolises ellagic acid resulting in the formation of bioactive urolithins A, B, C, and D. Urolithin A (UA) is the most active and effective gut metabolite and acts as a potent regulator of inflammation and anti-oxidant agent.
- Urolithin A is not known to be found in any food source.

Pomegranate

- The inflammatory regulation activities of anthocyanins are attributed by their antioxidant properties via various underlying mechanisms.
- Anthocyanins can quench free radicals and inhibit the activity of xanthine oxidase that generates free radicals. Besides reactive oxygen species (ROS), anthocyanins also inhibit the production of reactive nitrogen species (RNS), particularly nitric oxide (NO), as well as their associated oxidative processes.
- Release of pro-inflammatory mediators and adhesion molecules is suppressed by anthocyanins via targeting of the respective signalling pathways, e.g., the arachidonic acid and the tumour necrosis factor (TNF)-α, nuclear factor (NF)-κB pathways.

Pomegranate

- The IL-1b protein molecules create an overproduction of inflammatory molecules including matrix metalloproteases (MMP), which are tightly regulated enzymes necessary for tissue remodelling.
- When overproduced in a disease state, such as osteoarthritis, they degrade the cartilage resulting in joint damage and destruction.
- Study results indicate that pomegranate fruit extracts inhibit the overproduction of MMP enzymes in human cartilage cells.
- This suggests that consumption of pomegranate fruit extract may help in protecting cartilage from the effects of IL-1b by suppressing cartilage degradation in OA.

Pomegranate Fruit Shown To Slow Cartilage Deterioration In Osteoarthritis

Date: September 1, 2005

Source: Case Western Reserve University

Vitamin C

- The nutritional and biochemical role of vitamin C is enhanced by the synergistic activity of associated food factors such as polyphenols, antioxidants, flavanols and tannins contained in fruits such as Pomegranate, Plum and Blueberry.

Vitamin C Complex

- Vitamin C Complex combines two separate mineral sources of Vitamin C (Potassium Ascorbate and Magnesium Ascorbate) with the powdered extracts of three different fruits - Pomegranate, Plum and Blueberry.
- Ascorbate form (non-acidic), for ease in stomach.

Bionutri product with Pomegranate extract

Bionutri product with Pomegranate Juice

Rosehips

- Rosehips are a good food example as they contain a high content of vitamin C as well as polyphenols and unsaturated fats and they are given to guinea pigs to naturally increase their vitamin C content.
- Children were encouraged to gather rosehips during the last war and were given rosehip syrup as other citrus fruits were not available.
- Rose hips have been used for centuries in traditional and folk medicine for their modulation of inflammatory responses and pain-relieving properties.

Rosehips

- Reactive oxygen species (ROS) are key signalling molecules that play an important role in the progression of inflammatory disorders.
- Chronic muscle and joint pain problems develop primarily from improperly managed inflammation and oxidative stress.
- Rosehip antioxidants may neutralise toxic substances released by white blood cells in myofascial tissues, thereby reducing the presence of systemic inflammation.

Rosehip

- High in vitamin C, carotenoids, EFA's and tretinoin
- Helps the passage of fluids between cells through osmosis
- Antioxidant
- Helps in tissue injury
- Glycosides have an anti- inflammatory effect and antinociceptive activities including actions on arachidonic acid metabolism and inhibition of cyclooxygenases. Attenuates inflammatory responses in different cellular systems.
- Helps in arthritic conditions and low back pain
- Nourishes the skin (collagen and elastin)

Rosehips

- **Quercetin** is the most abundant flavonoid that accumulates in many plants where it forms glycosides, such as rutin. A potent antioxidant, inflammation regulator and histamine inhibitor.
- **Rutin** has shown inflammatory regulating properties in models of intestinal inflammation, possibly through down-regulation of the nuclear factor-kappa beta pathway. it aids in suppressing oxidative stress.
- Rutin protects cellular function, circulates in the bloodstream, seeking out toxic free radicals or poisonous metals and inactivating them, before these can damage cells (Arch Biochem Biophys 1998;355: 43-8)
- Strengthens small arteries and veins under the skin (J Mal Vasc 1998;23(3):176-82).
- Stabilises effects of vitamin C

Rosehips

- The lipophilic constituents in rosehip have been found to have anti-inflammatory activity including actions on arachidonic acid metabolism and inhibition of both cyclooxygenase-1 and 2.
- Much of the anti-inflammatory action of rosehip shown in various studies has been attributed to high quantities of its galactolipids. Galactolipids are a class of compounds widely found in the plant kingdom and are an important part of cell membranes.
- A specific galactolipid, GOPO, has been shown in clinical observation to reduce the activity of polymorphonucleated leukocytes that are implicated in inflammation and tissue damage.

NSAIDS

- The growing evidence base suggests that it has a high safety profile and with its low price and ease of administration provides an attractive alternative against conventional drug therapies such as NSAIDs.
- Rosehip has an inflammatory modulating action that does not have ulcerogenic effects, promote bleeding or disturb blood clotting mechanisms. This may limit potential side effects for patients who may be at increased risk from the gastrointestinal or cardiovascular side effects of NSAIDs.
- Additionally, repeated courses of NSAIDs may increase the destruction of cartilage over time.

Inflammatory responses

- Rosehip attenuates inflammatory responses in different cellular systems (macrophages, peripheral blood lymphocytes and chondrocytes) affecting cytokine production and matrix metalloproteinase (MMP) expression, down-regulating catabolic processes and conferring cartilage protection. (The matrix metalloproteinases (MMPs) are a group of enzymes responsible for degradation of collagen.

Rosehips

- A primary feature of arthritis, in particular osteoarthritis, is the degradation and erosion of the extracellular matrix (ECM) in cartilage, resulting in impaired joint motion, severe pain and disability. The preceding alterations of collagen and proteoglycan implicate the activation of enzymatic systems, i.e. matrix metalloproteinases (MMPs) and aggrecanase. Interleukin (IL)-1β is considered a key catabolic factor that induces ECM degradation and has multiple effects on the expression of chondrocyte genes and affects matrix enzymes, chemokines and cytokines.
- An early study on one hundred patients (65 women, 35 men with a diagnosis of osteoarthritis of either the hip or knee, verified on radiography), participated in a randomised, placebo-controlled, double-blind study. They were divided into 2 treatment groups of 50 patients each. Half of the patients were given five 0.5g capsules of standardized rose-hip powder twice daily for 4 months, and the other half received identical placebo capsules twice daily for the same period. Mobility of the hip or knee was measured in both groups after the initial screening and again after 4 months of therapy. Hip joint mobility improved significantly in the treatment group compared with the placebo group. Similarly, pain decreased significantly in the treatment group compared with the placebo group. In this study standardised rosehip powder reduced symptoms of osteoarthritis, as 64.6% of patients reported at least some reduction of pain while receiving treatment.

Green Tea

- A well-known anti-oxidant reducing oxidative stress that leads to inflammation resulting in reduced chondrocyte death, collagen degradation, and cartilage erosion.
- An adjunctive treatment both for control of pain and for the betterment of knee joint physical function in adults with osteoarthritis.

Ginger and inflammation

- In research done over the past 30 years, science has found support for the anti-inflammatory properties of ginger, according to a review published in the Journal of Medicinal Food.
- One early study compared the medicinal potential of ginger to non-steroidal anti-inflammatory drugs (NSAID's). Ginger possesses analgesic and pharmacological properties mimicking non-steroidal anti-inflammatory drugs. It found that ginger, like NSAID's, inhibits the enzymes cyclooxygenase-1 and cyclooxygenase-2.
- Further discoveries revealed that an extract of ginger inhibits several genes that contribute to inflammation.
- Multiple research studies outlined in the review established that ginger helped to manage multiple biochemical pathways activated in chronic inflammation without blocking enzymes vital for maintaining healthy tissues.
- Ginger Root is an excellent anti-oxidant, helping to scavenge free radicals from multiple sources including drugs and environmental toxins.

Ginger and inflammation

- A considerable amount of research suggests that ginger compounds interact with AA-derived eicosanoid and thromboxane synthesis. The AA cascade can produce the eicosanoids involved in inflammation (i.e., Prostaglandin E2) as well as thromboxane, which is amongst the many agonists of platelet aggregation.
- Numerous studies indicate that ginger extract and particular ginger compounds inhibit products specific to the cyclooxygenase pathway, including a reduction in thromboxane B2(TxB2) production prostaglandin formation (PGF2a, PGE2, and PGD2), and cyclooxygenase enzyme activity.
- These same compounds also interact with the lipoxygenase pathway, including reductions in 5-lipoxygenase enzyme activity.
- Finally, ginger compounds might also inhibit the activity of phospholipase A2, which suggests that ginger exerts its anti-platelet aggregating as well as its potential anti-inflammatory actions through interaction with one of the initial steps in this pathway.

I J A S Vol. 8 |Nomor 1 Edisi April 2018 |1| A Review: Is Ginger (Zingiber officinale var. Roscoe) Potential for Future Phytomedicine? Dina Mulyana Syafitri1,2, Jutti Levita1, Mutakin Mutakin3, Ajeng Diantini1

Osteoarthritis

- Five trials of Z. officinale for the treatment of osteoarthritic pain and experimentally induced muscle pain reported improved pain ratings by participants using Z. officinale compared with those using a placebo.
- A study that assessed ginger's effects on rheumatoid arthritis demonstrated improvement by reducing symptoms via inducing FOXP3 gene expression.

Muscle damage and DOMS

- It was determined if ginger supplementation is efficacious for attenuating muscle damage and delayed onset muscle soreness (DOMS) following high-intensity resistance exercise.
- Following a 5-day supplementation period of placebo or 4g ginger (randomized groups), 20 non-weight trained participants performed a high-intensity elbow flexor eccentric exercise protocol to induce muscle damage. Markers associated with muscle damage and DOMS were repeatedly measured before supplementation and for 4 days following the exercise protocol.
- In conclusion, 4g of ginger supplementation may be used to accelerate recovery of muscle strength following intense exercise but does not influence indicators of muscle damage or DOMS.

Grape seed extract

- Improves quality of blood- reducing stickiness
- Contains oligomeric proanthocyanidin complexes(OPCs) derived from polymers of catechin and epicatechin, water soluble which are very effective at preventing collagen breakdown
- Extremely beneficial to human health
- Blood vessel health – opcs have a high affinity for constituents of arterial walls
- Protects capillaries
- Enhances the structure and tone of cells
- Protects tissues and vessels from excess enzyme activity which induces fluid and abnormal permeability
- Antioxidant

Tissue repair

- The primary objective of the healing process is to fill the gap created by tissue destruction and to restore the structural continuity of the injured part.
- Concomitantly with tissue damage, at the peripheral of inflammatory process, begins the repair process, to limit the extension of it.

Over the past few years Glucosamine has become a popular food supplement. Although Glucosamine is normally derived from shellfish, CT Plex uses a vegetarian form so that it is suitable for vegetarians and vegans and those who are allergic to shellfish.

CT Plex combines glucosamine hydrochloride with Vitamins C and B6 along with a number of plant extracts from Rosehip, Grapeseed and Green Tea plus the bioflavonoids Rutin and Quercetin.

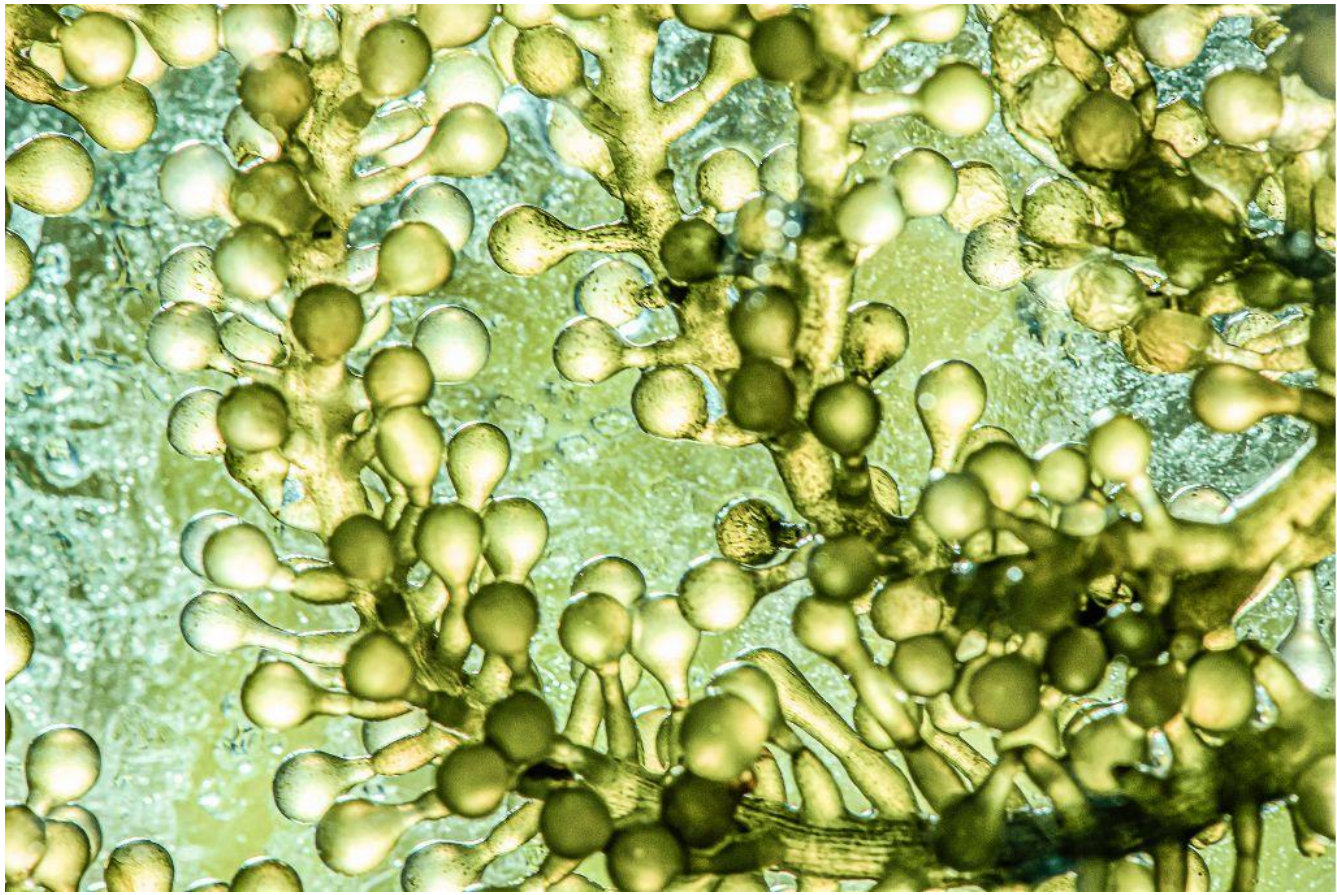
Thyme

Contains Thymol

- Inhibits collagen induced arthritis by decreasing lipid peroxidation mediated oxidative stress.
- Stops the activity of elastase, a marker for collagen degradation and prevents the invasion of inflammatory cells to the injured site.

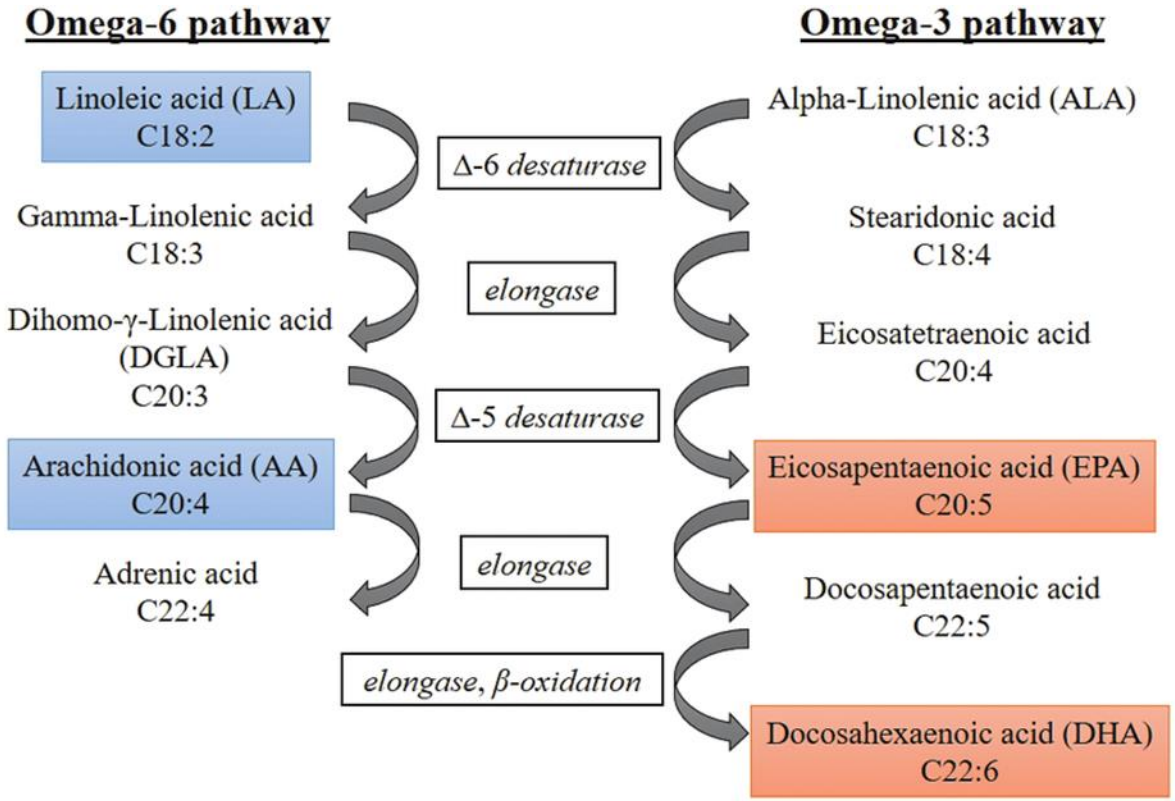
Algal oil

- The use of algal oils in foods and supplements will continue to grow as demand for EPA/DHA increases.
- The use of algal oils remains a proven, sustainable alternative to fish oils and is odourless.



Increasing dietary intake

- EPA is physiologically important but at high levels of supplementation may exert a competitive inhibitory effect upon DHA metabolism in certain individuals.
- This is a factor that has perhaps only become relevant as overall levels of Omega 3 supplementation have increased over the past decade.
- While DHA can be synthesised from alpha-linolenic acid (ALA), another plant-based omega-3 fatty acid, this process is very inefficient. Most DHA comes from our diet and there are some individuals who are more efficient at converting ALA ultimately to DHA, but many Westerners are poor converters and people who follow a low fat, low fish diet often miss out on beneficial long chain PUFA's.
- In humans, the adequate dietary supply of DHA is an important issue. (Qiu, 2003).
- The amount made can be low due to several factors such as a lack of the vitamins (B3, B6, C) and minerals (zinc, magnesium) necessary for conversion, lack of enzymes through competition and ageing, other nutritional factors and toxic influences.
- There is evidence that high carbohydrate diets slow down conversion, and diets higher in proteins enhance conversion.

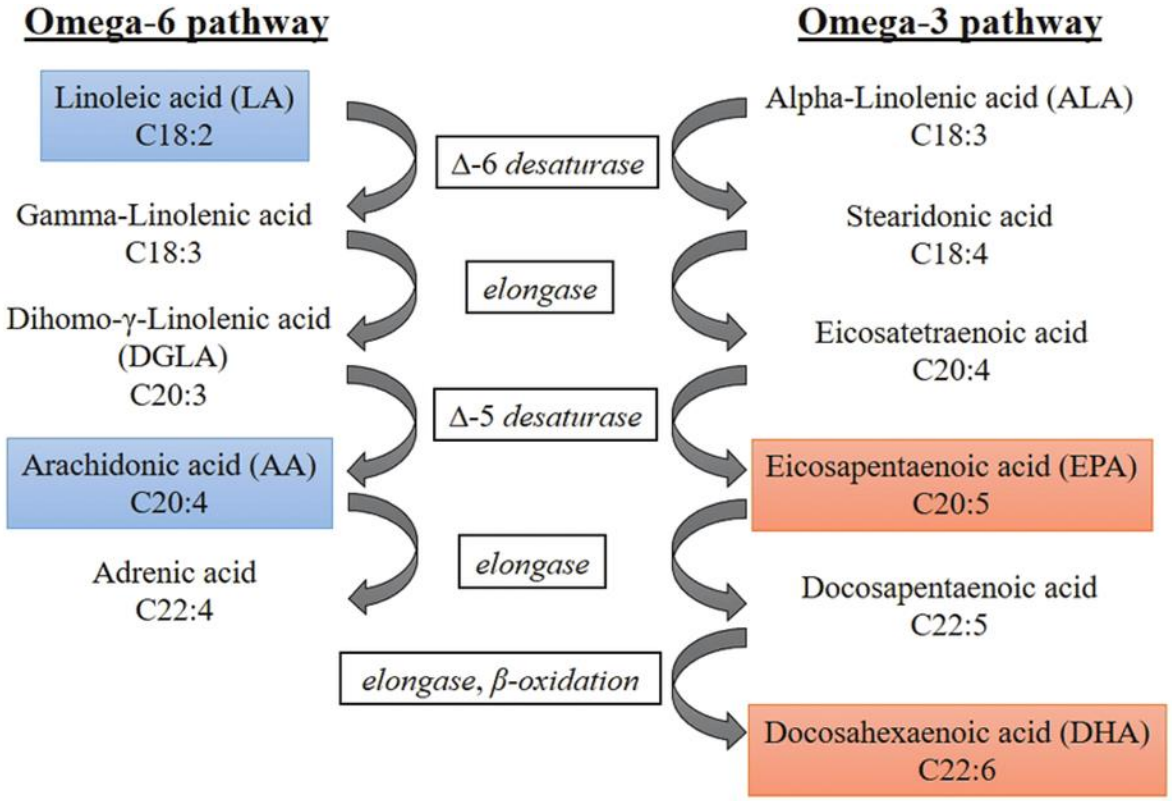


Increasing dietary intake

- Impaired liver function where DHA synthesis occurs.
- Liver tissue levels of DHA are depleted when Vitamin A is deficient
- Impaired metabolic pathways due to viral and bacterial infection/damage contribute to the conversion reduction/blockage.

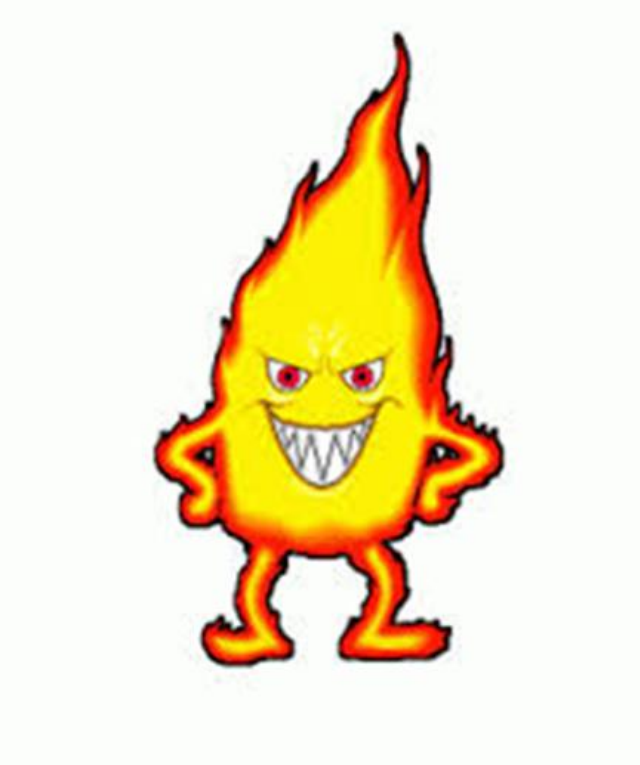
DHA to EPA

- In a study, it was shown that the increase in plasma EPA following DHA supplementation in humans does not occur via retroconversion, but instead from a slowed metabolism and/or accumulation of plasma EPA.
- In adult humans, circulating EPA rises with DHA dosing (DHA dose→EPA↑), though notably DHA never rises with EPA dosing (EPA dose→DHA no change).
- The conclusion is that circulating levels of EPA and DHA are regulated at another level than interconversion between EPA and DHA.



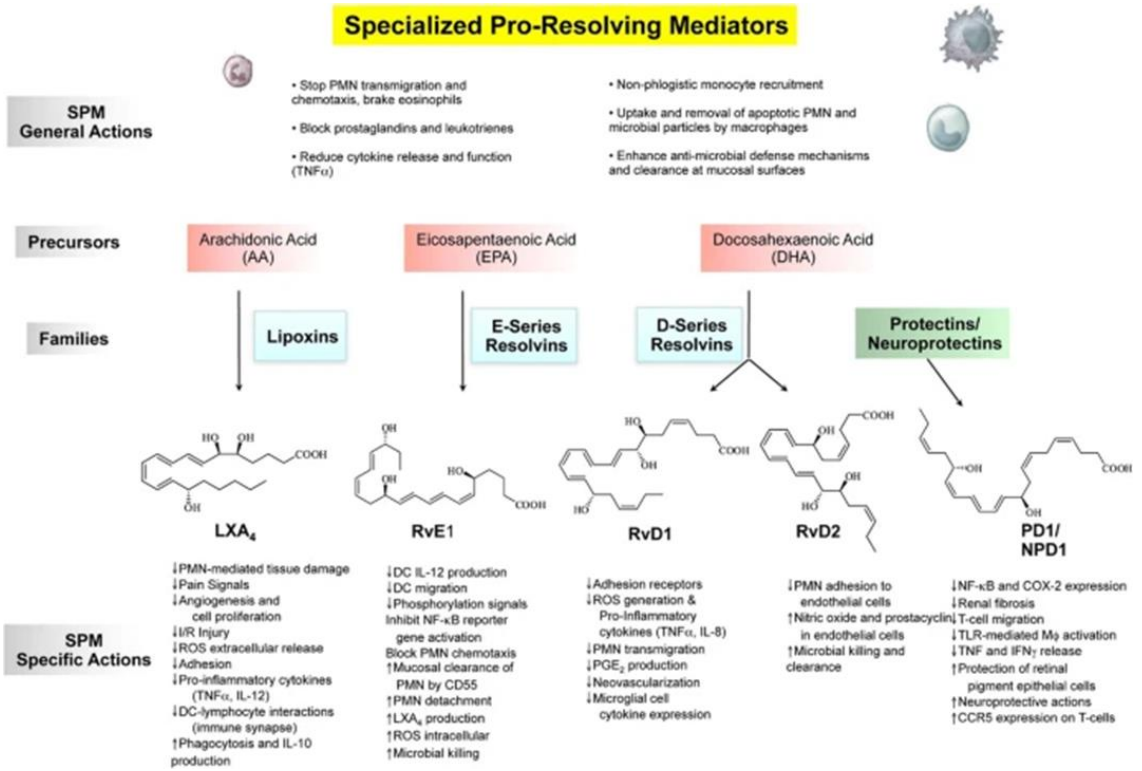
Inflammation

- There are two distinct phases of inflammation; initiation and the resolution of inflammation both active processes operating independently.
- If they are mismatched, the result is continuing low-level chronic inflammation below the perception of pain or cellular inflammation



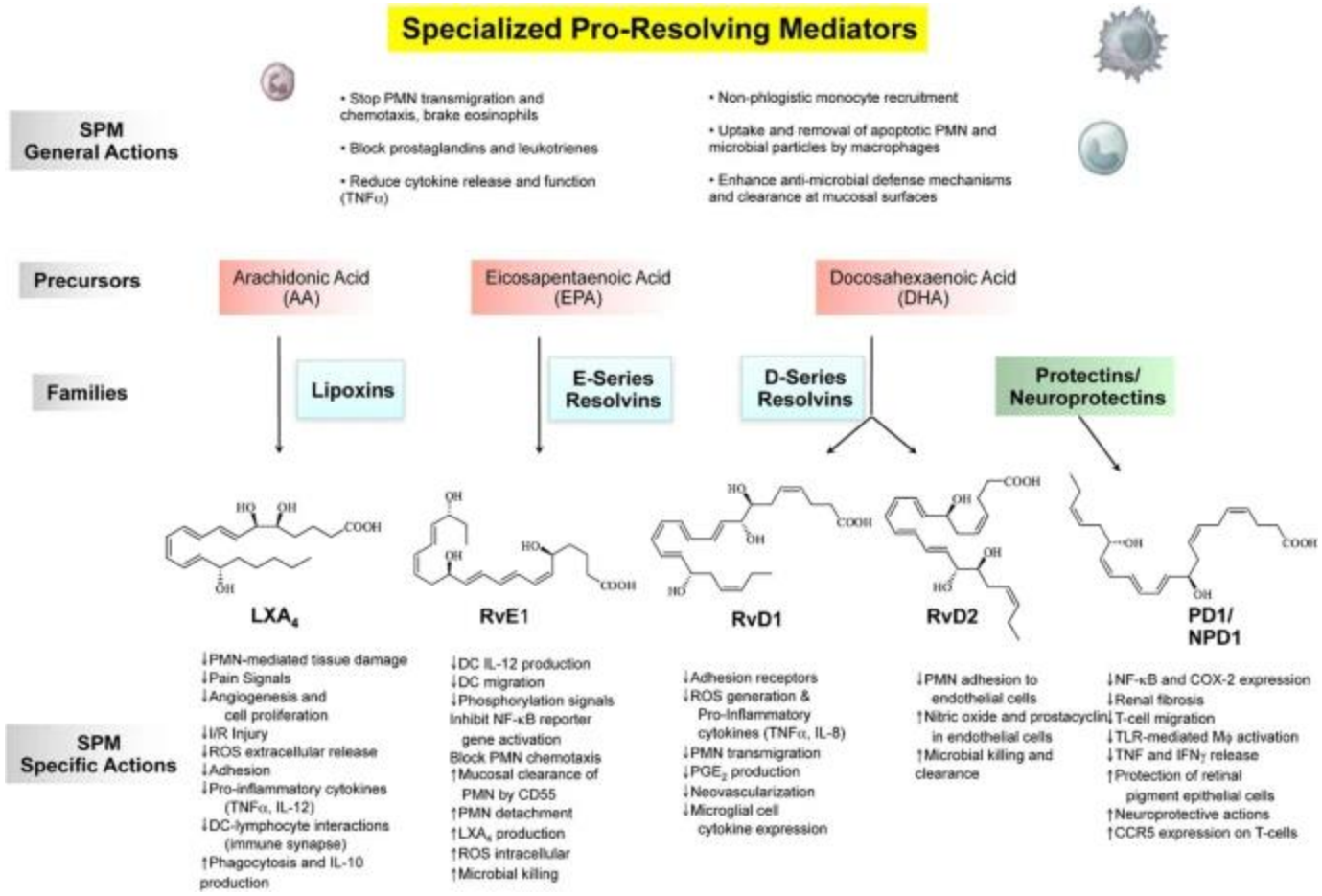
A keystone to resolving inflammation

- Resolution of inflammation has historically been viewed as a passive process, occurring because of the withdrawal of pro-inflammatory signals, including lipid mediators such as leukotrienes and prostaglandins with most anti-inflammatory drugs traditionally targeting primarily mediator pathways that are engaged at the onset of inflammation.
- Only recently has it been established that inflammation resolution is an active process with a distinct set of chemical mediators.
- Resolution of inflammation occurs by different mechanisms in different tissues.
- First, they sent out a "stop signal," quickly putting a stop to runaway inflammation. Next, they trigger the active resolution of inflammation.



A keystone to resolving inflammation

- The recent discoveries of the endogenous conversion of DHA to D-series resolvins, protectins/neuroprotectins, and more recently to the maresins, have provided a new basis for the health benefits of DHA in the resolution of inflammation.
- Protectins formed only by DHA prevent inflammation by blocking the recruitment and action of neutrophils, inhibiting TNF-alpha and altering COX-2 activity.
- Resolvin E1 (from EPA supplementation) and Resolvin D2 (from DHA) appear to act via a novel receptor to prevent the pro-inflammatory cytokine TNF-α from inducing pain.

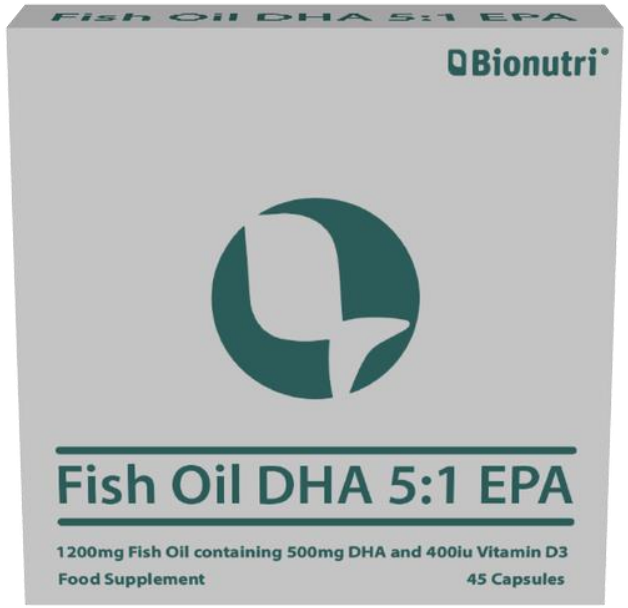


Available in 30 or 60 Capsules

- Each vegan omega-3 DHA algal oil capsule contains: 250mg DHA plus EPA 4mg
- Anti-oxidants –Vitamin C, Vitamin E and Rosemary Extract
- Innovative solvent free extraction process results in a pure, very stable oil, rich in DHA

Fish oil

- Fish oil's multiple benefits have long been attributed to its effects on reduced inflammatory signalling by cytokines.
- Ageing itself produces a total body loss of these health-promoting molecules.
- It may be more difficult to reach the necessary omega-3 fatty acid levels to generate adequate levels of anti-inflammatory molecules within the modern-day diet.
- Multiple studies reveal that supplementing with omega-3-rich fish oil boosts production of pro-resolution molecules and quickly brings the body back to a non-inflamed state.

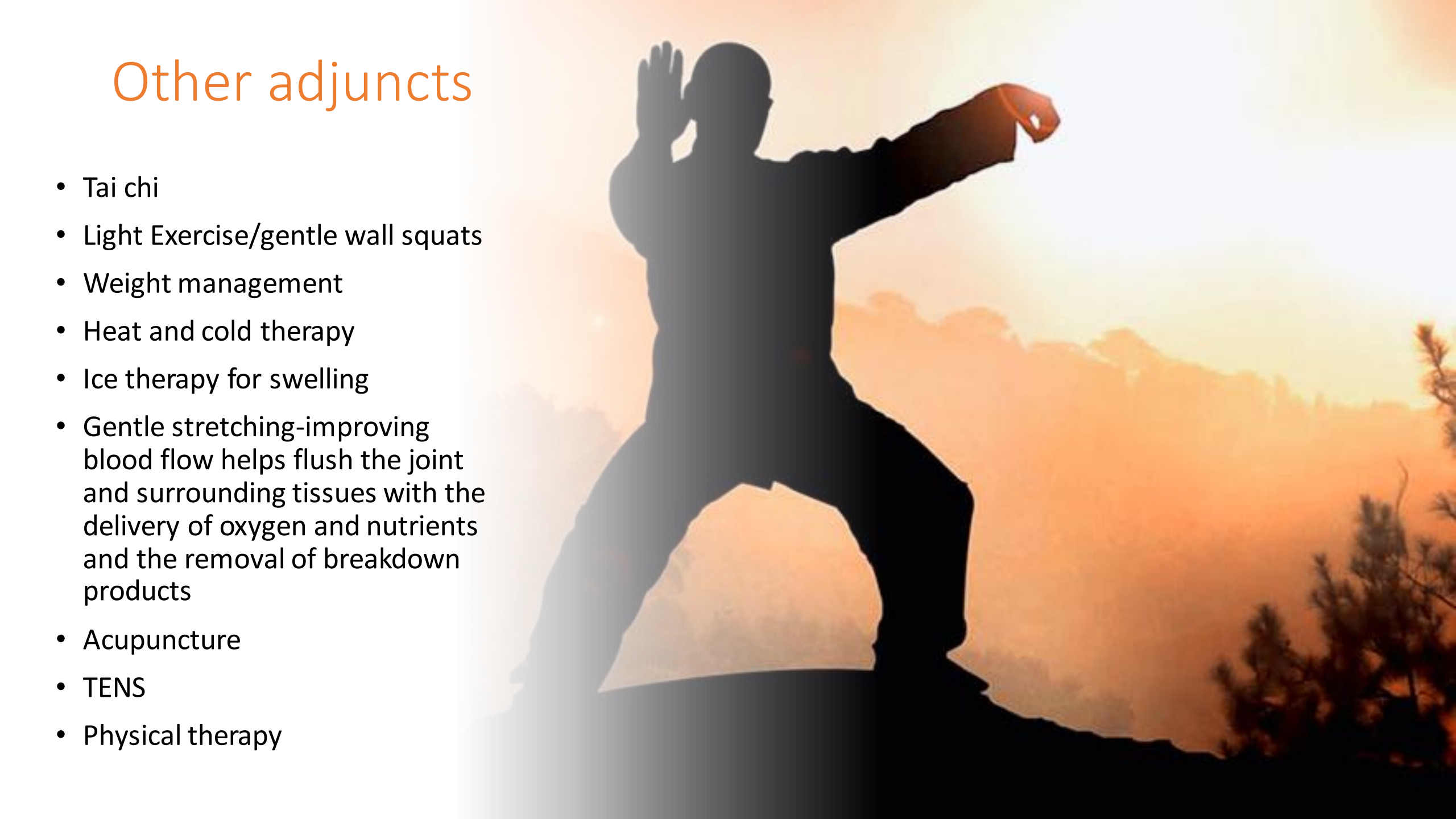


Organic Roman Chamomile and German Chamomile, the essential oils from these plants are renowned for their anti-inflammatory and analgesic properties. Chamomile is recognized by the European Scientific Cooperative for Phytotherapy and found in the pharmacopoeia of 26 countries. Chamomile's medicinal values include anti-inflammatory, anti-septic, carminative, antispasmodic and sedative. Organic Black Pepper, a 'warming essential oil'; Organic Eucalyptus, used for its anti-rheumatic, analgesic and decongestive properties; Organic Sweet Marjoram, used for its analgesic and anti-spasmodic properties.10% MSM is added to the cream to maximise its effectiveness.

https://www.lifestylenaturalhealth.co.uk

Other adjuncts

- Tai chi
- Light Exercise/gentle wall squats
- Weight management
- Heat and cold therapy
- Ice therapy for swelling
- Gentle stretching-improving blood flow helps flush the joint and surrounding tissues with the delivery of oxygen and nutrients and the removal of breakdown products
- Acupuncture
- TENS
- Physical therapy



Aquasol-unique instant pure herb teas

aquasol

- We source the best quality organic herbs around the world, fair trading with skilled farmers who maintain the complexity and full integrity of the herb.
- Superfine grade, smaller granules
- Whole herb is consumed-zero waste
- Liquids, hot and cold, food or yogurts

Aquasol-unique instant pure herb teas

- More bioactive and bioavailable after testing-higher than normal herbal powder
- Better than standardised herbs which may concentrate part of the herb making it more potent and not all of it so not concentrated materials without the wider part
- Aquasol overcomes this by through grinding has a much greater surface area, normally herbs may be 11-25 microns when ours are many times greater-250 microns

About Bionutri

- Nutrients constitute much of the vital energy in the foods we eat and equally, the more diverse and dynamic our diet the greater our potential for health. So, the capacity for Nutrition Practice to exert health benefits is indeed profound.
- However, the modern Practitioner is routinely confronted by clients in an inflammatory, congested state with a lifestyle that does not sufficiently nourish them. To overcome these barriers the Practitioner can intervene with individual or combination supplements.
- That being said, bioavailability and biological activity of nutrient combinations is dependent upon a number of factors; simply bombarding a stressed or weakened system can be either over-stimulating or just ineffective.
- Biosynthesis is the process through which basic nutrients and substrates are enzymatically activated into becoming much more than simply the sum of their parts. It is this process that forms Bionutri's core focus.

About Bionutri

- A name synonymous with nourishment, not overstimulation.
- Born out of a vision to simplify the work of nutritional and naturopathic practitioners.
- Specific and straightforward innovative solutions for daily supplementation geared to support the fundamental metabolic systems of the human body.
- Unique combinations of plants and nutrients with probiotics to enhance their biological activity and bioavailability nourishing the specific systems of the body with well constituted nutrition and phyto-nutrition, whilst supporting gut health for optimal activity and bioavailability.
- We do not look to by-pass nutritional pathways or megadose with single nutrients or enzymes.
- Cutting edge manufacturing processes allow us to activate and stabilise vital nutrition within their most complex groupings.

About Bionutri

Dosing

- Dosing is an important factor when either formulating or considering taking a supplement, Bionutri maintains a nutritional mandate:

- Our products are food supplements not functional medicines.

- We believe our role is to provide the best nutrition at a level that remains nutritional.

- We do not look to by-pass nutritional pathways or megadose with single nutrients or enzymes

- A new Bionutri product can be years in the making. From a draft formulation to a finished product is a meticulous process, involving multiple stages of research and development, analysis and testing.

About Bionutri

- Products designed for specific straightforward solutions for daily supplementation
- Range is compact and comprehensive
- We draw on 25 years of experience in food supplement manufacture to create a system approach that simplifies your prescribing task
- Eases client management
- Improves compliance
- Cost effective

About Bionutri

- Bionutri endorses a good manufacturing ethos.
- We maintain a conscientious but wholly pragmatic approach to our work.
- Above all, Bionutri is led by a scientific approach not an idealistic one.
- We formulate and manufacture our products to provide biological advantage, not adhering to fads that come and go within the health food industry.
- We have access to some of the most advanced biotechnology in a GMP registered probiotic manufacturing facility.

About Bionutri

Blister packing--our triplex foil sachets ensure the integrity of our products from the first to the last.

We have a specific policy in place to blister pack products containing volatile oils, probiotics, lipid nutrients or aromatic herbs

About Bionutri

Quality Assurance

- Among the many individual qualities of our company, Bionutri is most proud of the painstaking lengths we take to guarantee the best ingredients.
- An independent procurement policy allows us to source the best ingredients from around the world.
- Of particular importance in dealing with botanicals and insuring the best constituent value of the end product.

Example

Chios Mastic Gum

Mastic Gum is used as the primary ingredient in our digestive support supplement, Mastic Gum Plus. In order to guarantee the best quality ingredients, we source the raw material directly from the farming co-operative on the Island of Chios, Greece. During the harvesting process, the best quality mastic gum is set aside for nutraceutical, cosmetic and pharmaceutical use. We send this raw material to the Netherlands where we contract out a unique grinding and depolymerising process: micronising the Mastic Gum and providing Bionutri with a highly specialised ingredient.

Practitioner Support

- Website for your clients to browse www.bionutri.co.uk and a password protected practitioner page where you have access to catalogue pages and webinar listings for online registration (for webinars contact adel@bionutri.co.uk).
- CPD opportunities to join the hundreds of healthcare professionals that visit our free weekly 11-12 Wednesday webinar. A wide range of topics covered plus interactive Q and A. Extensive back catalogue of recorded CPD webinars available. Sign up at www.bionutri.co.uk/practitioner-signup-form
- We are also on Facebook/Bionutri for practitioners/Instagram and LinkedIn (Bionutri)
- Professional Product catalogue
- Technical Support by Zoom/phone or email-Sue McGarrigle ND (suem@bionutri.co.uk), Edward Joy Herbalist (ed@bionutri.co.uk), Rosie Rayner ND rosie@bionutri.co.uk
- Product training-one to one or small groups by telephone or Zoom/Teams.
- Kinesiology samples
- Samples for sensitive clients

Product sources

Practitioner/Patient

Bionutri Ltd
The Natural Dispensary

Ireland-Maria Cadogan at NT Supplies-
www.ntsuppliesireland.com

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- Nutrients. 2019 Feb; 11(2): 294. Published online 2019 Jan 30. doi: 10.3390/nu11020294 PMCID: PMC6412843 PMID: 30704054 The Effects of Glucosamine and Chondroitin Sulfate on Gut Microbial Composition: A Systematic Review of Evidence from Animal and Human Studies Anna Shmagel,1,* Ryan Demmer,2 Daniel Knights,3 Mary Butler,4 Lisa Langsetmo,5 Nancy E. Lane,6 and Kristine Ensrud7,8