

A woman and a man are walking through tall, golden-brown grass on a beach at sunset. The woman is in the foreground, wearing a grey beanie, a dark vest over a light-colored long-sleeved shirt, and dark pants. She is looking to the right with a slight smile. The man is behind her, wearing a dark jacket and a dark beanie, also looking to the right. The background shows a sandy beach and the ocean under a warm, orange sky. The text "NUTRITIONAL SUPPORT IN MUSCULOSKELETAL THERAPEUTICS" is overlaid in white, bold, sans-serif font across the middle of the image.

NUTRITIONAL SUPPORT IN MUSCULOSKELETAL THERAPEUTICS



CYTOPLAN
NATURE MEETS SCIENCE

NUTRITIONAL SUPPORT IN MUSCULOSKELETAL THERAPEUTICS

Musculoskeletal conditions significantly limit mobility and dexterity, leading to early retirement from work, lower levels of well-being and reduced ability to participate in society.

Because of longer life expectancy and growth of an elderly population, the number of people with musculoskeletal conditions is rapidly increasing, and it is now the largest cause of disability, affecting an estimated 1.71 billion people globally.¹

A recent online survey of those living with arthritis in the UK reported the following sobering statistics²:

34%
say arthritis pain
always or often
stops them
doing everyday
activities

21%
of those currently
in employment
miss an hour or
more of work
every month as
a result of their
arthritis

40%
take daily
painkillers

15%
have been
living with
arthritis for
over 20 years

The body has significant powers of self-healing and regeneration. Biological tissues are dynamic and two opposing processes which are constantly occurring simultaneously:

- the breakdown and removal of worn-out cells and cell components (known as clastic activity)
- and the building and regeneration of cells (known as blastic activity)

If blastic and clastic processes are in balance good health is sustained, but if the rate of breakdown exceeds the rate of repair there will be a net loss of healthy tissue and eventually the emergence of a diagnosable condition – for example osteoporosis or osteoarthritis.

Inadequate nutrient intake, poor gut health and inflammation can all contribute to the rate of breakdown exceeding the rate of repair, and therefore should be primary considerations when recommending dietary or supplement advice to your patients.

You will probably have noticed that injuries to bone, tendons and tissues are slower to repair in some patients than others and this is likely to be attributable to excessive inflammation or a lack of nutrients needed for the repair process, either through insufficient nutrient intake, or poor gut health resulting in reduced absorption and assimilation of vital nutrients.

Nutritional status

We are often advised to eat healthily to promote and maintain our brain health or the health of our hearts – and this is also crucial for our musculoskeletal health. Eating a varied, well-balanced, nutrient-rich diet is a good place to start, as an insufficiency of key nutrients puts yourself at risk for bone, muscle or joint disease. Nutrition can play many roles – it can modulate the immune system, be tailored to help suppress pain and inflammation and provide specific nutrients needed for growth, maintenance, and repair. Symptoms can therefore often be reduced, or conditions may be evaded altogether by implementing nutritional strategies.

In summary:

- The constant renewal and repair of cells and tissues requires an adequate supply of nutrients
- Nutrients are needed for basic cellular biochemistry that may underpin and sustain more specific support – for example, B vitamins are needed for cellular energy production, which is required for all metabolic processes, including repair
- Nutrients support the body to produce materials needed for structure and function – for example, the body needs an adequate supply of protein, vitamin C and other cofactors to manufacture collagen
- Some nutrients may also be relevant in helping to improve or relieve symptoms such as pain associated with many musculoskeletal conditions - for example, omega 3 fatty acids can help to stabilise membranes and prevent an inflammatory cascade.

The nutrition gap

For many years now at Cytoplan we have presented the rationale that there is a nutrition gap in most people's diet.

The nutrition gap refers to the difference between the levels of nutrients the average person, eating a reasonable Western diet is obtaining from food, and the levels of nutrients identified by research as being needed for optimal health.

Nutrient shortfalls can be caused by a number of different factors and this deficit impacts adversely on both immediate and long-term health.

The nutritional status of our bodies is dependent on a number of factors, including:



Food choices



Food growing, processing & preparation methods



The nutrient content of the food we eat

- this has decreased dramatically in the last 80 years with the development of intensive farming



The ability of our bodies to assimilate these nutrients



Lifestyle factors, such as smoking, stress, alcohol intake and medications which may give rise to additional needs



Our level of activity
(energy expenditure)

If you are eating a typical Western diet, many of the above are relevant to the nutrition gap in your life. However, even if you are adhering to what we would consider an optimal dietary regime, there are still two factors that can create nutrient shortfalls. These are a) the level of nutrients in the fresh foods you are eating and b) your level of activity – we were designed to lead active lives and consume 3000 to 4000 calories per day of nutrient dense food; today we consume around 2000 calories which means a lower level of intake of vitamins and minerals.

In recent years, pioneering work by biochemist Bruce Ames⁸ has opened up a whole new understanding of how the body uses nutrients. It is now apparent, that the first call on nutrients by our body will be for immediate and acute needs – for example the 'fright and flight' response and energy needs – however this is at the expense of repair and regeneration processes.

Inflammation

Inflammation is a normal part of metabolic activity that is necessary for cell turnover, renewal, and all metabolic processes of life. An optimal environment is one that is weakly inflammatory, but the problem in the Western world today is that, by virtue of diet, lifestyle, and other factors, most of us have a greater level of inflammation in our bodies than is healthy. Excess inflammation causes cell tissue dysfunction and destruction and is at the heart of many chronic diseases.

Inflammation is at the heart of most disease processes and musculoskeletal conditions often have an inflammatory component.

The term "arthritis" is derived from the Greek words "arthro" and "itis", meaning joint and inflammation respectively. They are however, often grouped as either inflammatory (e.g. rheumatoid arthritis) or non-inflammatory (e.g. osteoarthritis).

Osteoarthritis is known as a degenerative joint disease and more common as we age due to wear and tear and loss of cartilage. Although not typically considered an inflammatory condition, there is much research now that shows inflammatory mediators in its initiation and progression. Amongst other markers, the pro-inflammatory cytokine Interleukin-6 has been shown to suppress type II collagen and aggrecan synthesis – the key constituents of cartilage, as well as playing an important role in pain sensitivity and the severity of joint inflammation.²⁷ A variety of cytokines are produced by multiple joint tissues and cell types and can promote inflammatory and catabolic responses in chondrocytes (specialised cells found in cartilage tissue). In osteoarthritis, inflammatory signalling pathways are likely triggered by products of tissue damage and stress.³⁹ Whatever the musculoskeletal condition, following an anti-inflammatory diet may have great benefit. Please see below protocols for details on an anti-inflammatory diet.

Gut health

The gastrointestinal tract plays a central role in many chronic diseases and is often an important starting point for improving overall health. A complex living system, our gut is the first line of defence in protecting the body against the external pathogens that can cause us harm.

We have trillions of healthy bacteria living in our gut, known as our microflora. Collectively, they weigh 1-2kg and perform essential functions such as helping us to digest food, absorb nutrients, support the immune system, keep pathogenic bacteria at bay and maintain the integrity of our gut lining. A healthy intestinal microflora is essential to optimal wellness, but many factors can disrupt the balance of friendly bacteria and allow opportunistic bacteria to overgrow. This may include a poor, low fibre diet, use of certain medications, particularly antibiotics, intense exercise, stress and food sensitivities or intolerances.

This overgrowth is referred to as dysbiosis and can contribute to systemic inflammation as certain species of pathogenic bacteria produce the inflammatory triggers – endotoxins and lipopolysaccharides (LPS). If you look through the enormous amount of literature on the subject of the gut microflora, you will find some connection with almost every health condition you can think of, and, as such, it should be one of the first considerations for any nutritional protocol – particularly if your patients are experiencing any gastrointestinal symptoms. This might include bloating, heartburn, diarrhoea, constipation (i.e. less than once per day) and abdominal pain.

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Leaky gut

As mentioned, the gut is our first line of defence against pathogens we may ingest, and the lining, or epithelial barrier helps to maintain homeostasis through segregating the internal and external environments by preventing external antigens and endogenous substances from crossing into the bloodstream. It does so via the presence of “tight junctions” between epithelial cells as well as antimicrobial peptides and secretory IgA which prevent the adhesion of pathogenic microbes to the gut lining.

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However, barrier dysfunction, especially the disruption of tight junctions often leads to enhanced intestinal permeability or “leaky gut”, where undigested food particles, large proteins and other molecules are allowed to enter the bloodstream, causing the immune system to launch an inflammatory response. Chronic inflammation, resulting from leaky gut, can play a significant role in many health conditions, and particularly musculoskeletal conditions which commonly have an inflammatory aspect.

The beneficial bacteria in your gut produce short chain fatty acids (SCFAs) when they ferment dietary fibre, which can promote intestinal barrier function and research has demonstrated the benefits of multi-strain probiotics in reducing both inflammation and gut permeability.^{5-7,38} Other nutrients that may aid repair of intestinal cells and mucosa, as well as helping to reduce inflammation include foods rich in amino acids such as bone broth, and nutrients such as L-Glutamine, collagen, *Aloe vera*, marshmallow, slippery elm, curcumin, lactoferrin, essential fatty acids, vitamins A, C, D, E and zinc.

Nutrients to support musculoskeletal health and recovery

There are over 50 nutritional elements considered essential for life – vitamins, minerals, amino acids and fatty acids.

The table below lists some of these and explains their function in relation to musculoskeletal health:

Nutrient	Examples of functions in relation to musculoskeletal health
Vitamin A	<p>Vitamin A is required for epithelial and bone tissue development and cellular differentiation. Carotenoids, including beta-carotene, the precursor to vitamin A, have a positive impact on bone health. However, too much preformed vitamin A (ie retinol) has been linked to bone loss and an increase in the risk of hip fracture. Scientists believe that excessive amounts of vitamin A trigger an increase in osteoclasts, the cells that break down bone.</p> <p>Conversely, higher bone mineral density and lower fracture risk have been reported in individuals with higher vitamin A intake – so balance is key.^{9,10}</p>
B vitamins	<p>Inadequate B vitamin intake has been reported among hip fracture patients and an association between various B vitamins (B2, B6, folate or B12) and a lower risk of osteoporosis has been observed. Their benefits may be as a result of their links to homocysteine, which has been implicated in increased fracture risk.^{11,12}</p>
Vitamin C	<p>Ascorbic acid is an essential cofactor for the synthesis of collagen, proteoglycans, and other organic components of the intracellular matrix of tissues such as bones, skin, capillary walls, and other connective tissues. As an antioxidant, vitamin C seems to be associated with decreased risk of cartilage loss and osteoarthritis, possibly by the reduction of oxidative stress, which can also be damaging for bone health.¹³ Smokers or those exposed to passive smoke will have increased vitamin C needs.</p>

Vitamin D

Vitamin D is anti-inflammatory, and a deficiency is associated with increased inflammation. It is needed for calcium absorption and regulates gene transcription. The prevalence of vitamin D deficiency is increased among patients with connective tissue disease.¹⁴

Vitamin D has been found to have a preventative effect in autoimmune disease, and studies have shown low serum levels amongst those with Rheumatoid Arthritis, compared to healthy controls. Therefore, vitamin D deficiency is considered a risk factor in the development and activity of the condition.¹⁵

Vitamin E

Vitamin E is an antioxidant, anti-inflammatory agent and modulator of genes favourable to bone formation.¹⁶

Oxidative stress is one of the proposed mechanisms for the joint degeneration in osteoarthritis and low Vitamin E levels have been observed in osteoarthritic patients. It is thought that Vitamin E supplementation may slow the progression of osteoarthritis by reducing oxidative stress and inflammation of the joint.³¹

Vitamin K

Vitamin K is a coenzyme associated with the formation of osteocalcin, a major non-collagenous protein incorporated in bone matrix during bone formation. There are two forms of naturally occurring Vitamin K – K1 and K2. Vitamin K1 is found naturally in plants, especially green vegetables. K1 goes directly to the liver and helps maintain healthy blood clotting. Vitamin K2 is made by gut bacteria and goes to bones, blood vessel walls and tissues other than the liver. The association between vitamin K deficiency and fracture risk has been established by many epidemiological studies.¹⁷

The calcification of cartilage plays an important role in the pathogenesis of osteoarthritis, and Vitamin K may have a protective role by activating γ -carboxyglutamate-containing proteins that negatively regulate calcification. Studies show that a sufficient level of Vitamin K is associated with a lower risk of osteoarthritis.¹⁸

Nutrient	Examples of functions in relation to musculoskeletal health
Calcium	<p>“It is well known that calcium is the most important factor in bone strength.” Regrettably, this is a simplistic and inaccurate statement. Adding more calcium when the dietary intake is at required levels is unlikely to increase bone mass; and studies have shown that calcium supplementation has been associated with adverse cardiovascular events. Calcium from food, however, is considered safe.¹⁹</p> <p>Calcium intake in young children builds up a healthy reserve of calcium; however, calcium is not the only factor in bone growth and strength. No one single substance, food, vitamin or mineral can produce strong, healthy bones. Nutrients are required in combination to develop the complex matrix of bone.</p>
Magnesium	<p>Magnesium is a major element which aids in bone growth. It is necessary for the proper functioning of muscles and also regulates the metabolism of calcium. Where calcium works with skeletal muscle contraction, magnesium acts in opposition, therefore promoting muscle relaxation, which is useful for those who experience tissue cramping.</p>
Zinc	<p>Zinc is an essential cofactor for DNA synthesis, cell division, and protein synthesis, all necessary processes for tissue regeneration and repair.</p>
Iron/manganese/ copper/boron/ molybdenum/ selenium	<p>These trace minerals act as cofactors for enzymes involved in bone metabolism and/or collagen synthesis; and/or cofactors for endogenous antioxidants.</p>

Essential fatty acids

These have stabilising and anti-inflammatory properties, increasing calcium absorption and reducing calcium and bone loss.

Lipids are stored in the cartilage matrix and can contribute to inflammation and cartilage degradation. Osteoarthritic joints accumulate high levels of omega 6 fatty acids, precursors of inflammatory eicosanoids. Conversely, omega 3 fatty acids, EPA in particular generate anti-inflammatory mediators and supplementation has shown to reduce pain in both osteo and rheumatoid arthritis.²⁰

Amino acids

Regeneration and repair can increase overall protein needs. Researchers have investigated the effects of specific amino acids on the healing process and determined that arginine and glutamine appear to be necessary for proper wound healing. Glutamine is released from skeletal muscle following injury or surgery, which can cause a relative deficiency of glutamine in skeletal muscle and the gut.¹³



Other nutrients for repair

Glucosamine

Probably the most well-known supplement for regeneration is glucosamine: an amino sugar vitally important for repair to ligaments, bones and joints. Glucosamine is a natural constituent of glycosaminoglycans in the matrix of cartilage and synovial fluid. In osteoarthritis, glucosamine can induce the reversal of the pro-inflammatory and joint-degenerating effect of interleukin-1 – a pro-inflammatory cytokine produced in high amounts in the tissues of osteoarthritic joints.²¹ Glucosamine also speeds regeneration, and so long as the rate of repair keeps up with the rate of tissue loss, bones and tissues will stay healthy.

There are no edible sources of glucosamine - bound forms do occur in meat cartilage - but this is the gristle, which we tend not to eat.

Many of your patients may be taking glucosamine sulphate supplements. This will be doing some good, but some will be experiencing digestive discomfort with it in this form, particularly those who already have a diet high in sulphur-containing compounds. Glucosamine hydrochloride, however, is a purer form with less digestive problems reported and a preferred choice for long term supplementation.

Antioxidants

Antioxidants prevent damage by scavenging free radicals, which are produced as by-products of metabolic processes in the body. Free radicals have a number of negative effects in the body, including a direct reaction on the polysaccharide found in connective tissue and synovial fluid, resulting in damage and subsequent inflammation. Many studies have also demonstrated upregulated free radical levels in the cartilage and chondrocytes of those with osteoarthritis.²²⁻²⁴

Environmental pollution, smoking, excess alcohol, diet and exercise can all trigger the production of free radicals. Whilst moderate exercise stimulates the production of the body's antioxidant enzymes, high intensity exercise can lead to oxidative stress and athletes may benefit from additional antioxidant intake. An additional concern is for joggers and cyclists exercising in the smoky or polluted environment of our busy road networks, as this potentially increases their exposure to free radicals.

Vitamins C and E are possibly the most well-known antioxidants. However, they are reliant on enzymes to facilitate the free-radical scavenging process, which in turn require sufficient mineral resources in particular: copper, manganese, selenium and zinc.

Flavonoids & carotenoids: Fruit and vegetables contain other antioxidant groups, known collectively as flavonoids and carotenoids. These compounds have the ability to protect DNA, stabilise cell membranes, inhibit inflammatory processes, inhibit the breakdown of bone and cartilage and strengthen capillaries.

Collagen

Collagen is the most abundant protein in the human body and it accounts for approximately 33% of our body's protein mass. As a major component of connective tissue, it can be found in skin, muscles, tendons etc. While there are five different types of collagen proteins, it is collagen type II protein which makes up the fluids and function in the cartilage and joints. Type I accounts for 90% of the body's collagen and provides the major building block for ligaments, tendons, muscle and bone.

Hyaluronic acid

Hyaluronic acid is an integral component of synovial fluid and articular cartilage which together provide essential cushioning and lubrication to joints. Levels of hyaluronic acid are often reduced in people with osteoarthritis and this is associated with joint pain and stiffness.

Chondroitin sulphate

Chondroitin sulphate is an important structural component of cartilage found in joints within the body.

Anti-inflammatory nutrients

Nutrients with anti-inflammatory properties may also be used to help improve or relieve symptoms such as pain associated with many musculoskeletal conditions.

Curcumin

It is now widely documented that curcumin has the ability to inhibit inflammation through multiple molecular targets and mechanisms of action, including preventing the initiation of inflammation via the Nuclear Factor Kappa-B pathway (NF- κ B). Curcumin has demonstrated therapeutic potential for various chronic inflammatory diseases especially due to its anti-inflammatory and anti-oxidative properties against a vast array of molecular targets.^{25,26} A systematic review and meta-analysis concluded that 8-12 weeks of supplementing with curcumin extract can reduce the pain and inflammation related symptoms of arthritis as successfully as conventional pain medication.²⁶

In a study of patients suffering with knee osteoarthritis, improvements comparable to a sub-therapeutic level of ibuprofen were seen after 90 days of administration of Longvida® Optimized Curcumin – where free curcumin is encapsulated in a tri-lipid matrix, enhancing its solubility and allowing it to survive digestion and reach the target tissues.^{27, 28}



Celadrin

Celadrin is an esterified fatty acid that is available in supplement form. For those with on-going inflammatory reactions there have been many anecdotal reports on the benefits of Celadrin.³² Research indicates that Celadrin:³³

- **Inhibits inflammation in endothelial cells, reduces the production of the immune factor IL-6 (cytokine) and controls the tumour necrosis factor alpha responsible for inflammation**
- **Increases lubrication of affected joints**
- **Inhibits arachidonic acid, one of the main promoters of the inflammatory cascade of immune factors by inhibiting 5-lipoxygenase, another mediator of inflammation**
- **Provides added protection to the reduction of cartilage breakdown in joints**
- **Can reduce pain and improve function in tendon pathology**

Boswellia

Boswellic acid is the active ingredient in *Boswellia Serrata*, and has shown significant pharmacological activity in the treatment of inflammatory diseases such as rheumatoid and osteoarthritis, demonstrating improvements in pain, stiffness and the function of the joint.²⁹ A double-blind, placebo-controlled trial on an extract of *Boswellia Serrata* found that the supplement significantly improved the physical function of patients by reducing both pain and stiffness. Boswellia was shown to reduce serum levels of high-sensitive C-reactive-protein, a potential inflammatory marker associated with osteoarthritis.³⁰

Isoflavones

Soy isoflavones are flavonoids, the structure of which is believed to mimic the hormone oestradiol, which can exhibit antioxidant and protective effects on both health. Much of the research with soy isoflavones has centred on the times during and post menopause. Osteoporosis, a disease that weakens the bones, leading them to fracture more easily, is caused, in part by a decrease in oestrogen secretion in menopause, and studies suggest that soy isoflavones are effective for inhibiting bone loss and improving osteoporosis.^{34,35} The process of bone remodelling takes around four to eight months, so long term supplementation should be encouraged.³⁶

Cytoplan products to consider

Multivitamin and mineral formulae

For musculoskeletal health – address the basics first with all-round nutritional support and gut health support if needed. Due to the 'nutrition gap' a multi is recommended to provide a foundation for health, including musculoskeletal health. For example, B vitamins for methylation; vitamin C for collagen synthesis; vitamin D for anti-inflammatory benefits and calcium absorption; vitamin K2 for calcium metabolism; trace minerals that act as enzyme co-factors including zinc important for protein synthesis. We have a range of multiformulae; all are vegan and all contain good levels of vitamins D and K.

Wholefood Multi / Women's Wholefood Multi

A comprehensive wholefood multi which includes minerals grown into a base of cruciferous vegetable from the brassica family. Also contains a fruit and vegetable powder blend of carrot, *Spirulina*, alfalfa, artichoke leaf, beetroot, acai berry and acerola powder, which provides extra phytonutrients. Excellent levels of B Vitamins and a high level of antioxidant protection. The Wholefood Multi is a low in iron so suitable for men and post-menopausal women. If your client is of menstrual age, opt for Women's Wholefood Multi.

50+ / CoQ10 Multi

Two names, same formulation. A comprehensive wholefood multi with higher levels of B vitamins, vitamins C and D and trace minerals. Also contains the antioxidant coenzyme Q10; this antioxidant is produced in the body although levels decrease with age (and are depleted by statin medication).

Gut support

Research has demonstrated the benefits for multi species of probiotics in reducing inflammation and permeability of the gut which can lead to inflammation.

Sacchomyces Boulardii

For those in whom an imbalance of bacteria or *Candida* is suspected or identified, the use of *Saccharomyces boulardii* may be recommended. This beneficial yeast has been subject to much research with positive outcomes in relation to *Candida* infections, bacterial infections and antibiotic-associated diarrhoea. *Saccharomyces boulardii* is used ideally in combination with a live bacteria supplement.

Acidophilus Plus

Contains 9 strains of live bacteria.

Alternative products: Fos-A-Dophilus, Cytobiotic Active, Vegan Biotic, Women's Biotic

CytoProtect® GI Tract

CytoProtect® GI Tract is a synergistic multi-nutrient, botanical and probiotic formula designed to support the integrity and stability of the mucosal barrier membranes of the entire gastrointestinal tract.

It contains vitamin A, important for the maintenance of mucous membranes – the first line of immunological defence, along with vitamin D, copper and zinc, which also all contribute to the normal function of the immune system. Slippery elm and marshmallow root powder have traditionally been used to soothe and repair the gastric mucosal lining. Apple pectin provides a source of soluble fibre to support a healthy digestive system. Lactoferrin is a glycoprotein which supports intestinal cell growth. Quercetin provides a source of antioxidants which help protect cells against oxidative stress. *Bacillus coagulans* contributes to the protective layer of bacteria that lines the intestines.

Alternative products: L-Glutamine, Marine Collagen

Vitamins and minerals

Bone Support

Bone Support can be taken alongside a multivitamin/mineral formula. It contains key nutrients to support healthy bone mineral density. Calcium is not the only nutrient needed for bone health. In addition, high calcium intake has been linked to increased levels of urinary calcium which can be detrimental and deposition in soft tissues where it has been linked to atherosclerosis.

Wholefood Cherry C

Wholefood Cherry C contains pure powdered acerola cherry. It is gentle and can be taken between meals even on an empty stomach. It is therefore ideal for people who eat at irregular times and sports people who need regular intakes of vitamins to replace losses after physical exertion.

Alternative products: Food State Vitamin C, Vitamin C as calcium ascorbate powder, Organic Vitamin C

Vitamin D3 + K2 (available as 50µg/2000IU or 100µg/4000IU)

The higher potency formula can be taken alongside one of our multis to boost levels for a short period of time (e.g. for a few months or over the winter). Vitamin K2 is included in these formulas for its role in calcium metabolism. As vitamin D is fat soluble, it is best taken with a fat containing meal (i.e. main meal). Our vitamin D is sourced from lichen and is thus suitable for vegans.

Alternative products: Wholefood or Vegetarian D3 (62.5µg / 2500IU), D3 Drops (5µg / 200IU per 2 drops)

Wholefood Calcium

Wholefood Calcium is an organic multi-mineral seaweed product harvested off the coast of Ireland.

Biofood Magnesium

Biofood Magnesium is an organic matrix form of magnesium complete with natural amino acid carriers to ensure transport to sites of need within the body. Magnesium works with calcium and is a major element required for bone growth.

Alternative products: Magnesium Citrate or Magnesium Threonate

Fatty acids

Krill Oil

Krill Oil contains the omega 3 fatty acids EPA and DHA. The omega fatty acids are presented attached to phospholipids which help absorption; they are thus better absorbed than fish oil. Krill also provides the added benefit of being naturally rich in astaxanthin, a powerful antioxidant.

Alternative products: High Potency Fish Oil capsules, Lem-O-3 liquid

Omega 3 Vegan

Omega 3 Vegan provides DHA and EPA from a marine algal source. It is therefore suitable for vegetarians and vegans who may find it difficult to obtain sufficient omega-3 fatty acids from their diet.

Alternative products: Omega Balance, Omega Protect + CoQ10, Vegan Omega 3 Liquid

Celadrin

Celadrin is a plant based nutritional supplement helpful for joint pain, mobility, flexibility and inflammation, particularly for small joints such as hands and feet. Celadrin is a patented combination of fatty acids which beneficially enhances the integrity of cell membranes in the body, thus subduing the inflammatory process and reducing pain.

Celadrin Cream

Celadrin Cream can be applied to affected areas and is effective within 30 minutes of application. An innovative combination of modern and traditional ingredients for muscle and joint pain. Celadrin cream can be used alongside Celadrin capsules for best effect.

Other products

Cell-Active Curcumin Plus

Cell-Active Curcumin Plus is a natural phytonutrient and herbal complex which can help with pain and inflammation. It now includes Longvida® Optimised Curcumin extract, which is scientifically proven to be up to 285 times more bioavailable than standard 95% curcumin, alongside gingerols from ginger root. Curcumin and gingerols are powerful polyphenolic compounds which together bestow a wide range of anti-inflammatory properties.

Longvida® is an innovative, more bioavailable form of curcumin. Longvida®'s anti-inflammatory and antioxidant properties have been studied for various health applications including exercise-induced muscle damage and inflammation.³⁷

Boswellia

Our Boswellia provides 400mg of Boswellia serrata per capsule providing 260mg boswellic acids. Research has shown boswellia can improve both pain and stiffness in inflammatory diseases.

CytoProtect® Joint Health

CytoProtect® Joints has been formulated using Peptan® IIm powder; a hydrolysed matrix of type II collagen and glycosaminoglycans - chondroitin sulphate and hyaluronic acid.

Designed to support overall joint health; especially for those with active lifestyles or ageing joints. Glycosaminoglycans and type II collagen are the building blocks for cartilage. Cartilage is the main connective tissue in the body; it protects the ends of bones in joints by providing padding, lubrication and tensile strength. Glycosaminoglycans retain water and lubricate the joint. Extracted from bovine cartilage, studies have shown that Peptan® IIm has a high bioavailability in comparison to other collagen forms.

MSM

MSM (methylsulphonylmethane) is an organic form of sulphur. High levels of sulphur are found in the muscles, skin and bones as well as concentrated amounts in the hair and nails. Sulphur is a component of keratin, collagen and elastin providing flexibility, tone and strength to muscles, bones and joints (as well as skin, hair and nails).

Glucosamine Hydrochloride

A pure form of glucosamine which forms an important part of the matrix of cartilage and synovial fluid. Also available in vegan form.

Menopause Support


A source of 100% natural isoflavones. Research has shown a benefit in relation to maintaining bone density in post-menopausal women.

Amino Acids – L-Glutamine and L-Arginine plus

Amino Acids – L-Glutamine is often used to aid recovery after exercise; it is the most abundant free amino acid in muscle cells. Requirements can increase after surgery and trauma. L-arginine has been shown to improve circulation and increase vasodilation. It is used to improve lean muscle mass and support wound healing.

Marine Collagen

A bioactive collagen peptide formulation. Collagen is the most abundant protein in the body and one of the major building blocks of bone, skin, tendons, muscles and ligaments. Type 1 collagen peptides, as found in our marine collagen account for more than 90% of the body's collagen.



Sustainable
marine collagen
peptides from
whitefish

Example protocols for musculoskeletal conditions

Our aim is to create protocols, considering both diet, lifestyle and specific supplements that will give you the tools to make recommendations to your clients that are both safe and effective, for a range of different conditions you are likely to see regularly in your clinic. Below, we detail protocols for both joint and bone health, which will likely encompass several of the issues your clients are experiencing.



Joint health

(Osteoarthritis and similar conditions)

Osteoarthritis (OA) is a condition characterised by the World Health Organisation as the deterioration of cartilage in joints which results in bones rubbing together, creating stiffness, pain, and impaired movement. The degeneration and loss of cartilage can subsequently lead to alterations of the subchondral (underneath cartilage) bone. It is a reasonably common condition, with an estimated 80% of adults over 50 demonstrating some evidence of OA, which many people associate with wear and tear, as it is correlated with advancing age and excess pressure on joints. However, to view the condition as wear and tear may be slightly misleading as using your joints less, as in a sedentary lifestyle, may actually be a risk factor.

Osteoarthritis can be divided into two categories: primary and secondary.

Primary – is the form more associated with wear and tear and aging, this degeneration process tends to occur at the age of 50-60, with no predisposing abnormalities. These changes are due to cumulative effects of decades of use leading to stress on the collagen matrix of cartilage. This damage causes the release of enzymes which destroy collagen components. On top of that, as we age our ability to synthesise and restore normal collagen structure decreases.

Secondary – when OA occurs in association with a predisposing factor that has caused degenerative changes. These include.

- Congenital abnormalities, such as hypermobility and abnormal joint structure
- Trauma (Joint injury but also includes obesity and surgeries)
- Crystal deposition (e.g. uric acid in gout)
- Presence of abnormal cartilage (genetic)
- Inflammation (especially previous inflammatory disease such as rheumatoid arthritis)

Interventions to support arthritis – nutrients

1) Repair of collagen matrix and regenerations of connective tissue cells

Cartilage is made up of specialised cells known as chondrocytes, these produce an extracellular matrix made up of collagen, proteoglycans, and elastin. This matrix acts as shock absorber in the joint, to take strain off the end of the bone and help prevent wear and tear on the cartilage itself. Therefore, supporting this matrix and regenerating chondrocytes is essential for supporting joint health.

Nutrients to support repair and regeneration of connective tissue:

Collagen

Type II Collagen is the main structural component of hyaline cartilage (the firm, gel-like substance which covers the bones), accounting for around 60% of the collagen matrix, and provides structure, firmness, and resistance to compression. While our bodies do produce collagen naturally, this ability declines by as much as 1% annually and, as such a collagen supplement may help to mitigate the effects of this decline.

Dietary sources of collagen – can be found in animal proteins like eggs, chicken, meat and bone broths, with the body naturally making collagen from certain amino acids and nutrients including vitamin A, vitamin C and copper.

Vitamin C

Vitamin C is essential to produce collagen; it is a cofactor in the binding, cross-linking, and folding of collagen to provide its unique structure. Vitamin C intake has been shown to have an inverse relationship with the risk of arthritis progression and can also be useful for pain relief within the musculoskeletal system, and vitamin C deficiency is associated with higher incidence of pain.

Dietary sources include citrus fruits and leafy vegetables, tomatoes, potatoes and sweet potatoes.

Glycosaminoglycans (GAGs)

Glycosaminoglycans mainly consist of two building blocks – aggrecan (a large proteoglycan containing chondroitin sulphate) and hyaluronic acid, both essential components for maintaining a cushioned and lubricated joint environment, allowing for easy joint movement – this accounts for approximately 40% of the cartilage.

Hyaluronic acid provides a structural framework and allows cartilage to hold water. By the age of 70, hyaluronic acid contents have often dropped by up to 80% leading to loss of connective tissue integrity, thereby affecting joint health.

Glucosamine

Glucosamine has been shown to stimulate the production of GAGs, which give cartilage its shock absorbing properties. It also promotes the incorporation of sulphur into cartilage which, in turn, helps to maintain normal connective tissue. Glucosamine speeds joint regeneration. The body's ability to make glucosamine diminishes as we age, and therefore cartilage loses its shock absorbing and gel-like functions, affecting the joint of the health and contributing to the progression of osteoarthritis.

There are no dietary forms of glucosamine – bound forms do occur in meat cartilage, but this is the gristle, which we tend to discard.

MSM

MSM contains high levels of sulphur, which is important for maintaining healthy connective tissue. MSM may also exert anti-inflammatory properties and has been shown to improve symptoms of pain and physical function.

Other Nutrients

Other nutrients including vitamins A, D and E, B6, zinc, copper and boron are all essential for collagen production. A deficiency in any one of these nutrients can contribute to accelerated joint degeneration. Therefore, it is recommended to use a multi vitamin and mineral to ensure optimal intake of all nutrients.

2) Reduce inflammation

Inflammation plays a major role in osteoarthritis by contributing to both joint pain and degradation of the joints, and therefore interventions to reduce inflammation are essential for supporting wellbeing and recovering in patients with osteoarthritis.

Nutrients to reduce inflammation:

Boswellia

Boswellia is an Ayurvedic herb with anti-inflammatory properties that has been shown to significantly suppress the pain and immobility associated with osteoarthritis, with results being seen in as little as one week. As well as its anti-inflammatory action, it is thought that Boswellia can reduce GAG degradation and improve blood supply to the joints.

Celadrin®

Celadrin® is a patented combination of fatty acids which beneficially enhance cell membrane integrity, and thus can play a role in subduing the inflammatory process and reducing pain, aiding joint mobility and flexibility. Celadrin® has a particular affinity for the smaller joints such as the fingers.

Curcumin

Curcumin has the ability to inhibit inflammation through multiple mechanisms of action and has been demonstrated to have therapeutic potential for various chronic inflammatory conditions due to its anti-inflammatory and anti-oxidative properties against a vast array of molecular targets.

Interventions to support arthritis – diet

To bridge the nutrient gap

As previously mentioned, our modern diet and lifestyle is creating nutrient shortfalls in much of the population and this deficit can impact adversely on both immediate and long-term health.

- Opt for nutrient-dense wholefoods instead of processed convenience foods which offer low nutrient density and empty calories
- Base your meals around fresh vegetables – eat half a plate of vegetables with both lunch and supper. Aim for at least 6 portions (even better is 8) per day
- Buy organic produce where possible
- Support digestive health to improve absorption and assimilation of nutrients. Take time to slow down and eat your meals – and make sure you chew well
- Stress, smoking, alcohol and excessive exercise can all increase your nutrient needs, so take measures to avoid these where possible
- A comprehensive multivitamin and mineral supplement, with nutrients in highly bioavailable or active forms should be considered alongside a nutritious diet to help to cover any potential shortfalls

To provide antioxidants

There are many thousands of different plant antioxidants, and each has tissue specificity - which is why it is advisable to eat a broad selection of different fruits and vegetables. Most people do not eat sufficient fruit and vegetables for health and protection. The average consumption is 3 portions per day. The government recommends 5-a-day but current thinking suggests 7 to 10 per day would be better - particularly for those who exercise hard or who are predisposed to degenerative problems.

The mix of the fruit and vegetables is also important, because brightly coloured fruits and dark green and purple vegetables yield the highest concentration of protective compounds. Fruit is also high in sugar so is best consumed in small amounts only i.e. 2 to 3 portions per day with the majority of the 7 to 10 portions being made up of vegetables. This vegetable intake is achievable by eating a half plate of vegetables at both lunch and supper (for this purpose vegetables do not include potatoes).

To support gut health

Gut health is essential for maintaining overall health, and an imbalanced microbiome, or dysbiosis can create the inflammation that is at the heart of joint conditions such as arthritis.

- Prebiotics are indigestible fibres that can beneficially affect your gut bacteria. To support diversity in the gut, you need diversity in diet - different structures of prebiotic fibres will support different varieties of bacteria within the gut. Consuming a large number of plant foods will provide a wide range of different prebiotics – aim for at least 50 different foods each week! Excellent sources of prebiotics include: asparagus, garlic, chicory, onion, Jerusalem artichoke, barley, tomato, rye, soybean, peas, legumes and seaweeds.
- Polyphenols, as well as having powerful antioxidant activity, have a prebiotic effect and can increase the number of beneficial bacteria in the gut. Great sources include foods rich in polyphenols such as olives, olive oil, dark chocolate and coffee.
- Include a range of probiotic foods, including kombucha (fermented tea), kefir, sauerkraut, kimchi, miso, live unpasteurised yoghurt and pickles. For patients with digestive issues, ensure these are introduced gradually.
- As we age there is a decline in digestive function, most notably stomach acid levels and digestive enzyme production. Digestive function can be improved via lifestyle practices such as chewing food thoroughly, drinking fluids away from meals and taking a teaspoon of apple cider vinegar before meals to stimulate digestion. Bitter foods such as rocket, chicory, artichoke, Brussels sprouts and dandelion greens can also stimulate stomach acid and bile production.
- Gluten, the protein found in wheat, rye, barley and some oats increases gut permeability (i.e. leaky gut) for a while after it is eaten, which can lead to an immune response and contribute to inflammation. A healthy body can repair the gut, but as gluten is eaten so frequently in meals and snacks in this country, the body's ability to repair the gut may be exceeded, which can result in an inflammatory cascade. If you suspect leaky gut, or an intolerance to gluten, it should be avoided.

To reduce inflammation

The ratio of omega 6 to 3 is very important. Omega 6 is abundant in the Western diet, and most people are consuming too high a level of omega 6 to 3 and therefore are often producing excess amounts of pro-inflammatory prostaglandins.

Reducing intake of foods high in Omega 6	Avoid the following pro-inflammatory foods:
<p>For example farmed meats, dairy products and vegetable oils (such as sunflower and corn oil). These are high in the omega 6 fats, Arachadonic Acid and Linoleic Acid which can be converted into pro-inflammatory prostaglandins in the body</p>	<ul style="list-style-type: none">• Sugar sweetened drinks and fruit juices• Refined carbohydrates – white bread, rice and pasta etc.• Sugary snacks – biscuits, cake, ice cream etc.• Processed meats• Processed snack foods – crisps• Trans fats – margarine and baked goods such as pies and pastries• Some oils – processed fats such as soybean and corn oil• Alcohol – avoid excessive consumption
Increasing sources of Omega 3 fatty acids	Include the following anti-inflammatory foods
<p>For example oily fish contain the fatty acid EPA, and chia, hemp or flaxseeds or their oil and dark green leafy vegetables contain alpha linolenic acid which can be converted into EPA by the body, which can then be converted into anti-inflammatory prostaglandins</p>	<ul style="list-style-type: none">• Vegetables – especially green vegetables like broccoli, kale, Brussels sprouts, cabbage, cauliflower etc.• Fruit – especially dark coloured fruits like berries, cherries and grapes• Healthy fats – olive oil, nuts, and avocados• Oily fish – salmon, sardines, herring, mackerel and anchovies• Dark chocolate – at least 70% cocoa• Green tea• Spices – turmeric, ginger, cinnamon etc.

Interventions to support arthritis - lifestyle

Achievement of normal body weight

Patients should be guided towards a healthy weight through diet and exercise as obesity is a driver of trauma to joints; placing excess stress and therefore accelerating degeneration of cartilage.

General dietary guidelines to aid weight loss would be to balance blood sugar levels through limiting refined carbohydrates and including lean protein, healthy fat in fibre in meals to improve insulin sensitivity.

Exercise

Lack of exercise decreases the hydration of joint cartilage and decreases muscle strength, placing further strain on the joints. The pain accompanying osteoarthritis often results in reduced exercise and weight gain, which exacerbates the issue – so gentle exercises which focus on strengthening the muscles but are not weight bearing so gentle on the joints, such as swimming and isometrics, is recommended.

Topical analgesics

Topical applications can be very useful for relieving and pain/or localised inflammation. Topical products with most evidence for osteoarthritis relief include capsaicin and as well as topical forms of Celadrin®, see above.

Manual therapies

Other therapies that have been shown to help support pain, motion and recovery in osteoarthritis patients and could be considered as an adjunct to chiropractic or osteopathic treatment, nutrition and exercise include:

- Acupuncture
- Magnetic therapies
- Relaxation techniques

Supplement protocol for acute osteoarthritis

This protocol is suitable for the first 4-8 weeks of treatment, until symptoms begin to improve, and is in addition to one of our multivitamin and mineral formulas, Omega 3 supplements and pre and probiotic formulas. These supplements should be recommended alongside an anti-inflammatory, nutrient dense diet and gentle muscle building exercise.

Product Name	Dose	How to Take	Notes
CytoProtect® Joint Health	2 capsules per day	With food	Contains a hydrolysed matrix of type II collagen and glycosaminoglycans (chondroitin sulphate and hyaluronic acid)
Glucosamine HCl	3 capsules per day	With food	Purest supplemental form of glucosamine and suitable for long term use
MSM	1 tablet per day	With food	Our MSM is biomimetic, which means it is made by a process that mimics the earth's natural sulphur cycle
Celadrin	2 capsules per day	With food	Implicated if the arthritis is predominantly in the smaller joints such as fingers and toes
Boswellia	2 capsules per day	With food	Can increase to up to 4 capsules daily acutely for its analgesic properties

Supplement protocol for long-term joint health maintenance

This protocol should be followed as the symptoms of pain and stiffness begin to improve and can be followed on a long-term basis. Recommendations are intended in addition to one of our multivitamin and mineral formulas, Omega 3 supplements and pre and probiotic formulas. These supplements should be recommended alongside an anti-inflammatory, nutrient dense diet and gentle muscle building exercise.

Product Name	Dose	How to Take	Notes
CytoProtect® Joint Health	2 capsules per day	With food	Contains a hydrolysed matrix of type II collagen and glycosaminoglycans (chondroitin sulphate and hyaluronic acid)
Celadrin	2 capsules per day	With food	Implicated if the arthritis is predominantly in the smaller joints such as fingers and toes
Organic Vitamin C	2 capsules daily	With food	Cherry C or Food State Vitamin C would also be suitable options

Bone health

(Osteoporosis, Osteopenia, and Fracture)

Osteoporosis is a condition where bone density is greatly reduced, leading to an increased risk of fractures. It is generally associated with ageing, especially in women, although it does affect men too – and can have a significant impact on mortality in later life, due to the fact that the risk of fractures is greatly increased. Hip fractures in the elderly are extremely serious and often lead to complications such as infections, poor bone healing, and loss of mobility.

Osteoporosis is more prevalent in women because oestrogen has an important role in maintaining bone density through inhibiting osteoclasts which stimulate bone resorption. When women reach the menopause their production of oestrogen reduces significantly and therefore bone density decreases more rapidly. However, it is important to note that the majority of bone mass is achieved by age 17, and bone density begins to decrease around the age of 28 – and as bone tissue is continuously being remodelled and replaced when damaged throughout life – bone health should be a focus for your clients at all stages in their life and not just in older age.



Interventions to support bone health – nutrients

1) Provide nutrients that are essential for supporting bone health

Many vitamins and minerals are involved in bone health, so it is essential to ensure an adequate supply via diet and specific supplements.

Calcium

Calcium is the major component of the bone - over time, inadequate calcium intake can lead to osteopenia/ osteoporosis.

Vitamin D

Vitamin D contributes to the normal absorption/utilisation of calcium and the calcification of bones. Vitamin D deficiency is one of the main contributors to osteoporosis and fractures. Vitamin D3 is more efficacious at raising serum 25(OH) D concentrations.

Vitamin K

Vitamin K is required for the activation of osteocalcin and works in synergy with Vitamin D3 (caution with blood thinning medication). There are two forms of naturally occurring vitamin K – vitamin K1 and K2. Vitamin K1 is found naturally in plants, especially green vegetables. K1 goes directly to the liver and helps maintain healthy blood clotting, or it can be converted to K2. Vitamin K2 is made by gut bacteria and goes to bones, blood vessel walls and tissues other than the liver.

Magnesium

60% of the body's magnesium is stored in the bone. Works with calcium for optimal bone health by increasing bone density and preventing bone loss. Osteoblastic number and activity reduce during magnesium deficiency.

Boron

Boron stimulates bone growth and metabolism.

B Vitamins (B6, B12, Folate)

Low levels of B vitamins have been associated with low bone mineral density. They are also needed for homocysteine metabolism. Homocysteine is associated with increased oxidative stress and inflammation.

Vitamin C

Vitamin C is needed for collagen formation. Collagen makes up 90% of the organic matrix of bone.

Interventions to support bone health – diet

To bridge the nutrient gap

As previously mentioned, our modern diet and lifestyle is creating nutrient shortfalls in much of the population and this deficit can impact adversely on both immediate and long-term health. If we have sub-optimal levels of even one or two nutrients the body will place survival ahead of long-term health.

- Opt for nutrient-dense wholefoods instead of processed convenience foods which offer low nutrient density and empty calories
- Base your meals around fresh vegetables – eat half a plate of vegetables with both lunch and supper, Aim for at least 6 portions (even better is 8) per day
- Buy organic produce where possible
- Support digestive health to improve absorption and assimilation of nutrients. Take time to slow down and eat your meals – and make sure you chew well
- Stress, smoking, alcohol and excessive exercise can all increase your nutrient needs, so take measures to avoid these where possible
- A comprehensive multivitamin and mineral supplement, with nutrients in highly bioavailable or active forms should be considered alongside a nutritious diet to help to cover any potential shortfalls

Include the following foods abundantly to provide bone supportive nutrients:

Vitamin D

Small amounts are available from foods such as oily fish, eggs, beef, liver and fortified foods. However, in order to obtain sufficient vitamin D we need sunlight and/or supplementation.

Vitamin K

K1 – found in leafy green vegetables and K2 – created by microbiota so gut health should be supported.

Calcium

Great non-dairy sources of calcium include:

- Dark, leafy green vegetables
- Canned salmon and sardines
- Nuts and seeds (e.g. almonds and chia)
- Broccoli
- Sweet potatoes
- Figs

Magnesium

Magnesium is found in:

- Green leafy vegetables
- Nuts and seeds
- Dry beans
- Wholegrains

To reduce inflammation

There are many studies that show that low bone density is partly linked to chronic, low-grade inflammation

The ratio of omega 6 to 3 is very important. Omega 6 is abundant in the Western diet, and most people are consuming too high a level of omega 6 to 3 and therefore are often producing excess amounts of pro-inflammatory prostaglandins.

Reducing intake of foods high in Omega 6	Avoid the following pro-inflammatory foods:
<p>For example farmed meats, dairy products and vegetable oils (such as sunflower and corn oil). These are high in the omega 6 fats, Arachadonic Acid and Linoleic Acid which can be converted into pro-inflammatory prostaglandins in the body</p>	<ul style="list-style-type: none">• Sugar sweetened drinks and fruit juices• Refined carbohydrates – white bread, rice and pasta etc.• Sugary snacks – biscuits, cake, ice cream etc.• Processed meats• Processed snack foods – crisps• Trans fats – margarine and baked goods such as pies and pastries• Some oils – processed fats such as soybean and corn oil• Alcohol – avoid excessive consumption
Increasing sources of Omega 3 fatty acids	To provide an alkaline state
<p>For example oily fish contain the fatty acid EPA, and chia, hemp or flaxseeds or their oil and dark green leafy vegetables contain alpha linolenic acid which can be converted into EPA by the body, which can then be converted into anti-inflammatory prostaglandins</p>	<ul style="list-style-type: none">• Foods such as animal and dairy products decrease the pH of the blood (acid forming) and when this happens, calcium needs to be liberated from the bone in order to produce buffers to maintain acid-base homeostasis. Including an abundance of fruit and vegetables in your diet, particularly green leafy vegetables, will help to reduce acidity in the body

To support gut health

Absorption of key minerals is reduced if stomach acid levels are insufficient. Also healthy gut bacteria are important for assisting digestion, absorption and Vitamin K synthesis, as well as preventing inflammation which can have a negative effect on bone health.

- Prebiotics are indigestible fibres that can beneficially affect your gut bacteria. To support diversity in the gut, you need diversity in diet - different structures of prebiotic fibres will support different varieties of bacteria within the gut. Consuming a large number of plant foods will provide a wide range of different prebiotics – aim for at least 50 different foods each week! Excellent sources of prebiotics include: asparagus, garlic, chicory, onion, Jerusalem artichoke, barley, tomato, rye, soybean, peas, legumes and seaweeds.
- Polyphenols, as well as having powerful antioxidant activity, have a prebiotic effect and can increase the number of beneficial bacteria in the gut. Great sources include foods rich in polyphenols such as olives, olive oil, dark chocolate and coffee.
- Include a range of probiotic foods, including kombucha (fermented tea), kefir, sauerkraut, kimchi, miso, live unpasteurised yoghurt and pickles. For patients with digestive issues, ensure these are introduced gradually.
- As we age there is a decline in digestive function, most notably stomach acid levels and digestive enzyme production. Digestive function can be improved via lifestyle practices such as chewing food thoroughly, drinking fluids away from meals and taking a teaspoon of apple cider vinegar before meals to stimulate digestion. Bitter foods such as rocket, chicory, artichoke, Brussels sprouts and dandelion greens can also stimulate stomach acid and bile production.
- Gluten, the protein found in wheat, rye, barley and some oats increases gut permeability (i.e. leaky gut) for a while after it is eaten, which can lead to an immune response and contribute to inflammation. A healthy body can repair the gut, but as gluten is eaten so frequently in meals and snacks in this country, the body's ability to repair the gut may be exceeded, which can result in an inflammatory cascade. If you suspect leaky gut, or an intolerance to gluten, it should be avoided.

Interventions to support bone health – lifestyle

Exercise

Weight-bearing and strength training exercises are beneficial for improving many aspects of bone health. Like muscle, bone is living tissue that responds to exercise by becoming stronger. Weight-bearing exercise encourages bone density and improves balance and stability, reducing the likelihood of a fall.

Smoking

Avoiding can have beneficial effects for bone health. Smokers tend to have lower bone density than non-smokers and studies have shown a direct relationship between tobacco use and decreased bone density. Smoking has also been shown to have an adverse impact on bone healing after fracture.

Alcohol

Avoiding or minimising intake should be an important consideration. Excessive alcohol consumption negatively impacts bone health because of its effects on nutrient absorption - for example, it can impact on how the body absorbs calcium and vitamin D. It also affects the production of hormones, which have a protective effect on bone. For example, in women, overconsumption of alcohol can decrease oestrogen which can negatively impact bone density. Alcohol consumption may also lead to more falls and related fractures.

Phosphorus

Excess phosphorus intake (e.g. soft drinks) can interfere with calcium absorption and result in the loss of calcium from bone.

Caffeine

May cause the kidneys to excrete calcium, lowering the amount of calcium available to the bones. It can also interfere with the nutrient absorption of essential minerals including calcium, iron, magnesium, and also the B vitamins.

Medications

Certain medications may deplete nutrients important for bone health or may interfere with their absorption. Being mindful of these can be beneficial when looking at nutrient and supplement intake. For example, proton pump inhibitors or antacids decrease the production of stomach acid which may interfere with the absorption of calcium and other minerals.

Sunshine

Getting adequate sunshine is important from April to September. Vitamin D is manufactured in the body when skin is exposed to sunlight - this helps strengthen bones and increase calcium absorption. Vitamin D deficiency may lead to osteoporosis and contribute to bone fractures.

Hormone considerations

Hormone health is an integral part of bone health. Hormones direct osteoblast and osteoclast activity. The female hormone oestrogen is essential for healthy bones but after the menopause, oestrogen levels fall, which can lead to a decrease in bone density, so supporting with isoflavones following the menopause could be supportive alongside the dietary, supplement and lifestyle advice above.

Supplement protocol for bone health

This protocol will help to support optimal bone density and is in addition to one of our multivitamin and mineral formulas, Omega 3 supplements and pre and probiotic formulas. These supplements should be recommended alongside an anti-inflammatory, nutrient dense diet and weight bearing and strengthening exercise.

Product Name	Dose	How to Take	Notes
Bone Support	2 capsules per day	With food	Provides the key nutrients needed to support healthy bone mineral density, in a well-absorbed wholefood form
Vitamin D3 +K2	1 capsule per day	With food	Comes as either a 50µg & 100µg potency- the latter should be used as a short-term boost unless deficiency is diagnosed
Organic Vitamin C	2 capsules daily	With food	An essential component in collagen formation and bone growth
Menopause Support	2 capsules daily	With food	Implicated in menopausal women – provide phytoestrogens which may prevent bone loss in ageing women

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About Cytoplan

As leaders in food-based supplementation for over 30 years, Cytoplan has maintained the belief that nature holds the key to health, creating products that work in harmony with the body to optimise health. We are dedicated to improving the health of the nation, both ethically and sustainably.

Combining nature with science, we pioneered Wholefood & Food State supplements to create our market-leading supplement range. Our products are grounded in science, proven by results and designed to improve health, safely and effectively.

We are an independent British company, wholly owned by a charitable foundation and invest widely in health and nutritional projects across the UK and address issues such as community wellbeing and mental health. Every product purchased is helping us to help others.

Trusted by our practitioners and customers alike, we offer sound information about supplements and health to encourage self-empowerment and growth, helping customers to make their own informed decisions on their approach to nutrition and wellbeing.



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