DR.VEGAN®

Staying strong

Supporting bone health, muscle maintenance, and active ageing

Practitioner Paper • *For practitioner use only*

BONE HEALTH, STRUCTURE, CELLS AND FUNCTION

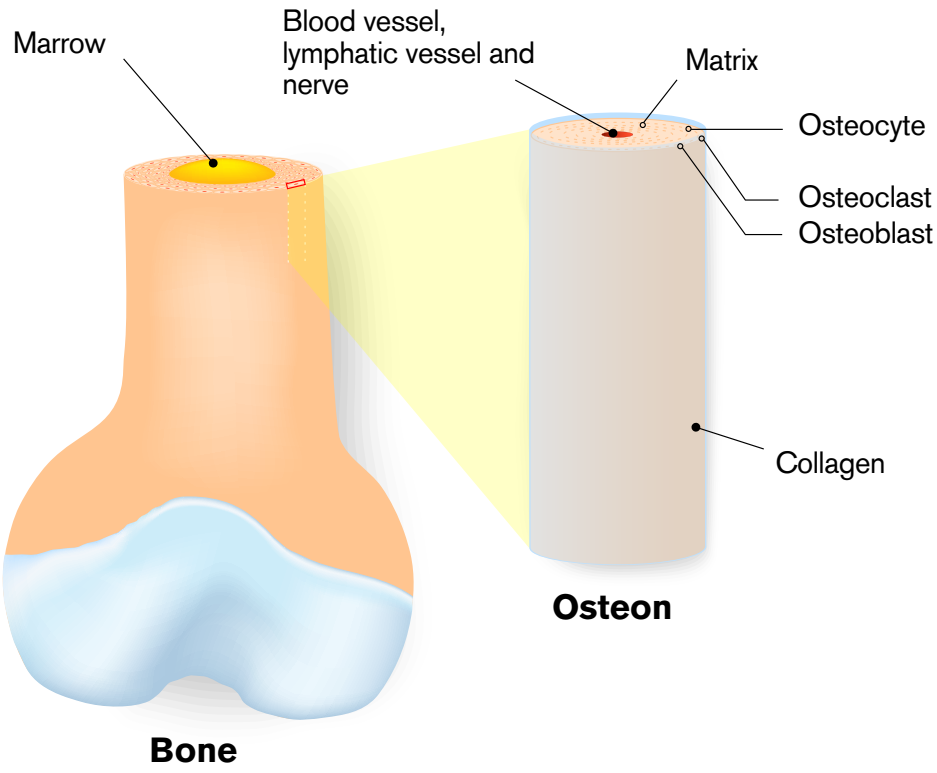
Bone Composition

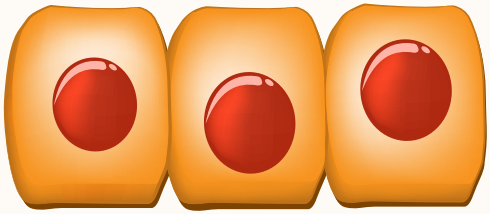
Organic matrix (35%):
Mostly type I collagen (provides tensile strength) and non-collagenous proteins like osteocalcin.

Inorganic matrix (65%):
Mostly hydroxyapatite crystals (calcium phosphate), providing rigidity and strength.

Bone is dynamic:
Constantly remodelling in response to mechanical stress, hormones and nutritional status.

Internal Structure Of A Bone

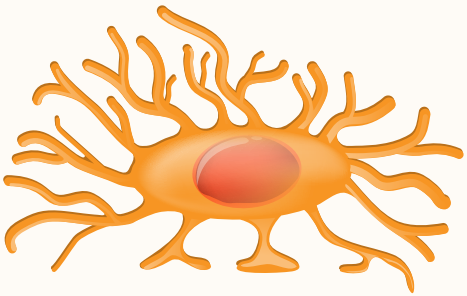




Osteoblast

Origin: *Mesenchymal stem cells.*

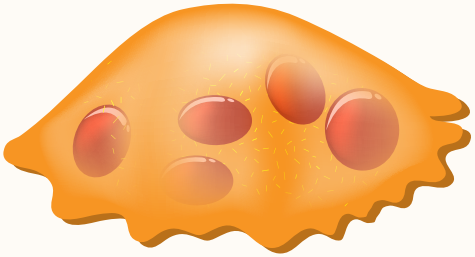
Function: *Build bone by synthesising collagen and promoting mineralisation. Eventually become osteocytes or undergo*



Osteocyte

Origin: *Former osteoblasts embedded in bone matrix.*

Function: *Regulate bone remodelling, sense mechanical stress and maintain calcium homeostasis.*



Osteoclast

Origin: *Haematopoietic stem cells (monocyte lineage).*

Function: *Resorb bone by secreting acid and proteolytic enzymes. Essential for bone turnover and calcium release.*

Bone Remodeling

Coupled process:
Bone resorption by osteoclasts followed by bone formation by osteoblasts.

Regulated by:
Mechanical stress: Load-bearing stimulates bone formation.

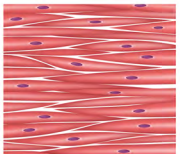
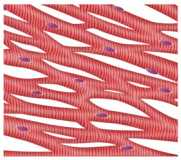
Hormones:
- **PTH:** Increases osteoclast activity (indirectly via RANKL).
- **Vitamin D:** Promotes calcium absorption and bone mineralisation.
- **Oestrogen:** Inhibits osteoclasts and promotes bone formation.
- **Calcitonin:** Inhibits osteoclasts (less significant in adults).

Cytokines and signalling pathways:
RANK/RANKL/OPG pathways. Wnt/B-catenin signalling for osteoblast activity.

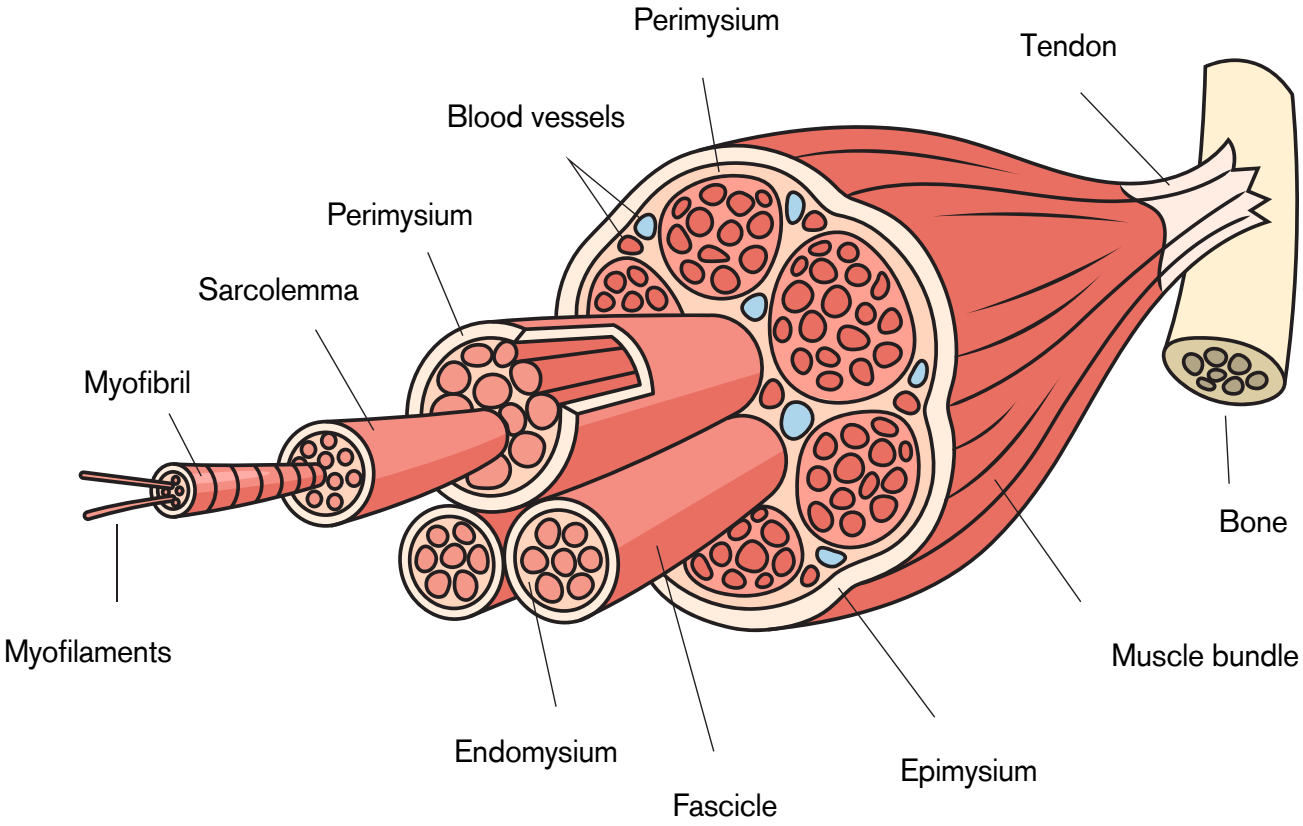
Diagnosis:
- **Bone Mineral Density (BMD):** via DXA scan is the gold standard. T-score ≤ −2.5 at the femoral neck or spine confirms osteoporosis.
- **FRAX Tool:** Estimates 10-year probability of hip and major osteoporotic fractures, incorporating clinical risk factors with or without BMD.

MUSCLE HEALTH, PHYSIOLOGY AND STRUCTURE

Types of muscles

	Skeletal	Smooth	Cardiac
			
Control	Voluntary	Involuntary	Involuntary
Location	Attached to bones	Vessels, bladder	Heart
Function	Movement, posture	Peristalsis, vasoregulation	Pumping blood

Skeletal Muscle Structure



- **Muscle fibre:** Multinucleated cell composed of myofibrils
- **Myofibrils:** Repeating sarcomeres (basic contractile unit).
- **Sarcomere:** Actin (thin) and myosin (thick) filaments that slide for contraction (sliding filament theory).
- **Excitation-contraction coupling:** Action potential → Ca^{2+} release from sarcoplasmic reticulum → cross-bridge cycling → contraction.

Muscle Fiber Types

Type	Features	Metabolism	Fatigue	Resistance	Use
I (Slow-twitch)	High Mitochondria	Myoglobin	Oxidative	High	Endurance
IIa (Fast oxidative)	Intermediate	Both	Moderate	Walking	Jogging
IIb (Fast glycolytic)	Low Mitochondria	Anaerobic Glycolysis	Low	Sprinting	Powerlifting

Muscle-Bone Interaction

- **Mechanical loading** from muscle contraction stimulates bone growth (myokine–osteokine crosstalk).
- **Muscle wasting** (sarcopenia) and **bone loss** (osteopenia/osteoporosis) are interconnected, especially in ageing.
- **Myokines (e.g. irisin, IL-6)**: Secreted by muscle, influence bone metabolism.
- **Osteokines (e.g. osteocalcin):** Secreted by bone, affect muscle function.

Clinical Considerations

Osteoporosis

- Loss of bone mass and microarchitectural deterioration.
- Common in postmenopausal women and the elderly.
- DXA scan to assess BMD (T-score ≤ -2.5 = osteoporosis).
- Risk factors: low estrogen, immobility, corticosteroids, vitamin D deficiency, smoking and poor diet.

Sarcopenia

- Age-related loss of muscle mass, strength and function.
- Increases falls, fractures, morbidity.
- Diagnosed via grip strength, gait speed and muscle mass (DXA/BIA).

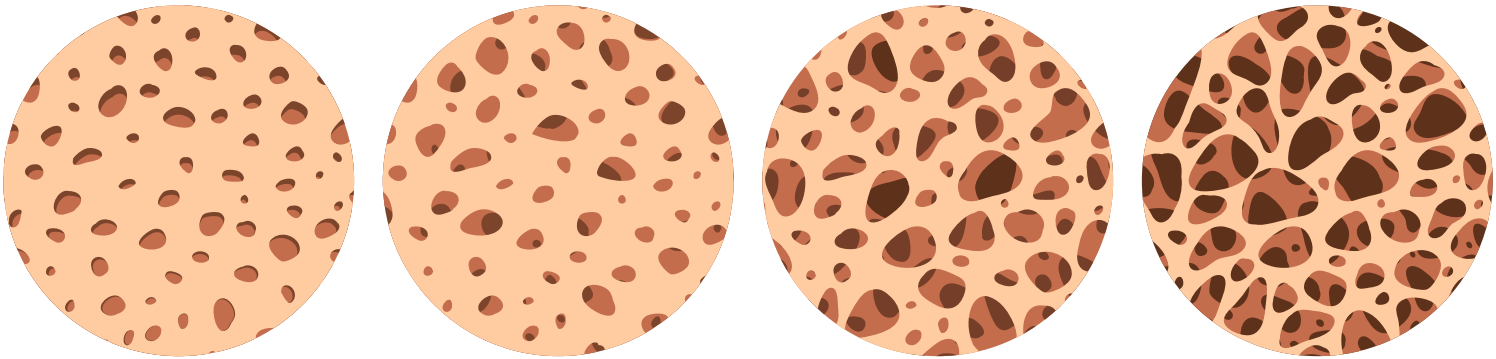
Osteosarcopenia

- Concurrent loss of bone and muscle.
- Shared risk factors: ageing, inactivity, malnutrition, chronic inflammation.
- Interventions target both systems simultaneously.

OSTEOPOROSIS

Osteoporosis is a systemic skeletal disorder that causes reduced bone mass and microarchitectural deterioration of bone tissue, leading to increased bone fragility and fracture risk. It remains underdiagnosed and undertreated, despite being a major contributor to morbidity in ageing populations, especially postmenopausal women and older men.

STAGES OF OSTEOPOROSIS



Normal bone | Osteopenia | Osteoporosis | Severe osteoporosis

Epidemiology

Globally, osteoporosis affects approximately 200 million women, with 1 in 3 women and 1 in 5 men over 50 expected to experience an osteoporotic fracture in their lifetime. The most common fracture sites include the hip, spine and wrist. Hip fractures in particular are associated with significant mortality and functional decline.

Pathophysiology

Bone remodelling is a continuous process involving osteoclast-mediated resorption and osteoblast-mediated formation. In osteoporosis, the balance shifts toward resorption. In women, oestrogen deficiency post-menopause accelerates bone loss. In men, age-related decline in testosterone and secondary causes (e.g. corticosteroid use, hypogonadism) are often contributory.

Risk Factors

- **Non-modifiable:** Age >50, female sex, Caucasian or Asian ethnicity, family history of osteoporosis or fragility fracture.
- **Modifiable:** Sedentary lifestyle, smoking, excessive alcohol, low calcium/vitamin D intake, low body weight or BMI <18.5, certain medications (e.g. glucocorticoids, PPIs, anticonvulsants), and secondary medical conditions (e.g. RA, hyperthyroidism, malabsorption syndromes).

Key Pathways And Interactions

Pathway role

- **RANK/RANKL/OPG:** Controls osteoclast activation. Oestrogen increases OPG to inhibit bone loss.
- **Wnt/β-catenin:** Promotes osteoblast differentiation; inhibited by sclerostin.
- **Myostatin:** Inhibits muscle growth; being targeted in therapies for sarcopenia.
- **Osteocalcin:** A bone-derived hormone affecting insulin sensitivity and muscle performance.

DIETARY AND LIFESTYLE ADVICE

Consume enough protein for your lifestyle and activity level

Distribute protein intake across meals.

Combine protein with resistance exercise for best results.

Lifestage	How much protein is needed per day?
Adults (19–64y)	0.75 g/kg/day
Older adults or clinical	1.0–1.5 g/kg/day
Athletes or active people	Typically 1.2–2.0 g/kg/day

Get a Vitamin D test and correct any insufficiencies

Vitamin D is essential for muscle strength, contraction and recovery.

DIET AND LIFESTYLE TIPS FOR BONE HEALTH

Anti-inflammatory diet

Rich in omega 3s (chia, flax and walnuts).
Colourful vegetables and fruits (rich in antioxidants).

Weight-bearing and resistance exercise

Strength training, walking, dancing and hiking stimulate bone growth and maintains muscle mass.

Sleep and recovery

The growth hormone released during sleep supports tissue repair and muscle strength.

Avoid smoking

Smoking impairs calcium absorption and reduces bone density.

Healthy body weight

Being underweight increases osteoporosis risk and obesity can impair muscle function and joint health.

OsteoFriend®

OsteoFriend® is a comprehensive formula that delivers 19 optimally dosed ingredients to support strong, healthy bones. It provides the nutrients needed to build bone, enhance nutrient absorption, and ensure those nutrients are effectively delivered into bone tissue. OsteoFriend® also includes targeted support for joint health and helps reduce ongoing bone loss.

	Per 1 Sachet	EC NRV %*
MSM (Methylsulfonylmethane)	1000mg	**
Calcium	740mg	92
Magnesium	320mg	85
Curcumin	200mg	**
L-Lysine	500mg	**
Boron	3mg	**
Lactobacillus reuteri	2 Billion CFU	***
Vitamin C	500mg	625
Vitamin D3 (Cholecalciferol)	1000 iu (25mcg)	500
Vitamin K2 (MK-7)	100 mg	133
Vitamin B6 (Pyridoxal-5-Phosphate)	6 mg	429
Folic Acid (Methylfolate)	397 mg	199
Vitamin B12 (Methylcobalamin)	200 mg	8000
Zinc	5 mg	50
Copper	1mg	100
Manganese	1mg	50
Selenium	112mg	204
Piperine (Black Pepper extract)	5mg	**
Silica (Bamboo Extract)	5mg	**

* NRV - Nutrient Reference Value
** No NRV Established
***At the time of manufacture

Ingredients

Calcium Citrate, Magnesium Citrate, MSM (Methylsulfonylmethane), L-Lysine Hydrochloride, Vitamin C (Ascorbic Acid), Curcumin (Turmeric Extract), Boron (Glycinate), Vitamin B12 (Methylcobalamin), Zinc (Citrate), *Lactobacillus reuteri,* Vitamin D3 (Cholecalciferol), Manganese Citrate, Vitamin K2 (MK-7), Bamboo Extract, Vitamin B6 (Pyridoxal-5-Phosphate), Black Pepper (*Piper nigrum*), Copper Citrate, Vitamin B5 (L-5 MTHF Calcium), Selenium (Selenomethionine).

Free from

Added Sugar, Starch, Sweeteners, Gluten, Wheat, Soya, Lactose, Dairy, Artificial Flavours, Colours and Preservatives.

Pairs well with

Protein & Creatine Superblend

Gut Works®

Vegan Omega 3

Debloat & Detox

MenoFriend®

PeriMenoFriend®

Directions

- Recommended serving: 1 teaspoon per day.
- Mix into cold drinks or sprinkle onto cold or lukewarm food.
- Store in a cool, dry place.

What customers can look forward to

1-7 days
Nutrient intake increases. Some people may experience less joint pain.

2 weeks
Increased absorption of bone-supporting nutrients.

3 weeks
Osteoblasts start getting to work.

4 weeks
Continued support for bone and joint health to work.

KEY INGREDIENTS IN OSTEOFRIEND®

Vitamin D

Vitamin D regulates calcium and phosphate homeostasis by increasing intestinal absorption of calcium and promoting bone mineralisation.[1] It also enhances osteoblast differentiation and reduces parathyroid hormone (PTH) levels, which in excess can lead to bone resorption.[2]

Calcium

As the main mineral component of bone, Calcium forms the crystalline structure of hydroxyapatite. Adequate intake is essential to maintain bone mass and strength, and insufficient levels trigger PTH release, promoting bone resorption to maintain serum Calcium.[3]

Magnesium

Magnesium supports bone structure and acts as a cofactor in Vitamin D metabolism. It helps regulate osteoblast and osteoclast activity and contributes to the structural development of bone through its role in bone matrix formation. Clinical research has shown that Magnesium agnesium supplementation can alleviate the symptoms of osteoporosis to some extent.[4]

Lysine

Lysine aids in collagen cross-linking, a key process in bone matrix stability. It also enhances calcium absorption in the intestine and may reduce urinary calcium excretion, thereby supporting skeletal calcium retention.[5]

Boron

Boron modulates bone metabolism by influencing the activity of hormones such as Viamin D, oestrogen and testosterone. It also reduces inflammatory markers and may support bone mineralisation and calcium retention.[6]

Silica

Silica contributes to collagen synthesis and is involved in the initiation of bone mineralisation. It is particularly important in early-stage bone formation and may improve bone density by enhancing calcium incorporation.[7]

Selenium

Selenium, through selenoproteins like glutathione peroxidase, protects osteoblasts from oxidative damage. Deficiency is associated with reduced bone mineral density and increased osteoclast activity due to elevated inflammation and oxidative stress.[8]

Zinc

Zinc is essential for osteoblast proliferation and collagen synthesis. It also supports alkaline phosphatase activity, which is necessary for bone mineralisation and modulates the effects of Vitamin D on bone cells.[9]

Manganese

Manganese acts as a cofactor for enzymes involved in the synthesis of proteoglycans and glycosaminoglycans, which are important components of the bone matrix. It also supports antioxidant defences that may protect bone tissue.[10]

Copper

Copper is required for the activity of lysyl oxidase, an enzyme essential for cross-linking collagen and elastin, which contributes to bone matrix strength. It also plays a role in antioxidant enzyme systems, protecting bone tissue from oxidative stress.[11]

Vitamin C

Vitamin C is essential for collagen synthesis, acting as a cofactor for prolyl and lysyl hydroxylase. It promotes osteoblast differentiation and has antioxidant properties that protect bone-forming cells.[12]

MSM (Methylsulfonylmethane)

MSM provides bioavailable sulphur needed for collagen production and connective tissue integrity. It may also reduce inflammatory cytokines that contribute to osteoclast activation and bone resorption.[13]

Vitamin K2

Vitamin K2 activates osteocalcin and matrix Gla-protein, which bind calcium and incorporate it into the bone matrix, reducing the risk of arterial calcification and promoting proper skeletal mineralisation.[14]

Curcumin

Curcumin inhibits NF- B and RANKL pathways, reducing osteoclastogenesis and bone resorption. It has potent anti-inflammatory and antioxidant effects, potentially preserving bone mass in chronic inflammatory states.[15]

Lactobacillus reuteri

This probiotic modulates gut microbiota and the immune system to reduce systemic inflammation and promote bone formation. It enhances calcium absorption and may reduce osteoclast activity through Treg-mediated pathways.[16]

Piperine

Piperine enhances the bioavailability of curcumin by inhibiting hepatic and intestinal glucuronidation. It may also have mild bone-protective effects through anti-inflammatory mechanisms.[17]

Vitamins B6, Folate and B12

Vitamins B6, Folate and B12 work synergistically to regulate homocysteine metabolism, which is essential for maintaining bone integrity. Elevated homocysteine is associated with impaired collagen cross-linking, reduced bone quality, and increased fracture risk. Vitamin B6 supports collagen formation and neurotransmitter synthesis, while Folate and Vitamin B12 are essential for DNA synthesis, methylation and bone marrow function. Deficiencies in any of these B vitamins can disrupt osteoblast activity, compromise bone matrix quality and increase the risk of osteoporosis.[18]

DRUG INTERACTIONS

Interaction Severity

Major	Dolutegravir	Calcium may reduce the effect of this drug.
	Elvitegravir	Calcium reduces the level of this drug.
	Levodopa	Magnesium may reduce the absorption of this drug.
Moderate	Atorvastatin	Vitamin D may reduce the absorption of this drug.
	Calcipotriene	Vitamin D may increase the risk of hypercalcaemia when taken with this drug.
	Thiazide Diuretics	Vitamin D may increase the risk of hypercalcaemia when taken with this drug.
	Verapamil	Calcium reduces the level of this drug.
	Bisphosphonates	Calcium and Magnesium may reduce the absorption of this drug. Take them at least 30 minutes apart.
	Calcipotriene	Calcium may increase the risk for hypercalcaemia when taken with this drug.
	Diltiazem	Calcium may reduce the effect of this drug.
	Levothyroxine	Calcium reduces the level of this drug. Take at least 4 hours apart.
	Lithium	Calcium may increase the risk for hypercalcemia when taken with this drug.
	Quinolone Antibiotics	Calcium, Magnesium, Zinc and Manganese reduce the level of this drug.
	Raltegravir	Calcium reduces the level of this drug.
	Sotalol	Apple Cider Vinegar, when taken with this drug, may increase the risk of hypokalaemia. Chromium may increase the risk of hypoglycemia when taken with this drug.
	Tetracycline Antibiotics	Calcium, Magnesium, Zinc and Manganese reduce the level of this drug.
	Thiazide Diuretics	Calcium may increase the risk of hypercalcaemia when taken with this drug.

Interaction Severity

Moderate

Aminoglycoside Antibiotics	Magnesium may increase the risk of neuromuscular weakness when taken with this drug.
Calcium Channel Blockers	Magnesium may increase the effects of these drugs.
Digoxin	Magnesium may reduce the absorption of this drug.
Ketamine	Magnesium may increase the risk of ketamine toxicity.
Potassium-Sparing Diuretics	Potassium-sparing diuretics decrease excretion of Magnesium.
Sulfonylureas	Magnesium increases the absorption of these drugs.
Anticoagulants / Antiplatelet Drugs	Selenium and Turmeric may increase the risk of bleeding when taken with these drugs.
Barbiturates	Selenium may prolong the sedating effects of these drugs.
Immunosuppressants	Selenium may reduce the effects of these drugs.
Warfarin	Selenium, Vitamin C and Turmeric may reduce the effect of this drug. Reverse the effects of this drug.
Cephalexin	Zinc may decrease the levels of this drug.
Cisplatin	Zinc may reduce the effects of this drug.
Integrase Inhibitors	Zinc may reduce the effects of this drug.
Penicinillamine	Zinc and Copper may reduce the effects of this drug.
Ritonavir	Zinc may reduce the effects of this drug.
Antipsychotic Drugs	These drugs increase the risk of Manganese toxicity.
Alkylating Agents	Vitamin C and Turmeric may reduce the effects of these drugs.
Antitumor Antibiotics	Vitamin C and Turmeric may reduce the effects of these drugs.
Oestrogens	Vitamin C may increase the blood level of these drugs.
Fluphenazine	Vitamin C may reduce the effects of this drug.
Indinavir	Vitamin C may reduce the effects of this drug.
Levothyroxine	Vitamin C may increase the absorption of this drug.

Interaction Severity

Moderate	Amlodipine	Turmeric may increase the level of this drug.
	Antidiabetic Drugs	Turmeric may increase the risk of hypercalcaemia when taken with these drugs.
	Hepatotoxic Drugs	Turmeric may increase the risk of hepatotoxicity when taken with these drugs.
	Methotrexate	Turmeric and Folate may increase the effects of this drug.
	Organic Anion-transporting Polypeptide Substrates	Turmeric may increase the blood level of these drugs.
	Sulfasalazine	Turmeric may increase the side effects from this drug.
	Tacrolimus	Turmeric may increase the side effects from this drug.
	Talinolol	Turmeric may reduce the absorption of this drug.
	Tamoxifen	Turmeric may reduce the level of this drug.
	Topoisomerase 1 Inhibitors	Turmeric may reduce the activity of these drugs.
	Amiodarone	Vitamin B6 may increase the photosensitive effects from this drug.
	Antihypertensive Drugs	Vitamin B6 may increase the effects of these drugs.
	Phenobarbital	Vitamin B6 may decrease the effects of this drug. Folate may increase the risk of seizures from this drug.
	Phenytoin	Vitamin B6 and Folate may decrease the effects of this drug.
	Primidone	Folate may increase the risk of seizures from this drug.
	Pyrimethamine	Folate may decrease the effects of this drug.
Minor	Levodopa	Magnesium may reduce the absorption of this drug.

Drug interactions taken from the Natural Medicines Database, June 2025. Do your own diligence before combining food supplements and medicines.

Bone & Muscle Support

Bone & Muscle Support is an advanced daily multi-nutrient with highly absorbable Calcium, Magnesium, Vitamin D3 and Vitamin K2 to maintain healthy bones and muscles. It is ideal for men and women, for those with bone conditions, for those on a plant-based diet, and for women during pregnancy and through the menopause.

	PER 2 CAPSULES	EC NRV %*
Calcium (as Bisglycinate)	160mg	20
Magnesium (as Citrate)	150mg	40
Vitamin D3	25mg (1000IU)	500
Vitamin K2 (MK-7)	100mg	133

* NRV - Nutrient Reference Value

Ingredients

Calcium Bisglycinate, Magnesium Citrate, Vitamin D (Cholecalciferol), Vitamin K2 (Menaquinone-7), Capsule Shell (Hydroxypropyl Methylcellulose).

Free from

Added Sugar, Starch, Sweeteners, Gluten, Wheat, Soya, Lactose, Dairy, Artificial Flavours, Colours and Preservatives.

Directions

- Take two capsules each day with food.
- We recommend taking it with or within 30-60 minutes after each main meal. Avoid taking it on an empty stomach.
- As a natural, plant-based supplement, it is safe to take alongside most medications and treatments.

PAIRS WELL WITH

Curcumin & Turmeric

Daily Multi-Vitamin

MenoFriend®

KEY INGREDIENTS IN BONE & MUSCLE SUPPORT

Calcium

Excitation-contraction coupling: Calcium plays a direct role in the initiation of muscle contraction. During neuromuscular signalling, an action potential triggers Calcium release from the sarcoplasmic reticulum. This Calcium binds to troponin-C on actin filaments, initiating a cascade that allows myosin to bind to actin and cause contraction.[1]

Membrane stability: Calcium is crucial in stabilising muscle cell membranes and maintaining permeability gradients, which are vital for muscle responsiveness and preventing cramping.[2]

Bisglycinate form: The bisglycinate chelate enhances bioavailability and is gentler on the gut, reducing the risk of gastrointestinal side effects often seen with other Calcium salts. Chelated forms may be better absorbed in individuals with impaired stomach acid or intestinal health, which is relevant in older adults or those with gut disorders.

Magnesium

Neuromuscular function: Magnesium modulates acetylcholine release at the neuromuscular junction, reducing excessive excitation and supporting muscle relaxation post-contraction.

Calcium antagonism: Calcium acts as a physiological calcium antagonist, helping to prevent excessive contraction and muscle cramps by regulating calcium influx into muscle cells.[2]

ATP production: Magnesium is a required cofactor for ATP synthesis and ATP is essential for both muscle contraction and relaxation phases. Magnesium-bound ATP is the actual active form used in muscle tissues.

Electrolyte balance: As a key electrolyte, Magnesium supports osmotic balance and intracellular fluid integrity, reducing the risk of exercise-induced fatigue or spasms.

Vitamin D3

Muscle cell differentiation and function: Vitamin D receptors (VDRs) are present in muscle tissue. Vitamin D3 enhances myocyte proliferation and differentiation, particularly of type II (fast-twitch) fibres, which are critical for strength and balance[3]

Calcium uptake and utilisation: Vitamin D promotes intestinal absorption of calcium, ensuring adequate availability for muscular and neuromuscular activity.

Genomic and non-genomic actions: Through genomic pathways, Vitamin D modulates gene expression linked to muscle development. Non-genomic mechanisms influence calcium flux within muscle cells, impacting contractility.[4]

Prevention of sarcopenia and falls: Studies show that sufficient D3 levels improve muscle strength and reduce fall risk in older adults. A meta-analysis (Bischoff-Ferrari et al., 2009) demonstrated that doses ≥700 IU/day significantly reduce fall risk by ~19%.[5]

Vitamin K2

Regulation of calcium distribution: MK-7 activates matrix Gla-protein (MGP) and osteocalcin, two Vitamin K-dependent proteins that direct calcium away from soft tissues (including arteries and possibly muscles) and toward bone. This prevents ectopic calcification, which can impair muscle elasticity, contractility and microcirculation.[6]

Vascular health: By keeping vascular tissue free from calcium deposition, K2 supports optimal perfusion and oxygen delivery to muscles, which is particularly important during exertion and recovery.[7]

Synergy with Vitamin D3: D3 increases Calcium absorption, while K2 ensures proper calcium utilisation and clearance, thereby minimising potential risks of hypercalcemia or soft tissue calcification.[8]

MK-7 Specifics: Menaquinone-7 (MK-7) has a long half-life and is more effective than K1 or MK-4 at activating extrahepatic Gla-proteins, including those in muscle and vascular tissue.[9]

Synergistic action for muscle health

D3 enhances Calcium absorption, Magnesium modulates calcium handling, and K2 ensures proper deposition, together reducing muscle fatigue, cramping and risk of musculoskeletal degeneration.

Calcium and Magnesium maintain the electrochemical gradients necessary for healthy muscle excitability and contraction-relaxation cycles.

In athletes, older adults and those with chronic illness or malabsorption, supplementation of this combination supports:

- Prevention of cramps and spasms
- Improved muscular endurance and strength
- Reduced fall and fracture risk
- Protection against sarcopenia
- Support for mitochondrial energy metabolism

DRUG INTERACTIONS

Interaction Severity

Major	Dolutegravir	Calcium reduces the level of this drug.
	Elvitegravi	Calcium reduces the level of this drug.
	Levodopa	Magnesium may reduce the absorption of this drug.
Moderate	Atorvastatin	Vitamin D may reduce the absorption of this drug.
	Calcipotriene	Vitamin D may increase the risk of hypercalcaemia when taken with this drug.
	Thiazide Diuretics	Vitamin D may increase the risk of hypercalcaemia when taken with this drug.
	Verapamil	Vitamin D may reduce the effects of this drug.
	Bisphosphonates	Calcium and Magnesium may reduce the absorption of this drug. Take them at least 30 minutes apart.
	Calcipotriene	Calcium may increase the risk for hypercalcaemia when taken with this drug.
	Diltiazem	Calcium may reduce the effect of this drug.
	Levothyroxine	Calcium reduces the level of this drug. Take at least 4 hours apart.
	Lithium	Calcium may increase the risk for hypercalcaemia when taken with this drug.
	Quinolone Antibiotics	Calcium and Magnesium reduce the level of this drug.
	Raltegravir	Calcium reduces the level of this drug.
	Sotalol	Calcium reduces the level of this drug.

Interaction Severity		
Moderate	Tetracycline Antibiotics	Calcium, Magnesium, and Zinc reduce the level of this drug.
	Thiazide Diuretics	Calcium may increase the risk of hypercalcaemia when taken with this drug.
	Verapamil	Calcium reduces the level of this drug.
	Aminoglycoside Antibiotics	Magnesium may increase the risk of neuromuscular weakness when taken with this drug.
	Calcium Channel Blockers	Magnesium may increase the effects of these drugs.
	Digoxin	Magnesium may reduce the absorption of this drug.
	Ketamine	Magnesium may increase the risk of ketamine toxicity.
	Potassium-Sparing Diuretics	Potassium-sparing diuretics decrease excretion of magnesium.
	Sulfonylureas	Magnesium increases the absorption of these drugs.
Minor	Gabapentin	Magnesium may reduce the absorption of this drug.

DR.VEGAN® PRACTITIONER SCHEME

Sign up to receive the latest updates, expert articles, cutting-edge research and more.

Scan the QR code to sign up now

REFERENCES

1. *Progress in Biophysics and Molecular Biology. Volume 71, Issue 1, January 1999, Pages 59-90.*
2. *American physiology society, Volume 80Issue . July 2000. Pages 1215-1265.*
3. *Ashcroft, Stephen Paul (2020). The role of Vitamin D and the Vitamin D receptor in skeletal muscle function and exercise adaptation. University of Birmingham. Ph.D.*
4. *Cell biochemistry and function. Volume39, Issue1. January 2021. Pages 48-59*
5. *BMJ. 2009 Oct 1:339:b3692.*
6. *Front. Med., 24 April 2020. Sec. Nephrology. Volume 7 - 2020.*
7. *Journal of Molecular and Cellular Cardiology. Volume 27, Issue 4, April 1995, Pages 1011-1022.*
8. *Endocrine Reviews, Volume 37, Issue 5, 1 October 2016, Pages 521–547.*
9. *Australasian College of Nutritional & Environmental Medicine Journal, 2024, Vol 43, Issue 1, p8.*
10. *Best Practice & Research Clinical Endocrinology & Metabolism. Volume 29, Issue 4, August 2015, Pages 621-631.*
11. *Current Pharmaceutical Design, Volume 10, Number 21.*
12. *Nature Reviews Endocrinology volume 11, pages. 298–307 (2015).*
13. *Front. Endocrinol., 06 June 2024 Sec. Bone Research Volume 15 - 2024.*
14. *Vitamin D Protocols. Totowa (NJ): Humana Press; 2008. p. 107–114.*
15. *Journal of Trace Elements in Medicine and Biology. Volume 62, December 2020, 126577.*
16. *Advanced materials, Volume33, Issue16. April 22, 2021. 2004418.*
17. *Biochimica et Biophysica Acta (BBA) - General Subjects. Volume 1840, Issue 11, November 2014, Pages 3246-3256.*
18. *Biological trace element research. Volume 201, pages 5640–5651, (2023).*
19. *J. Clin. Med. 2024, 13(16), 4679.*
20. *The American Journal of Clinical Nutrition. Volume 67, Issue 5, May 1998, Pages 996S-1002S.*
21. *Journal of biological chemistry. Volume 285, Issue 25, 18 June 2010, Pages 19510-19520.*
22. *Antioxidants 2025, 14(2), 216.*
23. *American Journal of Lifestyle Medicine, 13(5), 465–471.*
24. *Front. Pharmacol., 08 August 2024. Sec. Ethnopharmacology. Volume 15 - 2024.*
25. *The Journal of Clinical Investigation, 129(7), pp.3019–3027.*
26. *Nutrition and Skeletal Muscle (pp. 115–122).*
27. *A new role for vitamin K. Clinical Chemistry and Laboratory Medicine (CCLM), 43(5), pp.488–493.*


DR.VEGAN®
www.drvegan.com • team@drvegan.com