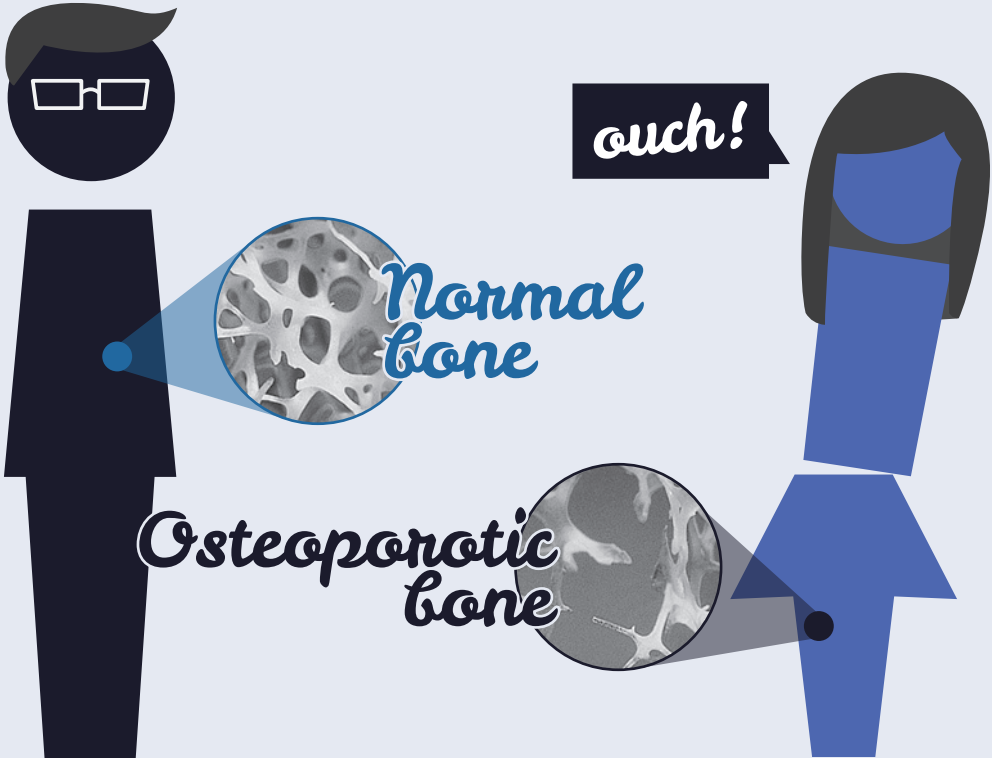
www.iofbonehealth.org

International Osteoporosis Foundation

Osteoporosis

Osteoporosis occurs when bones become thin and fragile. The result is that they break easily, even following a minor bump or fall from standing height. Worldwide, **one in three women and one in five men** over the age of 50 will suffer a fragility fracture (broken bone) due to osteoporosis.

Although fractures can occur in any part of the body, they most commonly affect the wrists, spine and hips. Fractures due to osteoporosis are a major cause of pain, long-term disability and loss of independence among older adults, and can even result in premature death.



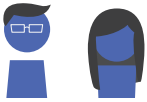
Setting the foundation for bone health throughout life

They say you are what you eat – and that's very true for your bones too. Bones, formed of living tissue, need the right nutrients to stay strong and healthy. A balanced diet, combined with regular exercise, will help to optimize your bone health at all ages and reduce the risk of osteoporosis.

The size and the amount of bone contained in your skeleton changes significantly throughout life. Likewise, as you age, the specific nutritional needs of your skeleton change too.

The goal of a bone-healthy diet is to help

Children & Adolescents
BUILD maximum peak bone mass



Adults
MAINTAIN healthy bones & avoid premature bone loss

Seniors
SUSTAIN mobility and independence

What are the key bone-healthy nutrients?

1. CALCIUM

Calcium is a major building block of our skeleton, with 99% of the 1 kg of calcium found in the average adult body residing in our bones. Bone acts as a reservoir for maintaining calcium levels in the blood, which is essential for healthy nerve and muscle function.

Calcium is a key nutrient for all age groups but the amount needed varies at different stages of life. Demands are particularly high during the rapid period of growth in teenagers.

Dairy foods (milk, yoghurt, cheeses) are the most readily available sources of calcium in the diet, they also contain other important nutrients for growth. Additional food sources include certain green vegetables, whole canned fish with soft, edible bones such as sardines or pilchards, nuts and tofu set with calcium.

Selection of calcium-rich foods

Food	Serving size	Calcium content
1. Milk	200 mL	240 mg
2. Yoghurt, natural	150 g	207 mg
3. Cheese, hard	30 g	240 mg
4. Broccoli (raw)	120 g	112 mg
5. Figs, dried	60 g	96 mg
6. Almonds	30 g	75 mg
7. Tofu, calcium-set	120 g	126 mg

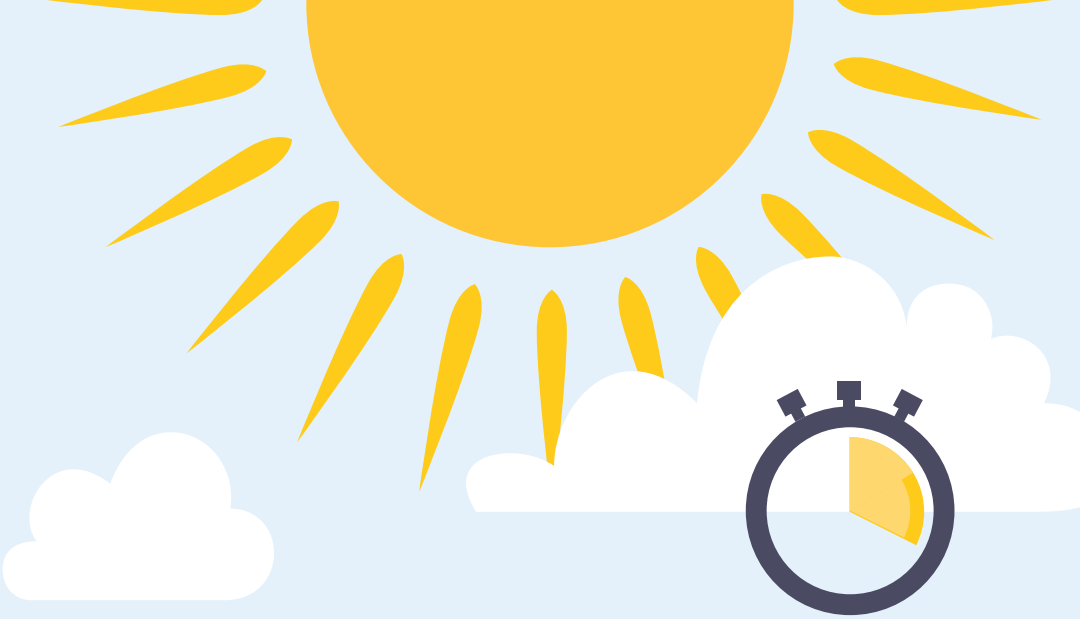
2. VITAMIN D

Vitamin D plays two key roles in the development and maintenance of healthy bones. It **assists calcium absorption** from food in the intestine and ensures **correct renewal** and **mineralization of bone**.

Vitamin D is made in the skin when it is exposed to UV-B rays in sunlight. Due to our increasingly indoor lifestyles, low levels of vitamin D have become a worldwide problem as they can jeopardize bone and muscle health. Very few foods are naturally rich in vitamin D. As a result, in some countries certain food and drinks such as margarine, breakfast cereals and orange juice are fortified with vitamin D.

Food	Vitamin D content*
Wild salmon	600-1000 IU
Farmed salmon	100-250 IU
Sardines, canned	300-600 IU
Tuna, canned	236 IU
Shitake mushrooms, fresh	100 IU
Shitake mushrooms, sun-dried	1600 IU
Egg yolk	20 IU per yolk

*per 100g unless otherwise stated
IU: International Unit



How much sun exposure do you need?

Sunlight is not always a reliable source of vitamin D. The season and latitude, use of sunscreen, city smog, skin pigmentation, and a person's age are just some of the factors that will affect how much vitamin D your skin can produce through sunlight. Generally, you should try to get **10–20 minutes of sun exposure** to your bare skin (face, hands and arms) outside peak sunlight hours (before 10 AM and after 2 PM) daily – without sunscreen – and taking care not to burn.

Selection of foods containing Vitamin D

3. PROTEIN

Protein provides the body with a source of essential amino acids necessary for health. Low protein intake is detrimental both for the building of peak bone mass during childhood and adolescence (affecting skeletal growth) and for the preservation of bone mass with ageing. Protein undernutrition also leads to reduced muscle mass and strength in seniors, which is a risk factor for falls.

Protein-rich foods include dairy products, meat, fish, poultry, lentils, beans and nuts.

The acid-load claim

Many people have been scared by claims that a high protein intake, including drinking milk, may cause increased calcium loss via the kidneys and therefore be bad for bone health. This claim has been disproved in many studies. Both plant and animal sources of protein promote strong bones and muscles. **Milk and dairy products, as part of a balanced diet, are excellent sources of calcium, protein and other nutrients.**

Micronutrients that support bone health

Micronutrients are required in trace amounts for normal growth and development. Ongoing research suggests that several, listed below, are important to bone health:

Vitamin K

Found in leafy green vegetables, spinach, cabbage and kale, liver, some fermented cheeses, and dried fruit

TIP Snack on prunes, a high source of vitamin K

Magnesium

Found in green vegetables, legumes, nuts, seeds, unrefined grains, fish and dried fruit

TIP 50 g of almonds = up to 40% of your daily need

Zinc

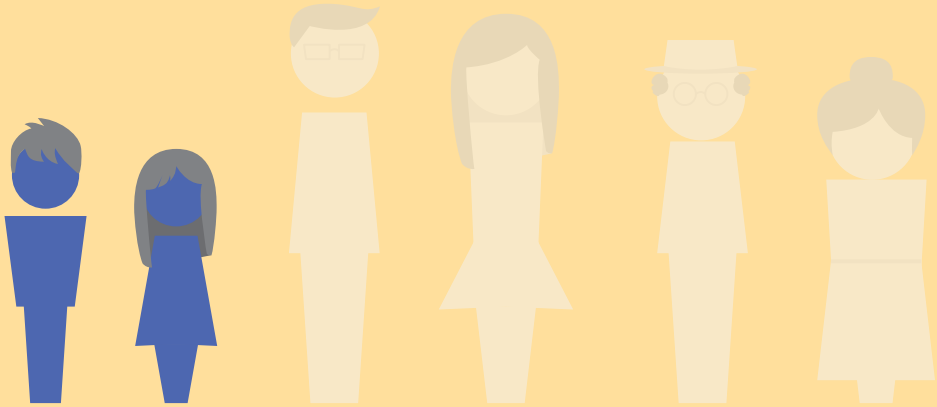
Found in lean red meat, poultry, whole grain cereals, pulses, legumes and dried fruit

TIP Beans and chickpeas are good plant sources

Carotenoids precursors to vitamin A

Found in many vegetables, including in leafy green vegetables, carrots and red peppers

TIP 50 g of raw carrots meet your daily need



Building bones early in life

Bone health starts early in life – in fact it begins at the foetal stage, when good maternal nutrition helps optimize the development of the baby's skeleton.

Childhood and adolescence is a critical time for bone building. It is during this period that both the size and strength of our bones increases significantly. **Approximately half of our bone mass is accumulated during adolescence**, with a quarter being built up during the two-year period of fastest growth. The process continues until our mid 20s.

Although genetics will determine up to 80% of the variability in individual peak bone mass, factors such as nutritional intake and physical activity will help a child achieve optimal bone strength. This is beneficial in late adulthood as there is more bone in reserve

from which to draw; unlike in their younger years adults cannot replace bone tissue as quickly as they lose it. It is believed that a **10% increase in peak bone mineral density** (BMD) – one measure of bone strength – **could delay the development of osteoporosis by 13 years**.

Calcium and protein-rich nutrition boosts bone development

Young people aged between 9–18 years have higher calcium and protein requirements, with the peak age for bone building being 14 years in boys and 12.5 years in girls.

Milk and other dairy products provide up to 80% of dietary calcium intake for children from the second year of life onwards. Although calcium is a vital nutrient for bone development during this stage of life, children are consuming less milk than they did 10 years ago and are instead turning to sweetened beverages. This trend needs to be reversed and children encouraged to drink more milk.

Young people also need enough protein to achieve their genetic potential for peak bone mass. Studies have shown a positive link between children who were given extra servings of milk in their diets – which is high in protein – and increases in a growth factor that enhances bone formation.

Getting enough of the sunshine vitamin

Young people often don't get enough vitamin D. This is partly due to their increasingly indoor lifestyles. By ensuring that children spend more time participating in sports and outdoor physical activity – and less time indoors in front of their computers or televisions – parents can help them maintain a healthy level of this key vitamin.

Recommended daily intake of key nutrients

according to the Institute of Medicine (IOM) USA

1-3 years
AGE
700 mg
CALCIUM
13 g
PROTEIN

4-8 years
AGE
1000 mg
CALCIUM
19 g
PROTEIN

9-13 years
AGE
1300 mg
CALCIUM
34 g
PROTEIN

14-18 years
AGE
1300 mg
CALCIUM
46 g
PROTEIN FOR **GIRLS**
52 g
PROTEIN FOR **BOYS**

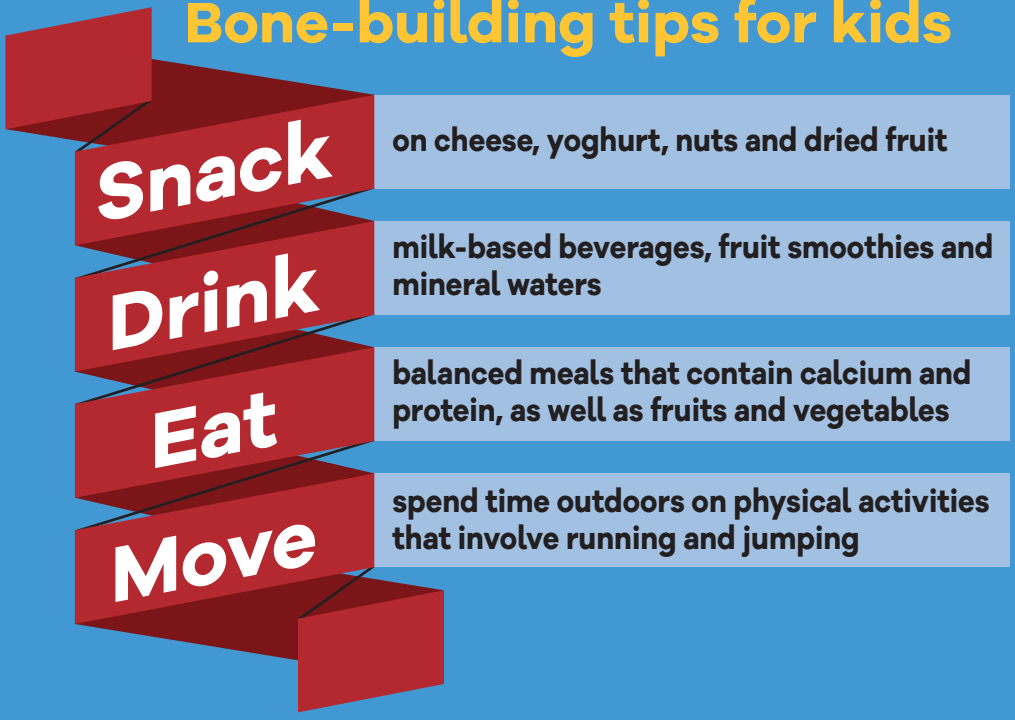
Psst.. And we all need 600 IU of Vitamin D per day!

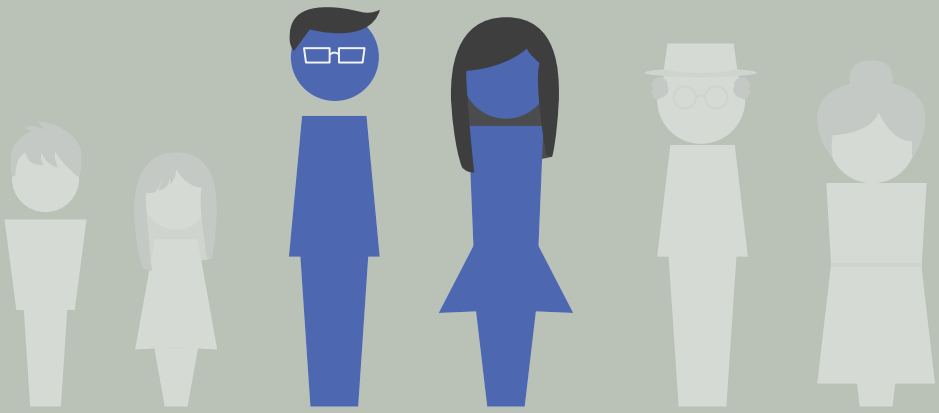
Exercise and lifestyle matter

Nutrition and physical activity work hand in hand to enhance bone development in people of all ages, and at no stage in life is this more important than in youth. Young people who exercise regularly show a significant increase in bone mass.

A healthy body weight during childhood and adolescence – being neither too thin nor overweight – contributes to optimal bone health. Anorexia has a serious and negative impact on BMD and skeletal strength in adolescents, while obese children are more likely to sustain fractures at the wrist.

Bone-building tips for kids





Maintaining healthy bones as an adult

Bone tissue loss generally begins at around the age of 40 years when we can no longer replace bone tissue as quickly as we lose it. At this stage in life you should take action to stem the tide of bone loss.

- **Ensure bone-healthy nutrition, with sufficient calcium, protein, vitamin D and important micronutrients**
- **Engage in weight-bearing and muscle-strengthening exercise**
- **Avoid negative lifestyle factors such as smoking and excessive alcohol use**

Adopting a bone-healthy lifestyle is of critical importance and adults need to pay particular attention at key points in their lives. In women, this is around the age of menopause when they experience a period of rapid bone loss due to a reduction in protective oestrogen levels. In men, bone loss accelerates after the age of 70 years.

Keep up your intake of dietary calcium

Adults aged 19–50 years should have a dietary calcium intake of 1,000 mg/day. For people who cannot get enough calcium through their diet, supplements (preferably combined with vitamin D) may be beneficial. These should however not exceed 500–600 mg per day.

Easy ways to **boost your calcium intake**:

- **Consume dairy products as they are calcium rich; add low-fat cheeses to your meals**
- **Try calcium-set soy, which can be used as a substitute for meats**
- **Drink milk or calcium-enriched substitutes - and add to your coffees and tea**
- **Eat yoghurt regularly as a nutritious breakfast or snack**
- **Add wholegrains or seeds like quinoa and chia to your meals**
- **Snack on nuts or dried fruit**
- **Drink calcium-rich mineral water (check the labels)**
- **Choose vegetables that are especially calcium rich (such as cress, broccoli, okra)**
- **Add chickpeas, lentils and white beans to your meals**

Are you at risk of vitamin D deficiency?

The IOM recommended **vitamin D allowance for adults aged 19–50 is 600 IU per day**. To maintain your vitamin D levels you need regular safe exposure to sunlight. Although sunlight is the primary source of vitamin D, eating fatty fish regularly (e.g., salmon, sardines and tuna) or consuming vitamin D enriched food and drink, can help boost your levels.

Adults at greater risk of deficiency include anyone who lives at latitudes with minimal exposure to sunlight and people who are obese, have a dark skin tone, cannot expose their skin to the sun

Are you getting enough calcium?

Calculate your average daily calcium intake in three easy steps. Available online and on mobile devices.
www.iofbonehealth.org/calcium-calculator

for medical or cultural reasons, or have diseases that reduce uptake of vitamin D from the intestine (e.g., Crohn's disease). If you have any of these risk factors, measurement of vitamin D, based on 25-hydroxyvitamin D levels in the blood, may be advisable. Supplementation may then be prescribed if required.

Proteins and healthy body weight

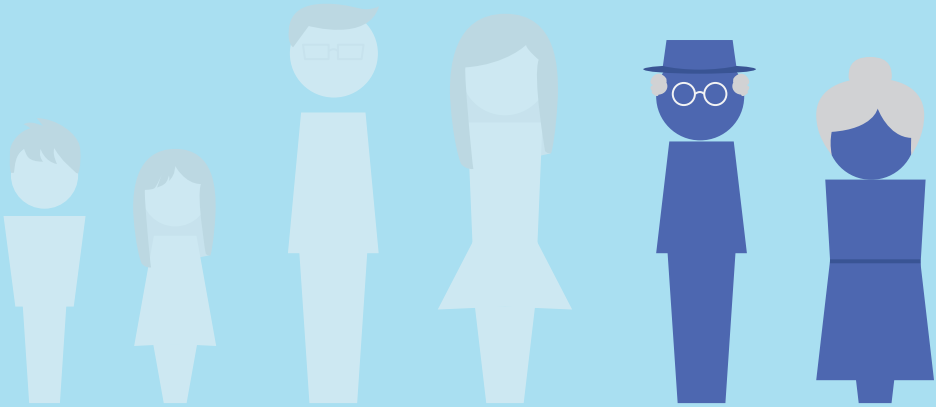
The current recommended daily allowance for healthy adults is 0.8 g of protein per kilogram (kg) of body weight, per day.

Adults should eat sufficient protein-rich foods such as dairy products, meats and fish, lentils, beans and nuts. Poor protein intake is often related to undernutrition. A person's body mass index (BMI) should ideally be between 20–25 kg/m^2. A BMI below 19 kg/m^2 is a risk factor for osteoporosis.

Knowing your risk factors

Take the IOF One-Minute Osteoporosis Risk Test to find out whether you may have specific factors which place you at higher risk of osteoporosis and fractures.

www.iofbonehealth.org/iof-one-minute-osteoporosis-risk-test



Nutrition in seniors: stay strong and mobile

In seniors, a bone-healthy diet is an essential ingredient in helping to slow the rate of bone thinning and preserve muscle function. This in turns **helps reduce the risk of falls and fractures**.

Malnutrition is common among the elderly for a number of reasons. Seniors may have reduced appetite or be less inclined to cook balanced meals. Vitamin D levels may be lower because of less frequent exposure to sunlight, especially in seniors who are housebound. The skin's capacity to synthesize vitamin D also

Daily dietary recommendations for seniors

decreases, as does the kidney's capacity to convert vitamin D to its active form. In addition, with age, the body is less able to absorb and retain calcium.

More calcium, protein and vitamin D needed

In addition to higher calcium intake, **seniors need more dietary protein and vitamin D than the young**. Both these nutrients help prevent muscle wasting (known as sarcopenia) and thereby help lower the risk of falls and fractures. Higher dietary intake of protein in older people who have been hospitalized with hip fracture has been shown to improve bone density, reduce the risk of complications and reduce rehabilitation time.

Age	Gender	Calcium RDA	Vitamin D RDA	Protein RDA*
51-70 years	female	1200 mg	600 IU	46 g
	male	1000 mg	600 IU	56 g
>70 years	female	1200 mg	800 IU	46 g
	male	1200 mg	800 IU	56 g

Based on IOM recommendations
RDA: Recommended Dietary Allowances
*According to IOF, a moderate increase in protein intake from 0.8 to 1.0–1.2 g/kg per day is considered optimal for skeletal muscle health in older adults

The International Osteoporosis Foundation recommends that seniors aged 60 years and over take a Vitamin D supplement at a dose of 800–1000 IU/day. Vitamin D supplementation at these levels has been shown to reduce the risk of falls and fractures by about 20%.

Exercise enhances the benefits of bone-healthy nutrition

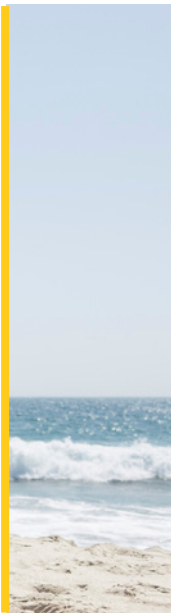
As at all stages of life, exercise is essential for bone health in seniors too. At this age, muscle strengthening exercises, suitable to individual needs and abilities, will help improve coordination and balance. This in turn helps to maintain mobility and reduce the risk of falls and fractures.

Treatment for those at high risk

Although bone-healthy nutrition is important, drug therapies are critical for fracture prevention in people at high risk, including those who have already experienced a first fracture. Today, there are many **proven and effective treatments** which have been **shown to reduce the risk of osteoporotic fracture by between 30–50%**.

If you're over aged 50 years and have broken a bone, or have other risk factors for osteoporosis ask your doctor for a clinical assessment.

Controlling osteoporosis risk factors and complying with treatment regimens, where prescribed, can ensure people live mobile, independent, fracture-free lives for longer.



Non-age related nutritional factors

Alcohol and caffeine: moderation is key

Excessive alcohol intake – more than two units per day – can increase the risk of suffering a fragility fracture. As a rough guide: 1 unit would be the equivalent of 25 ml of spirits (40% alcohol) or 250 ml of beer (4% alcohol).

If you enjoy drinking coffee or other caffeine-containing drinks you need to ensure that you are getting sufficient calcium. Caffeine intake at 330 mg per day (approximately 4 cups) could be associated with a 20% increase in risk of osteoporotic fractures.

Coeliac disease and other disorders can affect nutritional status

Diseases of the gastrointestinal system that affect nutrient absorption in people of all ages include inflammatory bowel disease (e.g., Crohn's disease and colitis) as well as coeliac

disease. People with these diseases may be at increased risk of osteoporosis and fractures and need to ensure an adequate intake of calcium (1,000 mg/day) and Vitamin D. In such cases it is recommended that individuals have their nutrient status checked as they may need supplements.

Getting enough calcium despite lactose maldigestion or intolerance

People with some degree of lactose maldigestion may avoid dairy products. As a result they often don't get enough calcium, which may increase their risk of osteoporosis.

If you are sensitive to lactose you may not need to eliminate dairy consumption completely: lactose-reduced milks, yoghurts with live cultures, and some hard cheeses are normally tolerated. Another alternative is to take lactase tablets or drops along with dairy foods. People who are lactose intolerant should consult with their doctor to discuss the best way of ensuring adequate calcium intake, either through diet, or if necessary, through the use of supplements.

#LoveYourBones

World**Osteoporosis**Day
October**20**

LOVE YOUR BONES

For further information about osteoporosis, consult your local osteoporosis patient or medical organization. You can find a list on **www.iofbonehealth.org**.

Information is also available on the World Osteoporosis Day website **www.worldosteoporosisday.org**.

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