

LOVE YOUR BONES

Protect your future

BUILDING STRONG BONES IN CHILDREN & ADOLESCENTS



www.worldosteoporosisday.org

Osteoporosis

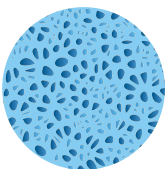
Osteoporosis is a disease in which the skeleton becomes weak and fragile – and as a result bones are in danger of breaking easily.

A person with osteoporosis may suffer a broken bone after only a minor bump, a sneeze, or a fall from standing height.

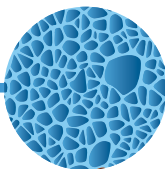
Around the world, about one in three women and one in five men aged 50 and over will break a bone due to osteoporosis. The result of these potentially life-threatening fractures is often pain, immobility, disability and loss of quality of life.

Because osteoporosis is a disease that normally affects older adults, many parents may not consider their children’s bone health to be a priority concern.

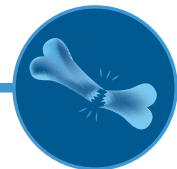
What is important to remember is that the best foundation for future bone health is set when bones are still developing – that’s when a bone-healthy lifestyle can make a lifelong impact.



Normal bone



Osteoporotic bone



Broken bone

Setting the foundation for strong bones in later life

Childhood and adolescence are a very important time for the formation of the skeleton – the stage in which bones grow both in size and strength. This is the most important time to set a solid foundation for future bone health.

Although maximum height may be reached in the mid to late teens, peak bone mass (when bones have reached their maximum strength and density) is nearly reached by the age of 20. Throughout life our bone mass is being lost and replaced all the time, but as we age the amount of bone lost isn't fully replaced by new bone. Following a bone-healthy lifestyle before peak bone mass is reached, can help a young person stock up, or 'bank', more bone.

By attaining his or her maximal genetic potential for strong bones, a young person will be less susceptible to osteoporosis and fractures in later life.

“Building strong bones now, will help me beat osteoporosis in the future”

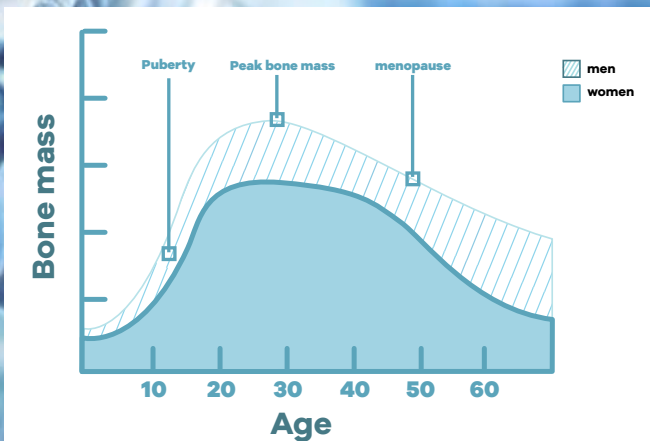


Genetics counts but lifestyle makes a difference

Our genes account for **60-80%** of the potential size and strength of our skeleton, but lifestyle makes a crucial impact that can account for the significant difference in peak bone mass between one person and another.

At the end of puberty, in healthy teens of the same sex, same age and same height, the difference in the amount of bone contained in the spine can vary by a factor of two. For example, one sexually mature, 165 cm tall girl might have 10 grams of bone mineral in one lumbar vertebrae while a physically similar girl of the same age might have 20 grams. This surprisingly large variation is due to genetics as well as life style factors, such as nutrition, physical activity and risk factors.

Maximizing a child's genetic potential for peak bone mass is important because it is estimated that a 10% increase in peak bone mass would delay the development of osteoporosis by 13 years.



Key ages for bone development

There is much that can be done to promote the development of healthy bones during childhood and adolescence.

Creating the optimal environment for healthy bones starts early: even before birth, optimal nutrition and healthy lifestyle in an expecting mother can make a difference to her child's future bone health.

In children, the most rapid periods of bone growth occur from birth to two years and around puberty, when sexual maturation takes place. This is roughly from age 11 to 14 in girls and 13 to 17 in boys. During puberty, the speed of bone build-up in the spine and hip increases by approximately five times.



In girls, the bone tissue accumulated during the ages 11 to 13 approximately equals the amount of bone lost during the 30 years following menopause.

The difference between bone growth in boys and girls

During growth the gain in bone mineral mass is mainly due to an increase in bone size, with very little change in bone density (the amount of bone tissue within the bones). It's important to note that even when a teenager has grown to maximum height, he or she has not yet reached maximum peak bone mass.

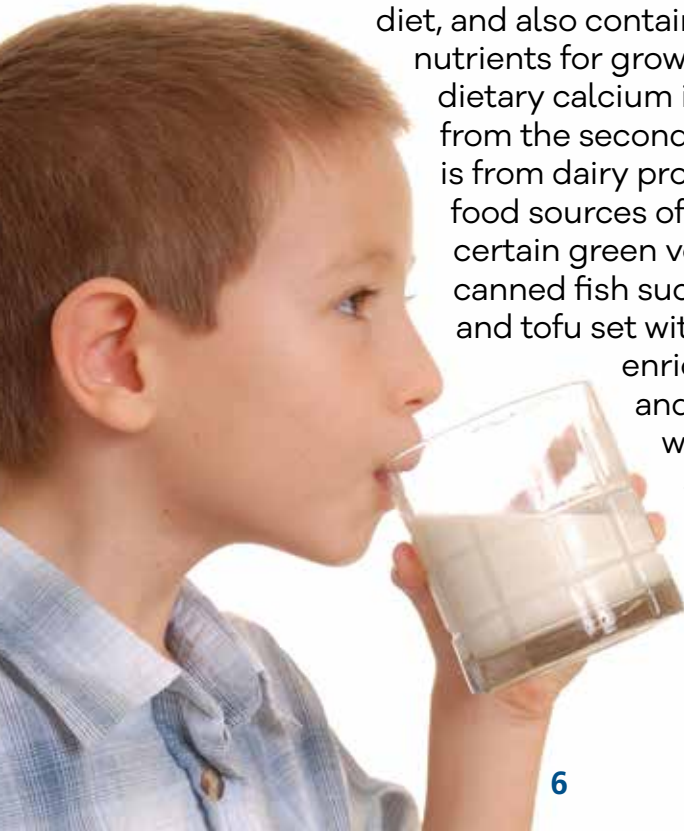
From birth to the onset of sexual maturation, bone mineral mass is the same in girls and boys. However, during puberty bone mass increases more in boys than in girls. This difference is mainly due to the longer period of rapid growth in males than in females, resulting in larger and thicker bones in males.

The importance of diet and bone-healthy nutrition

The nutrients of most importance to optimize bone health in children and adolescents are calcium, vitamin D and protein. Micronutrients are also required in trace amounts for normal growth and development.

Calcium

Calcium is essential for healthy bone development. Demands are particularly high during the rapid period of growth in teenagers. Dairy foods (milk, yoghurt, cheese) are the most abundant sources of calcium in the diet, and also contain other important nutrients for growth. Up to 80% of dietary calcium intake for children from the second year of life onwards is from dairy products. Additional food sources of calcium include certain green vegetables, whole canned fish such as sardines, nuts and tofu set with calcium. Calcium-enriched juices, cereals and bread are also widely available in some countries.



How much calcium is enough?

Calcium intake should be increased during the most important years of bone growth – particularly during the preteen and teenage years. Dietary recommendations for calcium intake vary from country to country, but studies have shown that regardless of recommended daily allowance, many children do not take in enough calcium for optimal bone health.

In the U.S., for example, less than 15% of adolescent girls consume the recommended daily allowance for calcium. This trend may be partly related to the fact that many young people do not have a proper breakfast, with its traditional variety of calcium-rich foods. There has also been a downward trend in milk consumption in many developed countries, due to the fact that milk has been displaced by increased consumption of sodas and other sweetened drinks.

If your child is sensitive to lactose, calcium-fortified soymilk is a good option as it tends to have about the same amount of calcium as regular milk. Don't forget that certain dairy products, such as aged cheese (e.g. cheddar, parmesan) and some yoghurts with live cultures are also well tolerated by those with lactose sensitivity.

See page 9 for recommended intakes.

Calcium rich foods across a range of food groups

FOOD	SERVING SIZE	CALCIUM (mg)
Milk	200 ml	240
Yoghurt natural	150 g	207
Hard cheese (Parmesan, Cheddar,...)	30 g	240
Kale, collard greens	50 g (raw)	32
Sesame seeds	15 g	22
Rice pudding	200 g	210
Fish (Cod, Trout, Herring, Whitebait)	120 g	20
Pasta (cooked)	180 g	26
Figs, dried	60 g	96
Tofu	120 g	126

Vitamin D

Vitamin D is essential for bone growth and health at all ages as it helps the body absorb calcium and deposit it into the skeleton. A failure to ensure adequate vitamin D can jeopardize bone development in children. Although rare in industrialized countries, severe vitamin D deficiency in children can lead to growth retardation and bone deformities known as rickets.

The most abundant natural source of vitamin D is through exposure to sunshine, as only a small group of foods are naturally rich in vitamin D (e.g. oily fish, liver, mushrooms, eggs). In some countries, margarines and ready-to-eat cereals are fortified. A European-wide study found that adolescents who consume ready-to-eat cereals had a higher intake of vitamins and minerals.

Low levels of vitamin D in children have been reported in studies worldwide, due in part to young peoples' increasingly indoor lifestyles, pollution in urban settings, and use of sunscreen.

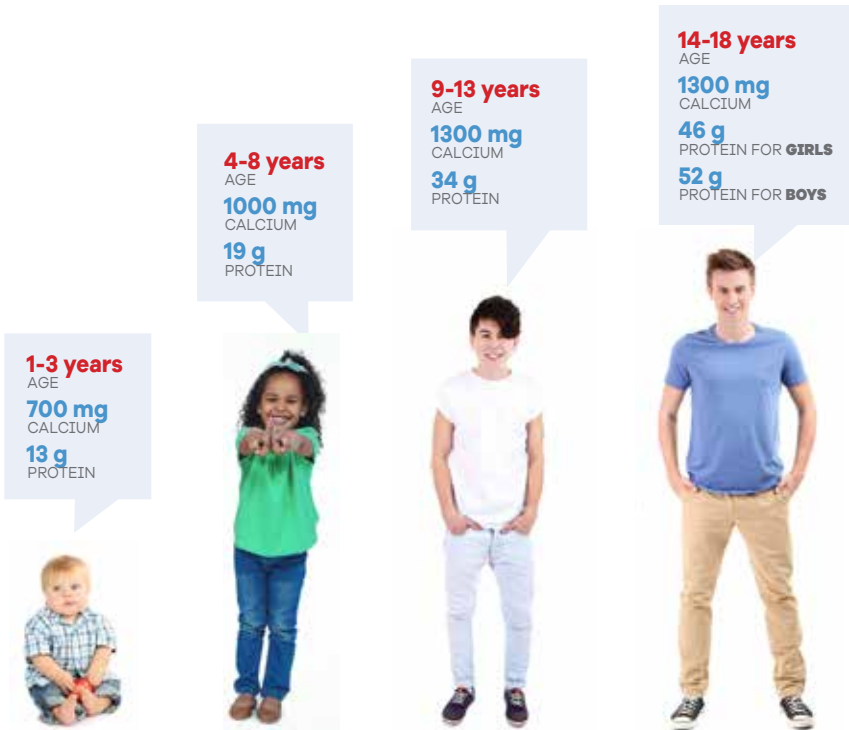
Guidance from several countries recommends supplementation for expecting mothers and for infants and young children. The U.S. Institute of Medicine (IOM) recommends 600 IU/day of vitamin D for most children aged 1-18.

Proteins

In addition to calcium, protein plays a key role in bone health, with higher protein intake resulting in bone mass gain in children. In contrast, under-nutrition during the growth period, including insufficient protein and calorie intake, can severely impair bone development. Protein-rich foods include meat, fish, eggs, beans, nuts and seeds.

Recommended daily intake of key nutrients

according to the institute of Medicine (IOM) USA



A healthy, balanced diet

Adequate consumption of fruits and vegetables also helps young people to get enough of the essential vitamins and minerals (such as vitamin K, magnesium, zinc and carotenoids) that play a role in bone- and overall health. A healthy balanced diet should include at least five portions of fruits and vegetables daily.



Bone-healthy nutrition tips & tricks



Yoghurt is a great snack – pep it up with nuts, fruits or oatmeal



serve almonds, walnuts, dried apricots or prunes as snacks



add cheese on pasta and salads



top cucumber slices, red peppers or celery sticks with creamed cheese

The importance of physical activity

Exercise is vitally important for bone health and goes hand-in-hand with good nutrition.

While exercise benefits people of all ages, young bones respond even more to exercise than do adult bones. Children and adolescents who exercise regularly show significant increase in bone mass.

Ideal exercises are those that 'load' the skeleton. These include running, jumping, ball games, competitive sports and dancing. Weekly gym classes in school are beneficial, but not enough - young people need to be engaged in daily physical activity. The World Health Organization (WHO) recommends that children aged 5-17 should accumulate at least 60 minutes of moderate- to vigorous-intensity physical activity daily, and notes that additional physical activity would provide even more health benefits.

A growing concern is the increasingly sedentary lifestyle of children and teens worldwide. A WHO- Europe report has found that time spent in front of computers and mobile devices among European youth has soared since 2002.



The importance of physical activity

In 2014, young people spent approximately 60% of their waking time sitting. The steepest increase was observed around the ages of 11 to 13 years, during the onset of puberty – when bone development is most rapid.

While sedentary lifestyle is a primary concern, it should be noted that too much intensive physical activity together with weight loss can be harmful - particularly in girls as this may result in reduced sexual hormone production and cessation of menstruation.



Avoiding unhealthy habits

In addition to poor nutrition and low levels of physical activity, certain lifestyle factors can hinder the development of strong bones in young people.

Tobacco

Tobacco use among adolescents is on the rise in many countries, particularly in teenage girls. Smoking can affect the attainment of peak bone mass, particularly when it is associated with other health-risk behaviours such as poor nutrition and inadequate physical activity. Another concern is the fact that smoking during adolescence increases the risk of continued and heavy smoking during adulthood, which is harmful to adult bone health and increases future fracture risk.



Alcohol

In adults, excessive alcohol consumption is associated with a decrease in bone formation and higher fracture risk. Although there are few studies on the influence of alcohol on peak bone mass attainment in young people, we can assume that alcohol also exerts a negative effect on bone mass attainment during adolescence.



Avoiding unhealthy habits

Coffee

Coffee-based drinks are increasingly popular among adolescents. Studies in adults have shown that drinking more than three cups of coffee daily may interfere with calcium absorption and have a negative impact on bone health.



Soft drinks

It has been suggested that excessive consumption of carbonated soft drinks, particularly cola, can damage bone health due to their high phosphate content. While there is no scientific evidence to support this claim, soft drinks definitely do not contribute to good bone health. They have no nutritional value, and young people who drink more sodas have a correspondingly lower intake of milk or other calcium-rich drinks, contributing to the so-called “milk-displacement effect”.



Body weight and bone health

A healthy body weight during childhood and adolescence is required for optimal bone health. Having a body mass index (BMI) at either end of the spectrum can pose a threat to the development of the skeleton. Anorexia nervosa is especially damaging to bone mass and strength in the young. Overweight children have low bone mass for their weight and are more likely to suffer wrist fractures.

Although it is uncommon for young people to have

Osteoporosis in children

osteoporosis, children and adolescents may develop fragile bones due to certain conditions or medications. Certain rare conditions such as osteogenesis imperfecta (OI) or idiopathic juvenile osteoporosis result in fragile bones. However, more common cases are related to secondary factors such as:

- anorexia nervosa
- nutritional problems such as celiac disease and inflammatory bowel disease
- long-term high-dose oral glucocorticoid therapy (often for treatment of asthma or arthritis)
- delayed puberty or conditions resulting in insufficient sex hormones
- leukemia or other childhood cancers
- diabetes
- cystic fibrosis
- conditions where there is reduced mobility

Children at potential risk of fractures due to secondary osteoporosis should be identified early so that preventive action can be taken.

As osteoporosis in children is complex, it is best to consult a specialist in paediatric bone health.

“ Osteoporosis has been called a pediatric disease with geriatric consequences.

Bone-healthy nutrition and regular, vigorous exercise during childhood and adolescence are the key ways in which to maximize a child’s genetic potential for strong bones – and a first step to osteoporosis prevention in later life. “

IOF President, Prof. Cyrus Cooper

#LoveYourBones

WorldOsteoporosisDay
October20

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BONES

The IOF vision is a world without fragility fracture in which healthy mobility is a reality for all.



Show your support, sign the IOF Global Patient Charter at
www.iofglobalpatientcharter.org

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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