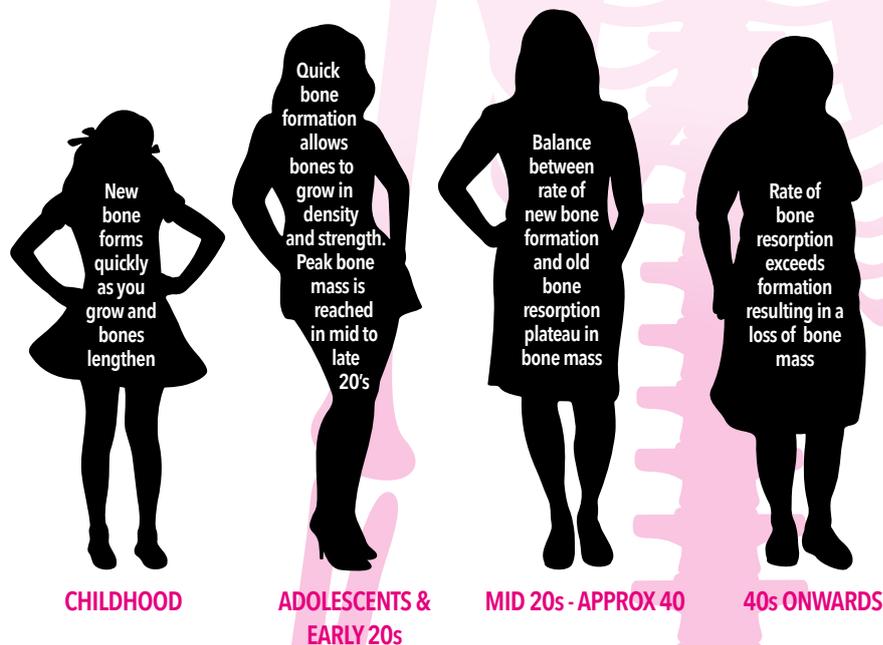


Building Bone Strength and Preventing Bone Loss in Later Life

Osteoporosis is often referred to as a 'silent disease' because there is very often little sign of it existing. However, osteoporosis is a condition that speeds up the loss of bone strength, the word literally means 'porous bones'. Despite popular belief, it's not confined to elderly frail ladies or post-menopausal women either. People of any age, particularly if your mobility is restricted due to spending a lot of time in wheelchairs or bed-bound, can suffer from it. Other causes can include poor nutrition, eating disorders, over-training in a particular sport, or chronic steroid use. Men can suffer from osteoporosis too. Approximately 1 in 3 women and 1 in 12 men have osteoporosis.

A simple fracture, especially when you're younger, may seem a minor consequence of the disease but this can impact your personal, social and sports life as well as work commitments. In older patients however, the more common hip fracture can have much more serious outcomes. The estimated mortality rate following a hip fracture within the first month is 10%, and 21% in the first year. Many patients do not recover full mobility or independence following a hip fracture, which for some results in admission to a care facility. Damage to your spine due to 'crumbling' vertebra can result in chronic pain and impact on your abdominal organs and lung capacity.

The good news is that there are treatments available to reduce the amount of bone loss resulting from both age and osteoporosis. The very best thing you can do is to achieve the best peak bone mass when you're young, through good nutrition and an active lifestyle. However, many of us are past that stage in our lives, and need to maximise bone strength and prevent bone loss through regular weight bearing activities. The ironic thing is that the thought of participating in exercise or sport may be frightening, because you may worry about suffering a bone fracture with impact, loading or falling, but the research has proven the benefits of exercise, if done correctly and safely, FAR outweigh the risks of osteoporosis.



THE BONE CYCLE

Bone is made up of minerals, mainly calcium salts, bound together by strong collagen fibres. Bones have a thick, hard, outer shell called cortical bone. Inside is a softer mesh of bone, called trabecular bone, which has a honeycomb-like structure. Bone is a living, active tissue that is constantly renewing itself. Old bone is broken down by cells called osteoclasts and is replaced by new bone material produced by osteoblast cells. The balance between the breakdown of old bone and formation of new bone, changes through life.

Everybody will experience a degree of loss in bone mass and density as they age. The amount of bone loss can vary across age, sex, race, health, activity level and underlying medical conditions. It is the rate of loss, accelerated by certain factors (like menopause in women, smoking, etc) that ultimately results in osteoporosis. When a bone is 'weakened' by osteoporosis, it is the "holes" in the spongy honeycomb that grow larger and more numerous, making the bone more fragile.

Women are at the greatest risk following the menopause because they

lose the protective benefits that come from the hormone, oestrogen. Oestrogen is responsible for facilitating the uptake and retention of calcium in bone. Hence the accelerated decline in bone mass following the menopause.

RISK FACTORS FOR OSTEOPOROSIS

- Early menopause, before age of 45
- Hysterectomy and removal of one or both ovaries (loss of oestrogen)
- Family history of osteoporosis
- BMI of 18.5 or less, if you are underweight
- Eating disorder, anorexia, bulimia
- Amenorrhea - your periods have stopped or are irregular for 6 months to a year prior to the age of menopause
- Have taken or are taking chronic steroid medication
- Smoker
- Alcohol intake of more than 4 units per day
- Lack calcium and/or vitamin D, poor diet and little exposure to sunlight
- Not very mobile, wheelchair, confined to chair or bed
- Underlying medical condition: hyperthyroidism, coeliac disease, Cushing's



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disease, Crohn's disease, chronic kidney disease, rheumatoid arthritis, chronic liver disease, type 1 diabetes.

OSTEOPOROSIS SYMPTOMS

Osteoporosis usually develops slowly over several years, without any symptoms. The force of a simple fall to the ground (from the height of a standard chair or less) resulting in a fracture may be the first sign. The most common fragility fractures occur in the hip, wrist and spine and fracture healing may be delayed due to the reduced speed of bone formation when we're older.

Aches and pains are NOT a symptom of osteoporosis. It does not cause pain unless there is a fracture. Fractures in the spine (vertebrae) are often missed. So, if you have severe or chronic back pain, with risks factors of having osteoporosis, consult a doctor for further investigation.

A vertebra affected by osteoporosis may fracture even without a fall or significant force, possibly just a sneeze or cough. The vertebrae become squashed/collapse following a fracture resulting in pain, height loss and stooping forward posture. This can affect your ability to perform daily activities, as well as your breathing, as your lungs have less room to expand within your chest.

DIAGNOSING OSTEOPOROSIS

In an ideal world, if you have any risk factors listed earlier or following the menopause you would go for screening for osteoporosis every two years, before you sustain a fracture. This involves measuring your bone mineral density (BMD) through a pain-free, non-invasive scan referred to as a DEXA

scan. From this you receive a score of your bone density which can be monitored over the years to track rate of bone loss and fracture risk. Medication can then be prescribed accordingly.

TREATMENT OF OSTEOPOROSIS

Where applicable focus should be on managing risk factors that we can change like making lifestyle changes and participating in fall prevention classes. Treatment includes:

- Weight-bearing exercises (discussed below)
- Calcium and vitamin D supplements
- Prescription medications such as:
 - risedronate, alendronate, zoledronic acid
 - calcitonin
 - denosumab
 - raloxifene
 - oestrogen therapy
 - injectable teriparatide

Lifestyle changes may include:

- Improving your BMI through healthy meal plans
- Sitting outside in the sunlight – the best natural Vitamin D comes from the sun and is absorbed through your skin
- Receiving treatment for underlying eating disorders
- Cessation of smoking
- Reducing alcohol consumption
- Changing/reducing chronic steroid medication
- Preventing falls
 - Check your home for hazards such as uneven or loose rugs, trailing wires, slippery floors, etc.
 - Regular weight-bearing exercise may help to prevent falls through better motor control and balance
 - Participating in local fall prevention programmes
 - Have your vision checked
 - Beware of going out in icy weather, and wet or slippery floors
 - Take care after taking medication that may make you drowsy or lower your blood pressure. Dizziness can result in a fall.

PREVENTION OF OSTEOPOROSIS

The following tips may help to prevent, or slow down bone loss. If you already have osteoporosis, these measures can also help to slow down bone loss.

1+ Exercise

Research shows that exercise can help to prevent osteoporosis. The pulling and tugging on the bones by your muscles during exercise helps to stimulate bone-making cells (osteoblasts) and strengthens your bones. Regular weight-bearing exercise throughout life is best but it is never too late to start. This means exercise where your feet and legs bear your body's weight, such as brisk walking, aerobics, dancing, running, or bearing weight through your arms and using hand held weights when exercising. If you're a bit older, a regular walk is a good start. However, the more vigorous the exercise, the better. A goal of at least 30 minutes of moderate exercise or physical activity five times per week would be ideal.

Note: because swimming is not a weight-bearing exercise, this is not so helpful in preventing osteoporosis.

Muscle strengthening exercises are important however. Strong muscles provide better support for your joints. This helps to increase tone, and improve balance which may help prevent a fall. Examples of muscle strengthening exercises include press-ups, lunges and squats, and lifting weights. There are simple exercises that you can do at home without having to go to the gym.

2+ Food and diet

There is no point in taking calcium without Vitamin D, as the calcium is dependent on vitamin D for absorption into the bone. Vitamin D you can get for free by being outdoors in the sunlight. If your country is less sunny, particularly during the winter months, then a supplement may be necessary. The recommended daily intake for calcium in adults over the age of 50 is at least 1000 mg per day.

3+ Smoking and drinking

Chemicals from tobacco and alcohol can affect absorption of minerals into the bone making bone loss worse. So the more you can do to reduce your consumption of these chemicals, the better it will be for your bones.

TALK TO YOUR HEALTH PRACTITIONER FOR MORE ADVICE

Talk to your health practitioner for more advice, or to answer any questions you may have. They can also point you in the right direction for local programmes and support.



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BUILDING BONE STRENGTH AND PREVENTING BONE LOSS IN LATER LIFE

YOUR EXERCISE PROGRAMME

This programme has specific exercises to promote bone strength which is beneficial in both the prevention and treatment of osteoporosis. The exercises also help strengthen your lower limbs and improve balance which can reduce your risk of a fall and subsequent fracture. Ensure you perform the exercises in a safe environment without loose carpets or a slippery floor and always have a support (eg. table, handrail) close by for balance, if needed. These exercises should be done at least once a day, preferably twice a day if possible. A brisk walk or participation in yoga/exercise classes may have additional benefit. It is important to ensure the exercises are performed with good technique and good postural control. Make sure to repeat the same number of exercises on both

sides where applicable. We have given suggested sets and repetitions. Remember everyone is different so your therapist may give guidance that is more specific to you.

WARM UP AND COOL DOWN

It is important to warm up (unless advised otherwise by your practitioner) with a brisk walk or a gentle jog for 5-10 minutes before you start your exercises. Marching on the spot is also a good warm-up. This increases your circulation and helps prepare the muscles for the activity to come. When you have finished your exercises, end the session with a 5 minute gentle walk or slow jog to allow your heart rate to slow down gradually.

STEP UP AND DOWNS UNSUPPORTED WITH WEIGHTS

Place an ankle weight around each ankle. If you don't have a weight you can leave it off. Stand upright in front of the bottom step of your staircase. Step up onto the first step with one leg, and bring the other leg to the step to meet it. With control, lower this same foot back to the floor, followed by the other. If you feel unstable, hold the wall or handrail for balance. **Repeat 8 times | Perform both sides**



 **Video:**
<https://youtu.be/ejb2B8Hc2cM>

1/2 SQUAT STANDING UNSUPPORTED

Stand upright with good posture. Stand close to a wall or table for support if you require it. Open your legs slightly wider than shoulder width, and bend your knees to the 1/2 squat position. Return to the start position. Make sure you keep the middle of your knee-cap in line with the middle toes of your foot. This is a strengthening exercise for the legs. **Repeat 10 times**



Video:
<https://youtu.be/SblA5zn9Dlo>

WALL SLIDES (1/2 SQUAT)

Stand upright, with your back resting against a wall and your feet slightly away from the side of the wall. Open your legs slightly wider than shoulder width, and bend your knees to the 1/2 squat position. Make sure you keep the middle of your knee-cap in line with the middle toes of your foot. Return to the start position. This is a strengthening exercise for the legs.



Repeat 8 times | Hold for 3 seconds
 **Video:**
<https://youtu.be/WKVYRXclqA4>

WEIGHT SHIFT SIDEWAYS UNSUPPORTED

Stand upright with good posture, next to a wall or rail just in case you need support. Lift one leg off the floor as you shift your weight onto the stationary leg. Point your toes to the side to touch the space to the side of you, and then back to the start position. This exercise improves strength and co-ordination in the legs. **Repeat 10 times | Perform both sides**



Video:
https://youtu.be/fh5_yg6ahes

WALL PRESS-UP

Stand upright with good posture, position yourself in front of a wall in a press-up position with your arms straight and palms flat on the wall. Drop your chest towards the wall by bending your elbows. Hold this position for 1-2 seconds. Return to the start position by pushing through your arms. This is a chest, back and shoulder strengthening exercise. You can make the exercise harder by standing further back from the wall. **Repeat 10 times | Hold for 2 seconds**



 **Video:**
<https://youtu.be/ox18YHnWTsU>

SHOULDER FLEXION SITTING

Sit upright with good posture. Lift both arms gently in front of you. Take your arms as far as feels comfortable. If you cannot get your arms above your head, just take your arms to your comfortable end of range. Slowly lower your arms. This will help mobilise your shoulders and upper back, and strengthen your arms. If you have a weight or medicine ball or any object (a bag of sugar) hold that in your hands and raise the weight over your head for added strengthening.



Repeat 10 times | Hold for 2 seconds at the top
Video:
<https://youtu.be/vWHilBHOhts>

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