

EXERCISE and Osteoporosis

**REGULAR WEIGHT BEARING
EXERCISE CAN PLAY A
MAJOR ROLE IN PREVENTING
OSTEOPOROSIS**



Osteoporosis is a condition which results in bones becoming "thin" and fragile and breaking more easily. Osteoporotic fractures afflict 60% of women and 30% of men over the age of 60 years in Australia. In women, the hormonal changes that occur during menopause lead to an increase in bone loss and weaker bones that are more prone to fracture.

HOW IS OSTEOPOROSIS CAUSED?

Throughout life bone tissue is very active and is constantly being 'remodelled'. Microscopic amounts of bone are continually being removed (resorbed) and reformed (laid down) in response to various factors. During childhood and adolescence more bone is laid down than is removed leading to an increase in bone density. During early adulthood the two processes are balanced but bone continues to become thicker and stronger. Peak bone density, which is the maximum amount of bone in the skeleton during lifetime, is thought to be developed by the early 20's. After about the ages of 30 to 40 more bone is removed than is laid down. During the 5-10 years around menopause the decline in oestrogen levels results in an accelerated bone loss of 2 to 3 per cent per year. Thereafter in both men and women, there is a gradual decrease in bone density of about 0.5 to 1.0 percent per year

ARE SOME ACTIVE WOMEN MORE AT RISK OF DEVELOPING OSTEOPOROSIS?

In general, women who are slim, white, smoke, do not exercise regularly, have an inadequate caloric (and calcium) intake and have irregular menstrual periods or early menopause, are at a higher risk of developing osteoporosis. Among active women, those most at risk are those who become amenorrhoeic (have no menstrual period for 3 months or longer). The decreased oestrogen levels associated with amenorrhoea cause increased bone loss, despite the positive effects of physical activity on bone density. While not all amenorrhoeic women have low bone density, prolonged amenorrhoea (no menstrual period for 6 months or longer) may result in increased bone loss and therefore 'early onset' osteoporosis (weak bones and fractures occurring at a young age) and an increased incidence of stress fractures.

*A HEALTHY BALANCED
DIET IS NECESSARY FOR
NORMAL BONE GROWTH
AND MAINTENANCE*

EXERCISE

Other factors including the volume and intensity of training and body composition may also contribute to injuries and stress fractures in athletes, eg some lean, highly trained endurance athletes, such as distance runners have very restricted diets and may not have adequate calcium intakes (see table below) to maintain bone health.

Some medical conditions (eg thyroid disease) and medications (eg corticosteroid medicines) are also associated with an increased risk of osteoporosis. Please check with a sports medicine doctor for information about specific medical conditions that might influence bone health, particularly those athletes who have not had a menstrual period for 6 months or longer.

CAN ANYTHING BE DONE TO PREVENT OSTEOPOROSIS IN ACTIVE WOMEN?

Yes. The best way is to develop the highest possible peak bone density during childhood and adolescence and maintain regular menstrual cycles throughout adulthood. Regular life-long weight bearing exercise or weight training can have a positive effect on bone density and so most active women are at reduced risk. However, if menstrual cycles cease for any length of time (amenorrhoea), oestrogen levels will fall which may lead to a decrease in bone density. Active women who develop amenorrhoea (lack of menstrual periods) should consult their doctor to identify the cause and discuss possible treatment options, which should include nutritional consultation (adequate calcium and vitamin D intake are important) and may involve the use of hormone replacement, the contraceptive pill or bisphosphonates (therapy used to treat osteoporosis in older adults). It is important that active women seek early advice because those who remain amenorrhoeic have an increased risk of developing osteoporosis.

HOW DO I KNOW IF I HAVE OSTEOPOROSIS?

At present the only accurate method of assessing bone density and the presence or risk of developing osteoporosis is by a bone density scan. This can be arranged by your doctor and involves a simple, low dose x-ray test.



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WHAT FACTORS AFFECT BONE DENSITY?

Several factors other than oestrogen levels also affect bone density. Your genes (family history/heredity) are considered to be the most important determinant of bone density. Other modifiable factors such as a poor calcium intake, inadequate vitamin D, lack of exercise, smoking, excessive alcohol intake and certain medications can increase your risk of osteoporosis.

HEREDITY

Bones, like many other features, are largely predetermined by genes. Active women who are thin and have small bones and a family history of osteoporosis (eg mother or grandmother who have had an osteoporotic fracture) are more likely to develop osteoporosis.

HORMONES

Many different hormones affect bone density, particularly oestrogen in women and testosterone in men. Young men have thicker and stronger bones than young women because they have higher testosterone levels which have a greater effect on bone size than oestrogen. If, for any reason, sex hormone levels decrease (as can happen with training-related amenorrhoea) then bone density will be reduced.

DIET

A healthy balanced diet is necessary for normal bone growth and maintenance. Long term dietary restriction can be harmful especially if this is associated with amenorrhoea. During the teenage years and after menopause calcium needs are increased.

Inadequate dietary intakes of calcium and vitamin D increases the risk of developing osteoporosis. Everyone, especially very active women, should ensure they consume an adequate amount of calcium in their diet throughout life. Check the table over the page for the best dietary sources of calcium.

Vitamin D is also an important ingredient for bone health because it help the body absorb calcium. The main source of vitamin D is from exposure to sunlight, with smaller quantities found in fortified margarines, fortified milks, fatty fish and eggs. Exposure of the face, hands and arms or of the legs to modest amounts of sunlight most days of the week (before 10 am and after 3 pm depending on the time of the year) should be sufficient to obtain optimal vitamin D levels.

HOW MUCH CALCIUM AND VITAMIN D DO I NEED?

The following table shows the recommended dietary intakes of calcium and vitamin D for girls and women at different stages of the life cycle.

	Dietary calcium (mg per day)	Vitamin D [ug (IU)]
Young girls (9-11 years)	1000	5 (200)
Teenage girls (12-18 years)	1300	5 (200)
Young and middle age adult women (19-50 years)	1000	5 (200)
Pregnant/lactating women	1000 – 1300	5 (200)
Women aged 51 – 70 years	1300	10 (400)
Women aged over 70 years	1300	15 (800)

HOW MUCH CALCIUM DO I NEED?

Daily dietary calcium intakes can be estimated from the table below. It is not necessary to take calcium supplements if daily intake is met from dietary sources. If unsure about diet adequacy, consult a sports dietitian. The table shows the recommended dietary intakes of calcium for girls and women at different stages of the life cycle.

LIFESTYLE FACTORS

Smoking and excessive caffeine, alcohol and salt may lead to bone loss. The risk of osteoporosis will be reduced by avoiding too much alcohol, salt and caffeine intake and by not smoking.

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**THE RISK OF DEVELOPING
OSTEOPOROSIS MAY BE
REDUCED THROUGH
REGULAR WEIGHT
BEARING EXERCISE**



EXERCISE

Research has shown that regular weight training or weight bearing exercise such as jogging, tennis or aerobics (one hour, three times each week) increases or maintains bone density. Swimming and cycling are weight-supported sports and while excellent for aerobic fitness are not thought to be as effective in maintaining bone mass or preventing bone loss. Exercise can also help to maintain bone density in older women by reducing post menopausal bone loss. Regular exercise also improves balance, coordination and agility which may help to prevent falls and subsequent fractures.

WHICH FOODS ARE GOOD SOURCES OF CALCIUM?

The best sources of dietary calcium are milk and dairy products. Fortified low fat products are recommended as they are often fortified with additional calcium and contain less fat. Check the labels of modified milks available to find out which has the best combination of high calcium (and vitamin D) and low fat.

For those who do not use milk or dairy products, check the fat and calcium content of calcium enriched soy products. Dairy foods are not fattening when low fat choices are made, so even when active women need to reduce energy intake it is still possible to meet their calcium requirements.

IS THERE ANY TREATMENT FOR OSTEOPOROSIS?

At present there is limited treatment for established osteoporosis although it is possible to delay bone loss by using bisphosphonates or hormone replacement therapy. The risk of developing osteoporosis may be reduced through regular weight bearing exercise, a balanced diet with adequate calcium and vitamin D intake and maintenance of a normal menstrual cycle. There are a number of medications that have recently been made available to treat osteoporosis, which may be discussed with a doctor or an endocrinologist.



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Food	Amount	Calcium
Low Fat (fortified) milk	1 glass (250 ml)	405 mg
Soy beverage (fortified)	1 glass (250 ml)	365 mg
Yoghurt	Small carton (200g)	330mg
Whole (plain) milk	1 glass (250 ml)	300mg
“Hard” cheese	1 slice (30g)	285 mg
Canned sardines (incl. bones)	50 g	275 mg
Processed (cheddar) cheese	1 slice (30 g)	190 mg
Oysters	10	190 mg
Tofu	100g	130 mg
Almonds	50 g	125 mg
Baked beans	1 cup (240 g)	108 mg
Canned salmon (incl. bones)	100g	90 mg
Cottage cheese	1/2 cup (100 g)	60 mg
Broccoli	60 g	15 mg