

## Osteoporosis in Men



### The 'silent epidemic' strikes men too

This publication is the fourth in a series of popular publications on osteoporosis, released on World Osteoporosis Day, October 20. It aims to highlight the relatively ignored issue of osteoporosis in men, show how men's bones differ from women's, look at challenges in awareness, diagnosis and treatment, and suggest what steps should be taken so that we can prevent fractures in men. Real-life stories, sharing the experiences of issues men face in dealing with their osteoporosis, complete the report.

Traditionally thought of as a women's disease, in the last decade the notion that bone loss is also an inevitable consequence of ageing in men has finally emerged.

*Although fragility fractures are less common in men than in women, when they occur, these fractures can be associated with higher morbidity and death than in women<sup>4</sup>.*

Fracture incidence varies markedly from country to country in men and women, but the burden of fractures is growing because life expectancy for both men and women is increasing. There will be more elderly people in the world predisposed to having fractures. The result will be diminished independence and mobility for an ever-growing number of people; for some it will be the cause of death. As well as the human distress, escalating direct and indirect healthcare costs will bring further

burden on already stretched healthcare budgets.

We can easily improve the situation for men and women by increasing awareness of the problem of osteoporosis and by taking appropriate steps in fracture prevention. Osteoporosis can be diagnosed and treatment is available. Individuals, general medical practitioners, specialists such as rheumatologists, urologists, radiologists, orthopedic surgeons, nurses and healthcare policy-makers, all have important roles to play.

*Overall, one in five men over the age of 50 will have an osteoporosis-related fracture in their remaining lifetime<sup>1,2,3</sup>. This varies by country; a study in Australia anticipates one in three men over 60 will suffer a fracture due to osteoporosis<sup>5</sup>.*

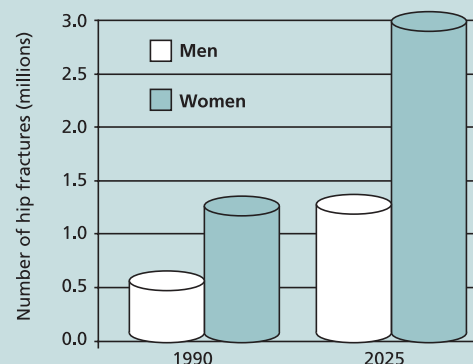
### The problem of fractures in men

Greater awareness of the consequences of the menopause to the quality of life in women has emerged during the last half of the 20th century. However, it is only in the last 20-30 years that the problem of osteoporosis and fractures has received any attention. Even now, most doctors still remain uninformed regarding the serious implications of these fractures.

Most women with fractures receive no tests to check their bone density, no blood tests to check for

**By 2025, number of hip fractures in men will equal number of hip fractures in women in 1990**

Adapted from Cooper C, et al, Ref. 9



lack of vitamins that can cause bones to become brittle and receive no treatment, even though treatments are available.

*Today, the lack of awareness of osteoporosis and fractures as a disease in men is similar to the lack of awareness in women 50 years ago.*

Men do not realize that the 'silent epidemic' of osteoporosis affects them and that their bones are becoming thinner and more porous and brittle during adult life.

## The size of the problem

Over a man's lifetime just under half of the bone mass achieved during growth to young adulthood is lost. This loss of bone is the same as the amount lost in women but men compensate better by laying down more new bone on the outer surface of the bone as part of the natural process of bone remodelling<sup>7</sup>. However, this addition of new bone on the outside surface does not entirely compensate for the loss of bone on its inside surface and so about one in five men over 50<sup>1, 2, 3</sup> will have a bone fracture that reduces the quality of their lives, and reduces the length of their lives<sup>5</sup>.

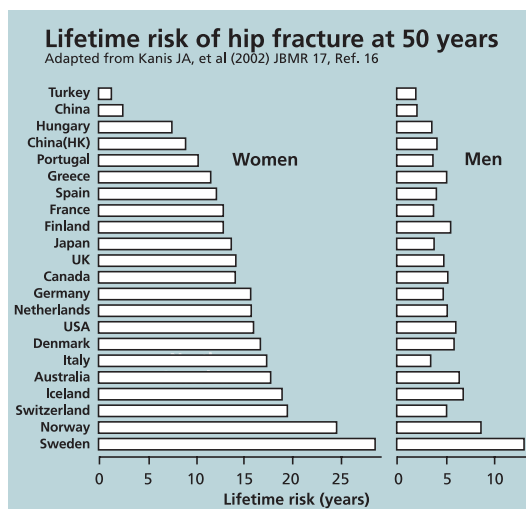
*The lifetime risk of a man suffering an osteoporotic fracture is greater than his likelihood of developing prostate cancer<sup>17</sup>.*

About one in every four to five hip fractures in people over 50 occurs in men<sup>9</sup>. Apart from lack of male hormone, bone thinning is a problem in men who smoke cigarettes and take alcohol in excess. Many illnesses that require cortisone treatment such as rheumatoid arthritis and asthma can be complicated by osteoporosis and fractures as a secondary effect of the medication, in men as well as in women.

Because we live longer and the global population is increasing, the total number of hip fractures in men in 2025 will be similar to that presently found in women<sup>9</sup>.

By 2025 the hospital wards will be filled with greater numbers of hip fractures in both sexes. It is not difficult to appreciate that this will produce a huge health burden on the community.

*In Sweden, osteoporotic fractures in men account for more hospital bed days than those due to prostate cancer<sup>8</sup>.*



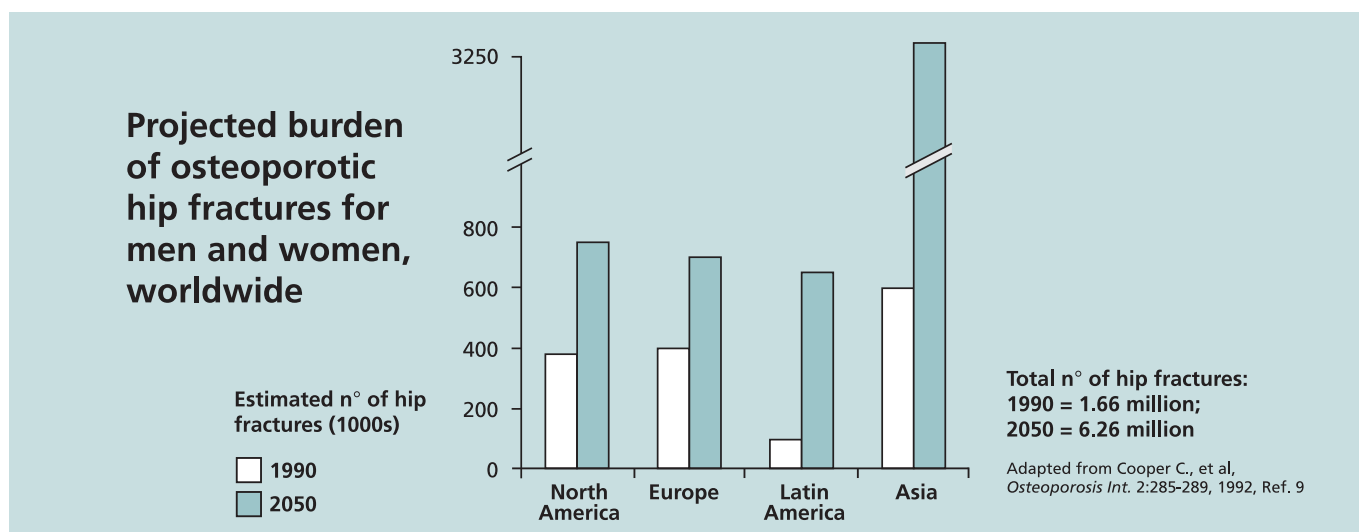
Fractures of the spine occur more commonly in men under 50 than in women, perhaps because trauma is more frequently involved. In older men, the risk of spine fracture is about half that of women but even so, this is still common and X-ray surveys suggest that 20% to 30% of all men over 65 have a spine fracture<sup>7</sup>.

## Reduced life span in men

The shortening of life span after a fracture is probably partly due to the fact that men have other illnesses, so the fracture plus other illnesses 'break the camel's back'. When men with hip fractures have no other illnesses their life expectancy is no different to that of healthy men. But when there is other illness present the life span is reduced in men with and without hip fractures, but more reduced in men with hip fractures<sup>5</sup>.

## ... and the cost to society

Osteoporosis-related fractures are expensive both in terms of human distress and in cost of care. By 2050, 6.4 million people will suffer a hip fracture every year, with 51% of these fractures in Asia<sup>9</sup>. In China, one in six men (16%) has one or more vertebral fractures<sup>10</sup>. In the US and Europe, one in every four or five hip fractures occur in men<sup>9</sup>. For men and women, it is estimated that in the US, direct expenditures (hospitals and nursing homes) for osteoporotic and associated fractures in 2001 was \$17 billion, and



the cost is rising<sup>11</sup>. In Europe in 2000, the number of osteoporotic fractures was estimated at 3.79 million of which 0.89 million were hip fractures (179,000 hip fractures in men and 711,000 in women). The total direct costs were estimated at approximately \$38.6 billion (euro 31.5/£21.2 billion) and these are expected to increase to approximately \$93.2 billion (euro 76/£51.1 billion) in 2050 based on the expected increase in the number of elderly in Europe<sup>12</sup>.

*Hip fractures account for a larger proportion of all fracture expenditures in men than women (73% versus 61%). Overall, 23% of the hip fracture expenditure occurs in men<sup>4</sup>.*

## How do men's bones differ from women's bones?

During childhood and adolescence our bones increase in length and width to reach their adult peak density at about 20-30. After this, they start to become thinner very slowly. Certain factors can accelerate the rate at which bone mass is lost, leading to porosity and thinning and the disease known as osteoporosis.

Men with spine fractures have smaller bones, the shell of the bone is thin and porous, the honeycomb or sponge-like bone that really functions like a spring or shock absorber is thinned, the honeycomb connections making the bone 'spring-like' are lost, so that when a force is placed on the bone it does not 'give' but rather cracks under the load and may collapse completely, resulting in a fracture of the spine. If fractures occur there may be severe pain, loss of height, and severe curvature of the spine. If there is severe curvature this can impair the function of the lungs and impair normal breathing.

This porosity and thinning of bone originates in two ways. First, during growth it is possible that lack of exercise, insufficient calcium in the diet, smoking, excess alcohol, inappropriate steroid use, delayed puberty and other factors might prevent the skeleton from developing its full potential size and bone structure. In addition, we know that the healthy sons of men with osteoporotic fractures have thinner bones than other young men, so genetic factors, that we still don't understand, can also determine whether one man will develop a smaller skeleton with a lower bone mass than another man. If we could identify what genes determine this we might be able to study how to remedy the problem. At this time, we have not identified any genes that tell us which person will have a smaller or larger bone mass.

So, partly, the lack of bone in old age is because some men develop a smaller skeleton with less bone mass. This suggests that the prevention of bone brittleness requires attention to skeletal health throughout the whole of life – during growth as well as during ageing.

Secondly, during ageing, bones become thinner in men just as they do in women; the reasons for this thinning process have been less studied in men than in women.

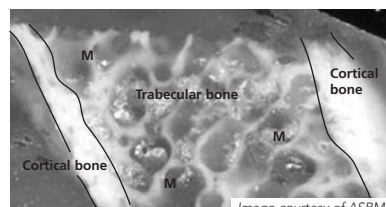
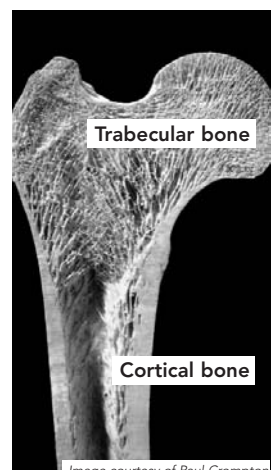
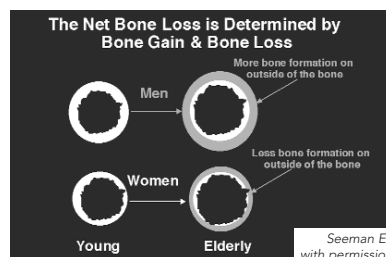
*Both lifestyle and genetic factors have a role in determining bone density and strength. Prevention of brittleness requires attention to skeletal health during growth as well as during aging.*

## Bone – a living tissue

Bone is a remarkable tissue with the same strength as cast iron, while remaining as light as wood. It can adapt to its functional demands and repair itself. Bone is made up of two major types, trabecular bone (spongy or cancellous) and cortical bone – the part of the bone that forms the outside shaft. Trabecular bone gives supporting strength to the ends of weight-bearing bone.

The skeleton has a way of rejuvenating itself throughout the whole of life, and old parts of bone can be replaced with new bone. It seems that when old and damaged bone is removed, bone cells that make new bone, known as osteoblasts, come in and replace it. However, when the new bone is deposited, the amount is just a little less than the amount of bone removed in the remodelling process. This means that there is a little less bone each time the renovation takes place. Over many years the skeletal mass becomes less and less. In men, this thinning process is less severe compared to that seen in women. In women complete plates of bone are removed resulting in loss of honeycomb connections. In men, there is thinning but the connections from one plate to another are better maintained.

Another important difference in men and women probably explains why fractures occur less commonly in men. At the same time as bone is being lost on the inside of the bone adjacent to the marrow cavity, there is new bone being deposited, like a coat of paint on the outside of the bone. The amount of new bone deposited on the outside surface is about three times more in men than in women. It is like men getting three new coats of paint while women only get one (See drawing below, at top left). This increases bone size, and so maintains the strength of the wider bone as well as offsetting bone loss from the inside of the bone.



## The impact of hormones and vitamins

Many hormones and vitamins look after the skeleton during ageing. Two important hormones are the male hormone, testosterone, and the female hormone, estrogen. Estrogen is

present in much lower amounts in men than in women but it is also important in men's health. As the levels of both of these hormones decline during ageing and become half those seen in young men, bone is lost, becoming brittle, just as in women. Lack of estrogen in men is likely to be responsible for the decline in trabecular bone density, as in women. Why men seem to be able to deposit more bone on the outside of the bone than do women is not known. It may be that they have more male hormone, testosterone, but this has not been proven.

In men and women over 65, the intestine cannot absorb calcium from the diet as well as in youth. As a result our bodies produce a hormone that makes the bone give up its calcium into the blood stream. Known as the parathyroid hormone, its presence increases in elderly men and women, and further contributes to the bone thinning process in old age. One of the reasons calcium tablets are given to the elderly is to try to overcome the low calcium absorption problem and in turn bring a halt to the high level of parathyroid hormone which eats away at bone.

## Challenges in diagnosis and treatment

Often the only time a patient realizes he has a problem is when he breaks a bone – and even then the diagnosis of osteoporosis is often overlooked by doctors unless they call for a bone mineral density (BMD) test.

The best way of identifying men at high risk for fracture is to measure their bone mineral density. This non-intrusive and painless test is a scan that indicates bone strength and should be available for men worried about osteoporosis, just as a measurement of blood cholesterol or blood pressure helps us identify men at risk for heart disease and stroke. In general, a level of bone density that is around the lower limit in normal young men is recommended to be a 'cut-off value'. Any men with bone density below this lower limit should be considered as having osteoporosis and therefore should be considered for treatment.

However, it can happen that people are found to have a fragility fracture, even with a normal bone mineral density, in which case they still need to be treated immediately, especially in the case of vertebral fracture.

There are gender differences in determining risk of hip fractures. In aging women spinal fractures are a strong indicator of risk of hip fracture but in men a wrist fracture, also called a Colles' fracture, is a better indicator of later hip fracture.<sup>15</sup>

At a personal level, men and women can take the IOF One Minute Risk Test (see page 15). The exercise helps people determine for themselves if they are at risk of osteoporosis and can serve as a starting point for discussion with a physician, who may then recommend a bone mineral test.

The risk for hip or spine fracture at any level of bone density is similar in men and women. However, the reason fewer men than women have fractures is because at any age, there are fewer men with BMD below the fracture threshold, so fewer men are at risk for fracture than women. Also, men have a shorter average life span and fewer falls than women.

## Fewer approved treatments for men than for women

Only a handful of osteoporosis treatments have been approved for use by men – the others have not been subjected to the lengthy and expensive clinical trials that are required.

Drugs have been less studied in men than in women with osteoporosis. At present the best studied drug for men is from the bisphosphonate drug group, alendronate. There is evidence also for other drugs such as risedronate and etidronate and the bone building drug parathyroid hormone, which makes new bone on the outside and inside surfaces of the bone, helping to reconstruct the skeleton and rejoin the disconnected trabeculae (struts and plates) in the spongy bone.

- Testosterone increases bone density in men with low levels of this male hormone.
- Calcium supplements have not been well studied in men but probably should be administered in men taking less than one gram of calcium daily.

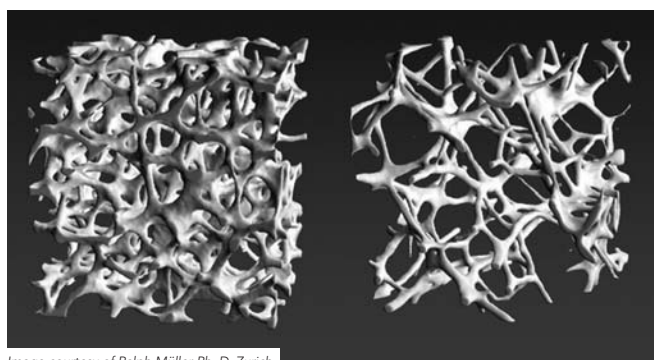


Image courtesy of Ralph Müller Ph. D, Zurich

Pictured from left to right: healthy bone and osteoporotic bone.

## So how shall we prevent the first fracture?

Osteoporosis is one of the more preventable diseases associated with ageing. Paying attention to skeletal health throughout life, from childhood onwards, is the most effective way of building and maintaining bone strength, thus decreasing bone loss and brittleness that can lead to the first fracture.

### Role of the individual

Assess your risks and seek advice from your doctor. Diet, exercise, sex hormones, lifestyle and the use of certain medications are the major ways of maintaining and restoring bone health.

- **for the elderly:** learn about fall prevention programs including muscle strengthening through exercise and medical assessment including balance and vision; check for potential dangers in the home, such as poor lighting and slippery rugs. If osteoporosis has been diagnosed, consider protective garments such as hip protectors.
- **diet:** a balanced diet rich in the essential nutrients for bone health, includes calcium, which strengthens bone, and vitamin D, which helps the body to absorb calcium. Between 25 and 65 years of age, men need at least one gram of calcium a day, increasing to 1.5 grams daily for the over 65s. Sunlight is a natural source of vitamin D and exposure to as little as ten minutes a day can be sufficient or vitamin-rich foods can be recommended.

## Health problems in ageing men

- ✓ **Heart disease – cholesterol**  
higher than 200 (US scale), or 5.2 mmol/litre, risk of stroke
- ✓ **Blood pressure**  
higher than 150 over 100, risk of heart attack
- ✓ **Prostate cancer**  
a prostate specific antigen greater than 10 indicates warning sign
- ✓ **Osteoporosis – bone density**  
bone mineral density lower than -1 to -2.5 standard deviations (SD), risk of osteoporotic fracture

- **physical activity:** weight-bearing exercise, such as walking, tennis and jogging may assist in maintaining muscle strength, coordination and flexibility and reduce the risk of falls. Resistance training and lifting weights may help maintain bone density.
- **lifestyle choices:** smokers lose bone more rapidly than non-smokers – give up smoking! Alcohol excess may inhibit calcium absorption and bone formation. The importance of building bone mass during puberty is explained further in the IOF report “Invest in Your Bones – How diet, lifestyle and genetics affect bone development in young people.”
- **medication:** use of some medications, such as steroids (often used for asthma, arthritis and kidney disease) and anticonvulsants, can accelerate the onset of osteoporosis.

### Role of the physician

Osteoporosis is a public health problem in men. When a male enters the consulting room the doctor thinks about cardiovascular disease, lipids, hypertension, alcohol and tobacco abuse, prostate cancer, but not about loss of height, kyphosis, hypogonadism, or symptomatic or asymptomatic fractures. It is unlikely that hypertension or hypercholesterolemia would be left untreated in a man discharged from hospital following a myocardial infarction. However, only 10-20% of women, and probably fewer men with osteoporosis and fractures are investigated or treated despite the fact that a prevalent fracture is a predictor of further fractures.

The reason for this is historical; osteoporosis was unstudied by most medical students, methods for measuring bone mineral density (BMD) were not available and no drugs were available to reduce fracture risk. So, osteoporosis and fractures were believed to be ‘normal’ ageing, an inevitable and untreatable consequence of ageing rather than a disease. This is incorrect.

Educational programs are needed to ensure that physicians recognise osteoporosis and fractures also occur in men and that investigation and treatment is needed, just as it is in women.

### Role of the orthopaedic surgeon/radiologist

Every surgeon should consider that any fracture in a person of 50 or older might be an osteoporotic fracture. The radiologist should be aware of the radiological characteristics of osteoporosis and mention the possibility of osteoporosis in a patient’s report. An educational program for radiologists, “Vertebral Fracture Initiative – to improve the recognition and reporting of vertebral fractures” is available from the IOF website:

[www.osteofound.org/health\\_professionals/education\\_radiologists/](http://www.osteofound.org/health_professionals/education_radiologists/)

### Role of the nurse

Often the first point of contact for many patients is the nurse. This specialist can play an important educational role and help build awareness by discussing the IOF One Minute Risk Test and bone health measures.

### Role of the health care policy officials in government and insurance companies

National governments need to understand the long-term social and economic benefits that come from preventing the first fracture. Since the occurrence of a first fracture can lead to the rapid development of further fractures (in a so-called ‘fracture cascade’), it is especially important that policies should promote the detection of osteoporosis before the first fracture occurs. A key step is to ensure that adequate diagnosis and treatment resources and reimbursement policies are made available.

If the growing burden of osteoporosis is to be reversed, the commitment to osteoporosis research must be significantly increased.

### Conclusion

We have a long way to go before we reach the same level of understanding osteoporosis in men as we have in women. Bone density tests should be available to men as well as women and increased awareness of the problem of osteoporosis in men is needed at all levels in the community – in men themselves, in doctors, government health officials and in funding bodies, so that research efforts are increased and the problem of fractures in men is acknowledged. Only then can begin to prevent osteoporosis.

*Written on behalf of the IOF Committee of Scientific Advisors by Ego Seeman, MD, Professor of Medicine, University of Melbourne, Austin Hospital, Melbourne, Australia.*

*Prof. Seeman is an IOF International Board member and editor of Progress in Osteoporosis, he is also president of the Australian and New Zealand Bone and Mineral Society. ■*

*References available upon request from Osteoporosis Australia.*