BONE DENSITY

National Osteoporosis Society

Why measure bone density?

Osteoporosis is a condition in which bone is more porous than average and therefore more prone to fracture. As this condition is symptomless until a bone is broken, it has traditionally been difficult to pinpoint which individuals have fragile bones prior to fracture occurring. With advances in technology and the development of bone densitometry, it has become possible to assess an individual's bone density. This is particularly useful because low bone density has been linked to an increased risk of fracture. Osteoporosis can now be diagnosed prior to bones breaking, giving individuals the opportunity to take treatments and adopt lifestyle changes which will reduce their risk of breaking their bones.

How is bone density measured?

The most common means of measuring bone density involves a simple test called Dual X-ray Absorptiometry (DXA). At the moment, it is the most accurate and reliable means of assessing the strength of bones. DXA machines usually scan some bones in the lower spine and one hip, two of the main areas at risk from osteoporotic fractures. Other areas can also be assessed including the forearm and the heel. This technique uses a radiation dose which is similar to natural background radiation, less than one tenth of the dosage of a chest x-ray. The DXA scan will take up to 10 - 20 minutes and is not in any way unpleasant. It involves lying on a firm couch whilst an arm passes over the body taking an image of the spine and hips. It does not involve being enclosed in a mechanical tunnel or having an injection. Generally, clothing does not have to be removed but clothes with metal at the hips or along the spine should be avoided (trouser zips are not a problem).

What will the results tell me?

A DXA scan produces a printout in which your bone density is compared to a reference range of young healthy adults with average bone density. The difference between this average and your bone density is then calculated and expressed in terms of standard deviations (SD) and you are given a T score.

If the T score is between	0 and -1 SD	- this is considered to be within normal ranges
	-1 and -2.5 SD	- this is termed osteopenia
	below -2.5SD	- this is classed as osteoporosis

Osteopenia is the name for the category between normal and osteoporosis, when bone is less dense than the average but not thin enough to be classed as osteoporosis. Lifestyle adaptation in diet and exercise levels may be useful in these cases and where relevant, use of hormone replacement therapy (HRT).

When a DXA scan is performed, a Z score is also calculated. This is a comparison between your bone density and that of a reference range of people of your own age. Although this is not used to diagnose osteoporosis, it is useful sometimes in the

assessment of treatments in older people or children, when a comparison with a young adult reference range may not be so relevant.

As has already been said, DXA scanning is the best method available at the moment to assess an individual's risk of fracture. There is, however, more to the story and more to fracture risk than just bone density. Low bone density, as diagnosed on DXA scan, should be considered as a risk factor for fracture and not a foregone conclusion i.e. there will be people who have low bone density but never break a bone.

The Royal College of Physicians' clinical guidelines for prevention and treatment of osteoporosis (1999), recommend that bone density measurements should be available to individuals at high risk of osteoporosis when results may influence the doctor's decision regarding treatment. These include:

- People who have already broken a bone after a minor bump or fall
- People who are taking long-term oral corticosteroids (7.5 mg or more per day of a corticosteroid such as prednisolone for a period of more than 6 months)
- Women who have had their menopause or hysterectomy, with ovaries removed, before the age of 45
- Women who have had a history of missed menstrual periods for reasons other than pregnancy e.g. anorexia nervosa for a period of more than one year
- Men with low testosterone levels
- Men and women suffering from other conditions known to lead to bone loss, such as malabsorption syndrome, hyperparathyroidism and prolonged immobilisation
- Women whose mothers have broken their hip

Some people may feel that they are at risk of osteoporosis but they are unable to obtain a bone scan on the NHS. It is possible, in some cases, to arrange scans privately but usually the referral will still have to be made via the GP. Osteoporosis is a symptomless condition prior to fracture and therefore the absence of fractures is the only sign that a treatment is working. Some people may feel that a bone scan to monitor the effectiveness of a treatment may be useful. Some GPs may be able to offer this service on the NHS whilst in other areas, due to scarcity of resources, the individual may have to finance the scan themselves.

If you pay for a bone density scan privately, you should ensure that the results are interpreted and reported by an expert who should be able to recommend appropriate treatment if necessary. Please note that the NOS does not have a facility for interpreting scan results as this will depend on individual circumstances and medical history. It is very important to ensure that consecutive scans are performed on the same machine, especially if they are to be used to monitor a treatment or bone loss. This is because an accurate comparison of results is only possible if the same machine is used.

Is a bone density scan useful for everyone?

Bone densitometry is not the best way of assessing fracture risk in the elderly. As we age the spine can be affected by other degenerative processes such as osteoarthritis. Such changes can make bone appear denser than it actually is when

it is scanned, therefore, affecting the accuracy of the results. The presence of previous fractures in the spine can also affect the results of a bone scan. It is generally thought that scanning is most appropriate if it is going to make a difference to the management of a person's osteoporosis or affect a decision with regards treatment.

Are there any other methods of assessing fracture risk?

Bones other than the hip and spine can be assessed using DXA, most commonly the forearm or the heel. A technique called ultrasound can also be useful as it is relatively cheap and portable. Although not assessing bone density, ultrasound readings do seem to correlate quite accurately with fracture risk in some groups. Please see our Information Sheet on ultrasound for more details on this technique.