



What is osteoporosis?

Osteoporosis occurs when the struts which make up the mesh-like structure within bones become thin causing them to become fragile and break easily, often following a minor bump or fall. These broken bones are often referred to as 'fragility fractures'. The terms 'fracture' and 'broken bone' mean the same thing. Although fractures can occur in different parts of the body, the wrists, hips and spine are most commonly affected. It is these broken bones or fractures which can lead to the pain associated with osteoporosis. Spinal fractures can also cause loss of height and curvature of the spine.

What are 'breast cancer treatments' and how do they work?

There are several types of breast cancer and many different treatments for the disease. Two out of three breast cancers are classified as 'oestrogen receptor positive' meaning that the cancer is potentially sensitive to changes to the hormone oestrogen. With such cancers, treatment will usually include very successful and effective therapies that reduce the levels of oestrogen or block oestrogen's effects on the cancer to prevent stimulation and spread of the disease.

Breast cancer may also be treated with drug treatments ('chemotherapy') that directly target breast cancer cells.

Do these treatments cause osteoporosis and fractures?

It is now well established that oestrogen helps to maintain healthy bones in women (and indeed in men). Osteoporosis (fragile bones that break relatively easily e.g. after a simple fall) becomes more common in women after the menopause when oestrogen levels drop significantly. Any breast cancer treatment - drugs or surgery - that reduces oestrogen levels in the body can increase the risk of osteoporosis and fractures. Some breast cancer drugs that do not have an effect on oestrogen levels may also have a direct effect on bones and reduce their strength.

In addition, the breast cancer itself may reduce bone strength. The breast cancer cells not only stimulate tumour growth but can also stimulate the production of osteoclasts (the cells that break down bone).

Which specific breast cancer treatments increase the risk of osteoporosis and fractures?

- Most women with breast cancer will go on a course of drugs to treat the cancer and reduce the likelihood of it coming back, even if they have already had surgery and/or radiotherapy.
- Some women (with oestrogen receptor positive breast cancer) will need treatment to reduce oestrogen levels temporarily or permanently by stopping the ovaries from working. This will be achieved by drugs (see below) or surgery to remove the ovaries, or very occasionally radiotherapy. The medical term for this type of treatment is 'ovarian suppression or ablation'. Any permanent reduction in oestrogen levels that causes an early or premature menopause, particularly before the age of 40, will increase the risk of osteoporosis.
- Some younger women will also need 'chemotherapy' to treat the cancer cells directly, and as a 'side effect' this may also cause an early menopause. This will depend on the chemotherapy used, the dosage and duration of treatment and is more likely in women nearing the menopause. Again, there may be an increased risk of accelerated bone loss and osteoporosis. It is also possible that certain chemotherapy treatments may have a direct effect on bone strength and increase fracture risk.

What are the cancer drugs that reduce oestrogen levels in the body?

Goserelin

Goserelin (Zoladex) belongs to a group of treatments known as gonadotropin-releasing hormone agonists which can reversibly switch off oestrogen production by the ovaries (ovarian suppression). It is used in pre-

menopausal women and results in a loss of periods similar to the menopause – however, treatment can usually be stopped after two to three years and most women will start their periods again, although some women may experience an early menopause. Studies have shown that during two years of goserelin treatment, pre-menopausal women can lose 5 to 10% of bone density. While some recovery in bone density may occur once the ovaries start working again, the extent to which bone density improves and the effect on longer term bone health or risk of fracture, is not known.

Aromatase Inhibitors

Many postmenopausal women with breast cancer will be treated with an aromatase inhibitor for at least five years. Commonly used drugs in this family include anastrozole (Arimidex), letrozole (Femara) and exemestane (Aromasin).

Aromatase inhibitors work by blocking the enzyme, aromatase, which is involved in the production of oestrogen in fatty tissues. This oestrogen is still produced after the menopause and may stimulate breast cancer cells. Studies have shown that aromatase inhibitors can decrease oestrogen production in postmenopausal women and are very effective breast cancer treatments. They are increasingly becoming the standard treatment for postmenopausal women with oestrogen receptor positive breast cancer. The treatments are generally well-tolerated but by dramatically reducing oestrogen levels, aromatase inhibitors can increase the rate of bone loss and the risk of fractures. If used in younger women with a menopause that was caused by surgery, radiotherapy, goserelin or chemotherapy, bone loss is even more rapid (up to 8 per cent per year).

Tamoxifen and bone health

Tamoxifen is still a very widely used drug treatment for breast cancer. It works by blocking the uptake of oestrogen by the breast cancer cells and its effect on bone depends on whether it is given before or after the menopause. Tamoxifen is not associated with significant bone loss in postmenopausal women; there is actually some bone protection provided by the drug and small increases in bone density may occur. In contrast, tamoxifen can cause small decreases in bone density in premenopausal women in the first two years of treatment, though this is not considered significant and does not continue in later years. Tamoxifen is usually given for up to five years, but may be used for

a shorter time (two to three years) before aromatase inhibitor therapy is started. Occasionally, tamoxifen is taken longer term particularly if a cancer has come back or has spread to other parts of the body.

Do I need a bone density scan?

Experts in the UK have produced guidelines for health care professionals on managing the bone health of women on breast cancer treatments. These guidelines help to identify those who need to have a bone density scan and treatment for osteoporosis.

What do the guidelines say?

The guidelines have been split into two sections; firstly for younger women experiencing a premature menopause (as a result of their treatment) and secondly, guidance for post-menopausal women being treated with aromatase inhibitors.

i) Guidance for younger women with a premature menopause

The guidance recommends the measurement of bone density (within three months of starting their breast cancer treatment) for younger women who have treatments that cause suppression of the ovaries or a premature menopause.

Depending on the result of the bone density scan and assessment of other factors that can influence the risk of fracture, the woman concerned can be considered as:

- Low Risk of fracture - reassured and given simple advice about maintaining a healthy lifestyle
- Medium Risk of fracture – may be started on calcium and vitamin D supplements if poor diet or sunlight exposure, and recommended for another scan in two years
- High Risk of fracture – usually started on a drug treatment from the bisphosphonate family* and calcium and vitamin D (if necessary) to counteract the effect of the breast cancer treatment on her bones. Women in this group should also have a scan repeated after two years.

*Drugs in the bisphosphonate family that might be used include alendronic acid or alendronate (Fosamax), risedronate (Actonel), ibandronate

(Bonviva) and zoledronic acid (Aclasta). An alternative treatment option may also include the six monthly denosumab (Prolia) injection. For more information see our leaflet *Drug Treatments and Osteoporosis*.

ii) Guidance for postmenopausal women

In postmenopausal women on aromatase inhibitor treatments, a bone density scan is recommended within three to six months of starting treatment.

Following this, women can be categorised as low, medium or high risk of fracture as outlined above.

Regardless of the bone density scan result, osteoporosis treatments are usually recommended for:

- Any woman with a previous fragility fracture (where the fracture has occurred as a result of a minor bump or fall, or even no trauma at all)
- Women over the age of 75 who are on a breast cancer treatment and who also have another risk factor for fractures.

The National Institute for Health and Care Excellence (NICE) has recommended incorporation of these guidelines into its own published guideline (reference number CG80) on the care and treatment of patients with early and locally advanced breast cancer. It is important to remember, however, that these are only guidelines and are not mandatory; individual doctors may, depending on circumstances, take slightly different approaches.

I have breast cancer and I am worried about osteoporosis caused by my treatments. What should I do now?

It is important that you do not stop taking your breast cancer treatment because you are worried about your bones. These drugs are very effective for treating breast cancer and help to reduce the risk of the cancer from coming back. If you do have concerns, then it is sensible to discuss this with your doctor or specialist nurse. If you already have osteoporosis and are on a drug treatment, such as a bisphosphonate, this will help to maintain your bone health.

What else can I do to protect my bones?

Life style factors such as a well-balanced calcium rich diet, regular weight bearing exercise, adequate vitamin D from sensible sunlight exposure, avoiding or stopping smoking and limiting alcohol consumption are all important in preserving bone strength and reducing bone loss.

I have recently stopped my Arimidex breast cancer treatment. Does this mean that I can also stop taking my weekly osteoporosis drug treatment?

This will depend on your overall risk of fracture. Stopping your aromatase inhibitor will mean that one potential cause of further deterioration to your bones has now been removed. But there are other factors not specifically related to your breast cancer treatment that may have an impact on your bones and increase your risk for fracture. Older age, a previous fracture, having a parent who has had a hip fracture, the use of glucocorticoid tablets (e.g. prednisolone) as well as a low bone density measurement can all contribute to fracture risk. Therefore, the decision to stop or continue the osteoporosis treatment should be taken after discussion with your doctor.

Useful contacts

Breast Cancer Care

5-13 Great Suffolk Street
London SE1 0NS

Helpline: 0808 800 6000

www.breastcancercare.org.uk

Macmillan Cancer Support

89 Albert Embankment
London SE1 7UQ

Macmillan Support Line: 0808 808 0000

www.macmillan.org.uk

The National Osteoporosis Society

To view the full guidance document entitled *Guidance for the Management of Breast Cancer Treatment- Induced Bone Loss.- A consensus position statement from a UK Expert Group* (2008) please visit the health professional section of The National Osteoporosis Society website:

www.nos.org.uk

National Institute for Health and Care Excellence (NICE)

Tel 0300 323 0140

www.nice.org.uk

The **National Osteoporosis Society** is the only UK-wide charity dedicated to improving the prevention, diagnosis and treatment of osteoporosis and fragility fractures. The Charity receives no Government funding and relies on the generosity of individuals to carry out its vital work.

For osteoporosis information and support contact our Helpline:

 **Freephone 0808 800 0035**

 **nurses@nos.org.uk**

To become a member or make a donation:

 **01761 473 287**

 **join online at www.nos.org.uk**

To order an information pack or other publications:

 **01761 471 771**

 **info@nos.org.uk**

or download from our website at www.nos.org.uk

This fact sheet is one of a range of publications produced by The National Osteoporosis Society. If you would like more general information about osteoporosis see our booklet *All about Osteoporosis*.

This information reflects current evidence and best practice but is not intended to replace the medical advice provided by your own doctor or other health professional.