What are bisphosphonates?
Bisphosphonates are drugs used to slow down or prevent bone damage. They are given because some cancers can cause weakness of your bones and bone pain. Some cancer treatments such as chemotherapy and hormone therapy can also have this effect on your bones. Bisphosphonates are often called ‘bone hardening’ or ‘bone strengthening’ drugs. They can also lower your calcium levels.

How does bone grow and repair itself?
To understand how bisphosphonates work, first you need to know about normal bone, how it grows and repairs itself, and how cancer can affect this.

Your bones are made of living tissue and are constantly changing. In healthy bones, special bone cells called osteoclasts and osteoblasts are constantly at work making new bone.
How does cancer affect bones?

Some cancers such as myeloma and some secondary cancers can cause damage to bone. The cancer cells can release proteins that interfere with normal bone activity.

These proteins encourage the cells that break down bone to work harder so bone is destroyed quicker than it is rebuilt. This means your bones can become thinner and weaker. This can also cause pain in the affected bone, raise calcium levels in your blood and increase your risk of breaking a bone.

Calcium is normally stored in your bones so the breakdown of bone cells releases more calcium into your blood. A high calcium level in your blood is called hypercalcaemia. This can make you feel thirsty, sick, constipated or drowsy.

How do bisphosphonates work?

There are several different types of bisphosphonates. Each works slightly differently but generally they are attracted to people having the above treatments. Your doctor will advise you on your own situation.

The normal process is called bone remodelling. This is usually very well controlled with your body keeping a fine balance between bone breakdown and growth. This keeps your bones strong. Different things can affect this balance causing bones to become weaker. This is called bone loss.

What causes bone loss?

Some risk factors of bone loss include:

- Increasing age, with the risk being higher over the age of 65 years
- Anyone diagnosed with low bone mineral density
- Women who are postmenopausal (no longer having periods) and have a low intake of calcium and vitamin D in their diet
- Being underweight, smoking, taking too much tea and coffee (more than 4 cups daily)
- Some cancer treatments such as hormone therapy and chemotherapy

Bisphosphonates can be recommended for some

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<th>Osteoclasts</th>
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areas where bone is growing and repairing itself a lot. The osteoclast cells absorb the bisphosphonate drug, which slows down their increased activity and reduces the breakdown of bone.

The aim of treatment is to:

- Prevent or control bone thinning (osteoporosis)
- Reduce the risk of bones breaking
- Reduce the level of calcium in your blood
- Reduce pain

Studies have found that bisphosphonates may slow down or prevent myeloma and secondary bone cancers. Cancer cells appear to be attracted to areas where bones are being broken down. It is hoped that stopping this process could slow the growth of cancer and help people live longer, as well as reducing bone damage. There are ongoing clinical trials looking at further uses of bisphosphonates for patients with cancer.

**Types of bisphosphonates**

There are different types of bisphosphonates as mentioned. The treatment recommended for you will depend on the type of cancer you have, as some drugs seem to work better for certain cancers. The drugs include:

- Zoledronic acid (Zometa®)
- Pamidronate disodium (Aredia®)
- Ibandronic acid (Bondronat®)
- Sodium clodronate (Bonefos®)

**Who may be offered bisphosphonates?**

Bisphosphonates are used to treat people with cancers that can affect their bones. For example, if you had cancer that started in another part of your body and it has spread to your bone (secondary bone cancer).

In this case, the most common types of cancer include:

- Myeloma
- Secondary breast cancer
- Secondary prostate cancer
- Secondary lung cancer

Bisphosphonate treatment is also used for patients with an early cancer diagnosis who are also suffering from bone loss and need cancer treatments. You may also be offered bisphosphonates as part of a clinical trial.

**How are bisphosphonates given?**

This depends on the type of bisphosphonate that has been recommended for you. Bisphosphonates are most commonly given into a vein in a drip,
which can take from 15 minutes up to 3 hours.

These bisphosphonates include zoledronic acid, pamidronate disodium, sodium clodronate and ibandronic acid. Sodium clodronate and ibandronic acid can also be given as a tablet.

When given in tablet form, they are best absorbed on an empty stomach. Certain medications such as antibiotics can also affect how they are absorbed. It is important to get instructions from your doctor or pharmacist before taking them.

How long will I be on bisphosphonates?

If you are having bisphosphonates to strengthen your bones or reduce pain, then you may need to take them as long as they are working for you. They may be given as an infusion every 3 to 4 weeks or as a tablet taken daily or weekly. Sometimes treatment is given with other treatments such as chemotherapy or as part of a clinical trial. In these cases, treatment may be for a shorter duration. Your specialist will advise you on how long you need to remain on this treatment.

What are the side-effects of bisphosphonates?

Like any treatment, bisphosphonates can cause side-effects. Everyone reacts differently to drugs and some people have more side-effects than others.

Ask your specialist for details of the side-effects of the drug you will be taking. Do let him or her know if you have any troublesome symptoms. It is best not to become pregnant while on bisphosphonate treatment due to the harmful effect it might have on your baby.

Common side-effects

These include:

- Headache
- Bone or muscle pain and discomfort in your joints
- Flu-like symptoms such as fever, hot flushes or chills that last only a short while

Less common side-effects

These include:

- Inflammation at the injection site that can become red or painful
- Diarrhoea, nausea and vomiting

Rare side-effects

These include:

- Muscle cramps, abdominal pain, feeling dizzy or drowsy and kidney problems
- Jaw damage known as osteonecrosis of the jaw

Signs of this very rare condition include swelling, pain, heaviness or numbness of your jaw. These symptoms may be signs of other less serious conditions such as a gum infection. But if you do develop any problems with your teeth or gums, let your cancer specialist and dentist know as soon as possible.
Dental care while on bisphosphonates

- Have a dental check-up before starting your treatment.
- See your dentist regularly during your bisphosphonate treatment.
- Tell your doctor before you have any dental treatment and always tell your dentist you are on bisphosphonate treatment.
- Do not have any teeth removed while on treatment unless your doctor says it is safe to do so.
- Tell your doctor immediately if you notice any changes in your mouth.

Take care of your mouth by:

- Brushing your teeth regularly with a soft toothbrush.
- Use a non-alcohol-based mouthwash.
- Floss gently daily.
- Change your toothbrush once it becomes worn.

For further information on dental care, ask your dentist for an appointment with the dental hygienist.

Do I need calcium and vitamin D supplements?

With some bisphosphonates you may be prescribed a calcium and vitamin D supplement to prevent low calcium levels. Calcium supplements can interfere with your body’s ability to absorb oral bisphosphonates, so follow the instructions given with your medication carefully. It is usually advised to take your bisphosphonate and calcium supplement separately. It is also advisable to have a well-balanced diet, including foods rich in calcium. For example, dairy products, green leafy vegetables and tinned fish. Vitamin D helps your body absorb calcium and is found in eggs, butter, oily fish and dried fruit. Fortified milk contains both calcium and vitamin D.

What can I do to help improve my bone strength?

- Take regular exercise, as advised by your physiotherapist. The general advice is for 30 minutes per day.
- Eat a well-balanced diet with enough vitamin D and calcium.
- Avoid alcohol or make sure your intake is within a safe limit.
- Avoid too much tea and coffee (no more than 4 cups per day).
- Stop smoking.
- Keep a healthy weight.

Taking bisphosphonates with other drugs

Certain antibiotics should be avoided, as the combination of drugs can interfere with the calcium level in your blood. Your cancer specialist will advise you further. If you are taking oral bisphosphonates, do not take any indigestion remedies or medications at home before taking your tablet as they can affect its absorption.

What should I do if I have any concerns?

If you are troubled by side-effects or have any concerns, do discuss them with your specialist doctor or nurse. In many cases there are medications that can help control and relieve side-effects while on bisphosphonates.
Further support

With a cancer diagnosis, there may be times when you feel overcome by fear, anxiety, sadness, depression or anger. If you find you need extra support, you can talk to your cancer nurse or public health nurse. A counsellor or psychotherapist may be suitable if you need more long-term professional help.

The Irish Cancer Society funds a counselling service for those diagnosed with cancer. A counsellor will provide emotional support by allowing you to express your feelings and fears. Counselling may help you to see things differently, and help you through a difficult patch. You may be able to express worries or concerns to a counsellor that you do not wish to discuss with others. For further information, contact the National Cancer Helpline on 1800 200 700.

Useful organisations

American Cancer Society  
Website: www.cancer.org

Irish Nutrition & Dietetic Institute  
Website: www.indi.ie

Irish Osteoporosis Society  
Website: www.osteoporosis.ie

FURTHER INFORMATION

For more information on bisphosphonates or for confidential advice from our cancer nurse specialists, call the National Cancer Helpline Freefone

1800 200 700  
(Monday–Thursday, 9am–7pm; Friday, 9am–5pm)  
or email helpline@irishcancer.ie

Irish Cancer Society  
43/45 Northumberland Road, Dublin 4  
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Website: www.cancer.ie

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