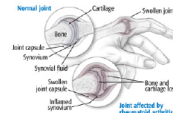


## BONE DISEASES

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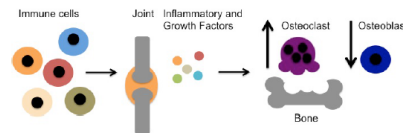
### Rheumatoid Arthritis (RA)

The immune system is there to defend the body against any attack. RA occurs when the immune system turns against the body, and starts attacking itself. This is referred to as an **autoimmune disease**. Why this happens is still unclear. RA is more common in **women** than men.



In RA, the joints are attacked. The immune cells invade the joints and release molecules, which cause inflammation in the joint. The signs of inflammation are **pain, redness, heat, swelling and loss of function**, all of which can commonly be seen in the joint of a RA patient.

Normally in bone, osteoblasts make bone, and osteoclasts destroy bone. In the joints in a RA patient, there is an **imbalance**. Some of the cells which have invaded the joint can also develop into osteoclasts, meaning there are more bone-destroying cells in the joint. Osteoclasts are overactive, and osteoblasts are underactive, resulting in an **increase in bone destruction**. This causes a lot of the **pain and disability** RA patients suffer.



### Osteoarthritis (OA)

OA is a disease of the **joints**, with the hips and knees being the most common joints affected.

How people come to develop OA is unknown! We think that **many factors** may influence the development of the disease.

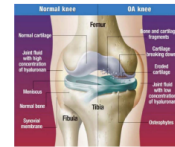
Over a period of time the cartilage in the joint is worn away and changes occur in the bone. This leaves the joint **stiff and painful** to move.

Bony lumps called **osteophytes** also form, making it difficult and painful to move the joint.

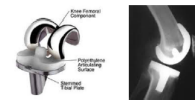
The best treatment we currently have for OA is to **replace the damaged joint** with an artificial one.

At the University of Glasgow we are working to better understand OA and find ways of delaying or preventing the need for joint replacement.

#### OA disease overview



#### Parts of the artificial joint and a X-Ray of a leg with a replaced joint.



### Multiple Myeloma (MM)

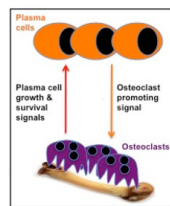
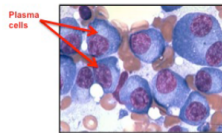
Multiple Myeloma (MM) is one of the most common **blood cancers** in Europe and the US. It is largely **incurable** with sufferers only surviving for 3-7 years from diagnosis.

MM is characterised by the accumulation of cells in the bone marrow, called **plasma cells (PCs)**.

The majority (~80%) of sufferers develop devastating **MM associated bone disease (MM-OBD)**, mainly affecting the spinal cord & the ribs.

MM-OBD develops due to plasma cells **enhancing the number and activity of bone cells**, known as osteoclasts, which destroy bone. Osteoclasts also aid the growth & survival of the PCs.

Drugs against both the PCs and the OBD have **severe side effects**, showing the need for less toxic therapies.



### Osteoporosis

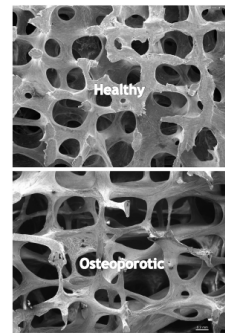
Osteoporosis literally means 'porous bones' and is also known as the '**fragile bone disease**'.

**Broken wrists, hips and spinal bones** are seen in people with osteoporosis.

It is most common in **older people** although sometimes younger people can have osteoporosis.

One in two women and one in five men over the age of 50 in the UK will **fracture** a bone, mainly due to poor bone health.

The cause of the disease is still not fully known, but involves **over-degradation** of the bone. This causes a decrease in minerals such as **calcium**. Calcium is very important for healthy bones.



Can you tell the difference?