What is an Isotope Bone Scan?

When Paget's disease is suspected, it is important that there is a detailed assessment process. An isotope bone scan is often used as part of this process to aid assessment and diagnosis. This scan will highlight areas of increased bone activity, to show the extent and activity of the disease.

What is an Isotope Bone Scan?

An isotope bone scan involves nuclear medicine, which is the name given to the use of radioactive isotopes (also known as radionuclides), to produce an image of different parts of the body. A tiny amount of isotope preparation is injected into a vein and the cells which are most 'active' will take up more of the preparation. We know that in Paget's disease old bone is broken down and replaced at a faster rate than normal, therefore the isotopes will collect in areas where there is a lot of bone activity.

Isotopes emit a type of radioactivity known as gamma rays, which are similar to X-rays. The gamma rays are detected by a device called a gamma camera. The most active parts of tissue will emit more gamma rays than less active or inactive parts. These rays are then converted into an electrical signal and sent to a computer to turn the information into images. The computer builds a picture by converting the differing intensities of radioactivity emitted, into different colours or shades of grey. The areas which emit lots of gamma rays are shown as darker areas and are known as "hot spots" (figure 1). These "hot spots" may indicate processes that trigger higher metabolism, such as increased blood flow or new bone formation. Areas which emit low levels of gamma rays are known as "cold spots" and are indicators of decreased metabolism, such as poor blood flow to an area of bone.

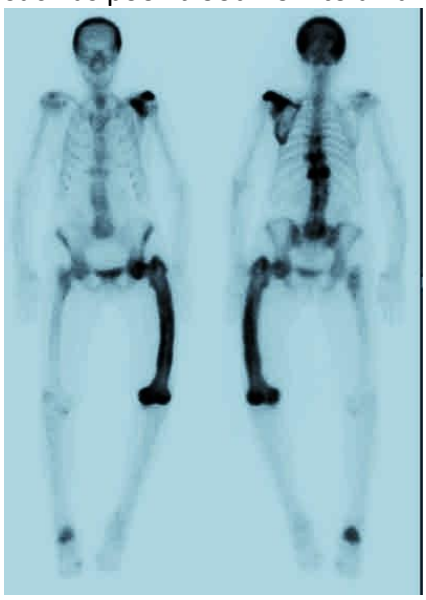

Figure 1
An isotope bone scan.
"Hot spots" are shown as black areas.

What does the procedure involve?

The arrangements, and the way the test is performed, may vary a little between different hospitals. Always follow any instructions given by your doctor or hospital and ensure that you are satisfied that you have received enough information about the appointment before you attend.

An injection of a small amount of the isotope preparation is given into a vein. It takes time for this substance to be absorbed; therefore the scan is performed approximately 3 hours after the injection. You will be asked to drink water between the injection and the scan.

When it is time for the scan, you do not need to undress. You will be taken to the examination room and made comfortable lying on the couch. You need to lie as still whilst each picture is taken. The gamma camera is passed over your body and this will take approximately 40 minutes. The scan builds up an image of the bone structure, as determined by the blood flow in the bones and the activity of the bone to generate cells.

Are there any side effects?

There are no ill-effects from the injection and apart from the injection itself, you will not feel anything.

The benefits

Isotope bone scans are non-invasive procedures that are more sensitive than X-rays in evaluating bone structure. It will assist your doctor in making a diagnosis and if Paget's disease is diagnosed it will determine the extent and disease activity.

Are there any risks?

X-rays and bone scans are safe and important investigations for those suspected of having Paget's disease. Health Professionals will always explain the risks and benefits of any test and they are guided by the principle that when using ionising radiation, the benefit from the procedure must outweigh any small risk involved.

- The scan is not recommended during pregnancy or for nursing mothers
- Very rarely, some people have an allergic reaction to the injection
- The radioactive chemicals used in an isotope bone scan, are considered to be low risk

Should I be concerned about the effects of radiation?

The short answer is no. Risks from x-rays and scans are often exaggerated. We are all exposed to natural background radiation every day of our lives. This comes from the ground and building materials around us, the air we breathe and the food we eat. In most of the UK the largest contribution is from radon gas which seeps out of the ground and accumulates in our houses. An X-ray or nuclear medicine examination gives us a small additional dose on top of this natural background radiation. The level of dose varies with the type of examination. Whilst Isotope bone scans involve higher doses than a plain x-ray, they still represent only a fraction of our

lifetime dose from natural radiation. The only effect, that is known to be possible at these low doses, is a very slight increase in the chance of cancer occurring, many years or even decades after the exposure.
Remember, everything we do in our daily lives carries some level of risk. We tend to regard activities as being “safe” when the risk of something unpleasant happening falls below a certain level. Isotope bone scans are considered to be low risk. The radiation from an isotope bone scan is kept to a minimum and soon falls to an insignificant level. The risks from missing a serious disorder by not having a bone scan may be considerably greater.
If you are worried about any treatment or scans you may be having, speak to your GP or the hospital staff.

Results

The scan will be examined after your visit and a written report on the findings, sent to your referring doctor. Your doctor will consider the result along with results of other tests, such as x-rays and blood tests, your symptoms and family history.
The scan is interpreted to be normal if there are no areas of increased or decreased activity. In general, a normal scan shows a uniform concentration of the isotope uptake in all bones.
Abnormal results can reveal Paget’s disease by showing a high concentration of the isotope in areas of increased bone activity.
Once the extent of Paget’s disease has been shown by an isotope bone scan, is it not usually necessary to repeat it, unless your doctor feels that the result will influence your treatment.

Diana Wilkinson
Healthcare and Education Officer
Paget’s Association
Paget’s News, Feb. 2013