Bone scintigraphy – or bone scan, as it is commonly called – is the assessment of physiological bone turnover (Box 1) using a radioactive drug injected into the body (Sharp et al, 2005). It is indicated for a wide range of patients, including some who have been admitted to hospital – this means that nursing staff in the hospital setting are likely to care for people undergoing this investigation.

How does scintigraphy work?
Phosphates of the same type as those used by the body in bone turnover are attached to a radioactive isotope (see part 1) and injected intravenously into the patient, usually at the antecubital fossa site. To the body, the radioactive phosphates are no different to those that are found in food and drinks and, because of that, it absorbs and uses them following the normal physiological processes. Osteoblasts and osteoclasts (Box 1) incorporate the radioactive phosphates directly into the bone matrix (Box 1).

The image obtained will show new bone that has been formed through normal bone remodelling (Box 1) in the time that has passed between injection and scanning. Injections are generally administered 2-4 hours before scanning, which means any bone we see on the image will have been created during those 2-4 hours. An example of a normal bone scan is shown in Fig 1.

Bone scintigraphy can be used to obtain an image of bones in the whole body or part of the body. Brighter areas on the image indicate an increased rate of bone production, which can be due to a number of factors including (but not limited to) trauma, cancer, arthritis and infection. Darker areas can also reveal issues – for example, osteolytic cancers (Sharp et al, 2005). Some brighter and darker areas can be seen in Fig 1: there is an intense area of uptake in the bladder due to the accumulation of radioactive urine although, in general, the darker areas – for example, the spine – are darker because they are closer to the camera than some of the deeper-lying bones.

Imaging takes 20-40 minutes and involves the patient lying flat on a table as the camera passes over, and sometimes around, them. The camera will come close – which can be a problem for patients who...
Preparing patients for the procedure

When a hospitalised patient is to undergo a bone scan, a member of staff from the nuclear medicine department often comes to their bedside to administer the radioactive drug. Alternatively, the patient may go to the nuclear medicine department for the injection. If the patient has poor venous access but has a cannula, the cannula can be used for administering the radiopharmaceutical but must be flushed beforehand to check patency. A cannula may sometimes be inserted specifically for the procedure.

Before the scan, the patient will be asked to empty their bladder as much as possible so the pelvis is clearly visible on the image. A small accumulation of radioactive urine in the bladder can be seen on Fig 1: if the patient had not emptied their bladder as much as possible before the procedure was undertaken, the bladder would have been much fuller and pelvic structures would be masked by the radioactive urine.

In cases of severe urinary incontinence, it is advisable for the patient to have a catheter in situ for the duration of the procedure to avoid contaminating the camera with spillages of radioactive urine. The catheter bag should be emptied regularly to prevent the accumulation of radioactive urine.

If the patient has recently had a CT scan with contrast, the nuclear medicine department should be contacted before they attend for bone scintigraphy. If the patient has reduced renal clearance, the bone scan may need to be delayed for up to a week to allow the contrast material to clear – if this is not done, it may cause an artefact (Box 1).

Alleviating patients’ anxieties

Patients – and sometimes even NHS staff – may not be aware of nuclear medicine as an imaging modality. This can be attributed, in part, to the lack of reference to nuclear medicine imaging in mainstream media. In addition – in terms of nursing, at least – this lack of awareness may be a result of the dearth of information about nuclear medicine imaging that is found in pre-registration nursing curricula.

Patients commonly ask health professionals questions about nuclear imaging modalities such as bone scintigraphy. They sometimes become apprehensive when they hear the word ‘nuclear’ and will ask whether it is safe for them to undergo the investigation or whether they will glow in the dark, etc (Prakash, 2014). Good patient outcomes overall can be achieved and, through education, we can alleviate patient anxieties.

Protecting everyone from radiation

After the bone scan, the patient should be encouraged, unless contraindicated, to drink and void their bladder often; this will help them clear their system more quickly, as the radioactive drug is excreted via the urinary tract. If samples of blood, urine or faeces need to be collected from a patient in the 24 hours after a bone scan, nurses should take extra care and:

- Wear gloves, an apron and shoe coverings;
- Use absorbent pads to clean up any spillages.

If possible, it is advisable to either perform sample collection before the injection of the radioactive drug or postpone it until after 24 hours after the scan.

Patients should not have close contact with young children or pregnant women – the two groups most at risk from radiation – for 24 hours after administration of the radiopharmaceutical. Ideally, pregnant staff should not care for patients who have just had a bone scan, and all staff need to take extra care to reduce their own exposure to radiation. After 24 hours, standard staff rotas and care protocols can be resumed.

References


Box 1. Glossary

Artefact: in medical imaging, something observed on the image that is not actually there but occurs erroneously (for example, because of the underlying physics of the technique, a data acquisition error or a limitation of the reconstruction algorithm).

Bone matrix: intercellular substance of bone, consisting of collagenous fibres, ground substance and inorganic salts.

Bone remodelling: continuous process of bone creation and replacement.

Bone turnover: total volume of bone that is resorbed and formed over a certain period of time.

Osteoblasts: cells that synthesise (or form) bone tissue.

Osteoclasts: cells that break down (or resorb) bone tissue.