

Baker & McVeigh Equine Hospital CAPE (PTY) LTD

Dr. J. McVeigh B.V.M.S M.R.C.V.S. - Principal
Dr. A.G Cameron B.V.M.S M.R.C.V.S - Partner
Dr. D. Timpson B.V.Sc M.R.C.V.S - Partner
Dr. A. Clements B.V.Sc Cert.E.S (Orth) M.R.C.V.S - Partner
Dr. E. Alsop B.V.Sc Cert.E.M (Intmed) M.R.C.V.S
Dr. B. Gillespie B.V.Sc BSc



P.O Box 55290, Sunset Beach, 7435

Tel: +27 (21) 552 3450

Fax: +27 (21) 552 3225

Email: cape@mcveigh.co.za

Website: www.bakermcveigh.com

DURBAN, SA

CAPE TOWN, SA

NEWMARKET, UK

YORKSHIRE, UK

CHANTILLY, FRANCE

Gamma Scintigraphy and Computed Tomography (CT)

This is the third information sheet on imaging modalities, this time covering two subjects, gamma scintigraphy, otherwise known as bone scanning, and computed tomography, or CT.

Gamma scintigraphy is available here in the Western Cape. CT is only available in Pretoria, but we can refer cases up there. MRI is not covered here as it is not yet available in South Africa for our equine patients.

GAMMA SCINTIGRAPHY

What is Gamma scintigraphy?

Gamma scintigraphy is a way in which to image your horse using nuclear medicine. A radioactive isotope is injected into the horse. The gamma rays emitted by this isotope as it decays are then picked up by external detectors, the gamma camera. This is done with the horse under standing sedation.

The radioactive isotope spreads around the body and gathers in areas of inflammation. The whole body will initially be radioactive but the areas of inflammation emit large quantities of gamma rays which are picked up by the gamma camera and called 'Hot Spots'. The main information obtained is based on physiological processes going on in the target areas. In bone, this is the turnover of bone and blood flow to the bone. If used to assess kidneys, it is their ability to produce and filter urine that is being assessed, i.e. their physiological processes.

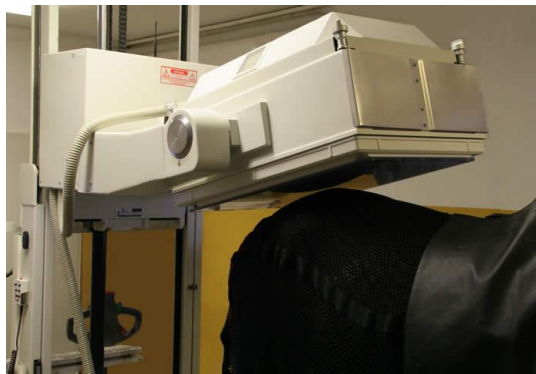


A horse being scanned

Gamma scintigraphy is an expensive tool that requires the use of ionising radiation. This has important implications for the safety of patients and personnel. There are strict safety rules in place for horses undergoing this procedure. For these reasons, gamma scintigraphy is reserved for particular situations, rather than being employed as a screening tool in all cases of lameness. The main indications for gamma scintigraphy in lameness cases include:

- Lameness that has not been abolished with conventional diagnostic anaesthetic techniques.
- Lameness that has been localised to a particular anatomic region with no evidence of clear pathology evident on radiographs or ultrasound images.
- Acute onset, severe lameness in a horse without any localising signs e.g. stress fractures in the racehorse.
- Suspected pelvic injury.
- Suspected back/neck pain.
- Horses that are not amenable to diagnostic nerve blocks (i.e. violently objects to needles placed in the limb).

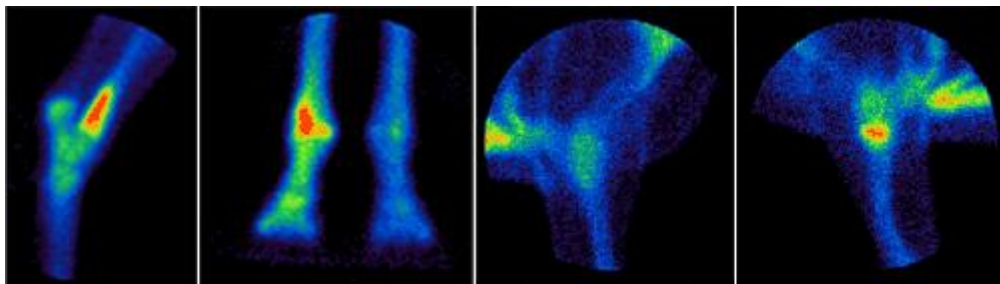
One of the most important roles of gamma scintigraphy is its use in picking up fractures in areas that cannot be xrayed, eg. The pelvis or where routine xrays cannot pick up the fracture.



A horse having its pelvis scanned

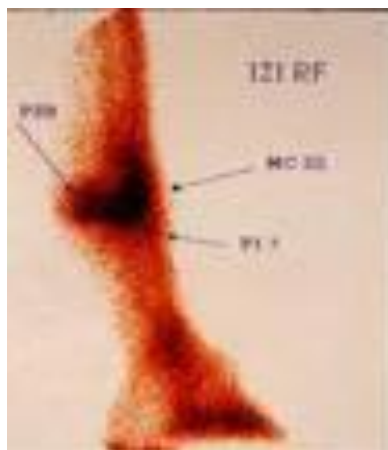


The view of the pelvis obtained from the positioning in the above image. This image shows a fractured pelvis, the bright emission of gamma rays seen here.

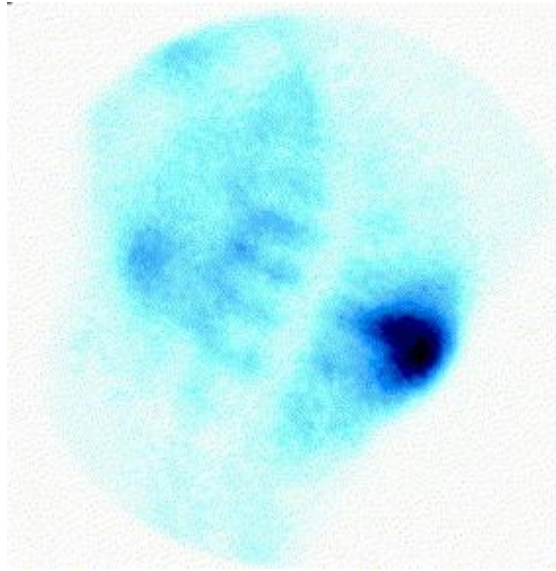


'Hot spots'

Gamma scintigraphy can also be used to investigate some medicine cases. In horses with evidence of infection, but where the source of infection cannot be found, the horses own white blood cells can be labelled with the radioactive isotope. As white blood cells fight infection, they will flood to the area of infection, taking the isotope with them, which then emit their gamma rays, which will be picked up by the gamma camera.



A fetlock image from a gamma scan.



A horse having its head and teeth scanned, with a periapical infection.

COMPUTED TOMOGRAPHY

What is computed tomography?

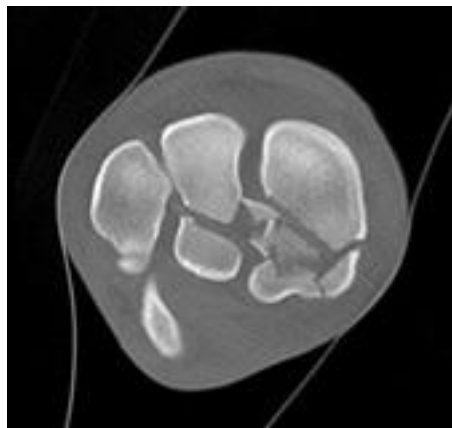
X-ray computed tomography, also **computed tomography (CT scan)** or **computed axial tomography (CAT scan)**, is a medical imaging procedure that utilizes computer-processed X-rays to produce tomographic images or 'slices' of specific areas of the body. These cross-sectional images are used for diagnostic and therapeutic purposes in various medical disciplines. Digital geometry processing is used to generate a three-dimensional image of the inside of an object from a large series of two-dimensional X-ray images taken around a single axis of rotation. A circular gantry houses the important electrical equipment and the xray equipment which is positioned opposite the detectors which measure the number and strength of the xrays reaching them from all angles around 360 degrees. This is done with the horse under full general anaesthesia.

The images generated are dependent upon the density of the tissue which is different to MRI and scinitgraphy which tells you the underlying physiological activity of the tissue. For example damaged tendons will be detected as the damaged areas become less dense due to oedema/ swelling and inflammation. This ability to measure such small changes makes CT excellent for assessing bone.

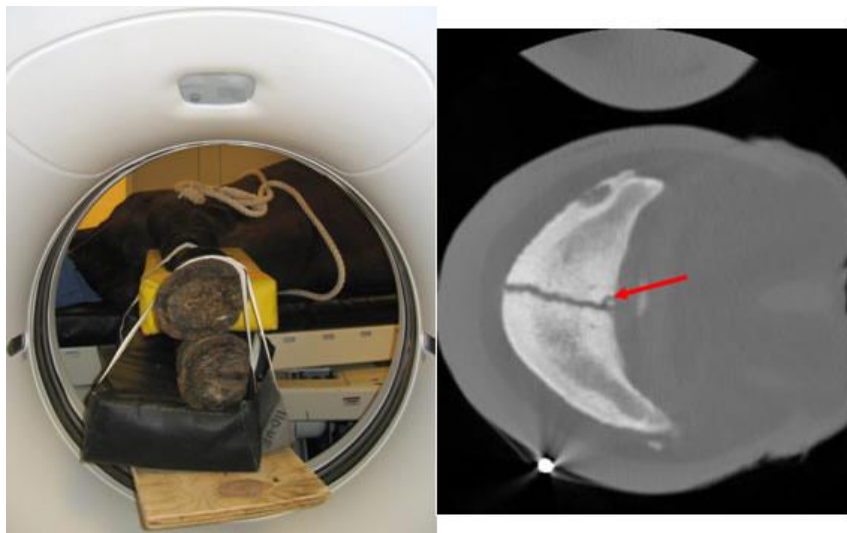
CT produces a volume of data that can be manipulated, through a process known as "windowing", in order to demonstrate various bodily structures based on their ability to block the X-ray beam. Although historically the images generated were in the axial or transverse plane, perpendicular to the long axis of the body, modern scanners allow this volume of data to be reformatted in various planes or even as volumetric (3D) representations of structures.



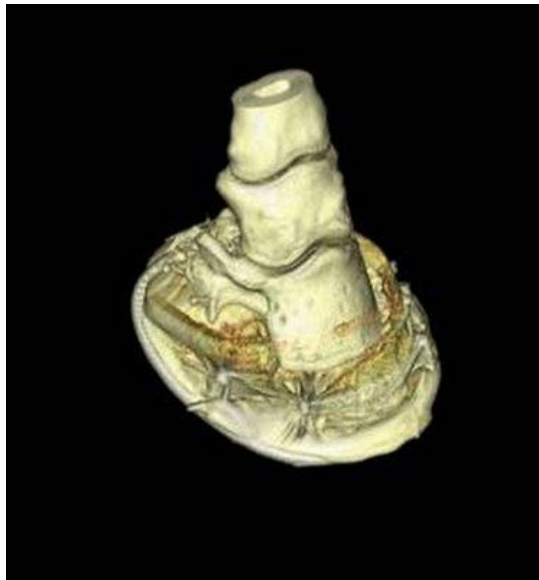
A horse going through the CT machine



A CT image of a horses knee with multiple fracture fragments



Feet being scanned with the image on the right showing a pedal bone fracture



A 3D reconstruction of the horses foot from the CT images

Unfortunately, CT is not available in the Western Cape, but it is available in South Africa at Onderstepoort University in Pretoria. If the case so requires, it is well worth sending your horse here as the results are so accurate.