



## *Neuro-Diagnostic Tests Fact Sheet*

An overview of the type of tests available in the diagnosis of neurological conditions.

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A definitive diagnosis is essential to the optimal management of patients with neurological disease. This is achieved through the application of a range of diagnostic tests.

### *Blood and Urine Tests*

The main aim of these tests is to ensure that the animal's kidneys, liver and other organs are functioning well. Occasionally some neurological symptoms can be caused by changes in the blood composition (for example low sugar level, abnormal salt balance, toxins not cleared by a failing liver, under active thyroid) and a simple blood test can sometimes reveal the cause of your pet's problem.

### *CSF Analysis*

Cerebrospinal Fluid (CSF) is the fluid that bathes the brain and the spinal cord. CSF collection (also known as a spinal tap) is indicated in most dogs with nervous system disease. This fluid can be collected from the back of the neck or the lower back. This procedure can only be carried out under general anaesthetic and is associated with very uncommon but significant risks.

Compared to blood, normal CSF contains very few cells and a small quantity of protein. Many neurological diseases (in particular encephalitis, meningitis and myelitis – **see Inflammatory CNS disease Fact Sheet**) can cause changes in the CSF composition (such as an increase in the number of cells, changes in the type of cells or elevation in the quantity of protein). Occasionally, certain types of tumour (such as lymphoma) can be detected in the CSF. Unfortunately, taken on their own CSF changes are rarely 'typical' of a specific disease and results of CSF analysis must be interpreted according to the clinician's suspicion and results of other tests (blood tests, Myelogram, MRI or CT-scan).

### *Spinal X-rays*

Spinal X-rays (radiographs) are commonly used for animals with neck or back pain, wobbliness and paralysis. They can reveal fractures, dislocation, infections or tumours of the spine. Spinal X-rays can sometime give indications of slipped disc but cannot be used alone to confirm such a problem. Unfortunately, spinal X-rays are likely to be normal in conditions directly affecting the spinal cord such as Ischemic Myelopathy, Myelitis or Meningitis.

## Myelography

This technique involves taking spinal X-rays after injecting a dye into the fluid that surrounds the spinal cord.

The shape of the spinal cord can, therefore, be outlined and be evaluated with X-rays. Conditions such as slipped disc will cause changes in shape of the spinal cord and are frequently diagnosed using Myelography. Although this technique provides relevant information on diseases compressing the spinal cord, it does not assess the spinal cord tissue itself as MRI scans do.

## MRI Scans

MRI stands for Magnetic Resonance Imaging. MRI has revolutionised the investigation of neurological disease. One of the main advantages of MRI over X-rays and CT-scans is its ability to image the brain and spinal cord tissue in great detail. Like CT, MRI is also non-invasive and painless, although it requires putting the animal under a general anaesthetic.

Contrary to the common belief, only a small portion of the body can be scanned using MRI. It is therefore essential that the animal is properly examined to ensure that its problem requires the use of MRI for diagnosis, but also to make sure that the appropriate part of the nervous system is scanned.

MRI is an essential tool in the diagnosis of brain disease. However, changes observed in the brain may not always be 'typical' of a specific condition, as diseases such as encephalitis, tumours or strokes can sometimes show very similar changes. The use of other tests, such as CSF analysis, can give indirect clues relating to the changes seen on MRI scans and help us to diagnose what is causing the animal's symptoms.

## CT-Scan

CT stands for computed tomography. It is an X-ray technique where a computer is used to reconstruct cross-sectional images of the animal in the scanner. Compared to MRI, CT gives better details of bones (skull, spine, joints) but lesser details of soft tissue such as the brain or spinal cord parenchyma.

## EMG

EMG stands for electromyography. This test is indicated in animals with suspected peripheral nervous system disease (muscle and peripheral nerve). Although it does not give a definitive diagnosis as to what disease is causing the problem, EMG is a useful test to detect or confirm peripheral nervous system disease as well as mapping which part of the body is involved. A very small recording needle is inserted in the muscle to detect any abnormal electrical activity that could be caused by a myopathy (muscle disease) or neuropathy (nerve disease). This test is performed under general anaesthetic.

## Tissue Biopsy

Biopsy (or sampling) is an important tool to determine the exact type of cells within a suspected abnormal tissue. Most neuro-diagnostic tests are very good at detecting abnormality but not as good at finding out the nature of the abnormality. For example, MRI may reveal a mass within the brain but it will not tell you what the exact nature of the mass is – for example, cancer, abscess, inflammation or a bleed?

Although in many cases the mass will be a tumour, definitive diagnosis can only be made after taking a sample of this mass either by biopsy (using a CT-scan or ultrasound-scan for guidance) or after surgical resection. Muscles and nerves are the other tissues more routinely sampled.

*If you are concerned about the health of your pet you should contact your veterinary surgeon.*

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