



**BUSH ADVANCED
VETERINARY IMAGING**

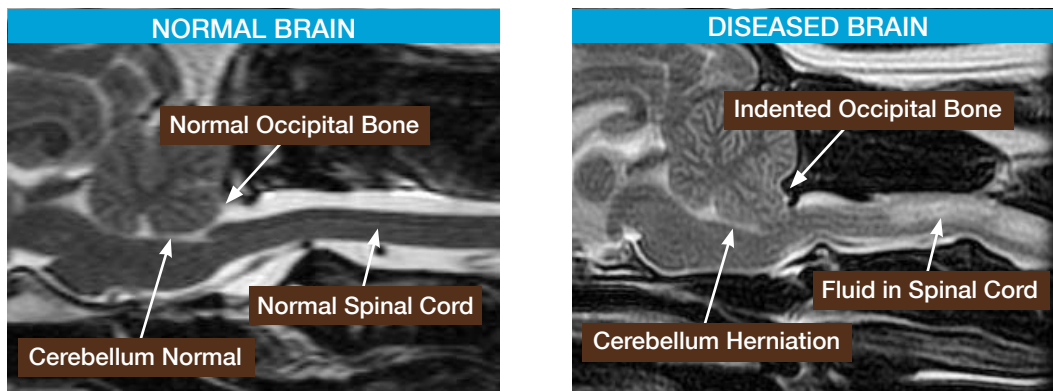
SM/CM/COMS

Syringomyelia/Chiari-like Malformation/Caudal Occipital Malformation Syndrome

MRI Screening with Bush Veterinary Neurology Service and Bush Advanced Veterinary Imaging

What is SM/CM/COMS?

Caudal occipital malformation syndrome (COMS or Chiari-like malformation), in simpler terms basically refers to a defect where the skull is too small for the brain, resulting in overcrowding of the caudal fossa or hind brain structures (essentially the cerebellum, pons and medulla) and increased intracranial and intra-parenchymal spinal cord pressures resulting in many clinical abnormalities such as excessive itching of the ears and neck, dysmetric/hypermetric gait (exaggerated high stepping gait), other gait abnormalities, paresis (weakness), pain, vertigo (dizziness), paralysis (inability to move), and even death, if severe enough.



Syringomyelia formation or hydrocephalus can be observed as part of COMS or as their own separate disease processes.

Syringomyelia basically refers to a fluid filled and increased CSF accumulation within the cord, which is thought to cause elevated intra-parenchymal cord pressures resulting in gait abnormalities, paresis, or paralysis, and, typically, cervical pain. Syringomyelia, dilation of central canal and spinal fluid accumulation within the spinal cord, is typically seen concurrently with COMS but may be a singular problem also seen in this breed.

Hydrocephalus, predominantly a congenital problem but can be acquired, generally refers to abnormal spinal fluid production or absorption within the ventricular system (pathway where spinal fluid flows within the brain and spinal cord), which can also result in increased intracranial pressures and varying clinical signs from seizures, behavior changes, and dizziness just to name a few.

What is a genotype?

A genotype is the DNA sequence of a particular animal. An individual's genotype is a 50% mix of the parents DNA.

What is a phenotype?

A phenotype is the physical attribute of an individual that is a consequence of expressing the genotype or DNA code. An example might be blue eyes or skin color.

What does it mean to say a physical trait is inherited?

Many physical attributes pass through the generations. In animals that are part of breeding stock certain desirable traits are selected in a breeding pair with the hopes they are inherited and will be conserved in a line of dogs. Unfortunately, certain phenotypes can be hidden despite the individual having the genotype. When this happens the individual is called a carrier for a particular genotype.

What is an MRI?

A magnetic resonance image (MRI) is an advanced imaging modality based on difference in water content or proton density in different tissues types in the body. Therefore MRI provides excellent detail in any tissue of the body that contains water. An MRI allows for a dramatically better study of the brain and spinal cord compared to traditional radiographs or CAT scan imaging.

What is the purpose of a MRI to screen for syringomyelia?

An MRI is the way of determining carriers for syringomyelia condition. Conscientious breeders would ideally screen their dogs with MRI and select dogs that did not have syringomyelia. If syringomyelia is not present on MRI, then the assumption is the individual screened is less likely to carry DNA which could pass on the disease and may be less likely to develop syringomyelia later in life. Importantly the screening MRI is not intended for dogs with clinical signs of disease.

What is syringomyelia?

Syringomyelia is when there is a cavity of fluid in the spinal cord.

Why does syringomyelia develop?

When the syringomyelia is in the cervical spinal cord it is thought to be a consequence of the abnormal cerebrospinal fluid flow from the brain to the spinal cord. The abnormal fluid flow is thought to be from an obstruction in fluid flow from the brain into the spinal cord. The obstruction is from the back of the brain (cerebellum and brainstem) being out of position or herniated. The back of the occipital bone is often misshaped or too small and this allows the structures in the back of the brain to be out of position, obstructing fluid flow and causing fluid to build-up in the spinal cord. The primary problem is thought to be an abnormality in the back of the occipital bone or caudal occipital bone malformation, therefore the disease is sometimes called caudal occipital malformation syndrome (COMS). Sometimes the fluid spaces in the brain called ventricles will be too large (a condition called hydrocephalus) at the same time as COMS is noted. This is similar to a condition in people called Chiari malformation. For this reason COMS is sometimes called Chiari-like malformation with syringomyelia (CM/SM). Regardless of what it is called the condition is thought to be inherited and thus preventable by selective breeding.

What breeds are at risk or should be screened for COMS/CM/SM?

Cavalier King Charles Spaniel and maybe the Brussels Griffon and Japanese Chin.

What are the signs of COMS/CM/SM?

When dogs have disease from the condition the most consistent signs are neck pain which can be manifested when the dog gets excited, active or is picked up and can be severe. Scratching or biting at the head, neck or sides are common and often initially thought to be from skin disease. This too is often worse with activity or excitement. Less common signs of this disease include lethargy (likely from a head ache), weakness, poor balance, seizure, seizure-like episodes, and facial paralysis.

What is involved in obtaining a MRI screening test for COMS/CM/SM?

Your pet will be under anesthesia during the MRI Screening procedure for approximately 40 minutes but you may be at BVNS for 2-4 hours possibly longer if you are having multiple pets imaged. Intravenous anesthesia induction agents are used then your pet is kept anesthetized by an inhalation anesthesia for the MRI Screening procedure. We routinely pre medicate with fentanyl-Diazepam intravenous followed by intravenous Propofol then use Isoflurane inhalant anesthesia for the remainder of the MRI Screening procedure. No intravenous contrast (“dye”) agents are used.

What will the MRI scan be able to determine and what disease processes might be missed?

The MRI screening is a limited study or “mini MRI” where we allow us to evaluate the shape of the occipital bone, cerebellum, brainstem and high cervical spinal cord for the characteristics of COMS/CM/SM. There are many other processes (intervertebral disc disease, tumors, immune, infectious diseases) that can cause signs that are the same as COMS/CM/SM that would not be detected with this study protocol. This study does not allow for evaluation of the entire brain, entire spinal cord or for collection of spinal fluid to assess for inflammatory disease processes.

What does the screening study cost and when can it be performed?

On Sundays, \$595.00 for 1st dog, then \$545.00 for each dog owned by the same owner for a total of 5 dogs scanned per COMS/CM/SM screening day. On Monday – Saturday, a screening of ONE dog can be done allowed by our schedule for \$695. Payment is expected at the time of your appointment.

How should an owner prepare for the MRI screen and what can be expected that day?

- 1) No food 12 hours prior to its appointment at BVNS but water at anytime.
- 2) Please provide copies of your pet’s microchip documentation and your pet’s AKC or other breed registry documentation as well as any tattoo information at the time of the appointment.
- 3) Your pet will need to have minimum blood work performed by your veterinarian within 7 days of its MRI screening at BVNS. Please bring a copy of the blood work with you at the time of your MRI screening appointment. The blood work should have, at minimum, a pack cell volume (PCV), total protein (TP), blood urea nitrogen (BUN/Azostick), and a blood glucose (BG) level. If the results of the blood work are older than 7 days from the day of the exam or not available then this will be done for an additional fee \$50.00.
- 4) Your pet will be examined by a veterinarian who is pursuing advanced neurology and neurosurgical training at BVNS. You will not meet with the veterinarian performing the examination unless there are problems identified during the pre anesthesia examination or blood work review. A scan will not be performed if there are anesthetic concerns or significant neurological deficits detected during the pre anesthetic examination. If a scan is not performed then the veterinarian will advise regarding the problems identified and necessary course of action. This may involve scheduling a Neurology consultation at BVNS during normal business hours or it may involve further diagnostics with your primary veterinarian.
- 5) Your pet will be undergoing an anesthesia for its MRI screening procedure and will need to be observed for a period of time following its anesthesia to ensure it is awake enough to be released into its owner’s care. From arrival at BVNS to release from BVNS, expect to be at our facility between 2-4 hours, possibly longer if you have more than one pet being imaged. Your pet will have small regions shaved on the limbs for intravenous catheter placement and for blood pressure monitoring while it is under anesthesia.
- 6) As anesthesia carries limited inherent risks, you will be required to sign an anesthesia authorization form prior to MRI screening.
- 7) You will be provided a copy of the MRI images on a disc in DICOM format for your records at the time of your pet’s release from BVNS.
- 8) You will also be provided with a brief report of the MRI findings generated from one of BVNS’s Board Certified Neurologists within 7 days by email or land mail.
- 9) If you choose to have your MRI evaluated by Dr. Clare Rusbridge, renowned CM/SM/COMS specialist in the United Kingdom (www.veterinary-neurologist.co.uk/sm_screening_breeders.htm). The owner will be responsible for contacting her, completing necessary paperwork, and additional fees for her evaluation.