

Brain Camp Online Part II– Neuroanatomy

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Content Launch Date: Monday, August 2, 2021
Live Q&A with the Presenters: Wednesday, August 25, 2021
(Session was recorded and is available for viewing in the learning platform)

This 6-hour course will cover the functional neuroanatomy of the quadrupedal nervous system, by giving an overview of regional anatomy and blood supply and exploring the neuroanatomy of the neurological examination (structure and function).

All topics will be presented in 50 – 60 minute pre-recorded sessions.

Neuroanatomy	
Topic / Description and Learning Objectives	Presenter
<p>Module 1: Regional and Functional Neuroanatomy of the Nervous System</p> <p>This session will provide an overview of the functional neuroanatomy for the different regions of the nervous system.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Define the functional divisions of the nervous system. • Outline the structure of the spinal cord, its functional layout (dorsoventral and craniocaudal) and state the location of the main spinal cord tracts. • State the key structures (grey and white matter) of the three functional divisions of the brain. • Extrapolate to the signs of dysfunction that could occur with lesions in the different divisions. 	<p>Christine Thomson, BVSc (Hons), PhD, DACVIM (Neurology), DECVN</p>
<p>Module 2: Ventricular System and Vascular Supply</p> <p>This session will provide an overview of the ventricular system, its structure and function, and the vascular supply and drainage of the nervous system.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Identify the different components of the ventricular system and use them to aid in determining the location of brain sections on imaging. • Describe the CSF pathway from production to drainage. • State arterial territories in the brain and spinal cord and be able to identify which vessels must be occluded to cause infarction in a particular region. • Recognize major blood vessels on brain images. 	<p>Christine Thomson, BVSc (Hons), PhD, DACVIM (Neurology), DECVN</p>

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Neuroanatomy	
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<p>Module 3: Posture, Gait and Sensory Systems This session will provide an overview of the neurological examination. It will outline the neuroanatomy of mentation/arousal. We will start discussing the functional neuroanatomy of posture and gait, beginning with sensory systems. This will include proprioception, autonomous zones, nociception and pain.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • State the core components of the neurological examination. • Define core components of the limbic system and functional neuroanatomy of the ARAS. • Describe the functional neuroanatomy of proprioception (conscious, subconscious and general) and the effect of lesions on an animal's proprioception. • Differentiate nociception from pain and outline the functional neuroanatomy of these systems. • State the location of nociceptors that can result in spinal hyperpathia. 	<p>Christine Thomson, BVSc (Hons), PhD, DACVIM (Neurology), DECVN</p>
<p>Module 4: Motor Systems This session will provide information about the motor unit, spinal reflexes, UMN and LMN, brain motor centers and cerebellar function.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Differentiate UMN and LMN structurally and functionally, and in neurological disease. • Define a reflex and state how reflexes and central pattern generators are used in locomotion. • Discuss the roles of the extrapyramidal and pyramidal systems in quadrupedal motor function. • Outline cerebellar functional anatomy and its role in gait and posture. • Extrapolate to the signs of dysfunction that could occur with lesions in different motor components. 	<p>Christine Thomson, BVSc (Hons), PhD, DACVIM (Neurology), DECVN</p>

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Neuroanatomy	
Topic / Description and Learning Objectives	Presenter
<p>Module 5: Cranial Nerves This session will provide information on the functional anatomy of the cranial nerves with reference to their identification by MRI.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • State the names, location and function of the cranial nerves and their nuclei, and which cranial nerves work together to permit various functions. • Extrapolate to signs of cranial nerve dysfunction caused by lesions affecting individual nerves or specific regions of the brain. 	<p>Christine Thomson, BVSc (Hons), PhD, DACVIM (Neurology), DECVN</p>
<p>Module 6: Visceral Nervous System This session will provide information on the functional anatomy of the visceral nervous system including afferent and efferent (autonomic) components. We will cover the autonomic innervation of the eyes and continence. Tables summarizing brain and spinal cord function and dysfunction will be provided.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • State the functional neuroanatomy of the afferent, efferent and central portions of the visceral nervous system. <p>Eye:</p> <ul style="list-style-type: none"> • Describe/draw the autonomic innervation of the eye. • Explain the clinical signs observed in Horner syndrome. • Understand pharmacological testing of the eye. <p>Urinary bladder:</p> <ul style="list-style-type: none"> • Discuss the autonomic and somatic innervation of the urinary bladder. • Describe its function during storage and voiding. • Differentiate UMN from LMN bladder and understand principles of pharmacological treatment. 	<p>Christine Thomson, BVSc (Hons), PhD, DACVIM (Neurology), DECVN</p>

Brain Camp Online Part II– Large Animal Neurology

Content Launch Date: Wednesday, September 8, 2021
Live Q&A with the Presenters: Thursday, September 30, 2021
 (Session was recorded and is available for viewing in the learning platform)

This 7-hour course will cover large animal neurology, including equine and small ruminants, with a review of the neurological examination in large animal species. An overview of congenital, infectious, degenerative and toxic diseases will be covered. Clinical presentation, diagnostics including electrodiagnostics, therapy and prognosis will be included where indicated.

All topics will be presented in 50 – 60 minute pre-recorded sessions.

Large Animal Neurology	
Topic / Description and Learning Objectives	Presenter
<p>Module 1: Neurologic Examination in Large Animals This session will provide an overview on how to perform and interpret the neurological examination in large animals. The session will be based on functional anatomy of the nervous system by providing examples of evolutionary species differences (prey versus predator).</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Become familiar with performing a neurological examination in large animals. • Recognize normal variations in neurological function depending on the species. • Recognize neurological abnormalities in large animals. 	<p>Monica Aleman, MVZ Cert., PhD, DACVIM (LAIM, Neurology)</p>
<p>Module 2: Brain Disease This session will provide an overview of brain diseases that affect large animal species in a case-based manner. Cases will include examples of diagnostic tests such as laboratory tests, imaging and electrodiagnostics. This session will cover diseases of the major functional divisions of the brain: cerebrothalamus, brainstem and cerebellum.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Recognize common brain diseases of large animals (individual versus herd diseases). • Integrate the use of diagnostics tests for the investigation of brain disease. 	<p>Monica Aleman, MVZ Cert., PhD, DACVIM (LAIM, Neurology)</p>

Brain Camp Online Part II– Large Animal Neurology

Large Animal Neurology	
Topic / Description and Learning Objectives	Presenter
<p>Module 3: Spinal Cord Disease This session will provide an overview of spinal cord disease in large animals. This session will be a case-based presentation that will include examples of dysfunction of various spinal cord segments.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Recognize common diseases affecting the spinal cord in large animals. • Recognize pathology of the spinal cord and vertebral column through imaging. • Understand interpretation of common diagnostic modalities (e.g. ataxic horse). 	<p>Monica Aleman, MVZ Cert., PhD, DACVIM (LAIM, Neurology)</p>
<p>Module 4: Neuromuscular Disease This session will provide an overview of diseases that affect the neuromuscular system. A review of the neuromuscular system will be presented from its central to peripheral components (motor neurons, nerves, neuromuscular junction). This session will be a case-based presentation.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Recognize common diseases affecting the various components of the neuromuscular system in large animals. • Review drugs that could alter the function of the neuromuscular junction. • Recognize available diagnostic tests for the investigation of disease in large animals. 	<p>Monica Aleman, MVZ Cert., PhD, DACVIM (LAIM, Neurology)</p>
<p>Module 5: Electrodiagnostics in Large Animals This session will provide an overview of the use of electrodiagnostics such as EEG, BAER, VEP, ERG, EMG, RNS for the investigation of neurologic disease in large animals. This session will provide examples of various diseases.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Recognize challenges to perform electrodiagnostics in large animals (but it is doable!). • Recognize effects of using drugs to perform electrodiagnostics (awake vs sedation vs anesthesia). • Recognize normal variations in electrodiagnostics depending on species. • Review cases. 	<p>Monica Aleman, MVZ Cert., PhD, DACVIM (LAIM, Neurology)</p>

Brain Camp Online Part II– Large Animal Neurology

Large Animal Neurology	
Topic / Description and Learning Objectives	Presenter
<p>Module 6: Cerebrospinal Fluid Collection This session will review sites of collection of CSF in large animals, centesis for collection and performance of myelogram.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Be familiar with collection sites for cerebrospinal fluid in large animal species. • Be familiar with interpretation of CSF samples. • Be familiar with diagnostic tests that can be performed in CSF in large animals. 	<p>Monica Aleman, MVZ Cert., PhD, DACVIM (LAIM, Neurology)</p>
<p>Module 7: Muscle and Nerve Biopsy Interpretation This session will review how to perform a muscle/nerve biopsy interpret essential diagnostic tests for the investigation of neurologic, neuromuscular, and muscle disease in large animals.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Recognize sites for muscle and nerve collection, storage, and preparation. • Be familiar with different stains and reactions used for the investigation of muscle disease. • Be familiar with common disorders on which biopsy has been definitive, essential or useful for the diagnosis of disease. 	<p>Monica Aleman, MVZ Cert., PhD, DACVIM (LAIM, Neurology)</p>

Brain Camp Online Part II – Neuropathology: Part II

Content Launch Date: Monday, October 4, 2021
Live Q&A with the Presenters: Tuesday, October 26, 2021, 8:00 am PDT / 10:00 am CDT / 11:00 am EDT

This 5-hour course will provide an overview of neuropathology, with a particular focus on spinal cord diseases. A general review of normal spinal cord histopathology will precede discussion of large and small animal spinal pathologies.

All topics will be presented in 50 – 60 minute pre-recorded sessions.

Neuropathology – Part II	
Topic / Description and Learning Objectives	Presenter
<p>Module 1: An Introduction to Spinal Cord Embryology, Anatomy, and Malformations This session will provide an overview of embryologic development of the spinal cord, a review of basic anatomy and histology, and conclude with a discussion of common spinal malformations.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Be familiar with the embryologic development of the spinal cord and associated structures. • Recognize the basic anatomic regions of the spinal cord and their histologic correlates. • Define the common spinal malformations and how to recognize them. 	<p>Andrew Miller, DVM, DACVP (Anatomic)</p>
<p>Module 2: Degenerative Diseases of the Central Nervous System This session will provide an in-depth overview of important degenerative diseases of the central nervous system that effect domestic animals including large animals.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Be familiar with the basic neuropathologic terms commonly used in neurodegenerative diseases. • Identify the critical neuropathologic features of degenerative myelopathy and compare and contrast degenerative myelopathy in different species. • Recognize the differences between equine neuroaxonal dystrophy and equine motor neuron disease. • Be familiar with common degenerative disorders that can affect the spinal cord. 	<p>Andrew Miller, DVM, DACVP (Anatomic)</p>

Brain Camp Online Part II – Neuropathology: Part II

Neuropathology – Part II	
Topic / Description and Learning Objectives	Presenter
<p>Module 3: Spinal Neoplasia This session will provide a thorough overview of how to localize neoplasia affecting the spinal cord and the primary differentials based on location.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Provide a list of differentials for tumors occurring extradural, intradural-extramedullary, and intradural-intramedullary. • Recognize the common pathologic features of each tumor. • Prioritize tumor differentials based on signalment, tumor location, and presentation. 	<p>Andrew Miller, DVM, DACVP (Anatomic)</p>
<p>Module 4: Inflammatory, Traumatic, and Circulatory Conditions of the Spinal Cord (2 hours) This session will provide a detailed overview of inflammatory (including infectious), circulatory and traumatic conditions that can affect the spinal cord of domestic animals, including large animals.</p> <p>Upon completion of the course, participants should be able to:</p> <ul style="list-style-type: none"> • Be familiar with infectious conditions that can affect the spinal cord in domestic animals (including large animals). • List pathways of spread for disease process in the spinal cord and most common agents associated with different pathways. • List the most common circulatory conditions affecting the spinal cord in different domestic species. • Be familiar with the neuropathologic features of intervertebral disc disease. 	<p>Alina Demeter, DVM, PhD, DACVP (Anatomic)</p>