

North American Neuroscience Course (Brain Camp) Week 1
AGENDA
On Demand 2022

Advanced Veterinary Neuroscience – Week 1	
Topic	Presenter(s)
<p>Regional and Functional Neuroanatomy of the Nervous System</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 functions of the different regions of the grey mater, and white matter State the key structures (grey and white matter) of the three functional divisions of the brain Extrapolate from normal functional anatomy, the signs of dysfunction that could occur with lesions in the different divisions 	Dr. Christine Thomson
<p>Ventricular System and Vascular Supply</p> <ul style="list-style-type: none"> Identify the different components of the ventricular system and use them to help determine the location of brain sections on imaging. Describe the CSF pathway from production to drainage. Identify different arterial territories in the brain and spinal cord and hence be able to determine which vessels must be occluded to cause infarction in a particular region. Recognize major blood vessels on brain imaging 	Dr. Christine Thomson
<p>MRI of the Brain</p> <ul style="list-style-type: none"> List frequently used MR sequences in the brain and their benefits Identify MRI pseudolesions List intracranial changes consistent with metabolic disorders 	Dr. Matt Winter
<p>Posture, Gait and Sensory Systems</p> <ul style="list-style-type: none"> State the key neurological functions tested in the neurological examination Define core components of the limbic system and functional neuroanatomy of the ARAS Describe the functional neuroanatomy of proprioceptive pathways (conscious, subconscious, and general pathways) and the effect of lesions on an animal's proprioception 	Dr. Christine Thomson

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<ul style="list-style-type: none"> • Differentiate nociception and pain and outline the functional neuroanatomy of these systems. • State the location of nociceptors that can result in spinal hyperpathia 	
<p>Motor Systems – Part I</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 	<i>Dr. Christine Thomson</i>
<p>Motor Systems – Part II</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 	<i>Dr. Christine Thomson</i>
<p>Myelography and CT in Neuroimaging</p> <ul style="list-style-type: none"> • Understand the advantages and disadvantages of myelography compared to MRI when imaging the spine • Understand the advantages and disadvantages of CT compared to MRI when imaging the spine 	<i>Dr. Silke Hecht</i>
<p>MRI of the Vertebral Column</p> <ul style="list-style-type: none"> • Select MRI sequences suitable for imaging of the canine and feline spine • Develop a systematic approach to the evaluation of a small animal spinal MRI study • Explain common pitfalls of small animal spine MRI 	<i>Dr. Silke Hecht</i>

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Cranial Nerves – Part I <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 	<i>Dr. Christine Thomson</i>
Cranial Nerves – Part II <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 	<i>Dr. Christine Thomson</i>
Visceral Nervous System and Summary <ul style="list-style-type: none"> State the functional neuroanatomy of the afferent, efferent and central portions of the visceral nervous system Eye: Describe / draw the autonomic innervation of the eye and adnexa. CN III, VII and sympathetic. Explain the clinical signs observed in Horner syndrome. Describe pharmacological testing of autonomic innervation of the eye. Urinary bladder: Discuss the visceral 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. 	<i>Dr. Christine Thomson</i>
Lysosomal Storage Diseases <ul style="list-style-type: none"> Explain the pathogenesis of lysosomal storage diseases (LSD) Recognize the signs that suggest a diagnosis of LSD Utilize DNA testing to confirm a diagnosis 	<i>Dr. Denny O'Brien</i>
Metabolic Encephalopathies <ul style="list-style-type: none"> Explain the pathogenesis of inborn errors of metabolism Utilize DNA testing or metabolite screening to make a diagnosis of an inborn error and apply dietary therapies, if available Explain the effects of sodium imbalances on brain function and recognize the importance of slow correction of the imbalance 	<i>Dr. Denny O'Brien</i>
Channelopathies <ul style="list-style-type: none"> Recall the role of ion channels in resting membrane potential and neuronal activity 	<i>Dr. Denny O'Brien</i>

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<ul style="list-style-type: none"> • Explain the pathogenesis of hereditary and acquired channelopathies • Apply appropriate therapies to restore normal activity 	
<p>Movement Disorders</p> <ul style="list-style-type: none"> • Explain the function of the direct and indirect pathways of the basal ganglia • Differentiate paroxysmal and drug induced dyskinesias from seizures • Apply rational therapy to restore balance to the system 	<i>Dr. Denny O'Brien</i>
<p>Neurologic Examination in Large Animals</p> <ul style="list-style-type: none"> • Perform a comprehensive neurologic exam in horses, cattle, camelids, small ruminants, and pigs • Recognize signs of neurologic dysfunction in large animal species • Review differences between large and small animal species 	<i>Dr. Monica Aleman, Dr. Amy Johnson</i>
<p>Forebrain Disorders</p> <ul style="list-style-type: none"> • Recognize signs of forebrain disease in large animals • Construct appropriate differential list for large animal species • Gain basic knowledge of diagnostic strategies and treatment approaches 	<i>Dr. Monica Aleman, Dr. Amy Johnson</i>
<p>Episodic Events</p> <ul style="list-style-type: none"> • Appreciate the scope of episodic events observed in large animal species • Recognize signs consistent with seizures and appropriate treatment strategies for seizures in large animals • Describe other causes of episodic events, including syncope and sleep disorders, in large animal species 	<i>Dr. Monica Aleman, Dr. Amy Johnson</i>
<p>Other Brain, CN, ANS</p> <ul style="list-style-type: none"> • Recognize signs of caudal fossa vs. peripheral cranial nerve disease in large animal species • Construct appropriate differential lists for farm animals vs. horses • Explain the most helpful diagnostic strategies and appropriate treatments depending on problem and species 	<i>Dr. Monica Aleman, Dr. Amy Johnson</i>
<p>Equine Spinal Disorders</p> <ul style="list-style-type: none"> • Recognize signs of spinal cord disease in horses and apply the modified Mayhew grading scale 	<i>Dr. Monica Aleman, Dr. Amy Johnson</i>

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<ul style="list-style-type: none"> Identify the most common causes of spinal cord disease in the horse as well as diagnostic and treatment strategies Describe current advances and limitations of imaging techniques in horses 	
<p>Non-Equine Disorders</p> <ul style="list-style-type: none"> Recognize signs of spinal cord disease in farm animal species Identify the most likely differentials for cattle, camelids, small ruminants, and pigs with spinal cord disease Explain typical diagnostic algorithms and treatment strategies for each farm animal species 	<i>Dr. Monica Aleman, Dr. Amy Johnson</i>
<p>Tetany, Tremor and Neuromuscular Disorders</p> <ul style="list-style-type: none"> Recognize signs of tetany and understand most common causes in farm animals vs. horses Recognize signs of diffuse neuromuscular weakness in large animal species and prioritize differentials depending on species Describe immediate diagnostic and treatment principles for tetanic and neuromuscular syndromes in large animal species 	<i>Dr. Monica Aleman, Dr. Amy Johnson</i>
<p>Cases</p> <ul style="list-style-type: none"> Practice identifying and localizing signs of neurologic disease in large animals Apply knowledge of large animal diseases to construct a differential diagnoses list Practice recommending appropriate diagnostic and treatment strategies depending on species and neuroanatomic localization 	<i>Dr. Monica Aleman, Dr. Amy Johnson</i>
<p>Neuromuscular Pathology</p> <ul style="list-style-type: none"> Recognize different nerve fiber types and to recall their function and neurophysiological properties Describe the various kinds of peripheral ganglia Link specific substructures and ion channel distribution to the neurophysiological properties Explain how structural changes might impact on nerve conduction 	<i>Dr. Kaspar Matiasek</i>
<p>Neuromuscular Pathology</p> <ul style="list-style-type: none"> Describe the most prevalent triggers and causes of congenital and acquired peripheral neuropathies in domestic animals 	<i>Dr. Kaspar Matiasek</i>

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<ul style="list-style-type: none"> Recognize main disease phenotypes from representative images Name the most important pathological neuropathy categories and to understand about their principal pathobiology 	
<p>Neuromuscular Pathology</p> <ul style="list-style-type: none"> Describe the physiological and biochemical properties of the most important muscle fiber types Explain the general composition of muscle tissue, its functional and supportive elements, including its vascularity and innervation Recall the most important molecular players of muscle excitation, contraction, and relaxation 	<i>Dr. Kaspar Matiasek</i>
<p>Neuromuscular Pathology</p> <ul style="list-style-type: none"> Recognize and name the most relevant muscle fiber abnormalities Explain the most common causes of myopathies in domestic animals Categorize myopathies in accordance with etiology, dysfunction and histological phenotype 	<i>Dr. Kaspar Matiasek</i>
<p>Cerebrospinal Fluid Analysis of the Dog and Cat</p> <ul style="list-style-type: none"> List the indications and contraindications of CSF collection Describe the different methods of CSF collection and their relative advantages and disadvantages Discuss the analysis of CSF parameters and how these parameters change with different disorders 	<i>Dr. Chris Mariani</i>
<p>Infectious Meningoencephalitis</p> <ul style="list-style-type: none"> List some common infectious agents that can invade the CNS of veterinary patients Describe the mechanisms by which infectious organisms cause CNS dysfunction List the diagnostic assays available to identify infectious organisms and elaborate on their various advantages and disadvantages Generate a diagnostic plan for animals with a potential CNS infection 	<i>Dr. Chris Mariani</i>
<p>Non-Infectious Meningoencephalitis</p> <ul style="list-style-type: none"> List the different syndromes comprising non-infectious meningoencephalitis and describe their differentiating factors 	<i>Dr. Chris Mariani</i>

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<ul style="list-style-type: none"> • Generate a diagnostic plan for a patient presenting with signs compatible with non-infectious meningoencephalitis 	
<p>Treatment of Non-Infectious Meningoencephalitis</p> <ul style="list-style-type: none"> • Explain the general mechanisms of action of immunosuppressive drugs used to treat non-infectious meningoencephalitis • List the potential adverse effects of these medications • Discuss the results of clinical studies of these drugs in the context of non-infectious meningoencephalitis therapy 	<i>Dr. Chris Mariani</i>
<p>Intro to Electrodiagnostic Theory and Testing</p> <ul style="list-style-type: none"> • Understand the biological source of signals recorded in electrodiagnostic tests • Recognize how machine recording settings affect the recorded response • Utilize artifact sources and actions you can take to remedy them and other recording problems • Know what to do when it doesn't work – a logical stepwise approach 	<i>Dr. George Strain</i>
<p>Hearing and Deafness</p> <ul style="list-style-type: none"> • Describe cochlear anatomy and physiology • Distinguish between sensorineural and conduction deafness • Distinguish between pigment-associated and non-pigment-associated inherited deafness • Distinguish between different forms of non-congenital deafness • Counsel clients with affected pets 	<i>Dr. George Strain</i>
<p>AER, Tympanometry, OAEs</p> <ul style="list-style-type: none"> • Recognize how a BAER test is performed and results are interpreted • Describe the effects of age, temperature, and drugs on recordings • Appreciate the effects of recording and stimulus settings on recordings • Describe how tympanometry is used to assess middle ear function 	<i>Dr. George Strain</i>
<p>Electrodiagnostics – EMG</p> <ul style="list-style-type: none"> • Recognize how to optimally perform an EMG examination • Identify normal EMG events (insertional activity, MEPP/end plate spikes, MUAP) and abnormal ones (giant MUAP, absent/decreased/prolonged insertional activity, 	<i>Dr. Colette Williams</i>

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fibrillation potentials, positive sharp waves, CRD, myotonic potentials, myokymic potentials) <ul style="list-style-type: none"> • Incorporate the role of EMG in a complete neuromuscular workup 	
Electrodiagnostics – Sensory & Motor Nerve Conduction Velocity <ul style="list-style-type: none"> • Explain techniques used in motor and sensory nerve conduction velocity determinations • Calculate numerical data such as, amplitudes, latencies and conduction velocities, from a set of motor and sensory recordings and describe other features of these potentials • Relate NCV findings to various disorders 	<i>Dr. Colette Williams</i>
Electrodiagnostics – Late Wave, RNS, CDP, SSEPs <ul style="list-style-type: none"> • Calculate f-ratios and to interpret the results • Identify significant findings in RNS studies • Recognize the utility of CNS recordings (CD, SEP and SSEP) 	<i>Dr. Colette Williams</i>
Electrodiagnostics – Case Studies <ul style="list-style-type: none"> • Critically evaluate all aspects of a given study to formulate a plan for additional diagnostics • Narrow down the diagnosis as closely as possible to aid in prognostication 	<i>Dr. Colette Williams</i>

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