Brain Camp Online – Electrodiagnostics

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Content Launch Date: **Tuesday, September 1, 2020**
Live Q&A with the Presenters: **Tuesday, September 22, 2020**
(session was recorded and is available for viewing in ACVIM Online)

This 6.5-hour course is designed to offer an intense, high-level review of clinical veterinary electrophysiology and electrodiagnostic testing aimed at the neurology resident. Topics will include brainstem auditory evoked responses, electromyography, nerve conduction studies, evaluation of the neuromuscular junction, and electroencephalography.

By the end of this course you will:

- Have an understanding of electrophysiologic theory
- Have a basic overview of electrodiagnostic testing for neurological disorders
- Have a basic understanding of diagnostic testing for neuromuscular disorders

All topics will be presented in 50 – 75 minute pre-recorded sessions.

Electrodiagnostics September 1, 2020	
Topic / Description and Learning Objectives	**Presenter**
Module 1: Introduction to Electrodiagnostic Testing This session will briefly introduce the biophysics behind biological recordings. Biological signals will be explained as dipoles and simple electrical circuits will demonstrate the role of different physical components of the overall recording setting. Included will be voltage/current/impedance, the effects of electrode distance from tissue signal generators, tissue impedance, electrode impedance, and measuring device input impedance, sources of artifact, differential recording, filtering, averaging, display gain and amplification, and the frequency ranges of relevant biological signals. Upon completion of the course, participants will be able to: • Understand the biological source of signals recorded in electrodiagnostic tests • Know how machine recording settings affect the recorded response • Know 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	George Strain, PhD

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Module 2: Deafness and Auditory Testing This session will review relevant auditory anatomy and physiology and the types of deafness that present in veterinary practice. Three tests of auditory function will be discussed, with focus on the first: the brainstem auditory evoked response (BAER), distortion product otoacoustic emissions (DPOAE), and tympanometry. The theoretical bases of the tests will be described and their clinical utility summarized. Factors affecting recordings will be discussed, including recording factors, stimulus factors, and non-pathologic biological factors. Upon completion of the course, participants will be able to: • Understand how a BAER test is performed and results are interpreted • Understand the effects of age, temperature, and drugs on recordings • Understand the effects of recording and stimulus settings on recordings • Distinguish between sensorineural and conduction deafness • Understand how tympanometry is used to assess middle ear function	George Strain, PhD
Module 3: Electrodiagnostics: EMG This session will cover the basics of performing EMG studies from equipment requirements and settings to muscle selection and electrode placement. Examples of normal and abnormal EMG findings will be featured with scoring for the latter described. The limitations of using this examination as a stand-alone test in cases of suspected neuromuscular disease will be listed. Upon completion of the course, participants will be able to: • Understand 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, fibrillation potentials, positive sharp waves, CRD, myotonic potentials, myokymic potentials) • Comprehend the role of EMG in a complete neuromuscular workup	D. Colette Williams, PhD

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Module 4: Electrodiagnostics: NCV The principles and methods for testing several commonly employed motor, sensory and mixed nerves will be presented. Descriptive and numeric analyses for determining whether findings are normal or abnormal will be described, along with factors that can influence these parameters. Particular attention will be on interpreting the results in terms of the associated pathophysiology behind them. Upon completion of the course, participants will be able to: • Understand the 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 • Have the knowledge to relate NCV findings to various disorders	D. Colette Williams, PhD
Module 5: Electrodiagnostics: Late Waves, RNS, MUNE, Cord Dorsum, SEP, SSEP The various late waves (f-wave, h-wave and a-wave) will be described, along with methods for recording RNS and MUNE. In addition to these and the previously mentioned PNS studies, EDX techniques for examining the CNS will be presented. Upon completion of the course, participants will be able to: • Have the ability to calculate f-ratios and to interpret the results • Identify significant findings in RNS studies • Have an understanding of the utility of CNS recordings (CD, SEP and SSEP)	D. Colette Williams, PhD
Module 6: Electrodiagnostics: EEG EEG terminology and methods will be covered, along with normal background patterns and transient events commonly recorded. Various artifacts will be presented and contrasted with true epileptiform discharges (spikes, sharp waves and slow waves). Event localization, in relation to display montage, will be discussed. Examples of normal and abnormal EEGs from various species will be shown, as will patterns associated with certain anesthetics. Upon completion of the course, participants will be able to: • Define the following EEG terms: Input Terminal 1, Input Terminal 2, derivation, montage, background, paroxysm, spike, sharp wave, slow wave, rhythmic and periodic • Identify various EEG artifacts in addition to normal and abnormal patterns and events • Contrast how EEG events are localized in a bipolar recording versus a referential recording	D. Colette Williams, PhD