



Prof. Dr. Lutz S. Göhring,
DVM, MS, Ph.D. Dipl. ACVIM,
ECEIM

Ludwig-Maximilians-
Universität München,
Klinik für Pferde, Germany

TOWARDS A BETTER DIAGNOSIS OF NERVOUS SYSTEM DISEASE

A number of tools and modalities for accurate (central) nervous system diagnoses were developed over the last decades. However, the most important exam for accurate and cost-conscious nervous system disease diagnosis is still to determine the neuro-anatomical location of the lesion!

Although a lot of progress has been made in nervous system diagnostics in the horse, its sheer size does not allow the same or similar use of equipment that is available for small animals or humans.

The clinical exam will guide the veterinarian to the area of interest. Then, a list of differential diagnoses for the specific region can be put together, followed by a structured plan of applied diagnostics. Ranking of diagnostics should be always from least invasive and least expensive to the more advanced and invasive procedures. Additional diagnostic procedures could include cerebro-spinal fluid (CSF) analysis, imaging techniques, functional assessments and histopathological examination of relevant tissues.

Blood work can reveal systemic inflammation or increased liver enzyme activity and hyperammonemia during liver failure. Cerebrospinal Fluid (CSF) analysis often reveals subtle changes in products associated with CNS conditions. CSF analysis further allows comparison of (specific), antibody titers with serum titers, and conclusions whether intrathecal production is fact, or not. There are 2 sites available for safe and standing fluid collection in the horse, and 2 sites available for centesis under general anesthesia. Classical parameters such as cell count, protein concentration but also specific antibody titers in CSF can be determined. Future focus in CSF analysis will be on metabolomics and proteomics. Imaging, by far, is currently used to evaluate the (bony) support structures surrounding the central nervous system, mainly radiographs and CT-imaging. MRI is able to show brain tissue, spinal cord, as well as spinal or peripheral nerves as long as body parts fit into the equipment. The outline of parts of the spinal cord can be evaluated during contrast studies.

Electrodiagnostics are relatively new, and methodology for these diagnostics exists or are under development. Electrodiagnostics (currently) comprise modalities like EMG, TcMEP, and EEG while BAER and Electroretinography are incidentally used. The importance of histopathology is growing. Muscle biopsies can reveal conditions of muscle spindle, motor end plates or denervation. Accessory nerve biopsies can show conditions that affect a peripheral (motor) nerve, and can be collected in the alive-standing animal without complications of functional loss. C1-C2 spinal cord sampling is an excellent method to acquire a section of spinal cord tissue including a dorsal root ganglion and a (short section) of a peripheral nerve. Certainly, the latter procedure has to be conducted post mortem and only when the entire body does not become available for necropsy.

All areas are expanding their diagnostic ranges, and will lead to an increase and improvement of our diagnostic range. However, everything comes with a price tag, which again points out the importance of an in-depth clinical evaluation guiding the examiner which additional tools needs to be chosen for an examination.