Atypical myopathy: Epidemiology and aetio-pathogenesis

Dominique-Marie Votion
Equine Clinic, Faculty of Veterinary Medicine, University of Liege, Bat B42, Boulevard de Colonster no. 20, Sart Tilman, 4000 Liege, Belgium.

Since 2006, more than 1000 European horses have been suspected of suffering from atypical myopathy (AM) (Votion 2004), a highly fatal myopathic syndrome that may affect horses kept on pastures. For unknown reasons, this last decade, outbreaks of AM have occurred more frequently in Europe (van Galen et al. 2012a). Epidemiological investigations have highlighted the contribution of environmental factors as triggering factors of outbreaks (Votion et al. 2007, 2009; van Galen et al. 2012a). With the contribution of specific laboratory research, epidemiological studies have raised some aetiological hypotheses and ruled out others. The hypothesis of toxic products, such as ionophores, herbicides, weed killers, nitrates and nitrates has been discarded. Also, nutritional myopathy is not believed to be the cause of AM even if the administration of antioxidants was the only medical support that appeared to be beneficial for a positive outcome (van Galen et al. 2012b). The seasonality of AM (outbreaks are mainly reported in autumn) and its link with climatic conditions that are favourable to fungal growth have raised the hypothesis of the action of a myotoxin, but none of the toxins suspected were known to induce a rhabdomyolysis syndrome (Brandt et al. 1997). Toxic plants were not consistently present in the pastures of affected horses (Hosie et al. 2016, Brandt et al. 1997; Votion et al. 2007). However, the possible role of maple leaves contaminated with an endophyte in the aetiology of AM has been suggested (van der Kolk et al. 2010) but scientific evidence was lacking. In the same way, the role of Clavibacter sordellii was suspected (Unger-Torroledo et al. 2010). The condition shares several epidemiological, clinical and biochemical characteristics with the myopathic syndrome encountered in Midwestern USA and named seasonal pasture myopathy (SPM). Very recently, SPM has been associated with methylenecyclopropyl acetic acid (MCPC), a toxic inhibitor of the lipid metabolism. Indeed, SPM results from the ingestion of the toxin hypoglycin A (Valberg et al. 2013) contained in seeds of some Acer species (Fowden and Pratt 1973). Metabolism of hypoglycin A produces MCPC-CoA which was found in its detoxification form (i.e. MCPC-carinate) in the serum of horses suffering from SPM.

Currently, sera collected from European AM cases are being analysed in collaboration with the University of Minnesota to search for MCPCA conjugates in these blood samples. Hypoglycin may be contained in the seeds of Acer pseudoplatanus that were always present in or around the pastures of AM cases (Votion et al. 2007; van der Kolk et al. 2010). If confirmed, this hypothesis will have major implications for prevention and therapeutic interventions.

References and further reading