Update on PDD and Avian Bornavirus

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To date, the so-called Psittacine Macaw Wasting Disease or Proventricular Dilatation disease (PDD) is one of the most important diseases of the gastrointestinal tract in psittacine birds. Due to most recent advances in gaining more knowledge in this disease, the terms mentioned above should not be used any more, as they describe just a little part of the disease, which covers a triad with dysfunction of the digestive tract, neurological and ocular disorders which may present all together in one individual or as the sole symptom. Because of most recent clinical virological, clinical and histopathological xxx should be replaced by the new term “avian borna ganglioneuritis (ABG). This term covers completely both, the aetiological aspect as well as the most obvious clinical and pathomorphological aspects of the disease.

Birds present with weight loss, passage of undigested feed, regurgitation, crop stasis or diarrhea. Neurological signs may include ataxia, tremor of head or wings, proprioceptive deficits, seizures or blindness. A dilated proventriculus and ventriculus is a typical radiographic finding and paper-thin walls and spontaneous ruptures of these parts of the digestive tract are frequently seen during necropsy (Grund et al., 1999). Microscopically, so-called PDD is recognized by the presence of lymphoplasmacytic infiltrates at enteric ganglia and nerves. Similar infiltrates may also be present in other organs, e.g. the brain, spinal cord, peripheral nerves, or adrenal glands (Mannl et al., 1987, Gregory et al 1994, Berhane et al., 2001). At present, clinical diagnosis is based on biopsy of crop wall and demonstration of inflammatory cell infiltrates at ganglion cells (Doolen 1994; Gregory et al 1996). So-called PDD is a chronic disease and is always fatal. Treatment is not available leading to pain and suffering of the affected animals over years.

Recently, two independent research groups (Kistler et al., 2008, Honkavuori et al., 2008) identified a new clade of bornavirus, called avian bornavirus (ABV), as a possible cause of PDD. Association of PDD and infection with ABV was later confirmed in other investigations (Rinder et al., 2009, Weissenböck et al., 2009) and was supported by experimental infection trials using ABV containing brain homogenates (Gancz et al., 2009) and cell culture materials (Gray et al., 2010, Payne et al., 2011, Piepenbring et al., 2011). Detection of ABV and ABV transmission during an outbreak of PDD in two aviaries further consolidated the role of ABV as the etiological agent of PDD (Kistler et al 2010). An extensive genetic heterogeneity has been found in ABV leading to the differentiation of at least 7 genotypes (Kistler et al., 2008, Rinder et al., 2009, Weissenböck et al., 2009a, 2009b).

Diagnosis of ABV infection is based on the detection of viral RNA by reverse transcription- polymerase chain reaction or realtime PCR (Kistler et al., 2008, Honkavuori et al., 2008). In addition, for antibody detection, immunofluorescence assays was developed (Herzog et al., 2010) and an ELISA was established using recombinant ABV N protein as the antigen (Rinder et al 2010). At present, a combination of PCR and antibody tests is recommended for routine diagnosis of ABV infections in psittacine birds.

Immunohistochemistry has successfully been used for detection of ABV antigen in avian internal organs and revealed broad tissue tropism which is in contrast to findings in borna disease virus in mammals (Kistler et al., 2008, Lierz et al., 2009, Rinder et al., 2009, Weissenboeck et al., 2009a).

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