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A Unique virus-mediated neurologic disease causing intestinal paralysis in birds

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The bornaviruses are negative stranded RNA viruses with the unique ability to replicate within the nucleus of infected cells. There are multiple genotypes of these viruses, the great majority affect birds and are classified asAvian bornaviruses (ABV). One genotype causes Borna disease in mammals and hence is named Borna disease virus (BDV). All the bornaviruses invade the central nervous system. Under some circumstances they cause an acute lethal encephalitis. However in many birds, while they infect the brain but do not cause significant disease. These birds survive indefinitely as apparently healthy carriers. Avian Bornavirus infects numerous species of parrot, waterfowl such as ducks, geese and swans, gulls, raptors and some finches. The spectrum of resulting disease extends from asymptomatic carriage through encephalitis of variable severity, blindness, ataxia and inability to fly to acute proventricular dilatation and intestinal blockage. It is this last syndrome, called proventricular dilatation disease (PDD) that is of major significance in captive birds.

The pathogenesis of PDD is unknown. Affected birds develop a polyneuritis with detectable virus, not only in the brain and spinal cord, but also in the vagus and sciatic nerves and in the autonomic ganglia of the anterior gastrointestinal tract. However ABV is not cytopathic so the neuronal inflammation is not secondary to virus-mediated cytotoxicity. Likewise vagotomy does not result in proventricular dilatation suggesting tat the key lesion is not in the vagus.In laboratory rodents infected with Borna disease virus, nervous system lesions are most likely mediated by cytotoxic T cells since anti T cell serum or appropriate immunosuppression can ameliorate the disease. It is unclear whether this also applies to ABV/PDD although in our hands preliminary treatment with cyclosporine is giving encouraging results. It has been asserted that PDD may also develop as a consequence of the development of a Gullain-Barre-like syndrome associated with the development of antiganglioside antibodies. Certainly such antibodies may be detected in some cases (as may anti-myelin antibodies), but the correlation between antibody levels and disease severity is poor.There is however a correlation between the level of anti ABV antibodies in serum and the severity of disease. In our studies seroconversion is associated with the onset of severe clinical disease. Additionally the close association between the viral ribonuclear complex and the histones in chromatin implies that the virus may mediate significant epigenetic effects within infected neurons.

Biography

Tizard obtained his degree in Veterinary Medicine from the University of Edinburgh and his PhD from the University of Cambridge. He is currently University Distinguished Professor of Immunology and Richard M. Schubot Professor of Exotic Bird Health at Texas A&M University. His current research focuses on vaccines administered by the intranasal and oral routes, as well as studies on viruses of wild and exotic birds. He is also involved in whole genome sequencing of several avian species.

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