Emerging and Reemerging Viruses of Dogs and Cats

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Diagnostic Investigation of Emerging Viruses of Companion Animals 755
Sanjay Kapil, Teresa Yeary, and Bill Johnson

In this article, the authors are specifically concerned with the timely and accurate detection of emerging diseases of small animals that are viral in origin. Veterinarians are bound to encounter emerging viruses in their practice. The problem is unavoidable, because viruses are highly mutagenic. Even the immune response dictates the nature of virus that evolves in a host. If the clinical signs and diagnostic methods fail to correlate, the veterinarian should work with the diagnostic laboratory to solve the diagnostic puzzle.

Molecular Virology of Feline Calicivirus 775
Patricia A. Pesavento, Kyeong-Ok Chang, and John S.L. Parker

Caliciviridae are small, nonenveloped, positive-stranded RNA viruses. Much of our understanding of the molecular biology of the caliciviruses has come from the study of the naturally occurring animal caliciviruses. In particular, many studies have focused on the molecular virology of feline calicivirus (FCV), which reflects its importance as a natural pathogen of cats. FCVs demonstrate a remarkable capacity for high genetic, antigenic, and clinical diversity; “outbreak” vaccine resistant strains occur frequently. This article updates the reader on the current status of clinical behavior and pathogenesis of FCV.

Canine Distemper Virus 787
Vito Martella, Gabriella Elia, and Canio Buonavoglia

Vaccine-based prophylaxis has greatly helped to keep distemper disease under control. Notwithstanding, the incidence of canine distemper virus (CDV)–related disease in canine populations throughout the world seems to have increased in the past decades, and several episodes of CDV disease in vaccinated animals have been reported, with nationwide proportions in some cases. Increasing surveillance should be pivotal to identify new CDV variants and to understand the dynamics of CDV epidemiology. In addition, it is important to evaluate whether the
efficacy of the vaccine against these new strains may somehow be affected.

**Canine Adenoviruses and Herpesvirus**

Nicola Decaro, Vito Martella, and Canio Buonavoglia

Canine adenoviruses (CAVs) and canine herpesvirus (CHV) are pathogens of dogs that have been known for several decades. The two distinct types of CAVs, type 1 and type 2, are responsible for infectious canine hepatitis and infectious tracheobronchitis, respectively. In the present article, the currently available literature on CAVs and CHV is reviewed, providing a meaningful update on the epidemiologic, pathogenetic, clinical, diagnostic, and prophylactic aspects of the infections caused by these important pathogens.

**Canine Respiratory Coronavirus: An Emerging Pathogen in the Canine Infectious Respiratory Disease Complex**

Kerstin Erles and Joe Brownlie

Infectious respiratory disease in dogs is a constant challenge because of the involvement of several pathogens and environmental factors. Canine respiratory coronavirus (CRCoV) is a new coronavirus of dogs, which is widespread in North America, Japan, and several European countries. CRCoV has been associated with respiratory disease, particularly in kenneled dog populations. The virus is genetically and antigenically distinct from enteric canine coronavirus; therefore, specific tests are required for diagnosis.

**Canine Influenza**

Edward J. Dubovi and Bradley L. Njaa

In 2004, the isolation of an influenza virus from racing greyhounds changed the point of reference for discussions about influenza virus in dogs. A virus isolated from greyhounds did not have its origin in a previously described human influenza virus but came from a virus with an equine history. More significantly, evidence emerged to indicate that the virus was capable of transmission from dog to dog. This virus is now referred to as canine influenza virus (CIV) and is the focus of this review. Because the history of CIV is relatively short, the impact of this virus on canine health is yet to be determined.

**Parvovirus Infection in Domestic Companion Animals**

Catherine G. Lamm and Grant B. Rezabek

Parvovirus infects a wide variety of species. The rapid evolution, environmental resistance, high dose of viral shedding, and interspecies transmission have made some strains of parvovirus infection difficult to control within domestic animal populations. Some parvoviruses in companion animals, such as canine parvovirus (CPV) 1 and feline...
parvovirus, have demonstrated minimal evolution over time. In contrast, CPV 2 has shown wide adaptability with rapid evolution and frequent mutations. This article briefly discusses these three diseases, with emphasis on virus evolution and the challenges to protecting susceptible companion animal populations.

Rabies in Small Animals 851
Sarah N. Lackay, Yi Kuang, and Zhen F. Fu

Rabies in small animals has been dramatically reduced in the United States since the introduction of rabies vaccination of domestic animals in the 1940s. As a consequence, the number of human rabies cases has declined to only a couple per year. During the past several years, the dog rabies variant has almost disappeared completely. Rabies in wildlife has skyrocketed, however. Each wildlife species carries its own rabies variant(s). These wildlife epizootics present a constant public health threat in addition to the danger of reintroducing rabies to domestic animals. Vaccination is the key to prevent rabies in small animals and rabies transmission to human beings.

Emerging Viral Encephalitides in Dogs and Cats 863
Bradley L. Njaa

Few viral pathogens resulting in encephalitis in dogs and cats have emerged over the past decade or so. All are the result of penetration through presumed species barriers and all are considered zoonoses or possible zoonotic pathogens. In all cases, encephalitis is a rare event that has low morbidity but high mortality. More viruses are likely to emerge as pathogenic in our domesticated carnivorous companions as our habitats continue to overlap with the shrinking wildlife habitats. Hopefully, however, none reach the level of distinction that was once held by rabies virus.

Retroviral Infections of Small Animals 879
Stephen P. Dunham and Elizabeth Graham

Retroviral infections are particularly important in cats, which are commonly infected with feline leukemia virus and feline immunodeficiency virus. This article describes the biology of these viruses and explores current issues regarding vaccination and diagnosis. The seeming lack of a recognized retrovirus infection in dogs is speculated on, and current and potential future therapies are discussed.

Vaccines for Emerging and Re-Emerging Viral Diseases of Companion Animals 903
David Scott McVey and Melissa Kennedy

It is likely that new viral diseases may continue to emerge in companion animals. It is more likely that genetic or antigenic virus variants or geographically translocated viruses may emerge or re-emerge in companion
animals, however. This latter possibility represents the greater risk. Because this represents an ongoing threat, research and development should continue to maximize broad efficacy and effectiveness in addition to safety. To achieve these goals, the research and development effort should evaluate newer available technologies that may also reduce any barriers to use and availability.

**Accidental Introduction of Viruses into Companion Animals by Commercial Vaccines**

James F. Evermann

The use of biologics in veterinary medicine has been of tremendous value in safeguarding our animal populations from debilitating and oftentimes fatal disease. This article reviews the principles of vaccination and the extensive quality control efforts that are incorporated into preparing the vaccines. Examples of adverse events that have occurred in the past and how enhanced vigilance at the level of the veterinarian and the veterinary diagnostic laboratory help to curtail these events are discussed. Emphasis on understanding the ecology of viral infections in dogs and cats is introduced, together with the concepts of the potential role of vaccines in interspecies spread of viruses.

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