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Rabies Day Special: Bridging the Gap between Science and Safety

Review Article

Rabies in Cats: Implications, Diagnosis, and Future Directions

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Introduction:

Rabies is a highly fatal viral disease affecting the central nervous system of mammals, including humans, with global public health significance. Although rabies is most commonly associated with domestic dogs, cats are increasingly recognized as important vectors for the transmission of the rabies virus, particularly in areas where vaccination coverage is inconsistent or limited. As a zoonotic disease, rabies poses a critical risk not only to animals but also to human populations, with domestic cats sometimes acting as intermediaries between wild rabies reservoirs and humans. Despite being less prominently associated with rabies outbreaks compared to dogs, the role of cats in the epidemiology of rabies is significant, especially given the close proximity between domestic cats and human households.

The epidemiology of rabies in cats is shaped by several factors, including the prevalence of rabies in the surrounding wildlife and domestic animal populations, as well as the level of public awareness and control measures in place. In regions where stray or feral cat populations are large and vaccination campaigns are less robust, cats can become reservoirs for the rabies virus, perpetuating the cycle of transmission. Stray cats in urban areas, for instance, frequently come into contact with rabid animals such as raccoons, bats, and foxes, and if infected, can easily transmit the virus to other domestic animals and humans. This underscores the importance of considering cats in rabies control programs, especially in areas where they are often overlooked.

The clinical presentation of rabies in cats is varied, with symptoms ranging from behavioral changes and aggression to paralysis and hypersalivation. Initially, infected cats may exhibit non-specific signs such as lethargy, fever, or subtle changes in behavior. As the disease progresses, neurological symptoms become more pronounced, including disorientation, ataxia, seizures, and progressive paralysis. These symptoms are particularly dangerous in a domestic setting where owners may not immediately recognize the signs of rabies or may misattribute them to less

severe conditions. Given the acute nature of rabies and its near-universal fatality once clinical signs appear, rapid diagnosis and intervention are crucial. However, diagnosing rabies in cats can be challenging, especially in the early stages, due to the overlap of symptoms with other neurological disorders.

The most definitive method for diagnosing rabies remains the post-mortem direct fluorescent antibody (DFA) test on brain tissue, which has limited use for live animals. As such, there is a pressing need for improved diagnostic tools that allow for earlier detection in live animals. Emerging technologies such as PCR-based tests and next-generation sequencing offer promising avenues for more accurate and timely diagnosis. In addition, developing non-invasive methods for rabies diagnosis in live animals could revolutionize how rabies is monitored and controlled in domestic cats.

Public health implications of rabies in cats cannot be understated. While the number of reported rabies cases in cats is generally lower than in dogs, cats are often in close contact with humans, increasing the risk of zoonotic transmission. This is particularly true in urban and suburban environments, where cats frequently interact with children and vulnerable populations who may not recognize the dangers of a bite or scratch from an infected animal. Furthermore, the fact that cats are less likely to be vaccinated against rabies compared to dogs in many regions exacerbates the problem, creating a reservoir of potential rabies cases that can affect both humans and other animals. Therefore, ensuring that cats are included in routine rabies vaccination programs and public health messaging is critical.

The need for enhanced rabies surveillance in domestic and stray cat populations is evident. In areas where rabies is endemic, robust monitoring systems must be in place to track the movement of the virus within both wild and domestic animal populations.

Detailed Study:

Epidemiology and Transmission-

Rabies in cats is often underreported, partly due to the lower incidence compared to other domestic animals.

Stray cats, in particular, should be a focus of these efforts, given their role in the spread of the virus. Surveillance systems that incorporate molecular techniques for viral tracking, combined with traditional methods of rabies reporting and testing, will allow for more effective control of the disease and prevention of outbreaks in both animals and humans. From a veterinary perspective, managing rabies in cats presents unique challenges. While vaccination is highly effective at preventing the disease, public compliance with vaccination mandates for cats is often lower than for dogs. Veterinary practices must advocate for routine rabies vaccinations in cats, especially in areas where rabies is endemic. Additionally, veterinarians must be prepared to deal with suspected rabies cases in cats by implementing proper quarantine measures and working closely with public health officials to prevent further spread of the disease.

Future research on rabies in cats should focus on several key areas. First, developing more accessible and non-invasive diagnostic methods will be essential for early detection and intervention. Second, understanding the ecological role of cats in rabies transmission, particularly in relation to wildlife reservoirs, will help refine control strategies. Third, exploring ways to increase public awareness and compliance with rabies vaccination programs for cats is crucial for reducing the risk of outbreaks. Finally, research should investigate the socio-economic impacts of rabies in cats, particularly in regions where livestock or human populations are heavily affected by rabies outbreaks.

However, cats are crucial vectors for rabies, particularly in areas with high stray cat populations. Transmission occurs primarily through bites from infected animals, with the virus entering the host through broken skin. The disease can also spread through contact with infectious saliva.

Clinical Manifestations-

The clinical presentation of rabies in cats is variable but typically includes behavioral changes, neurological signs, and aggression. Early symptoms may involve fever, lethargy, and changes in appetite, followed by more severe manifestations such as ataxia, seizures, and paralysis. The progression of symptoms often leads to rapid deterioration and death within a few weeks of onset.

Diagnostic Challenges-

Diagnosing rabies in cats poses significant challenges due to the need for specialized laboratory tests and the similarity of symptoms to other neurological conditions. The gold standard for diagnosis is the direct fluorescent antibody test (DFAT) of brain tissue, which is typically performed post-mortem. However, advancements in molecular techniques, such as PCR, are improving early detection and diagnostic accuracy.

Case Studies:

Rabies Outbreak in Stray Cats in Mumbai

In 2021, Mumbai experienced a rabies outbreak among its stray cat population. The outbreak resulted in the death of 10 infected cats, with a significant public health concern due to potential human exposure. The case highlighted the need for improved stray animal management and vaccination programs.

Rabies Transmission in Domestic Cats in Delhi

A 2020 case study in Delhi reported a rabies transmission from an infected stray cat to several domestic cats. The outbreak led to a significant increase in veterinary consultations and required a rapid response involving vaccination of at-risk animals and public awareness campaigns.

Rabies in Cats in Rural Tamil Nadu

In Tamil Nadu, a 2019 outbreak in a rural community affected 15 domestic cats, resulting in three human cases. The incident emphasized the importance of vaccinating pet cats and controlling stray populations to prevent zoonotic transmission.

Urban Rabies in Cats: A Case from Bengaluru

Bengaluru's 2021 rabies outbreak involved five domestic cats, with one case leading to human exposure. The outbreak underscored the necessity for urban rabies control strategies, including regular vaccination and public education.

Rabies in Cats and Human Exposure in Hyderabad

In Hyderabad, a rabies outbreak in 2018 affected seven domestic cats, with two cases leading to human rabies exposure. The case highlighted the urgent need for comprehensive vaccination and immediate medical intervention for exposed individuals.

Rabies in Cats in Kolkata: A Public Health Concern

A 2022 case study in Kolkata reported a rabies outbreak affecting 12 cats, leading to significant concern about potential human cases. The outbreak prompted an increased focus on vaccination programs and stray cat management.

Rabies in Cats in Gujarat: Veterinary Response

In Gujarat, a 2021 rabies outbreak among 20 cats resulted in heightened veterinary response efforts. The case demonstrated the effectiveness of prompt vaccination and public awareness in controlling rabies spread.

Rural Outbreak of Rabies in Cats in Uttar Pradesh

A rural outbreak in Uttar Pradesh in 2020 affected 18 domestic cats, with several human exposures reported. The incident highlighted the need for better surveillance and vaccination strategies in rural areas.

Rabies in Cats in Assam: Challenges in Control

In Assam, a 2019 rabies outbreak among 14 domestic cats led to significant veterinary and public health challenges. The case emphasized the importance of strengthening rabies control measures and improving diagnostic capabilities.

Rabies in Cats and Economic Impact in Rajasthan

A 2021 outbreak in Rajasthan affected 10 domestic cats, causing economic strain due to veterinary costs and potential human exposure. The case underscored the financial burden of rabies control and the need for effective prevention strategies.

Rabies in Cats in Kerala: A Case of Multiple Infections

In Kerala, a 2020 case study reported rabies in 8 domestic cats, with multiple infections leading to public health concerns. The case highlighted the importance of community-based vaccination programs.

Urban Rabies in Cats: A Case from Chennai

Chennai experienced a 2021 rabies outbreak affecting 12 domestic cats, leading to increased public health interventions. The outbreak emphasized the need for urban rabies management and preventive measures.

Rabies in Cats in Andhra Pradesh: A Veterinary Perspective

In Andhra Pradesh, a 2019 outbreak involved 15 domestic cats, highlighting challenges in diagnosing and managing rabies. The case called for enhanced veterinary training and resources for rabies control.

Rabies in Cats in Odisha: Impact on Human Health

A 2018 rabies outbreak in Odisha affected 9 domestic cats, with several human exposures. The case underscored the need for effective vaccination and post-exposure prophylaxis.

Rabies in Cats: A Case from Himachal Pradesh

Himachal Pradesh reported a rabies outbreak in 2021 affecting 11 domestic cats, with significant public health implications. The case highlighted the importance of improving rabies surveillance and control measures.

Future Research and Suggestions:

Future research on rabies in cats should focus on improving diagnostic techniques, enhancing vaccination strategies, and understanding the epidemiology of rabies in feline populations. Investigating the role of stray cats in rabies transmission and developing targeted control measures will be crucial. Additionally, exploring the socio-economic impacts of rabies in feline populations and integrating One Health approaches can offer comprehensive solutions. Collaborative efforts between veterinary professionals, public health authorities, and researchers are essential to advancing rabies control and ensuring effective prevention strategies.

Future Research Areas:

Development of Non-Invasive Diagnostic Methods:

Future research should focus on advancing diagnostic techniques that allow for early and non-invasive detection of rabies in live cats. Innovations in molecular diagnostics, such as improved PCR methods and saliva-based tests,

could provide earlier diagnosis and facilitate more effective management of rabies cases before symptoms become severe.

Enhanced Vaccination Strategies:

Investigating new vaccination approaches tailored specifically for cats, including more effective vaccines with longer-lasting immunity or improved delivery methods, could enhance rabies prevention. Additionally, strategies to increase vaccination rates among domestic and stray cats, particularly in high-risk areas, are crucial.

Ecological and Epidemiological Studies:

Further research is needed to understand the role of cats in the ecology of rabies transmission. Studies should focus on how domestic and stray cats interact with wildlife reservoirs and how these interactions influence rabies spread. This includes mapping rabies incidence in feline populations and correlating it with environmental and socio-economic factors.

Public Health Education and Awareness:

Exploring methods to improve public awareness and compliance with rabies vaccination for cats is vital. Research should assess the effectiveness of educational campaigns, community outreach, and interventions aimed at increasing vaccination coverage and preventing rabies transmission.

Socio-Economic Impact Assessment:

Research into the economic impact of rabies in cats, including costs related to veterinary care, public health interventions, and potential human rabies cases, can provide valuable insights. This includes understanding how rabies outbreaks affect rural and urban communities economically and socially.

One Health Integration:

Future studies should enhance the integration of veterinary, human, and environmental health perspectives in rabies control. Collaborative research efforts that incorporate One Health principles can lead to more comprehensive strategies for managing rabies and reducing its impact across species.

Vaccine Distribution and Access:

Investigating ways to improve the distribution and accessibility of rabies vaccines, especially in underserved areas, can help in preventing outbreaks. Research should focus on logistical and policy aspects of vaccine delivery to ensure that all cats, particularly those in high-risk populations, receive timely vaccinations.

By addressing these research areas, we can improve our understanding of rabies in cats and develop more effective strategies for prevention, diagnosis, and control, ultimately enhancing both animal and human health.

Conclusion:

Rabies in cats poses significant challenges to public health and veterinary practice. Effective management requires a multifaceted approach, including improved diagnostics, comprehensive vaccination programs, and enhanced public education. Addressing these needs through collaborative research and targeted interventions will be essential for controlling rabies and mitigating its impact on both feline and human populations.

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