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Human Adenovirus: A Comprehensive Review of Epidemiology, Pathogenesis and Therapeutic Approaches

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Introduction

Human adenoviruses (HAdVs) belong to the Adenoviridae family and are ubiquitous pathogens infecting humans worldwide. With over 70 known serotypes classified into seven species (A to G), HAdVs are responsible for a spectrum of clinical diseases, including respiratory infections, conjunctivitis, gastroenteritis and more rarely, severe systemic illnesses. This review comprehensively explores the epidemiology, pathogenesis and therapeutic strategies for HAdV infections.

HAdVs exhibit a broad spectrum of epidemiological patterns, with prevalence varying by geographic location, age and season. Respiratory adenoviral infections commonly occur in children, with outbreaks frequently reported in institutional settings such as schools and daycare centers. Seroprevalence studies suggest that nearly all individuals have been exposed to HAdV by adulthood, indicating the widespread circulation of these viruses in human populations. Additionally, certain serotypes demonstrate tropism for specific tissues, contributing to variations in clinical presentations and disease severity [1].

Description

HAdV infections typically occur via respiratory droplets, fecal-oral transmission, or direct contact with contaminated surfaces. Following initial entry into the host, HAdVs primarily target mucosal epithelial cells, where they undergo replication and cause localized inflammation. The expression of viral proteins facilitates immune evasion mechanisms and modulates host cell signaling pathways, leading to viral spread and tissue damage. Furthermore, HAdVs can establish latent infections, with viral persistence linked to the development of chronic diseases and malignancies.

The clinical manifestations of HAdV infections range from mild, self-limiting illnesses to severe, life-threatening conditions. Respiratory adenoviral infections commonly present with symptoms such as fever, cough, rhinorrhea and pharyngitis, mimicking other respiratory pathogens [2]. In severe cases, pneumonia and acute respiratory distress syndrome (ARDS) may develop, particularly in immunocompromised individuals or those with underlying respiratory conditions. Other clinical syndromes associated with HAdV infections include conjunctivitis, gastroenteritis, hepatitis and neurologic complications.

The diagnosis of HAdV infections relies on various laboratory methods, including viral culture, polymerase chain reaction (PCR), antigen detection assays and serological testing. PCR-based assays offer high sensitivity and specificity and are commonly employed for the rapid detection and typing of HAdV strains. Serological assays, such as enzyme-linked immunosorbent assay (ELISA) and neutralization assays, aid in assessing immune status and investigating seroprevalence trends within populations [3].

Currently, there are no specific antiviral agents approved for the treatment of HAdV infections. Management primarily focuses on supportive care and symptom relief, with interventions such as antipyretics, hydration and oxygen therapy as needed. In severe cases, particularly in immunocompromised individuals, antiviral drugs such as cidofovir and brincidofovir may be considered off-label. However, their efficacy remains limited and the emergence of drug-resistant strains poses challenges to treatment outcomes. Novel therapeutic strategies, including immunomodulatory agents and gene therapy approaches, are being investigated for their potential in combating HAdV infections.

Preventive measures play a crucial role in controlling the spread of HAdV infections. Vaccination represents a promising strategy for reducing the burden of respiratory adenoviral diseases, particularly among military recruits and pediatric populations at higher risk of severe illness. Several candidate vaccines targeting specific HAdV serotypes or conserved antigens are under development, with ongoing efforts to enhance their immunogenicity and cross-protective efficacy. Additionally, promoting good hand hygiene practices, environmental disinfection and adherence to infection control protocols are essential for preventing HAdV transmission in healthcare settings and community settings [4].

Human adenovirus (HAdV) infections are ubiquitous and can cause a wide range of clinical manifestations, ranging from mild respiratory illness to severe pneumonia, gastroenteritis, conjunctivitis and even life-threatening disseminated disease in immunocompromised individuals. The epidemiology of HAdV is complex, with multiple serotypes circulating worldwide and varying patterns of seasonal prevalence.

The pathogenesis of HAdV involves viral replication in the respiratory, gastrointestinal, or ocular mucosa, followed by dissemination to other organs via viremia. The virus can evade host immune responses and establish persistent infections in lymphoid tissues, leading to the potential for recurrent or chronic disease. Additionally, certain serotypes have specific tissue tropisms, contributing to the diverse clinical manifestations associated with HAdV infections [5].

Therapeutic approaches for HAdV infections primarily focus on supportive care, as there are no specific antiviral agents approved for clinical use. However, recent advances in gene therapy and immunomodulatory strategies hold promise for the development of targeted therapies against HAdV. These may include antiviral drugs targeting viral replication, immunotherapies to enhance host immune responses and gene editing techniques to disrupt viral genes essential for pathogenesis.

Conclusion

Human adenoviruses remain significant pathogens with diverse clinical manifestations and epidemiological patterns. Despite advancements in diagnostic techniques and supportive care, effective management of HAdV infections remains challenging, particularly in severe cases and immunocompromised individuals. Continued research efforts aimed at elucidating the molecular mechanisms of HAdV pathogenesis and developing novel therapeutic and preventive strategies are warranted to mitigate the impact of these infections on global public health.

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Conflict of Interest

None.

References

1. Carbajal, Ricardo, Andre Rousset, Claude Danan and Sarah Coquery, et al. “Epidemiology and treatment of painful procedures in neonates in intensive care units.” JAMA 300 (2008): 60–70.
2. Lei, Yue, Zhichao Zhuang, Yang Liu and Zhaolin Tan, et al. "Whole genomic sequence analysis of human adenovirus species C shows frequent recombination in Tianjin, China." Viruses 15 (2023): 1004.
3. Hall, Richard W. and Kanwaljeet J. S. Anand. “Pain management in newborns.” Clin Perinatol 41 (2014): 895–924.
4. Marcus, Julia L., Wendy A. Leyden, Chun R. Chao and Felicia C. Chow, et al. "HIV infection and incidence of ischemic stroke." Aids 28 (2014): 1911-1919.
5. Feinstein, Matthew J., Ehete Bahiru, Chad Achenbach and Christopher T. Longenecker, et al. "Patterns of cardiovascular mortality for HIV-infected adults in the United States: 1999 to 2013." Am J Cardiol 117 (2016): 214-220.

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