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Perspective

Significance of Torque Teno Virus: A Potential Emerging Pathogen

Omar Sandro*

Department of Biomedical Sciences for Health, University of Milan, Milan, Italy

DESCRIPTION

Torque Teno Viruses (TTVs) are a group of small, single-stranded DNA viruses that have been found in various mammalian species, including humans. TTVs were first discovered in 1997 in the serum of a patient with post-transfusion hepatitis of unknown origin. Since then, TTVs have been found in a wide range of healthy and diseased individuals, but their role in human disease remains unclear. TTVs belong to the family *Anelloviridae* and are characterized by a circular genome of approximately 3.8 kilobases in length. They are non-enveloped viruses and have a T=1 icosahedral capsid. TTVs are highly diverse and are classified into several genotypes based on their nucleotide sequence. Currently, there are at least 29 known TTV genotypes, with TTV1 being the most prevalent genotype in humans. TTVs are ubiquitous and have been detected in various human tissues and fluids, including blood, saliva, semen, breast milk, and feces. The virus is primarily transmitted through the fecal-oral route, although other routes of transmission, such as blood transfusion and sexual contact, have also been reported. TTV infection is common, with seroprevalence rates ranging from 30% to 90% in different populations worldwide.

Although TTVs have been detected in a wide range of human diseases, including hepatitis, respiratory infections, and cancer, their association with disease remains controversial. Some studies have suggested a potential role for TTVs in the development of liver disease, particularly in patients with Hepatitis C Virus (HCV) infection. However, other studies have failed to find a significant association between TTVs and liver disease. Similarly, TTVs have been detected in respiratory secretions of patients with respiratory tract infections, but their role in these infections remains unclear. One of the challenges in studying TTVs is the lack of a reliable cell culture system. TTVs cannot be propagated in cell cultures, and the only available method for detecting TTVs is through PCR-based assays. PCR-based assays can detect TTV DNA in various tissues and fluids, but they cannot differentiate between active and latent infections. Additionally, PCR-based assays may produce false-positive results due to contamination or cross-reactivity with other viruses. Another challenge in studying TTVs is the lack of a suitable animal model. TTVs have been found in various animal species, including non-human primates, pigs, and cows, but their pathogenicity in these animals remains unclear. The absence of a suitable animal model has hindered the development of vaccines and antiviral therapies for TTV infection.

TTVs have also been implicated in the pathogenesis of other diseases, including lymphoma, leukemia, and autoimmune disorders. However, the evidence for these associations is limited, and further studies are needed to clarify the role of TTVs in these conditions. The diagnosis of TTV infection is usually based on the detection of TTV DNA in bodily fluids. Several methods are available for the detection of TTV DNA, including PCR, hybridization assays, and sequencing. However, the clinical significance of a positive TTV DNA test remains uncertain, and the interpretation of test results can be challenging. There is currently no specific treatment for TTV infection, and management is usually supportive. However, some studies have suggested that interferon therapy may be effective in treating TTV-related liver disease.

In conclusion, TTVs are a group of small, single-stranded DNA viruses that have been detected in various mammalian species, including humans. Although TTVs have been detected in a wide range of human diseases, their role in disease pathogenesis remains unclear.

TTVs are highly diverse, and at least 29 known genotypes have been identified. TTV infection is common, with seroprevalence rates ranging from 30% to 90% in different populations worldwide. The primary mode of transmission is through the fecal-oral route, but other modes of transmission have also been reported. One of the challenges in studying TTVs is the lack of a reliable cell culture system, and the absence of a suitable animal model has hindered the development of vaccines and antiviral therapies for TTV infection. Future studies are needed to determine the pathogenicity of TTVs and their potential role in human disease.

Correspondence to: Omar Sandro, Department of Biomedical Sciences for Health, University of Milan, Milan, Italy, E-mail: sandromar@omar.gmail.com

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