

Enterovirus

Enteroviruses are a genus belonging to the Picornaviruses, a family of small, nonenveloped, icosahedral viruses which contain a single-stranded, non-segmented RNA genome and four structural proteins. Other genera in the picornaviruses include the rhinoviruses, cardioviruses, aphthoviruses, and hepatoviruses.

Nomenclature

The enteroviruses' nomenclature follows a numerical designation as they still continue to be discovered and more than seventy enteroviruses have been identified (for example, enterovirus 68). However, historically significant members of the genus retain their empirical names, for example poliovirus, which is considered to be the smallest, simplest "significant" virus.

Epidemiology

Enteroviruses are transmitted through the fecal-oral route - mainly through the contamination of food or water. They have the advantage in being stable in low pH, and therefore are able to survive in the acidic environment of the stomach and GIT. There, they are able to replicate and then be shed in the stool. These viruses are also able to spread from the GIT and enter the blood stream, causing viremia, and spread to other organs. An example of this would be the spread of the poliovirus to motor-neurons of the central nervous system, causing paralytic poliomyelitis. Most infections are asymptomatic; they do, however usually result in protective immunity.

Viral Replication

Cell entry

Enteroviruses bind to specific receptors on host cell surfaces. The expression of these receptors by a cell or tissue seems to be the determining factor for the susceptibility of the tissue to the virus. For example, poliovirus selectively binds to immunoglobulin-like receptor CD155, also referred to as the Poliovirus receptor (PVR).

Mechanism of Genome Replication

The incoming parental RNA serves as a template for the creation of a genome-size, negative strand RNA (recall that enteroviruses contain a single positive strand of RNA), which in turn serves as a template from multiple progeny of positively stranded RNA. This is also referred to as Type I viral replication.

Translation

The enterovirus genome contain a single, long open reading frame, with a highly structured internal ribosome entry site (IRES) on the 5' end directing translation of the viral DNA. Translation results in the formation of a long polypeptide which is then autocleaved into 10 structural and non-structural proteins by viral proteases. The end product also includes the viral RNA polymerase needed to synthesize additional copies of the virus.

Clinical Significance of Enterovirus Infections

An important aspect of all enteroviruses is that they are all capable causing CNS disease. This significance is reflected by the fact that enteroviruses are the major recognizable cause of acute aseptic meningitis syndrome. This syndrome refers to any meningitis for which the cause is not clear after initial examination plus routine stains and cultures of the cerebrospinal fluid.

Links

Bibliography

HARVEY, Richard A, et al. *Lippincott's Illustrated Reviews: Microbiology*. 2nd edition. 2007. Chapter 26: Positive-strand RNA Viruses. ISBN 0-7817-8215-5.