



Adenovirus

Adenoviruses were first isolated from human adenoids and are ubiquitous pathogens that can cause infection in both animals and humans^(1,2). They are non-enveloped double-stranded DNA viruses with an icosahedral capsid and 252 structural capsomeres (shown in Figure 1)⁽¹⁾. There have been over 50 serotypes identified, allowing disease to occur in various tissue types⁽³⁾.

Transmission

Infection is often transmitted via ocular secretions or respiratory droplets⁽²⁾. Additionally, faecal–oral transmission and contaminated fomites are common modes of transmission⁽¹⁾. Transmission during birth from cervical canal secretions and during solid organ transplants can occur but this is rare⁽¹⁾.

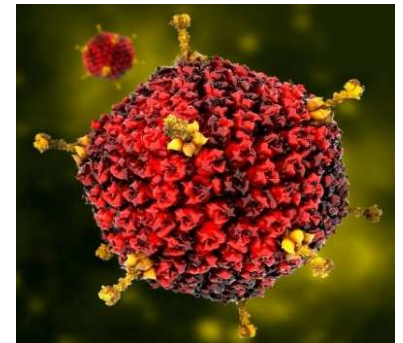


Figure 1. Computer artwork showing the external protein structure of a human adenovirus particle⁽⁶⁾. Photo credit: Ramon Andrade (2018)⁽⁶⁾

Infection and Treatment

Human adenoviruses are classified into 7 species (A-G), which usually cause mild gastrointestinal tract, conjunctiva and upper or lower respiratory infections in children and adults^(1,3). Due to a lack of humoral immunity, infection is more common in young children^(2,3). Adenoviruses can also cause less common disease, such as pancreatitis, encephalitis, haemorrhagic cystitis, nephritis, haemorrhagic colitis and hepatitis⁽³⁾. Additionally, they can cause severe pneumonia.

Adenoviruses are a frequent cause of ocular infections and can cause epidemic keratoconjunctivitis and pharyngoconjunctival fever⁽⁵⁾. Adenoviruses can also cause acute respiratory distress syndrome (ARDS)⁽¹⁾. ARDS is a relatively rare condition that can lead to hypoxemia, which could progress to multiple organ failure and death⁽⁴⁾. Moreover, due to the possibility of multi-organ failure, adenovirus infections are of particular concern among hematopoietic stem cell transplant patients, thus early diagnosis may assist pharmacotherapy⁽⁵⁾.

Adenovirus infections are usually self-limiting and therapy (e.g. cidofovir) is only used as a supportive agent for more severe cases⁽⁵⁾. Therefore, diagnostic tests can be used to help avoid the use of unnecessary antibiotics as it eliminates assuming a bacterial infection⁽⁵⁾.

Micropathology Assay

The adenovirus assay is a single round PCR with real time visualisation of the fluorescence increase (proportional to the degradation of the probe, hence the amount of DNA template) on a Roche Light Cycler 480 II PCR instrument. Quantifiable validated sample types include CSF, whole blood, plasma, and urine. Other validated sample types for qualitative results include vitreous fluid, eye fluid, skin, eye, nose and throat swabs, serum, bronchial washings, NPA, pericardial fluid and bone marrow. Please refer to the Laboratory User Handbook (S-748) for further information.

Tissue samples are an unvalidated sample type, however if sent then non-fixed specimens are preferred due to the possibility of DNA degradation in formalin-fixed specimens. Sample types known to contain inhibitors that are not removed during DNA extraction (e.g., heparinised blood) are not appropriate for this assay.

Respiratory samples can be tested for adenovirus by single round PCR. However, if the sample has a request for a full respiratory screen, then the adenovirus testing will be conducted on the Luminex system. This assay is routinely used for testing respiratory samples which fall between a calculated signal of 5-65 on the Luminex system. Please refer to the Laboratory User Handbook (S-748) for further information.

References

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