Table 64. Laboratory Diagnosis of JC Virus Infection

Diagnostic Procedure	Optimal Specimen	Transport Issues
NAAT	Cerebrospinal fluid	Sterile, preservative-free tube, RT, ≤24 h
Histopathology	Tissue	Sterile, preservative-free container, RT, ≤24 h

Abbreviations: NAAT, nucleic acid amplification test; RT, room temperature.

Table 65. Laboratory Diagnosis of Adenovirus Infection

Diagnostic Procedures	Optimum Specimens	Transport Issues
NAAT	Nasopharyngeal aspirate/washing, throat or nasopharyngeal swab, lower respiratory specimen, stool, conjunctiva swab	Sterile, preservative-free container or viral transport medium, RT, ≤24 h
	Cerebrospinal fluid	Sterile, preservative-free tube, RT, ≤24 h
	Plasma	EDTA tube, RT, ≤2 h PPT tube, RT, ≤6 h
Antigen detection, rapid	Nasopharyngeal swab, respiratory specimen	Sterile, preservative-free container or viral transport medium, RT, ≤24 h
Antigen detection (Adenovirus types 40 and 41)	Stool	Sterile, preservative-free container, RT, ≤24 h
Culture	Nasopharyngeal aspirate/washing, throat or nasopharyngeal swab, lower respiratory specimen, stool, cerebrospinal fluid	Sterile, preservative-free container or viral transport medium, RT, ≤24 h

Abbreviations: NAAT, nucleic acid amplification test; PPT, plasma preparation tube; RT, room temperature.

JC Virus

John Cunningham virus (JCV) is the etiologic agent of progressive multifocal leukoencephalopathy (PML), which is a fatal, demyelinating disease of the central nervous system that occurs in immunocompromised hosts. Histologic examination of brain biopsy tissue may reveal characteristic pathologic changes; however, in situ hybridization for JCV is often required to confirm the diagnosis. Detection of JCV DNA in CSF specimens by NAAT has largely replaced the need for tissue biopsy for laboratory diagnosis of PML (Table 64). A serologic test (STRATIFY JCV™, Quest Diagnostics, Inc.) is now FDA-cleared for screening patients who are considering treatment with certain immune-modulating therapies (eg, Natalizumab). A positive result by this test is indicative of prior exposure to JCV, and potentially elevated risk of developing PML, if initiating treatment with the immune-modulating drug, natalizumab.

Respiratory Viruses

Adenovirus

In otherwise healthy individuals, adenoviruses may cause mild, self-limiting respiratory illness or conjunctivitis, with most cases being diagnosed on clinical grounds. Occasionally, adenovirus infections in immunocompetent hosts can result in severe disease, especially in children with asthma. In immunocompromised patients, adenoviruses may cause pneumonia, disseminated infection, gastroenteritis, hemorrhagic cystitis, meningoencephalitis, or hepatitis.

The diagnosis of adenoviral infections Is typically made using NAAT, viral culture and/or histopathology (Table 65). Viral culture has a long turn-around time (~5 to 7 days), but this can be reduced by using shell vial technology. Plasma viral load (assessed by quantitative NAAT) may be useful as a marker for preemptive therapy, to diagnose adenovirus-associated disease, and to monitor response to antiviral therapy in some immunocompromised populations. Adenovirus is included in certain FDA-cleared multiplex respiratory panels.

Coronaviruses

Coronaviruses are host-specific and can infect a variety of animals as well as humans. Four distinct sub-groupings have been described, known as Alpha, Beta, Gamma, and Delta. Among these, there are seven coronaviruses that have been associated with human disease; Human coronaviruses (HcoV)-229E and -NL63 (subgroup alphacoronavirus), HcoV-OC43 and -HKU1 (subgroup betacoronavirus, lineage A), as well as 3 associated with more severe disease, including severe acute respiratory syndrome CoV-1 (SARS-CoV-1; subgroup betacoronavirus, lineage B), Middle East respiratory syndrome CoV (MERS-CoV; subgroup betacoronavirus, lineage C), and SARS-CoV-2 (subgroup betacoronavirus, lineage B).

Human coronaviruses 229E, NL63, OC43, and HKU1 are generally associated with mild symptoms of rhinorrhea, congestion, sore throat, sneezing, cough, and may present with fever. In children, these HcoVs have also caused exacerbation of asthma and otitis media. Respiratory secretions or nasopharyngeal (NP) swabs placed in viral transport media (VTM) are the specimens of choice for detection of common HcoVs. Diagnostic tests include NAATs, and common HcoVs are often included in multiplex respiratory panels, which may be beneficial in immunocompromised hosts or those with severe illness.

Suspected cases of SARS-CoV and MERS-CoV require immediate notification to the laboratory and public health officials. Guidance for testing can be found at www.cdc.gov/sars/index.html and www.cdc.gov/coronavirus/MERS/index.html. Fortunately, neither SARS-CoV-1 nor MERS-CoV have been associated with widespread transmission or disease. Testing for both viruses is limited to public health laboratories.

SARS-CoV-2, the causative agent of coronavirus disease 2019 (COVID-19), resulted in a global pandemic in 2020.