

# Virology

Virus infections can be diagnosed in 1 of 4 ways: (1) culturing the site of infection, (2) submitting serum or fluid for serological testing, or (3) DNA/RNA by PCR (4) Direct antigen testing.

Where appropriate, specimens for viral culture are collected using a Culturette swab and put into transport media. Viral culture performed on spinal fluid or body fluid requires 1 mL of fluid collected in a screw-capped, sterile vial. Urine is acceptable only for mumps culture and requires 0.5 ml of urine. Specimen should be handled under sterile conditions to avoid contamination. For most viruses, PCR methodology is available.

Serological testing is performed on 1 mL of serum. Best results are obtained if submitted during both the acute phase and during the convalescent phase. Convalescent-phase serum specimen should be submitted within 30 days of the date of the acute-phase report.

## Test Interpretation

- *General Infections:* A 4-fold or greater rise in antibody titers between the acute- and convalescent-phase sera or the presence of antibody of the IgM class is indicative of infection. Timing for obtaining the sera is of utmost importance. Convalescent-phase serum specimen should be submitted within 30 days of the date of the acute-phase report. In most instances, a serologic test performed on a single serum specimen will not differentiate recent infection from 1 that occurred sometime in the past.
- *Congenital Infections:* Serial sera from both the mother and infant are required for laboratory diagnosis. Antibodies in the infant will decay over 2 to 3 months because they are passively acquired by placental transfer. Active infection, however, is indicated by antibody levels that are unchanged or increased in serial sera over a 2 to 3 month period. The absence of antibody in the mother rules out congenital infection. In addition, for cytomegalovirus, herpes simplex virus, and rubella virus, IgM antibodies may be determined by the immunofluorescence test using a serum specimen from the infant.

## Specimen Selection

The 2 tables which follow are a guide in selecting the proper specimen for viral studies.

Table I is used if only the clinical picture is known and the physician does not indicate any specific organism. Please be

sure to provide the clinical information when prompted for Special Instructions when ordering the test in the computer.

Table II lists the most suitable sources for culture and is used when the physician has a specific virus in mind.

**Table I. Symptom-Oriented Guide**

<b>Clinical Manifestation</b>	<b>Suggested Specimen</b>
Respiratory—pharyngitis, croup, bronchitis, pneumonia, URI	<ol style="list-style-type: none"><li>1. Throat swab, sputum, nasopharynx, bronchial wash, lung, tissue</li><li>2. Serology—please specify particular virus (see Table II for list of specific agents)</li></ol>
Rash—maculopapular exanthem	<ol style="list-style-type: none"><li>1. Throat swab, spinal fluid, stool (enteric virus only)</li><li>2. Serology—please specify particular virus (see Table II for list of specific agents)</li></ol>
Exanthems	
Vesicular	<ol style="list-style-type: none"><li>1. Vesicle fluid on Culturette</li><li>2. Serology—please specify particular virus (see Table II for list of specific agents)</li></ol>
Vesicular with stomatitis (hand, foot, mouth disease)	<ol style="list-style-type: none"><li>1. Vesicle swab, oropharyngeal swab</li><li>2. Serology—please specify particular virus (see Table II for list of specific agents)</li></ol>
Diffuse rash (roseola)	<ol style="list-style-type: none"><li>1. Serology—please specify particular virus (see Table II for list of specific agents)</li></ol>
Aseptic meningitis, encephalitis	<ol style="list-style-type: none"><li>1. Throat swab, stool, urine (mumps), spinal fluid, brain biopsy</li><li>2. Serology—please specify particular virus (see Table II for list of specific agents)</li></ol>
Congenital	<ol style="list-style-type: none"><li>1. Spinal fluid, throat swab, vesicle fluid, stool</li><li>2. Serology—please specify particular virus (see Table II for list of specific agents)</li></ol>
Ocular	<ol style="list-style-type: none"><li>1. Conjunctival or corneal scrapings or swab, eye washings</li><li>2. Serology—please specify particular virus (see Table II for list of specific agents)</li></ol>
Infectious mononucleosis-like syndrome	<ol style="list-style-type: none"><li>1. Throat swab, urine (CMV)</li><li>2. Serology (heterophile-negative)—Epstein-Barr virus, CMV</li></ol>
Myopericarditis	<ol style="list-style-type: none"><li>1. Fluid, throat, stool</li></ol>
Immunosuppressed or immunodeficient	<ol style="list-style-type: none"><li>1. Urine (CMV), throat swab, vesicle fluid, tissue, bronchial wash, spinal fluid</li><li>2. Serology—please specify particular virus (see Table II for list of specific agents)</li></ol>

**Table II. Specimen Guide for Specific Viruses**

<b>Common Pathogenic Viruses</b>	<b>Culture Methods</b>	<b>Serologic Methods</b>
<b>Respiratory:</b>		
Adenovirus	Bronchoalveolar lavage or sputum, throat, tissue	Serum for CF
Cytomegalovirus	Bronchoalveolar lavage or sputum, throat, tissue	Serum for MFI
Enterovirus	Bronchoalveolar lavage or sputum, throat, tissue	Serum CF
Herpes simplex virus	Bronchoalveolar lavage or sputum, throat, tissue	Serum for MFI, EIA, IF
Influenza virus	Bronchoalveolar lavage or sputum, throat, tissue	Serum for IF
Parainfluenza virus	Bronchoalveolar lavage or sputum, throat, tissue	Serum for CF
Respiratory syncytial virus	Bronchoalveolar lavage or sputum, throat, tissue	Serum for IF
<b>Rash—maculopapular:</b>		
Enterovirus	Throat, stool	Serum for CF
Rubella virus	Not cultured	Serum for ELFA
Rubeola virus	Not cultured	Serum for IFA
<b>Rash—vesicular:</b>		
Coxsackie	CSF, rectal	Serum for CF
Herpes simplex virus	Vesicle fluid swab	Serum for MFI, EIA, IF
Varicella-zoster virus	Vesicle fluid swab	Serum for MFI, IF
<b>Aseptic meningitis and encephalitis:</b>		
Adenovirus	Eye, NP, spinal fluid, tissue, throat	Serum for CF
Arbovirus	Not cultured	Serum for IF
Cytomegalovirus	Respiratory, tissue, urine	Serum for IF, CF
Enterovirus	NP, spinal fluid, stool, throat, tissue	
Herpes simplex virus	Eye, genital, oral, spinal fluid, urethral, vesicle, throat	Serum for IF, CF
choriomeningitis	Not cultured	Serum for IFA
Mumps	Urine	Serum for CF, IF
Varicella-zoster virus	Lung tissue, skin lesions, spinal fluid	Serum for CF, IF, EIA
<b>Congenital:</b>		
Cytomegalovirus	Throat, urine	Serum for MFI
Herpes simplex virus	Throat, vesicle fluid	Serum for IF
Rubella virus	Not cultured	Serum for ELFA
<b>Ocular:</b>		
Adenovirus	Conjunctival, corneal	Serum for CF
Enterovirus	Conjunctival, corneal	Serum for CF
Herpes simplex virus	Conjunctival, corneal	Serum for MFI, EIA, IF
<b>Infectious mononucleosis-like syndrome:</b>		
Cytomegalovirus	Throat, urine	Serum for MFI
Epstein-Barr virus	Not cultured	Serum for MFI
<b>Immunosuppressed or immunodeficient:</b>		
Adenovirus	Throat, tissue	Serum for CF
Cytomegalovirus	Bronchial wash, throat, tissue, urine	Serum for MFI

**Table II. Specimen Guide for Specific Viruses (Cont.)**

<b>Common Pathogenic Viruses</b>	<b>Culture Methods</b>	<b>Serologic Methods</b>
Immunosuppressed or immunodeficient (Cont.):		
Epstein-Barr virus	Not cultured	Serum for MFI
Herpes simplex virus	Throat, tissue, vesicle fluid	Serum for IF
Parainfluenza	Bronchial wash, NP, throat, tissue	Serum for CF
Respiratory syncytial virus	Bronchial wash, NP, tissue	Serum for IF
Varicella-zoster virus	Tissue, vesicle fluid	Serum for MFI, IF
Gastrointestinal:		
Adenovirus	Stool	Serum for CF
Rotavirus	Stool	No test available
Herpangina, Stomatitis, Pharyngitis:		
Adenovirus	Oral lesions, throat swab	Serum for CF
Enterovirus	Oral lesions, throat swab	Serum for CF
Herpes simplex virus	Oral lesions, throat swab	Serum for IF
Genito—Urinary Tract		
Adenovirus	Urine	Serum for CF
Herpes simplex virus	Genital swab, vesicle swab	Serum for MFI, EIA, IF
Papillomavirus	Not cultured	No test available

CF (complement fixation)  
 IF (immunofluorescence)  
 EIA (enzyme immunoassay)  
 ELFA ( Enzyme linked fluorescent assay)  
 MFI (Multiplex flow immunoassay)

<b>Recommended Tests</b>				
<b>Test Code</b>	<b>EPIC Order Code/Epic Keyword</b>	<b>Test</b>	<b>Source</b>	<b>Methodology</b>
LAB 0292631	VIRNR	Culture, Virus, Non-Respiratory	Stool, tissue, ocular, spinal fluid, body fluid, rectal, urine (mumps only)	Culture
LAB 0292748	VRESP	Culture, Virus, Respiratory	Respiratory sites, tissue, throat	Culture
LAB 0201806	HERPV	Herpes Simplex Virus (HSV) by Rapid PCR	Genital, dermal, body fluid, ocular, respiratory sites	Rapid PCR
LAB 0299123	LVZV	Varicella-Zoster Virus (VZV) by Rapid PCR	Genital, dermal, spinal fluid, ocular, body fluid, respiratory sites, tissue	Rapid PCR
LAB 213058	HSVC	Herpes Simplex Virus (HSV), Molecular Detection, PCR	Spinal fluid	Rapid PCR
LAB 0234805	HERPB	Herpes Simplex Virus 1 and 2, Qualitative PCR, Blood	Whole Blood	Rapid PCR

Please feel free to contact the CentraCare Laboratory Service Specimen Referral Center at 320-255-5999 extension 57320 with questions or concerns.