

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

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

Table II. Specimen Guide for Specific Viruses

| Common Pathogenic Viruses | Culture Methods | Serologic Methods |
|---|---|--------------------------|
| Respiratory: | | |
| 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 |
| Rash—maculopapular: | | |
| Enterovirus | Throat, stool | Serum for CF |
| Rubella virus | Not cultured | Serum for ELFA |
| Rubeola virus | Not cultured | Serum for IFA |
| Rash—vesicular: | | |
| 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 |
| Aseptic meningitis and encephalitis: | | |
| 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 |
| Congenital: | | |
| Cytomegalovirus | Throat, urine | Serum for MFI |
| Herpes simplex virus | Throat, vesicle fluid | Serum for IF |
| Rubella virus | Not cultured | Serum for ELFA |
| Ocular: | | |
| Adenovirus | Conjunctival, corneal | Serum for CF |
| Enterovirus | Conjunctival, corneal | Serum for CF |
| Herpes simplex virus | Conjunctival, corneal | Serum for MFI, EIA, IF |
| Infectious mononucleosis-like syndrome: | | |
| Cytomegalovirus | Throat, urine | Serum for MFI |
| Epstein-Barr virus | Not cultured | Serum for MFI |
| Immunosuppressed or immunodeficient: | | |
| Adenovirus | Throat, tissue | Serum for CF |
| Cytomegalovirus | Bronchial wash, throat, tissue, urine | Serum for MFI |

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

| Common Pathogenic Viruses | Culture Methods | Serologic Methods |
|---|------------------------------------|--------------------------|
| 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)

| Recommended Tests | | | | |
|--------------------------|-------------------------------------|--|--|--------------------|
| Test Code | EPIC Order Code/Epic Keyword | Test | Source | Methodology |
| LAB 0201806 | HSVPV | Herpes Simplex Virus (HSV) by Rapid PCR | Genital, dermal, body fluid, ocular, respiratory sites | Rapid PCR |
| LAB 029912 | VZVPV | Varicella-Zoster Virus (VZV) by Rapid PCR | Genital, dermal, spinal fluid, ocular, body fluid, respiratory sites, tissue | Rapid PCR |
| LAB 0213058 | HSVC | Herpes Simplex Virus (HSV), Molecular Detection, PCR | Spinal fluid | Rapid PCR |
| LAB 0234805 | HSVPB | Herpes Simples 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.