Stanford HEALTH CARE
STANFORD MEDICINE

PATHOLOGY & LABORATORY MEDICINE

Esoteric Departments

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Virology

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General Information

The Stanford Clinical Virology Laboratory offers a range of culture, antigen and molecular test procedures for the diagnosis of viral and chlamydia infections. We provide clinical technical expertise in a setting where the test procedures are incorporated into the diagnosis, treatment and prognosis of the disease state of immuno-compromised patients such as patients receiving chemotherapy, transplant patients and HIV. The services we provide include virus isolation and identification, rapid detection of viral antigens and determination of viral antibody response. Molecular methods are a major improvement in diagnosis of viral infections. These methods have superior sensitivity and rapid turnaround times compared with conventional diagnostic methods and play a critical role in testing protocols for managing viral infections.

TO SEND A SPECIMEN FOR CONSULTATION

TESTS: Select a test to view Test Description & Clinical Indications	TEST CODES: Select a Test Code to view Test Specimen Collection Instructions
ADENOVIRUS QUANTITATIVE PCR, PLASMA ORDER	ADVQT
BK VIRUS DNA PCR PLASMA, QUANTITATIVE	BKVPC
BK VIRUS DNA PCR URINE, QUANTITATIVE	BKVPCU
CHLAMYDIA TRACHOMATIS AND NEISSERIA GONORRHOEAE (GC), NUCLIEC ACID AMPLIFICATION TESTING (NAAT)	CLGC3
CYTOMEGALOVIRUS QUANTITATIVE (CMV VIRAL LOAD) PCR	CMVQT
CYTOMEGALOVIRUS(CMV) DNA, QUALITATIVE PCR, NON-PLASMA	CMVQL
EPSTEIN BARR VIRUS (EBV) QUANTITATIVE PCR, PLASMA	EBVQP
HEPATITIS B PCR QUANTITATIVE, SERUM	HBPCR
HEPATITIS C VIRUS (HCV) RNA, QUANTITATIVE PCR, SERUM, WITH REFLEX TO GENOTYPING	HCVPCX

HHV-6 QUANTITATIVE PCR, PLASMA ORDER	HHV6QT
HIV-1 ANTIVIRAL RESISTANCE TESTING - INTEGRASE	AVIN
HIV-1 ANTIVIRAL RESISTANCE TESTING, PROTEASE AND REVERSE-TRANSCRIPTASE, PLASMA	AVRT
HIV-1 RNA, QUANTITATIVE PCR, PLASMA	HIVPCR
HPV 16/18 TYPING	HPVPCR
HPV 6/11 TYPING	HPV6PC
HUMAN PAPILLOMAVIRUS VIRUS (HPV), NUCLIEC ACID AMPLIFICATION TESTING (NAAT)	HPVHR3

Looking for a test that isn't listed? View all tests on our Test Directory

Hours

Specimens are accepted 24 hours a day, seven days a week, except as noted in test specimen requirements.

Consultation Services

The Laboratory provides Medical Directors with expertise to give comprehensive consultation service to assist the clinician in choosing the appropriate tests and interpreting the results of all viral testing. For consultation services please call Customer Services AT 1-877-717-3733 and request the Virology Laboratory.

Specimen Collection Instructions

Table 1: Virology Specimen Collection for Viral Cultures, Direct Exam (DFA) and Rapid Antigen Testing (Refer to Test Directory for Molecular Testing Requirements)

Specimen Source/Type	Collection Container	Representative Viruses	Comments
Blood	10 mL in Yellow-top tube (ACD) Acid Citrate Dextrose, Solution A	CMV, HSV, VZY, Adenovirus, Enterovirus	Specify suspected virus on requisition. If no virus is specified, only CMV PCR testing will be performed. Consider Molecular testing for specific viruses.
Bone marrow	2 mL in Yellow-top tube (ACD) Acid Citrate Dextrose) or Blue-top tube (Sodium Citrate)	CMV	
Eye, conjunctiva/cornea	Swab inside of lower, then upper lid.	Adenovirus, HSV, Chlamydia, Enterovirus, CMV, VZV	Request both viral culture and DFA for optimal detection of Adenovirus,

	Collect infected epithelial cells not pus. Place 1-2 swabs, fluid or tissue into VTM tube.		HSV and VZV. If both tests are requested, must collect 2 swabs. Both swabs can be placed into 1 VTM tube. Chlamydia culture is a separate test request.
Fluids	2-5 mL in sterile screw-cap tube	Varies with source	
CSF	1-5 mL in sterile screw cap tube	Enterovirus, HSV, Mumps, CMV, VZV, Measles, Influenza	Mumps or Measles culture must be specified on requisition. Consider Molecular testing for specific viruses.
Pericardial fluid	1-5 mL in sterile screw cap tube	Enterovirus, CMV	Consider Molecular testing for specific viruses Request PCR for enterovirus, HSV, CMV, VZV, etc.
Genital swabs (cervix, vulva, urethra, penis)	Place 1-2 swabs into VTM tube. Collect adequate cells from infected area. Collect both fluid and cells from base of lesion.	HSV, CMV (Chlamydia)	Consider Molecular testing for Chlamydia.
Lesions, derma/mucosal vesicles	Place 1-2 swabs into VTM tube. Collect both fluid and cells from base of lesion.	HSV, VZV, Enterovirus	Request both culture and DFA for optimal detection. If both tests are requested, must collect 2 swabs. Both swabs can be placed into 1 VTM tube.
Respiratory - NP/throat swabs - Lung tissue - BAL, other fluids	Place 1-3 swabs aspirates or tissue into VTM tube. Fluids including BAL should be placed into	Adenovirus, CMV, HSV, RSV, Enterovirus, Influenza, Mumps, Parainfluenza, Rhinovirus, Rubeola, Rubella, VZV, human Metapneumonovirus, (Chlamydia in neonates)	Rapid Antigen Testing (STAT) requires 1 swab in dedicated VTM tube. Culture and Direct Slide (DFA) requests require 2 swabs, which can be combined into 1 VTM tube. Consider molecular testing for human

	sterile screw-cap tube		Metapneumonovirus, CMV or Chlamydia. Measles, mumps, and rubella must be specified on Requisition.
Stool	Place walnut size amount into a Screw-cap container	Adenovirus, Enterovirus, HSV, VZV	Adenovirus types 40/41 and Rotavirus are not detected by culture and must be requested individually.
Rectal	Place swabs into VTM tube.	Enterovirus, HSV, VZV	
Tissues/Biopsy	Place tissue (3 mm or more) into VTM tube.	HSV, CMV, VZV Varies with source	Consider Molecular testing for specific viruses.
Urine	Place into Sterile screw-cap container	CMV, Adenovirus, Enterovirus, HSV, Mumps	Mumps by special request only.
VTM - viral transport medium. Once specimens have been collected, keep refrigerated and transport promptly.			

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Specimen Submission

Request Forms

Use individual requisition forms available from the laboratory or from our test requisition page. All test requests require a physician's written order to process a specimen. Follow the collection instructions for each type of specimen.

Patient Identification

All patients from whom clinical specimens are obtained must be positively identified, utilizing at least two unique identifiers prior to specimen collection. Positive identification is the responsibility of the person collecting the sample.

Required Information

All specimens must be labeled.

- Patient's full name (not a nickname)
- Medical Record Number or other unique identifier (ID)
- Date and, if appropriate, time when specimen was obtained
- Specimen source
- Signature/ initials of collector
- The label should be affixed directly to the specimen container and not the bag

Bar-coded pre-printed labels with accession numbers generated by an information system may be used.

- Place the labeled specimen in the provided leak proof sealed plastic biohazard bag

Place the matching requisition in the outside pouch of the bag

Use of a request form wrapped around the container is not acceptable as a specimen label.

Specimens will not be accepted if the information on the specimen label does not match the information on the accompanying requisition.

On all requests forms, the following information is required

- Patient's name & address
- Patient's gender
- Date of birth
- The last six digits of the patient's social security number or other unique identifier (ID#)
- Date and if appropriate, time of collection
- Test requested
- Type or source of the specimen
- Requesting physician/ or Client Number
- Clinical information if requested
- All applicable medical necessity codes (ICD-9)
- Complete billing and insurance information

Providing additional relevant information may be important in alerting the laboratory of the need for special handling or specimen work-up.

Tests sent to reference laboratories must have patient history information. The need for such information is indicated on the test request form.

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Table 2: Viruses Associated With Disease Categories

Disease Category	Common Virus	Less Common
CNS		
Aseptic meningitis	Coxsackie, Echovirus, Mumps, HHV-6	Other enteroviruses, HSV-2, HIV, LCM, VZV
Paralysis	Polio	Coxsackie, Enterovirus 71, other Enteroviruses
Encephalitis	Arboviruses, HSV, Enteroviruses, HIV, CMV, HHV-6, Mumps	Herpes B, CMV, PML viruses (JCV), Rabies, VZV
Genitourinary		
Lesions	Herpes, Molluscum, HPV	CMV, VZV
GU tract	CMV	Mumps, HSV

Cystitis, Glomerulonephritis	Adenovirus, BKV	
Gastrointestinal	Adenovirus, CMV, norwalk, rotavirus	Enteroviruses
Hepatitis	Hepatitis A, B, C, D, EBV, CMV	Hepatitis E, G, TTV, HSV, Togavirus (Yellow Fever), Arenavirus
Neonatal disease		
TORCH	Rubella, CMV, HSV, Echovirus, Parvovirus, Hepatitis B	Adenovirus, VZV
NB respiratory	Influenza, HSV, RSV	Adenovirus, Measles, Parainfluenza, Enteroviruses
Ocular		
Conjunctivitis	Adenovirus, enteroviruses, HSV, VZV, (Chlamydia)	Dengue, Newcastles
Corneal Lesion	HSV	
Respiratory		
Upper respiratory		
Colds, Pharyngitis	Adenovirus, Coxsackie, EBV, Echovirus, Influenza A & B, Respiratory Syncytial (RSV), Herpes, Parainfluenza, Rhinovirus	Coronavirus, Influenza C, Parainfluenza
Croup, Bronchiolitis	RSV, Parainfluenza	Adeno, Influenza, Measles
Lower Respiratory		
pneumonia, adults	Influenza	Adenovirus, measles, newcastles; immunocompromised: CMV, HSV, VZV
pneumonia, children		Adeno, measles, VZV

	RSV, influenza, parainfluenza	
Skin		
hemorrhagic	Arboviruses	Ebola
lesions, local	HSV, VZV, HPV, molluscum	Poxviruses
maculopapular	Coxsackie, echovirus, parvovirus, rubella, rubeola (measles)	Adenoviruses, CMV, EBV

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Nasopharyngeal Specimen Collection

Specimen Collection for Detection of Respiratory Viruses (including Adenovirus, CMV, Enterovirus, Influenza, Parainfluenza, RSV, and Rhinovirus). Other appropriate specimens include throat/pharyngeal swabs, tracheal aspirates, and bronchial samples.

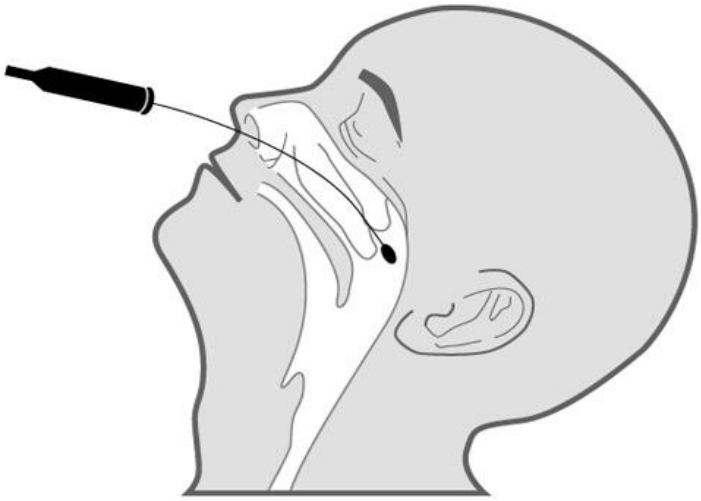
Place fluids in sterile leakproof containers and transport to the laboratory.

Nasopharyngeal Swab Method

Materials:

- Nasopharyngeal swab with synthetic fiber tip
- 1-2 mL viral transport medium (VTM)
- Specimen container

Do not use calcium alginate swabs. Dacron swabs are provided with viral transport medium.



Insert swab into one nostril.

Press swab tip on the mucosal surface of the midinferior portion of the inferior turbinate (see sketch), and rub the swab tip several times across the mucosal surface to loosen and collect cellular material.
Withdraw swab; insert into container with VTM.

For best sample quality, repeating procedure for the second nostril will deliver optimal combined sample. Collect two to three swabs of NP and/or pharynx. Place swabs into viral transport medium. Tighten caps(s) securely. Samples must be kept cold and received within 24 hours of collection. Submit specimens promptly to the laboratory. Refrigerate
For collection kits. call Customer Services at 1- (877) 717-3733.

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Conjunctival Specimen Collection for Detection of Viruses and Chlamydia (Adenovirus, Chlamydia trachomatis, Enterovirus, and Herpesvirus)

Gently remove pus or discharge. Use for Gram stain or microbial cultures only.
Swab inside of lower, then upper lid as pictured. Collect infected epithelial cells (not pus) on swabs for viral and chlamydial detection.
Use dacron swabs supplied with viral transport medium (VTM). Do not use calcium alginate or wood swabs as these are inhibitory to viruses and Chlamydia.
Collect multiple swabs for both eyes (if affected) and place in viral transport medium (VTM). Collection of throat or nasopharyngeal swabs may increase detection of viruses.
Note: For detection of HSV from corneal ulcers, collect cells from affected area of cornea also and submit in viral transport medium (VTM).
Submit specimens promptly to the laboratory.
Eye specimens can be tested for the following agents:

- Adenoviruses
- Chlamydia trachomatis
- Enteroviruses (Coxsackie, echovirus, poliovirus)
- Herpes simplex virus

Collect multiple swabs if both culture and direct viral exams are desired. Two or three swabs can be submitted in each vial of viral transport medium (VTM).

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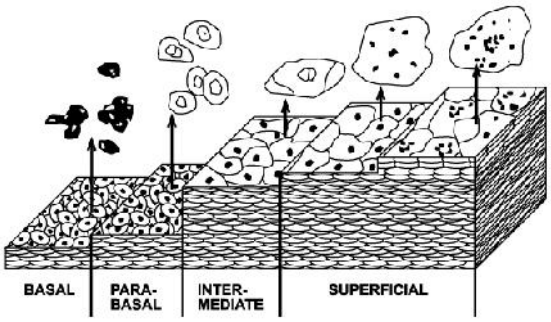
Collection of Lesion Samples for HSV and VZV Viral Detection

To increase the chance of obtaining positive results, it is necessary to collect the types of cells that the HSV typically infect.

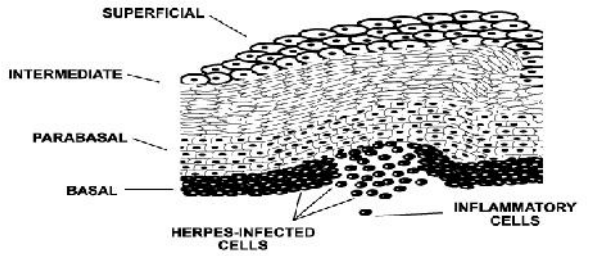
In figure 1, normal epithelium can be seen to consist of four distinct zones.
In figure 2, these same zones are seen in herpetic lesions.

The non-superficial cells, intermediate, para-basal, and particularly the base cells - are the ones that can become infected. To obtain these cells it is critical that the base of the lesion be thoroughly scraped. If the laboratory sees only superficial cells, erythrocytes, or polymorphonuclear leukocytes, the sample is inappropriate for this test.



Cell Maturation Sequence

Figure 1



Representation of Small Herpetic Lesion

Adapted from original illustration by Syva Company

Figure 2

Collection Procedure

To expose the base of lesion:

- Vesicles: Use a sterile needle to lift up the cap of the vesicle. Note that while vesicular fluid is not an adequate sample for the direct test, it is ideal for isolation. If vesicular fluid is present, aspirate with a sterile needle and syringe and inject into an appropriate transport medium (VTM).
- Ulcers: Use a sterile swab to remove any unwanted pus without disturbing the base of the lesion; discard the swab after use.
- Crusts: Use a sterile needle to expose the base of the lesion.

Moisten a large or small dacron swab in sterile water and vigorously swab the entire base of the lesion. Vigorous scraping of the lesion base is essential and this can be expected to cause the patient momentary pain.

Collect two to three lesion swabs and place in viral transport medium. Tighten cap securely. Transport promptly to the laboratory.

Samples must be kept cold and received within 24 hours of collection.
Submit specimens promptly to the Laboratory (24 hours/7 days).

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