



COLLECTION AND TRANSPORT OF VIROLOGICAL SAMPLES

Khder Hussein Rasul

Zahra Mohammad Maghded

Practical Medical Virology and MA 403

Summer Term

Second week

19/08/2024

Outline

- Virological samples
- Viral samples collection
- Handling of virological samples

Objectives

- Get knowledge about types of virological samples
- Learn about viral sample information
- Learn about the collection of different virological samples
- VTM and its composition
- Get information about virological sample transportation

Virological samples



A virological sample is a biological specimen collected from a living organism for the purpose of detecting, studying, or analyzing viruses.

Types of viral samples

1. Blood sample
2. Respiratory sample
3. Stool sample
4. Urine sample
5. Tissue sample

Viral sample collection



Viral sample collection refers to the process of collecting biological samples for the purpose of detecting and studying viral infections. This is a crucial step in diagnosing and monitoring viral diseases, conducting research on viruses, and developing vaccines or treatments.

- The collected samples may contain **viral particles, genetic material (RNA or DNA), or antibodies produced by the immune system** in response to a viral infection.
- Collection and handling of these samples are essential to ensure the accuracy of diagnostic tests and to preserve the integrity of the viral material for further analysis.
- Viral sample collection can be done in **various healthcare settings, laboratories, or fieldwork environments**, depending on the specific objectives of the study or diagnosis.

Viral sample collection



In the investigation of viral infection, reliable laboratory results can only be obtained if specimens are **collected, preserved, and transported correctly** to the virological laboratory. Adequate information must accompany samples.

- Samples for the detection of the viruses should be collected as soon as possible after the **appearance of symptoms**, which is when the concentration of the **virus is at the highest concentration.**



Viral sample information



The following information must be provided:

1. Patient name or another unique identifier.
2. Date of specimen collection.
3. Type and/or source of specimen.
4. Name and location of the submitter.
5. Examination requested.



Additionally, the age and sex of the patient, disease suspected, symptoms, patient address, etc., may be required for some specified tests.

Viral sample information



*** Required**

Monitor ID (On back of Monitor) * Example: AA1234	LAB REQUEST FORM PLEASE Print Clearly & Complete all boxes	Assay Tech Contact No.
------------------------------------------------------	-------------------------------------------------------------------------	------------------------

Send Lab Report To:

Name/Title/Mail Stop *
Information of the person to receive and review report

Company/Organization *	E-Mail *		
Address *	TEL *		
City *	State	ZIP *	FAX

Sampling Data:

Sample ID (Person/Location Monitored)				
Start Time	<input type="checkbox"/> AM <input type="checkbox"/> PM	Stop Time	<input type="checkbox"/> AM <input type="checkbox"/> PM	Time Sampled (min) *
Date(s) Sampled *		Sampled & Relinquished By		

IMPORTANT ! Record All Sampling Data !

Project Name/No. (optional): _____

Please select the chemical you would like analyzed for each sample

Check*	CAS No.	CHEMICAL ANALYTE
--------	---------	------------------

Unacceptable Specimens



1. There is no patient name or other unique identifier on the specimen.
2. There is a patient name or file number discrepancy between the **specimen label and the request form.**
3. Specimen is too old when received.
4. There is apparently no specimen in the container.
5. The expiration date of the transport medium has been exceeded.

Documentation of viral sample



Lab Master - [Test Booking]

Masters Booking Test Perform Printing Transaction Lab Reports Settings Utilities Window Help

Patient ID Date * Time (hh:mm) : Lab No

Name Mobile No.

Sex Age Mons Days

Referred By: Panel Code

Panel ID

e-mail

Test ID	Test Name	Rate	Disc %	Discount Amount	Tax(%)	Tax Amt

Total Tests

Test Amt.

Concession

Home Collection

Tax Amt

Net Amt

Balance

Home Collection Pay Type Paid Receipt No.

Viral blood sample collection



- 1. Pre-collection preparations:** Ensure that you have the necessary personal protective equipment (PPE), including gloves, a lab coat, and face protection. Sterilize the collection site and prepare all the required equipment
- 2. Collect blood by venipuncture method:**
- 3. Storage and transport:** Keep whole blood, serum, or plasma samples in refrigerator at 2-8°C to prevent degradation. Transport samples to the laboratory as soon as possible for processing and testing.
- 4. Laboratory Processing:** Upon arrival at the laboratory, ensure the proper documentation and labeling of the samples. Depending on the virus being detected, perform the appropriate tests, such as PCR, ELISA or serological assays.

Example: HIV (Human Immunodeficiency Virus)

HIV is a virus that attacks the immune system, leading to acquired immunodeficiency syndrome (AIDS). Blood samples are commonly used to detect HIV infection.

Viral respiratory sample collection



Collecting respiratory viral samples is crucial for diagnosing and studying various respiratory infections. Proper sample collection is essential to ensure accurate results and minimize the risk of contamination.

Here's a general guideline for collecting respiratory viral samples:

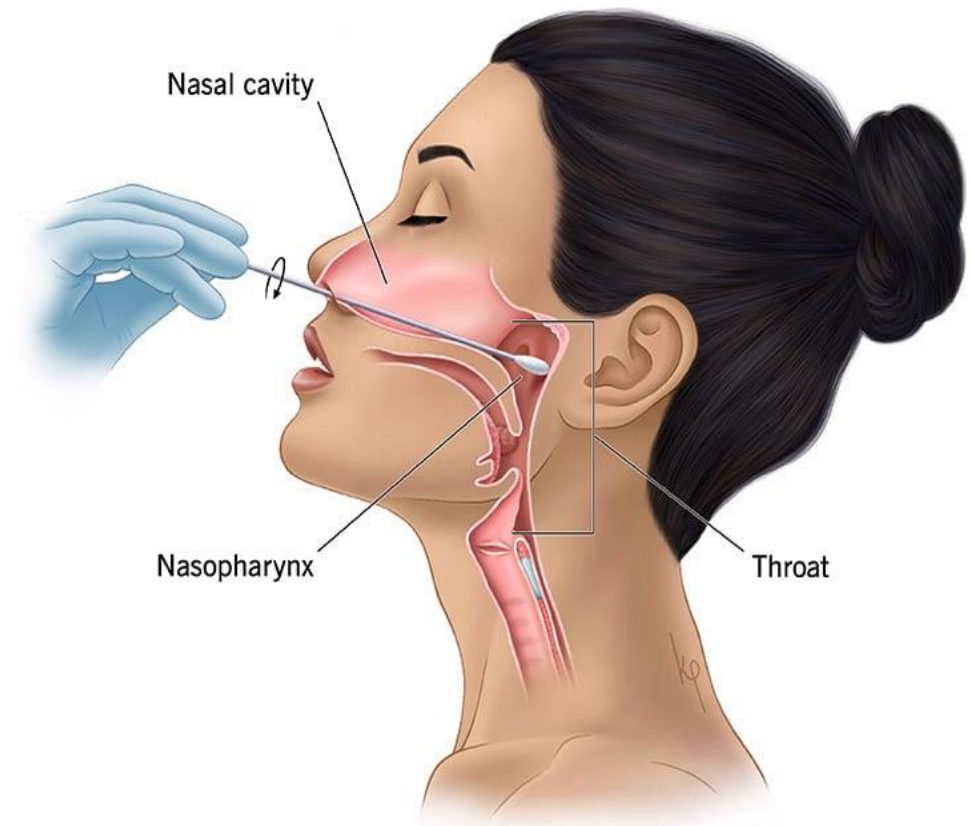
- 1. Pre-collection preparations:** Ensure that you have the necessary personal protective equipment (PPE), including gloves, a lab coat, and face protection.
- 2. Prepare the patient:**
 - Explain the procedure to the patients and obtain their consent.
 - Ask the patients to tilt their head slightly backward.

Viral respiratory sample collection



A. Nasopharyngeal swab collection:

- Using a sterile swab, gently insert it into one nostril.
- Advance the swab along the floor of the nasal passage to the posterior nasopharynx, which is the point where the nasal passage meets the throat.
- Rotate the swab several times at this location to collect the sample.
- Slowly remove the swab. Ensure the sample does not touch the sides of the nostril.
- Place the swab into a VTM.

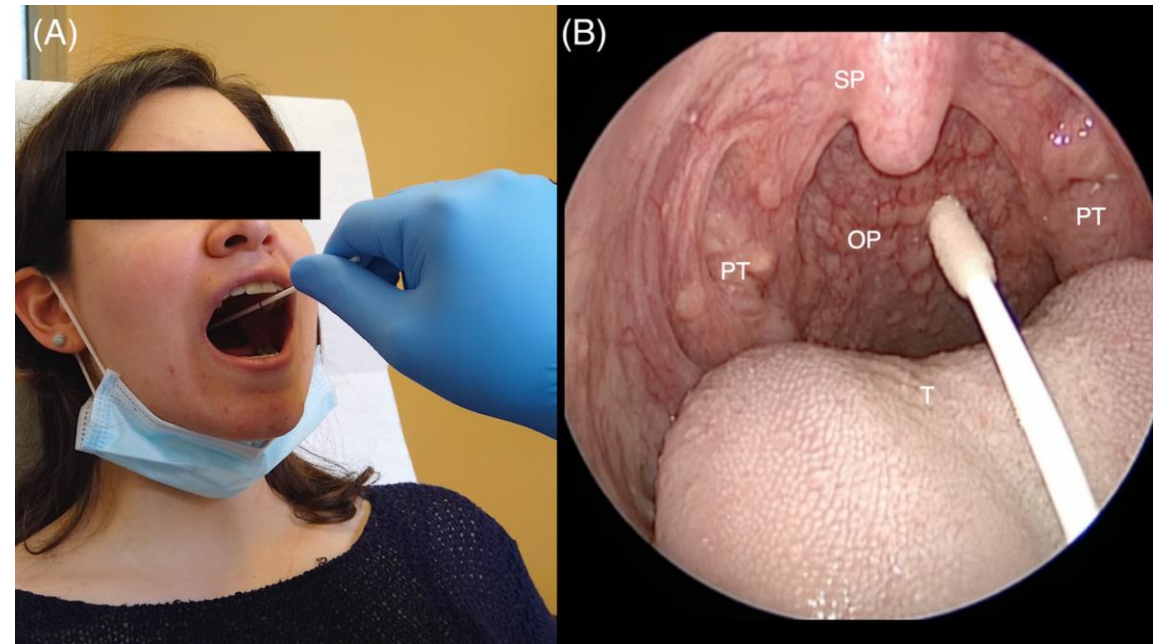


Viral respiratory sample collection



B. Oropharyngeal swab collection:

- Using a sterile swab, swab the back of the throat, avoiding the tongue.
- Rotate the swab several times to collect the sample.
- Place the swab into a VTM.



Viral respiratory sample collection



3. Transport and storage:

- Store the collected sample at the appropriate temperature (usually refrigerated) until it can be transported to the laboratory for testing.

4. Laboratory Processing: Upon arrival at the laboratory, ensure the proper documentation and labeling of the samples. Perform the appropriate tests, such as PCR.

Examples:

- 1. Influenza Virus:** Influenza is a well-known respiratory virus that causes seasonal outbreaks of flu.
- 2. Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2):** SARS-CoV-2 is the virus responsible for the COVID-19 pandemic that emerged in late 2019.

Viral Transporting Medium



VTM (Viral Transporting Medium):

VTM is a buffered medium used to maintain the viability of viruses during their transport to a virology laboratory.

Formula and preparation of VTM:

To make about 25 bottles

1. Hank's Balanced Salt Solution.....43ml
2. Bovine albumin, 100gm/L (10%w/v).....5ml
3. Phenol red, 4gm/L (0.4 %w/v).....0.25ml
4. Nystatin, 2500 IU/ml in sterile phosphate buffer...0.5ml
5. Penicillin, 104 IU/ml and streptomycin 10mg/ml buffer.....0.5ml



Viral Transporting Medium



Hanks' Balanced Salt Solution is composed of inorganic salts and supplemented with **glucose**. The solution may be used to wash cells and tissue and **to maintain cells in a viable state**. The solution is buffered with phosphate and maintains a physiological pH and osmotic pressure.

Bovine serum albumin is a major component that provides **antioxidant, cryoprotectant, and anti-adsorption properties** that favor retention of intact virus in solution over lysis and adherence to plastic.

Phenol red (also known as phenolsulfonphthalein or PSP) is a pH indicator frequently used in cell biology laboratories.

Nystatin is used to prevent infections caused by a fungus (or yeast).

The antibiotics **penicillin** and **streptomycin** are used to prevent bacterial contamination of VTM due to their effective combined action against gram-positive and gram-negative bacteria.

Viral stool sample collection



1. **Pre-collection preparations:** Ensure that you have the necessary personal protective equipment (PPE), including gloves, a lab coat, and face protection.
2. **Prepare the patient:**
 - Explain the procedure to the patients and obtain their consent.
 - Instruct the patient on proper hand hygiene before collecting the sample.
3. **Sample Collection:**
 - Use a clean, disposable container with a secure lid to collect the stool sample.
 - Ask the patient to pass stool directly into the container without urine or toilet water contaminating the sample.
 - Collect a sufficient amount of stool (usually about one to two tablespoons) using a clean, dry spatula or a wooden stick.
 - Make sure the sample is not contaminated with water, urine, or toilet paper.

Viral stool sample collection



4. Transport and Storage:

- Store the collected stool sample at the appropriate temperature (usually refrigerated) until it can be transported to the laboratory for testing.

5. Laboratory Processing: Upon arrival at the laboratory, ensure the proper documentation and labeling of the samples. Perform the appropriate test.

Example: Rotavirus are a common cause of viral gastroenteritis, especially in young children.

Note: If the fecal sample cannot be obtained, a rectal swab should be collected and transported in buffer saline. The isolation of viruses from rectal swabs however is less satisfactory than faeces sample.

Viral urine sample collection



1. **Pre-collection preparations:** Ensure that you have the necessary personal protective equipment (PPE), including gloves, a lab coat, and face protection. Ensure that you are working in a clean and well-lit area, ideally a laboratory or healthcare facility.
2. **Prepare the patient:**
 - Explain the procedure to the patients and obtain their consent.
 - Instruct the patient on proper hand hygiene before collecting the sample.
3. **Sample Collection:**
 - Provide the patient with a clean, sterile urine collection container.
 - Instruct the patient to use a clean, dry cup or container to collect a **midstream urine sample**. The patient should first urinate a small amount into the toilet to clear the urethra of contaminants and then collect the midstream portion in the provided container.

Viral urine sample collection



4. Transport and Storage:

- Store the collected urine sample at the appropriate temperature (usually refrigerated) until it can be transported to the laboratory for testing.

5. Laboratory Processing: Upon arrival at the laboratory, ensure the proper documentation and labeling of the samples. Perform the appropriate test.

One example of a virus that can be detected in urine is the **Cytomegalovirus (CMV)**.

Viral tissue sample collection



1. **Pre-collection preparations:** Ensure that you have the necessary personal protective equipment (PPE), including gloves, a lab coat, and face protection. Ensure that you are working in a clean and well-ventilated area, such as a laboratory or healthcare facility.
2. **Prepare the patient:**
 - Explain the procedure to the patient, obtain consent if necessary, and provide information about the risks and benefits of the procedure.
3. **Sample Collection:**
 - Using sterile instruments, collect a small tissue sample from the affected area. The exact procedure may vary depending on the location of the tissue to be sampled. Common methods include **biopsy, fine-needle aspiration, or swabbing.**

Viral tissue sample collection



4. Sample handling

- Place the tissue sample immediately into a sterile container. The container may contain a **culture medium or a fixative solution**, depending on the analysis required.

One example of a virus that can be detected in tissue samples is the **Human Papillomavirus (HPV)**.

Transport virological sample



Transporting of samples to the laboratory

- Viruses are unable to survive temperatures over 50 °C, freezing, or fluctuation in temperature.
- Viruses can also be damaged by light, drying, change in pH, and bacterial enzymes, the use of VTM will prevent samples from drying out and help to preserve viral activity
- As soon as possible samples are collected they should be delivered immediately to the lab.

References (in APA style)

- Mohandas, S., et al. (2022). "Urinary immunoglobulins in viral diagnosis: An overview." Indian J Med Res **155**(1): 11-21.
- Jo, S. J., et al. (2022). "Simple Saliva Sample Collection for the Detection of SARS-CoV-2 Variants Compared With Nasopharyngeal Swab Sample." Arch Pathol Lab Med **146**(12): 1435-1440.
- Culhane, M. R. and S. E. Detmer (2014). "Sample types, collection, and transport for influenza A viruses of swine." Methods Mol Biol **1161**: 259-263.