



Advanced Lab. Techniques Theoretical

Lecture No.1

Introduction to Sample Collection

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Brief Introduction (Definition)

Sample collection is the first step in the laboratory investigation process. It involves obtaining biological specimens from patients or subjects. Correct sample collection is crucial for accurate and reliable results.

Importance of Proper Sample Collection

Accurate Diagnosis

Accurate and reliable test results depend on correctly collected samples. This ensures that the laboratory analysis is conducted on the appropriate material and yields meaningful results.

Effective Treatment

Proper sample collection helps to identify the causative agent or underlying condition, guiding the selection of effective treatment strategies and improving patient outcomes.

Patient Safety

Following standardized procedures ensures the safety of both the patient and the healthcare professional. Proper collection minimizes the risk of contamination or injury.

Research and Development

Reliable samples are crucial for research studies and clinical trials, contributing to advancements in medical knowledge and the development of new diagnostic tests and treatments.

Types of Samples for Laboratory Investigation

1. Blood Samples

Blood samples are commonly collected for a wide range of diagnostic tests, including blood cell counts, blood chemistry, and blood typing.

2. Urine Samples

Urine samples are used to detect infections, kidney function, and metabolic disorders, as well as to assess the presence of drugs or other substances.

3. Stool Samples

Stool samples are collected to diagnose gastrointestinal infections, parasitic infestations, and other digestive disorders.

4. Sputum Samples

Sputum samples are used to diagnose respiratory infections, such as pneumonia, bronchitis, and tuberculosis.

Factors Affecting Sample Quality

Contamination

Contamination from external sources can compromise the integrity of samples, leading to inaccurate test results. Strict adherence to aseptic techniques is crucial.

Storage Conditions

Improper storage temperatures and humidity can affect the stability and viability of samples, potentially altering the analytical outcomes.

Time Delays

Delays in sample processing and analysis can lead to sample degradation and compromised results. Rapid sample handling is essential.

Sample Integrity

Proper collection, handling, and storage methods ensure sample integrity and prevent alterations that can impact the reliability of laboratory tests.

Sample Collection Techniques

Sample collection techniques are essential for accurate laboratory results. It involves obtaining the specimen accurately, using the right methods, and ensuring its quality.

- Aseptic Techniques

Minimize contamination

- Proper Equipment

Sterile needles, tubes, swabs

- Patient Preparation

Fasting, hydration

- Sample Handling

Storage, transportation

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Proper technique ensures the sample is representative of the patient's condition and free from contaminants. The chosen method should be appropriate for the type of specimen and the specific test being performed.

Venipuncture Procedure

Preparation

Gather necessary supplies, including gloves, needles, tubes, and antiseptic wipes.

Patient Identification

Verify patient identity using two identifiers, such as name and date of birth.

Site Selection

Choose an appropriate vein, usually in the antecubital fossa, and cleanse the area.

Tourniquet Application

Apply a tourniquet above the selected vein to distend it.

Needle Insertion

Insert the needle into the vein at a 15-30 degree angle, bevel up.

Blood Collection

Fill the collection tubes with the desired volume of blood.

Removal

Remove the needle and apply pressure to the site until bleeding stops.

Labeling and Documentation

Label the collection tubes with patient information and the time of collection.

Capillary Blood Collection

Preparation

Cleanse the puncture site with an antiseptic wipe to minimize contamination.

Puncture

Prick the fingertip with a sterile lancet to draw a small blood sample.

Collection

Gently massage the fingertip to encourage blood flow into the collection tube.

Urine Sample Collection

Clean Catch

Minimizes contamination

Midstream

Collected mid-stream

Sterile Container

Prevents contamination

Labeling

Accurate identification

Urine samples are collected for various laboratory investigations, including urinalysis, culture, and microscopic examination. It's important to collect samples in a sterile container to minimize contamination. Proper labeling is crucial for accurate identification and analysis.

Sputum Sample Collection

Patient Preparation

Instruct patients to rinse their mouth with water, ensuring no food particles remain. Deeply inhale and exhale several times before coughing. They should cough deeply from their chest and expectorate the sputum into a sterile container.

Sample Collection

Collect sputum in the morning, before eating or drinking. Patients should cough deeply and expectorate into a sterile container. Ensure the container is labeled with the patient's name, date, and time of collection.

Proper Handling

Handle the sample carefully to prevent contamination. Seal the container tightly and transport it to the laboratory promptly. Label and store the sample according to laboratory protocols.

Swab Sample Collection

Sterile Swab Selection

Choose a swab appropriate for the collection site and specimen type.

Proper Collection Technique

Collect the swab by gently rubbing the site and avoid touching any other surfaces.

Sample Transport

Transport the swab in a sterile container and label it appropriately.

Documentation

Record the collection date, time, site, and any relevant patient information.

Quality Control in Sample Collection

Accuracy

Ensure samples are properly labeled and identified to avoid mix-ups.

Storage

Maintain appropriate temperatures and handling conditions for different sample types.

Timeliness

Collect samples promptly and deliver them to the laboratory in a timely manner.

Validation

Use quality control measures like proficiency testing to monitor accuracy