



Name :Ali Mehran

Id:13724

Medical microbiology assignment

Ans1: Importance of medical microbiology

Medical microbiology deals with pathogenic organisms which cause tremendous misery to human beings. Along with the study of pathogenic bacteria, viruses, parasites, and fungi, it also deals with Immunology and its research. Medical microbiology plays a significant role in vaccine production for the majority of the pathogenic organisms. It also deals with microbial metabolism and numerous other aspects of molecular biology with regard to the pathogenic microbial world. It also

contributes significantly to the interactions of the organisms to antibiotics, antivirals, antifungal, and antiparasitic drugs. In a nutshell, it is a study of all the pathogenic microorganisms and their interactions.

Microbiology involves the study of bacteria, viruses, parasites and fungi, all of which cause 1000's of human diseases a year. It's up to the medical community to successfully treat all of these diseases, on an ongoing basis.

ANS2: list of medical microbiology lab tests

1. Abscess, Aerobic And Anaerobic Bacteria Culture

Test : Abscess, Aerobic and Anaerobic Bacteria culture

Indications : Identification of bacteria causing abscess and provide therapy

Physiology : Serious anaerobic infections are due to mixed bacterial flora, which act as pathogenic synergists. Wound infestations are caused by the anaerobes – Bacteroides fragilis, Prevotella melaninogenica, Peptostreptococcus prevotii, Fusobacterium. Aerobes are found in less numbers than anaerobes.

Normal Range : No growth of aerobic or anaerobic bacteria.

Sample : Fluid, pus, or abscess material

Test Method : Aerobic and anaerobic culture

Related Tests : Cerebrospinal Fluid Anaerobic culture, Fine Needle Aspiration, Susceptibility Testing, Wound culture.

2. Blood Culture, Aerobic And Anaerobic

Test : Blood culture, Aerobic and Anaerobic

Interpretation : Table - Interpretation of Positive blood cultures

Sample : Venous blood

Test Method : Early subculture in aerobic bottle, blood agar and chocolate agar. Antimicrobial susceptibility

3. Fungus Smear, Stain

Test : Fungus Smear, Stain

Indications : The stain helps in the diagnosis of fungal diseases, used in combination with fungus culture.

Normal Range : No yeast or hyphal elements seen.

Sample : Fungal specimen

Test Method : Periodic acid Schiff (PAS) stain, Calcofluor white, and Gomori methenamine silver stain (GMS).

Related Tests : Gram stain, India ink stain, KOH preparation, skin fungus culture

4. Penicillinase Test

Test : Penicillinase Test

Indications : The test is ordered to detect antibiotic resistance in certain infection- causing bacterial strains. No preparation is required prior to the test.

Samples are collected using cotton swabs from parts of the body, based on the type of infection. It is transferred to a plate containing appropriate media to enable the growth of these organisms.

There are two methods to carry out the acidometric tests.

(i) Tube method

For this method, 2 mL of 0.5% (w/v) aqueous phenol red solution is made dilute with 16.6 mL of distilled water. Then 1.2 g of benzylpenicillin is added and the pH is adjusted to 8.5 using 1 M NaOH. This results in a violet colored solution which can be stored at -20°C. 100 µl of

this solution is then transferred into tubes or microtitre wells and inoculated with a sample of cultured bacteria to form dense suspensions. Experiments using controls must run parallel to the ones using samples.

(ii) Paper strip method

For this method, seven numbers of Whatman No. 1 filter paper is cut into 5 x 1 cm strips and allowed to soak in a freshly-prepared solution containing 125 g/L benzylpenicillin, 0.1% (w/v) bromocresol purple and 1.25 mM NaOH.

These strips are later allowed to dry, after which they are stored at 4°C for 6 months. They must be moistened with distilled water before use. A small portion of the bacterial isolates from the culture plates are smeared on the moistened strips.

Physiology : The Penicillinase test is used for rapid detection of beta lactamase production from isolated colonies of Haemophilus influenzae, Neisseria gonorrhoeae, Moraxella catarrhalis, S. aureus, and enterococci sp.

Beta lactamase enzyme, also known as penicillin lactamase, renders a few bacterial species resistant to some antibiotics, such as beta lactams. This acidimetric test is based on the fact that hydrolysis of the beta lactam ring generates a carboxyl ring that acidifies unbuffered

systems.

Interpretation : Tube method - A yellow color develops within 5 min of inoculation, indicating β -lactamase activity.

Paper strip method - A yellow color develops within five minutes of smearing the sample, indicating β -lactamase activity.

Sample : Haemophilus influenzae, Moraxella catarrhalis, Neisseria gonorrhoeae, enterococci, Staphylococcus aureus, gram negative anaerobic rods.

Test Method : Acidimetric method

Related Tests : Neisseria gonorrhoeae culture, Susceptibility testing.

5. Sputum Culture

Test : Sputum culture

Indications : The test is ordered to identify the causative organism, when a patient presents with chronic upper respiratory tract infection.

For the test, sputum located deep in the airways or throat

must be brought up. Sputum sample is collected early in the morning before you eat anything. You are required to rinse your mouth, take three deep breaths and cough with force. If you find it difficult to cough up a sample, you may be required to inhale an aerosol mist which would help you to cough and bring out the sputum.

Do not use mouth wash as it contains bactericidal agents which will interfere with test results.

Spit the sputum that comes up into a sterile cup. Transport the cup to the lab where it is transferred on to petriplates containing special media that would allow the growth of bacteria or fungi.

It would help if you drink plenty of water or fluid the night before sample collection. Also inform the doctor regarding any antibiotic that you may have recently taken as it could affect test results.

Care must be taken to ensure that adequate amount of sputum is collected and that it is transferred to the laboratory without delay. In some people bronchoscopy or the suction method may be employed to collect sputum. Sometimes, as many as three samples will have to be collected to ensure proper diagnosis.

Physiology : Sputum culture test is carried out to diagnose upper respiratory tract and lung infections and identify the micro organisms, such as bacteria and fungi

that may be causing it.

Sputum culture is carried out to avoid the usage of diagnostic techniques such as bronchoscopy, which are more invasive, laborious and expensive.

Normal Range : Normal upper respiratory flora, Tracheal aspirate and bronchoscopy specimen should not have any growth.

Interpretation : Normal

No disease-causing microorganism is present. Sometimes bacteria belonging to the normal mouth flora will grow in sputum culture. This does not indicate infection.

Abnormal

The culture result is positive indicating growth of microorganisms when viewed through a microscope. This indicates the presence of an infection of the respiratory tract and /or the lungs.

If the result is positive then a sensitivity test should also be conducted to determine the right antibiotic treatment.

Sample : Sputum, tracheal aspiration, bronchoscopy specimen, transtracheal aspirate.

Test Method : Aerobic culture.

Related Tests : Blood culture, Bordetella pertussis, Bronchoalveolar lavage, Gram stain, Legionella culture, Mycoplasma pneumoniae, Sputum cytology.