

| | |
|-------------------|-----------------------------|
| Name | Gul shad |
| I.D | 13766 |
| Subject | Medical Microbiology |
| Assignment | Internal Assessment |

Q.1/ what is the importance of medical microbiology ?

Ans: Importance Of Medical Microbiology:-

A medical **microbiologist** studies the characteristics of **pathogens**, their modes of transmission, mechanisms of infection and growth. The academic qualification as a clinical/Medical Microbiologist in a hospital or medical research centre generally requires a Masters in Microbiology along with Ph.D. in any of the life-science. Using this information, a treatment can be devised. Medical microbiologists often serve as consultants for physicians, providing identification of pathogens and suggesting treatment options. Other tasks may include the identification of

potential health risks to the community or monitoring the evolution of potentially virulent or resistant strains of microbes, educating the community and assisting in the design of health practices. They may also assist in preventing or controlling epidemics and outbreaks of disease. Not all medical microbiologists study microbial pathology; some study common, non-pathogenic species to determine whether their properties can be used to develop antibiotics or other treatment methods.

Epidemiology, the study of the patterns, causes, and effects of health and disease conditions in populations, is an important part of medical microbiology, although the clinical aspect of the field primarily focuses on the presence and growth of microbial infections in individuals, their effects on the human body, and the methods of treating those infections. In this respect the entire field, as an applied science, can be conceptually subdivided into academic and clinical sub-specialties, although in reality there is a fluid continuum between **public health microbiology** and **clinical**

microbiology, just as the state of the art in **clinical laboratories** depends on continual improvements in academic medicine and **research laboratories**.

Q.2/Enlist and briefly explain what type of diagnostic test we perform in clinical or medical microbiology laboratory?

Ans:

1/ 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.

2/Test : Urine culture:-

Indications culture is usually ordered when the symptoms of **UTI**, such as pain and burning sensation on urination, are detected. The test is done for the following reasons -

- Detect the cause of UTI
- Decide on the treatment method and,
- Monitor the effect of treatment for UTI

No preparation is required prior to the test.

Inform the doctor about any medication that you may be taking.

Avoid urinating before sample collection. Also, do

not drink too much water or take diuretics, as it tends to dilute the urine and the bacteria present in it.

Wash genital area from front to back, thoroughly, with medicated towels or swabs before collecting sample. After the initial flow of urine, collect 60ml of a clean-catch midstream urine sample into a sterile container. Do not allow the sample to be contaminated with any tissue, paper, feces, menstrual blood or fluid. Make sure you wash hands before and after sample collection.

In some cases the urine is collected by inserting a catheter into the bladder through the urethra. The sample is then transported to the laboratory as quickly as possible and allowed to grow in an appropriate medium.

Physiology : Certain types of bacteria and sometimes yeast enter through the urethra into the urinary tract and causes urinary tract infection (UTI). Urine is stored in the urinary bladder where it is sterile, until it becomes infected by bacteria or yeast. A urine culture

helps to detect the cause of UTI.

UTI is more prevalent in females than in males because the female urethra is closer to the anus and, the chances of infection by intestinal bacteria are far greater. Besides in men, there is an antibacterial secretion from the prostate, reducing their chances of infection.

Normal Range : No growth. Significant bacteriuria is usually considered to be 10^5 CFU/mL.

Interpretation : A urine culture test result usually takes about 2-3 days. Fungal cultures take longer

Normal – Negative

No bacterial or fungal growth seen in the culture

Abnormal – Positive

Micro organisms, mostly bacteria or yeast, are seen to have grown in the culture dish indicating UTI or urinary bladder infection.

Sample : Urine

Test Method : Quantitative aerobic culture

Related Tests : Chlamydia trachomatis, Gram stain, Urine fungus culture, Viral culture

3/ Test : Cryptosporidium Test:-

Indications this is done to differentiate work up of diarrhea, particularly in immunocompromised hosts and suspected AIDS patients, establish the diagnosis of cryptosporidiosis by demonstration of the oocysts.

Physiology : Cryptosporidium is a coccidian parasite of the intestines and respiratory tract of many animals including mice, sheep, snakes, turkeys, chickens, cows, monkeys, and domestic cats. It is a cause of severe and chronic diarrhea in patients with hypogammaglobulinemia and the acquired immune deficiency syndrome. The organism is widely recognized as a disease in immunocompetent patients.

Normal Range : Negative

Sample : Stool

Test Method : Phase contrast microscopy

4/ Test : Bacterial Antigens:-

Indications : Qualitative identification for the presence of antigens of Haemophilus influenzae, Streptococcus pneumoniae, Neisseriae meningitidis. The test is used to detect bacterial antigens in CSF for the rapid diagnosis of meningitis.

Normal Range : Negative

Interpretation : Bacterial antigens may be detected despite previous antibiotic therapy, immunologic methods.

Sample : Cerebrospinal fluid, serum

Test Method : Latex agglutination

Related Tests : Cerebrospinal fluid culture, Cryptococcal Antigen titer, Viral culture, Central Nervous system.

5/Test : Blood culture, Brucella

Indications : Test used to diagnose brucellosis

Physiology : Symptoms of brucella infections may be subclinical, subacute, acute, relapsing and chronic. Symptoms include abdominal pain. Unpasteurized milk is mostly the source of infection.

Normal Range : No presence of Brucella species

Interpretation : The bacteria brucella appears as a small, slow growing white colony. It is a gram negative coccobacillus

Related Tests : Blood culture, Aerobic and Anaerobic