Name : Babar Ali

ID: 15036

Department : DPT(4th Semester)

Subject : Microbiology and pathology

Instructor : Dr. Imran Khan

Mid-term Assignment

Q1: Write down any viral or bacterial disease in detail?

Answer:

Pneumonia: It is an infection that inflames the air sacs in one or both lungs. The air sacs may fill with fluid or pus (purulent material) causing cough with phlegm or pus fever , chill, and difficulty breathing . A variety of organisms , including bacteria , viruses and fungi , can cause pneumonia.

Sign and symptoms:

- Chest pain when you breath
- Confusion or changes in mental awareness(In adults age 65 and older)
- Cough which may produce phlegm
- Fatigue
- Fever , sweating and shaking chills
- Lower body temperature (In adults older than age 65 and people with weak immune system)
- Nausea , vomiting and diarrhea
- New born and infants may not show any sign or they may vomit have a fever and cough appear restless or tired and without energy or have difficulty breathing and eating difficulty

Causes: Many germs can cause pneumonia , the most common are the viruses and bacteria in the air we breath.

It is classified as

- **Streptococcus pneumonia :** This type of pneumonia can occurs on its own or after you had a cold or flue . It effect one part (lobe)of lungs a condition called lobar pneumonia.
- Bacteria like organisms . Micro plasma pneumonia . It produces milder symptoms . Walking pneumonia is an informal name given to this kind of pneumonia . It is not severe enough to require bed rest.
- **Fungi :**This type of pneumonia is most common in people with chronic heath problems or weaken immune system. It is found in soil or birds.
- **Viruses:** Some of the viruses that causes cold and flue can cause pneumonia.

- **Hospital acquire pneumonia:** Some people can catch pneumonia during a hospital stay . This pneumonia can be serious because the bacteria causing it may be more resistant to antibiotics. Mostly people on ventilators and in ICU are at higher risk .
- **Health care acquire pneumonia** : People who live long term care facilities like kidney dialysis centers , These type of bacteria may be more resistant to antibiotics .
- **Aspiration pneumonia:** It occurs when you inhale food , drink , saliva , vomit into your lungs. It is more likely If something disturb your normal gag reflex , brain injury or excessive use of alcohol or drugs .

Risk factors:

- Children who are two year old or younger
- People who are age 65 or older
- Being hospitalize
- Chronic disease
- Smoking
- Weaken or suppressed immune system

Prevention:

- Get vaccinated
- Practice good hygiene
- Don’t smoke
- Keep your immune system strong

Diagnosis : Doctors will ask about medical history and doing a physical exam . If pneumonia suspected doctor may recommend

- Blood test
- Chest X-ray
- Pulse oximetry
- Sputum test

Treatment:

Treatment for pneumonia involves curing the infection and preventing the complication.

The option include:

- Antibiotics
- Cough medicine
- Fever reducers or pain relievers

Q2: What is cancer? How cancer is diagnosed? What is the role of genetics in cancer? Also explain TNM diagnostic test for cancer?

Answer:

Cancer : It is uncontrolled growth of abnormal cells in the body . Cancer develops when the body's normal control mechanisms stops working. Old cells do not die and instate grow out of control forming new abnormal cells . These extra cells may form a mass of tissues called a tumor.

Diagnosis: Imaging tests used in diagnosis cancer may include :

- Computerize tomography (CT) scan
- Bone scan
- Magnetic resonance imaging (MRI)
- Positron emission tomography (PET) scan
- Ultra sound and X-ray
- Biopsy(In most cases a biopsy is the only way to definitively diagnose cancer)

Role of genetics in cancer:

Cancer is a genetic disease that is caused by certain changes to genes that controls the way our cells function especially how they grow and divide . Genes carries the instructions to make proteins which do much of the work in our cells.

TNM diagnostic test for cancer: The TNM test is widely used for cancer.

- The T refers to the size and extend of the main tumor , the main tumor is usually called primary tumor .
- The N refers to the numbers of the nearby limb nodes that have cancer
- The m refers to whether the cancer has metastasized . This means that the cancer has spread from the primary tumor to the other parts of the body

Primary tumor (T):

- TX: Main tumor cannot be measured
- T0: Main tumor cannot be found .
- T1 , T2 ,T3 , T4 : Refers to the size and /or extend of the main tumor.

Regional lymph nodes(N):

- NX: Cancer in nearby lymph nodes cannot be measured .
- N0: There is no cancer in nearby lymph nodes.
- N1 , N2 , N3 : Refers to the number and location of lymph nodes that contains cancer.

Distant metastasis(M):

- MX: Metastasis cannot be measured.
- M0: Cancer has not spread to other parts of the body
- M1: Cancer has spread to the other parts of the body

Q:3 Explain the structure of Bacterial Cell. How antibiotics kills bacteria? What is the mood of action of antibiotics?

ANS:

Structure of Bacterial Cell:

It is a gel like matrix composed of water, enzymes, nutrients, waste, gases and contains cell structure such as ribosomes, a chromosome and plasmid. The cell envelope encases the cytoplasm and all its components. Unlike the eukaryotic cells, bacteria do not have a membrane enclosed nucleus.

A prokaryotic cell has five essential structure components a nucleoid (DNA), ribosomes,cell membrane, cell wall and some sort of surface layer which may or may not be inherent part of the wall. Structurally there are there regions:

- Appendages in the form of flagella and pili
- A cell envelope consisting of a capsule
- Cell wall and plasma membrane and a cytoplasm region that contains the cell chromosome and ribosomes and various sorts of inclusions.

How antibiotics kills bacteria?

Antibiotics fight bacteria infection either by killing bacteria or slowing and suspending its growth. They do this by attacking the way or coating surrounding bacteria. Interfering with bacteria reproduction.

An antibiotic is a type of antimicrobial substance active against bacteria and is the most important type of antibacterial agent for fighting bacterial infection. Antibiotics medication are widely used in the treatment of and prevention of such infections. They may either kill or inhibit the growth of bacteria.

Antibiotics Mode of Action:

Different antibiotics have different modes of action, Owing to the nature of there structure and degree of affinity to certain target site within bacterial cell.

- **Inhibitors of cell wall synthesis:**

  While the cells of humans and animals do not have cell walls, this structure is critical for the life and survival of bacterial species. A drug that targets cell walls can therefore selectively kill or inhibit bacterial organisms.

  Examples: penicillin. cephalosporins, bacitracin and vancomycin

- **Inhibitors of cell membrane function**

  Cell membranes are important barriers that segregate and regulate the intra-and extracellular flow of substances. A disruption or damage to this structure could result in leakage of important solutes essential for the cell's survival. Because this structure is found in both eukaryotic and prokaryotic cells, the action of this class of antibiotic are often poorly selective and can often be toxic for systemic use in the mammalian host. Most clinical usage is therefore limited to topical applications.

  Examples: polymyxin B and colistin

- **Inhibitors of protein synthesis**

  Enzymes and cellular structures are primarily made of proteins. Protein synthesis is an essential process necessary for the multiplication and survival of all bacterial cells. Several types of antibacterial agents target bacterial synthesis by binding to either 30S or 50S subunits of the intracellular ribosomes. This activity then results in the disruption of the normal cellular metabolism of the bacteria, and consequently leads to the death of the organism or the inhibition of its growth and multiplication.

  Examples: Aminoglycosides, macrolides, lincosamides, streptogramins. chloramphenicol, tetracyclines.

- **Inhibitors of nucleic acid synthesis**

  DNA and RNA are keys to the replication of all living forms, including bacteria. Some antibiotics work by binding to components involved in the process of DNA or RNA synthesis, which causes interference of the normal cellular processes which will ultimately compromise bacterial multiplication and survival.

  Examples quinolones, metronidazole, and rifampin

- **Inhibitors of other metabolic processes**

  Other antibiotics act on selected cellular processes essential for the survival of the bacterial pathogens. For example, bath sulfonamides and trimethoprim disrupt the

folic acid pathway, which is a necessary step for bacteria to produce precursors important for DNA synthesis. Sulfonamides target and bind to dihydropteroate synthase, trimethoprim inhibits dihydrofolate reductase; both of these enzymes are essential for the production of folic acid, a vitamin synthesized by bacteria, but not humans.