**Mid-term assignment**

**Pathology and microbiology (DPT 4th)**

 **Instructor: Dr. Imran khan**

 **Max Marks: 30**

Name: …Saqlain khan…………….. ID………15309…………………………

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

 **Answer: Viral disease:**

* Definition: A viral disease is any illness or health condition caused by a virus.
* Viruses are type of tiny microorganism, they are smaller than bacteria.
* Viruses are very small infectious agents. They are made up of a piece of genetic material, such as DNA or RNS that are enclosed in a coat of protein.
* Viruses are parasitic mean they require living cells or tissue in where they are growing.
* Viruses invade cells in a body and use components of those cell to help them multiply. This process often damages or destroys infected cells. Some viruses even kill host cells as part of their life cycle.

**Common viral infection:**

* Respiratory viral diseases
* Gastroenteritis viral diseases
* Exanthemata’s viral diseases
* Cutaneous viral diseases
* Hemorrhagic viral diseases
* Human immunodeficiency virus (HIV)
* Hepatitis viral diseases

Viral infection spread:

* Many Viral infections are also contagious. They can spread from one person to another person same ways,
* Coming into close contact with a person who has a viral infection
* Contact with body fluid of a person with a viral infection
* Transmission from mother to child during pregnancy or birth
* Coming into contact with contaminated surfaces

**Respiratory Viral Diseases:**

They are contagious and commonly affect the upper or lower parts of respiratory tract.

Common Symptoms:

* Runny or stuffy nose
* Coughing or Sneezing
* Fever
* Body Aches

Examples Respiratory Viral Diseases:

* Flu
* Common cold
* Respiratory Syncytial Viral Infection
* Adenovirus Infection
* Para influenza Infection
* Severe Acute Respiratory Syndrome (SARS)

**Treatment:**

They are usually heal on their own but Sometime over counter (OTC) medication including nasal decongestants, cough suppressants and pain relievers can help to reduce symptoms.

Antiviral drugs are sometime prescribed in early stages of developing flu.

**Gastrointestinal Viral Diseases:**

Gastrointestinal viral diseases are affected digestive tract. The viruses which cause them are contagious and usually lead a conduction known is stomach flu or gastroenteritis

Common Symptoms:

* Abdominal cramps
* Diarrhea
* Vomiting

Examples of Gastrointestinal Viral Diseases:

* nor virus infection
* Rotavirus infection
* Some adenovirus infection
* Astronirus infection

**Treatment:**

There is no treatment of gastrointestinal viral diseases. In many cases they are resolve on their own with a day or two. Drink plenty of fluid to replace those lost from diarrhea or vomiting

**Exanthemata’s Viral Diseases:**

Exanthemata’s viruses cause skin rashes. They also cause additional symptoms. Viruses of this category, such is measles virus are highly contagious.

Example of Exanthemata’s Viral Diseases:

* Measles
* Rubella
* Chicken pox or Shingles
* Rosella
* Small pox
* Fifth diseases
* Chikungunya virus infection

**Treatment:**

Exanthemata’s viral diseases focus on managing symptoms. Fever reducing medications such acetaminophen antiviral drugs such as acyclovir given for chickenpox or shingles.

**Cutaneous Viral Diseases:**

This viral disease causes lesions or papules to from on skin. In many cases those papules can stick around for a long time or come back after disappearing for a while.

Example of Cutaneous Viral Diseases:

* Warts including genital warts
* Oral herpes
* Genital herpes
* Molluscum

**Hemorrhagic Viral Diseases:**

The hemorrhagic viral diseases are severe condition that involves damage the circulatory system.

Symptoms:

* High Fever
* Body Aches
* Weakness
* Bleeding Under the Skin
* Bleeding From the Mouth or Ears
* Bleeding in Internal Organs

Example of Hemorrhagic Viral Diseases:

* Ebola
* Lassa Fever
* Dengue Fever
* Yellow Fever
* Marburg Hemorrhagic Fever
* Crimean Congo Hemorrhagic Fever

**Treatment:**

 No specific treatment for hemorrhagic viral diseases.it is important to stay hydrated if viral disease.

Some cases people need intravenous (IV) fluid to maintain electrolyte balance. In some cases the antiviral drugs ribavirin may be given.

**Hepatic Viral Diseases:**

The Hepatic viral diseases cause inflammation of the liver known as viral hepatitis. Those diseases caused virus such as cytomegalovirus and yellow fever virus also effect liver.

Example of Hepatic Diseases:

* Hepatitis A
* Hepatitis B
* Hepatitis C
* Hepatitis D
* Hepatitis E

**Treatment:**

There is no specific treatment for people with mild viral meningitis or encephalitis, getting rest and stay hydrated. In some cases antiviral drugs or medication are prescribed.

In severe cases of meningitis or encephalitis require additional treatment such as breathing or IV fluids

**Bottom line:**

Many viral diseases such as common cold, stomach flu are minor and go away on their own within few days. Viral diseases do not respond to antibiotic treatment usually focuses on managing symptoms and supporting the immune system with the res and hydration.

**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:**

* Neoplasm and Malignant tumor are other common name cancer.
* Cancer word come from Greek word means crab.
* The uncontrolled growth of abnormal cells anywhere in the body.
* Cancer develops when the body normal control mechanism is stops working.
* These abnormal cells are termed cancer cells, malignant cells or tumor cells.
* A tumor is an abnormal mass of cells. Tumor may be benign (non-cancerous) or Malignant (cancerous).
* Malignant tumors have the ability to spread and invade other tissues. These processes known as metastasis it is key feature of cancer.

**Common cancer symptom and signs:**

* Fever
* Pain
* Fatigue
* Skin Changes (redness and sores that won’t heal, jaundice, darkening)
* Unintended weight loss or gain

Other more signs of cancer:

* Lumps or tumors (mass).
* Difficulties with bowel or bladder function.
* Short of breath.
* Chest pain.
* Unexplained bleeding.

Most common types of cancers in man and woman, children are follows:

* Man: have Prostate, Lung and Colorectal.
* Woman: have Breast, Lung and Colorectal.
* Children: Leukemia, Brain tumors and lymphoma.

 **Diagnosing of cancer:**

* Medical history.
* Complete blood count electrolyte levels.
* imaging studies ( X-rays, CT and MIRI Scans and ultrasound are common tools use)
* endoscopy
* Some skin biopsy or intestinal tissues biopsy and brain tissue or lymph node biopsy.

**Role of Genetics in Cancer:**

There are two types of gene:

1. Proto-oncogene:

 It is the normal cell proliferation, normal mitosis, and normal cell synthesis.

1. Tumor suppresser gene.

It stops cell proliferation stops cancer cell division and stop tumor cells from spreading

* Proto-oncogene coverts into oncogene then produce abnormal cell synthesis.
* Tumourauppressor gene. The cancer causes mutation in these gene there why spread the tumor.
* Gene regulation. The cancer also changes this gene, the apoptosis process of body loss.
* Gene regulating DNA repair. The tumor stops the gene from the repair of the gene that develops during synthesis due to tumor.

**TNM Diagnostic test:**

The TNM system is based on the extent of the of the tumor (T) the extent of spread to the lymph nodes (N) and the presence of distant metastasis (M) a number is added to each letter to indicate the size or extent of the primary tumor and the extent of cancer spread (high number mean bigger tumor or more spread).

**NCI describes the TNM staging system**:

1. **Primary tumor(T):**
* TX – Primary tumor cannot be evaluated.
* T0- No evidence of primary tumor.
* T1, T2, T3 and T4 – size and extant of the primary tumor.
1. **Regional lymph Nodes(N):**
* **NX-** Regional lymph nodes cannot be evaluated.
* N0- No regional lymph node involvement.
* N1, N2 and N3 involvement of regional lymph nodes (number of lymph nodes and extent of spread.
1. **Distant Metastasis (M);**
* MX- Distant metastasis cannot be evaluated (some clinicians do not even use this designation).
* M0- No distant metastasis.
* M1- Distant metastasis is present.

**Q3**: Explain structure of bacterial cell. How antibiotics kill bacteria? What is the mode of action of antibiotics?

Answer:  **Bacterial:**

**Definition**: Bacteria are microscopic single cell called organisms that thrive in diverse environments. These organisms can live in soil, the ocean and inside the human gut. Bacteria are unicellular mean consist of only one cell. Bacteria the first lives which are appear in earth.

Human and bacterial relationship is complex. Sometime bacterial lend us a helping hand such as curding milk into yogurt or helping in digestion. In some cases bacteria are destructive which are causing diseases such as pneumonia

**Structure of Bacterial cell**:

* Capsule
* Cell Envelope
* Cell Wall
* Cytoplasm
* Cytoplasmic Membrane
* Flagella
* Nucleoid
* Ribosomes

**Capsule:**

* Some species of bacteria have a third protective covering
* Capsule made up polysaccharides( complex carbohydrates)
* Most Important role plays to keeps the bacterium from drying out and protect from phagocytosis by large microorganisms.

 **Cell Envelope:**

* Cell envelope made up two to three layers
* The interior cytoplasmic membrane
* The cell well
* And in some species of bacteria an outer capsule

**Cell wall:**

* Cell wall composed of peptidoglycan and protein sugar molecule
* The wall hives the cell shape and surrounds the cytoplasmic membrane and protecting form the environment.
* The strength of the wall is responsible for keeping the cell from bursting when there are large differences in osmotic pressure between cytoplasm and the environment.

**Cytoplasmic membrane:**

* A layer of phospholipids and proteins called cytoplasmic membrane
* Encloses the interior of the bacterium regulating the flow of materials in out of the cell
* They are a barrier that allows selectively interact with the environment.

**Flagella:**

* Are hairs like structures that provide a means of locomotion for bacteria .
* They are found at both ends of bacterium over all surfaces.

**Nucleoid:**

* A region of cytoplasm where the chromosomal DNA is located.
* It is not a membrane bound nucleus, but simply an area of the cytoplasm where the strands of DNA are found.

**Ribosomes:**

* Ribosomes are found in bacteria cell.
* They are translate the genetic code from the molecular language of nucleic acid to amino acid,
* Ribosome of bacterial is similar eukaryote but smaller and have slightly different composition and molecular structure.
* Bacterial ribosomes are never bound to other organelles.

**Antibiotic:**

* Antibiotic are medication which are used to fight against infections which are caused by bacteria.
* They also called antibacterial. They treat infection by kill or decreasing the growth of bacteria.

**Antibiotics Work against Bacteria:**

Antibiotics fight bacterial infection either kill bacteria or slow the suspending its growth.

* Antibiotic attacking the wall or coating surrounding bacteria.
* Interfering with bacteria reproduction.
* Blocking protein production in bacteria.

**Antibiotic Mode of Action:**

 Different antibiotics have different modes of action, owing to the nature of their structure and degree of affinity to certain target sites within bacterial cells.

* **Inhibitors of cell wall synthesis**
* **Inhibitors of cell membrane function**
* **Inhibitors of protein synthesis**
* **Inhibitors of nucleic acid synthesis**

 **Inhibitors of cell wall synthesis:**

* While the cells of humans and animals do not have cell walls
* A drug that targets cells walls can therefore selectively kill or inhibit bacterial
* Example cephalosporin’s and bacitracin

**Inhibitors of cell membrane function:**

* Cell membranes are important barriers that segregate and regulate the intracellular and extracellular flow of substances.
* Damage to this structure could result in leakage of important solutes essential for the cell survival because this structure is found in both eukaryotic and prokaryotic cells
* The action of this class of antibiotic is often poorly selective and can often be toxic for systemic use in the mammalian host.

**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 protein synthesis by binding to either the 30s or 50s subunit of the intracellular ribosomes
* This activity is 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
* Example aminoglycosides , macrolides, Tetracycline

**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 component 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 and rifampin