

15/05/16

Q.1]

Write the short note :-

(i) AIDS (b) Tetanus (c) Leprosy

Q.2]

Define the immunoglobulins and explain the types of immunoglobulins

Q.3]

Describe the Recombinant DNA technique.

Q.4]

Describe the applications of biostatistics in the field of work.



AIDS short note me a...



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Listen

AIDS, or Acquired Immunodeficiency Syndrome, is a condition caused by the Human Immunodeficiency Virus (HIV), which attacks and severely weakens the body's immune system. It is the most advanced stage of HIV infection, making an individual vulnerable to a range of life-threatening opportunistic infections and cancers. [🔗](#)

Causes and transmission

The HIV virus is primarily transmitted through the exchange of certain bodily fluids from an infected person. [🔗](#)

- **Unprotected sexual contact:** This includes vaginal, anal, and, less commonly, oral sex.
- **Sharing needles:** Sharing contaminated needles, syringes, or other equipment for injecting drugs poses a high risk.
- **Mother to child:** The virus can be passed from a pregnant woman with HIV to her



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from a pregnant woman with HIV to her baby during pregnancy, childbirth, or breastfeeding.

- **Blood transfusions:** Though extremely rare in countries with proper screening, transmission can occur through infected blood or organ transplants.
- **Non-transmissible means:** HIV is **not** spread through casual contact, such as hugging, kissing, or sharing utensils, nor is it transmitted through air, water, or insect bites. 

Symptoms

Symptoms of HIV vary depending on the stage of the infection. 

- **Early stage (acute HIV):** Within 2 to 4 weeks of infection, some people may experience a flu-like illness with symptoms such as fever, headache, rash, and sore throat. Many people, however, have no noticeable symptoms.



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- **Chronic HIV:** After the initial stage, the virus continues to multiply, but at lower levels. This stage can last for many years without significant symptoms. Swollen lymph nodes are a common sign.
- **Advanced stage (AIDS):** At this stage, the immune system is severely damaged. Symptoms can include rapid weight loss, persistent fever, chronic diarrhea, extreme fatigue, and night sweats. 

Treatment and prevention

Treatment

- **Antiretroviral therapy (ART):** While there is no cure for HIV, ART can control the virus and prevent the disease from progressing to AIDS. When taken consistently, ART can reduce the viral load (the amount of HIV in the blood) to an undetectable level, allowing people with HIV to live long, healthy lives. An undetectable viral load also means the virus cannot be



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Prevention

- **Safe sex:** Using condoms correctly and consistently during sexual contact is highly effective.
- **PrEP (pre-exposure prophylaxis):** This is a medication taken by HIV-negative people at high risk of exposure to prevent infection.
- **PEP (post-exposure prophylaxis):** A course of medication taken after a possible exposure to HIV to prevent the virus from taking hold. It must be started within 72 hours.
- **Clean needles:** Never share needles, syringes, or other drug injection equipment.
- **Testing:** Knowing your and your partner's HIV status is crucial for making informed health decisions. 



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 tetnes short note me...

Tetanus is a serious bacterial infection that affects the nervous system, causing painful muscle spasms and stiffness, and is commonly known as "lockjaw". It is a medical emergency that can be fatal if left untreated. 

Causes and transmission

- Tetanus is caused by the bacterium *Clostridium tetani*, which lives in soil, dust, and animal feces.
- The spores of the bacteria enter the body through cuts, deep puncture wounds (e.g., from a nail), burns, or other skin breaks.
- Once inside the body, the bacteria produce a potent neurotoxin called tetanospasmin, which interferes with nerve signals that control muscles.
- Tetanus is not contagious and cannot be spread from person to person. 



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Signs and symptoms

Symptoms typically appear 3 to 21 days after infection. They often begin in the jaw and neck and then spread to the rest of the body. [🔗](#)

- **Lockjaw (Trismus):** Painful muscle spasms and stiffness of the jaw muscles.
- **Stiffness:** Muscle rigidity in the neck, shoulders, back, and abdomen.
- **Trouble swallowing:** Difficulty or inability to swallow (dysphagia).
- **Body spasms:** Sudden, painful, and involuntary muscle spasms, often triggered by noise or touch.
- **Other symptoms:** Fever, sweating, headache, and a rapid heart rate. [🔗](#)

Prevention

- **Vaccination:** The most effective way to prevent tetanus is through immunization.



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Prevention

- **Vaccination:** The most effective way to prevent tetanus is through immunization. Vaccines like DTaP (for children) and Tdap or Td (for adolescents and adults) offer protection.
- **Booster shots:** A tetanus booster shot is recommended every 10 years for adults.
- **Wound care:** Immediate and thorough cleaning of any wound can help prevent infection. 

Treatment

Tetanus requires immediate hospital care and often involves treatment in an Intensive Care Unit (ICU). 

- **Tetanus Immune Globulin (TIG):** An antitoxin is given to neutralize any unbound tetanus toxin in the body.
- **Wound management:** Aggressive wound



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Treatment

Tetanus requires immediate hospital care and often involves treatment in an Intensive Care Unit (ICU). 

- **Tetanus Immune Globulin (TIG):** An antitoxin is given to neutralize any unbound tetanus toxin in the body.
- **Wound management:** Aggressive wound care is performed to remove infected tissue and bacteria.
- **Medications:** Muscle relaxants are used to control muscle spasms, and antibiotics help kill the bacteria.
- **Supportive care:** Patients with severe symptoms may need breathing support, such as mechanical ventilation. 

Note: Surviving a tetanus infection does not provide natural immunity, so a person who recovers will still need to be vaccinated. 



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 kusth rog short note...

Kusht rog, commonly known as leprosy or Hansen's disease, is a chronic infectious disease caused by the bacterium *Mycobacterium leprae*. It primarily affects the skin and peripheral nerves, but can also harm the eyes, upper respiratory tract, and testes. Though it has historically been associated with severe stigma and disfigurement, modern medicine can cure it, especially with early diagnosis and treatment. 

Causes and transmission

- **Causative agent:** The disease is caused by the slow-growing bacterium *Mycobacterium leprae*. A second species, *Mycobacterium lepromatosis*, was identified in 2008 as another cause.
- **Transmission:** Leprosy is not highly contagious. It is believed to be transmitted through prolonged, close contact with an untreated individual, most likely through respiratory droplets from the nose and mouth. Most people have a natural



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Symptoms

Symptoms can take many years to appear after infection, typically between three and five years, but sometimes as long as 20 years. The signs and symptoms depend on the type of leprosy and the individual's immune response. 

Common symptoms include: 

- **Skin lesions:** Discolored, pale, or reddish patches on the skin that may be numb.
- **Nerve damage:** Numbness, tingling, or pain in the hands, feet, and limbs due to damage to the peripheral nerves.
- **Muscle weakness:** Weakness or paralysis, especially in the hands and feet.
- **Eye problems:** Dryness, decreased blinking, and vision problems, which can lead to blindness if left untreated.
- **Deformities:** Advanced, untreated cases can lead to the loss of fingers and toes



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Types and classification

The two main classifications for treatment purposes are: 

- **Paucibacillary (PB) leprosy:** A milder form characterized by five or fewer skin lesions and a low bacterial load.
- **Multibacillary (MB) leprosy:** A more severe form with more than five skin lesions or detectable bacteria. This type is more contagious if left untreated. 

Treatment

Leprosy is curable with multi-drug therapy (MDT), a combination of antibiotics provided free of charge by the World Health Organization. The specific medications and treatment duration depend on the type of leprosy. 

- **For PB leprosy:** A combination of rifampicin and dapsone is used for six months.



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 definition of immunog...

Immunoglobulins, also known as antibodies, are specialized Y-shaped proteins produced by B-lymphocytes that help the immune system fight infections by binding to specific antigens. The five main types are IgG, IgA, IgM, IgE, and IgD, each with distinct functions, structures, and locations in the body. 

Immunoglobulin types

- **IgG:** The most abundant immunoglobulin, it provides long-term immunity by crossing the placenta to give newborns passive immunity. It is a potent activator of the complement system and enhances phagocytosis.
- **IgA:** Primarily found in bodily secretions like tears, saliva, and breast milk, it protects mucosal surfaces from pathogens. In secretions, it is often in a dimer form with a secretory piece.
- **IgM:** The first antibody to appear in



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passive immunity. It is a potent activator of the complement system and enhances phagocytosis.

- **IgA:** Primarily found in bodily secretions like tears, saliva, and breast milk, it protects mucosal surfaces from pathogens. In secretions, it is often in a dimer form with a secretory piece.
- **IgM:** The first antibody to appear in response to a new antigen. It is a large pentamer that is effective at activating the complement system but is too large to cross tissue membranes.
- **IgE:** Primarily involved in allergic reactions and immunity against parasites. It binds to mast cells and basophils, triggering the release of histamine.
- **IgD:** Mostly found on the surface of B lymphocytes, where it acts as a B-cell receptor. Its specific function is not as well understood as the other types. 



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describe the recomb...



Recombinant DNA (rDNA) technology involves **joining DNA fragments from different sources to create a novel genetic sequence that is then inserted into a host organism, like bacteria, to produce new combinations of genes**. Key steps include using restriction enzymes to cut and a vector (like a plasmid) to carry the gene of interest, then using DNA ligase to seal the fragments and introduce the new DNA into a host cell for cloning or expression. 

Core process

- **Isolate gene of interest:** A specific gene with a desired trait is identified and isolated from an organism's DNA.
- **Select a vector:** A carrier, or vector, such as a circular bacterial plasmid, is chosen to transport the gene.
- **Cut DNA:** Restriction enzymes are used to cut both the gene and the vector at specific points, often creating "sticky



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- **Join DNA fragments:** The isolated gene is inserted into the cut vector. An enzyme called DNA ligase is used to join the two pieces of DNA together, forming a single, continuous molecule of recombinant DNA.
- **Introduce into a host:** This recombinant DNA molecule is then introduced into a host cell, such as a bacterium.
- **Clone and express:** The host cell replicates the recombinant DNA along with its own genetic material, creating many copies of the gene. The host then expresses the gene to produce the desired protein or trait. 

Key tools

- **Restriction enzymes:** "Molecular scissors" that cut DNA at specific sequences.
- **DNA ligase:** An enzyme that acts as "molecular glue" to join fragments of DNA.
- **Vectors:** DNA molecules like plasmids that



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Key tools

- **Restriction enzymes:** "Molecular scissors" that cut DNA at specific sequences.
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- **Vectors:** DNA molecules like plasmids that carry and replicate foreign DNA in a host cell. 

Applications

- Producing therapeutic proteins like insulin and human growth hormone.
- Creating genetically modified crops with traits like disease resistance or enhanced nutritional content.
- Developing recombinant vaccines.
- Enabling gene therapy and disease diagnosis. 



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 describe the applicati...

Biostatistics has diverse applications, including evaluating the effectiveness of new drugs and public health programs, identifying disease risk factors through epidemiological studies, and understanding genetic variations that contribute to diseases. It is crucial in cancer research, analyzing health trends, interpreting genomic data, and even in areas like environmental science and agriculture for tasks such as assessing climate change impacts and designing experiments for crop improvement. 

Key Applications

- **Clinical Trials and Drug Development:** Biostatistics is used to design clinical trials, determine sample sizes, analyze treatment effects, and monitor side effects to evaluate a new drug's efficacy and safety. 
- **Epidemiology:** It helps in studying disease patterns, causes, and effects in populations by identifying risk factors,



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tracking disease outbreaks, and assessing public health interventions. 

- **Genetics and Genomics:** Biostatisticians analyze large datasets from DNA and RNA sequencing to identify mutations, understand gene-disease associations, and interpret complex genetic interactions. 
- **Public Health:** Applications include monitoring disease rates, evaluating the success of vaccination programs, and informing policy decisions regarding population health. 
- **Health Services Research:** Biostatistics helps examine the impact of social, financial, and other factors on health outcomes and the functioning of healthcare systems. 
- **Environmental and Agricultural Science:** It is used to assess ecological impacts, analyze crop yields, and develop strategies for disease resistance and pest control. 



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- **Health Services Research:** Biostatistics helps examine the impact of social, financial, and other factors on health outcomes and the functioning of healthcare systems. 
- **Environmental and Agricultural Science:** It is used to assess ecological impacts, analyze crop yields, and develop strategies for disease resistance and pest control. 
- **Pharmacology:** Biostatistical methods help find the mechanism of drug action, compare different drugs and dosages, and determine the potency of new medications. 
- **Demography:** It is applied to estimate population attributes like birth rates, sex ratios, and growth curves. 
- **Bioinformatics:** Biostatistics contributes to biological sequence analysis, helping to assign functions to genes and proteins by studying sequence similarities. 



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