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Q1: Fill in the Blanks.

- 1) **Probiotics** are live bacteria and yeasts that are good for and have beneficial effects on the host by improving its intestinal microbial balance.
- 2) Foods containing the combination of probiotics and prebiotics are referred to as **symbiotic**
- 3) When a chemical substance inhibits bacterial growth and proliferation is known as **bacterostatic**
- 4) Microbes that are always present are called **pathogen**
- 5) The symbiotic relation in which one organism benefits, the other is neither helped nor harmed is known as **mutualism**
- 6) **Conjugaton** is the direct transfer of DNA from one bacterium to another.
- 7) A genetic structure in a cell that can replicate independently of the chromosomes is known as **plasmid**
- 8) The population of microorganisms that live on the skin and mucous membranes of health normal person from birth until death is called **Normal Microbial flora**
- 9) The expression of a gene into a protein occurs by **Transcriptions and Translation**

Q2.

Ans. Normal flora is the term used to describe the various bacteria and fungi that are permanent resistant to certain body sites especially the skin. Oropharynx. Colon and vagina Normal

flora are the microorganisms that live on another living organism (human or animal) or inanimate object without causing disease. The human body is not sterile; we become colonised by bacteria from the moment we are born. They prevent colonization by pathogens by competing for attachment & nutrients.

Some synthesize vitamins that are absorbed as nutrients by the host (e.g. K & B12).

Some produce substances that inhibit pathogenic species.

Advantages

- ⇒ They constitute a protective host defense mechanism by occupying ecological niches.
- ⇒ They produce vitamin B and vitamin K in intestine
- ⇒ The oral flora contribute to immunity by introducing low level of circulating in secretory antibodies that may cross react with pathogen.

Disadvantages

- ⇒ Body odour .
- ⇒ body odour originates from the skin
- ⇒ decomposition of secretions of apocrine sweat glands located primarily under arms and in the groin .
- ⇒ *Corynebacterium tenuis* and *C. xerosis* in particular
- ⇒ best eliminated through good hygiene .
- ⇒ fungal infections such as athlete's foot also odourous

Q3 .

Ans. Stages of Pathogenesis. To cause disease, a pathogen must successfully achieve four steps or stages of pathogenesis: exposure (contact), adhesion (colonization), invasion, and

infection. pathogenesis include microbial infection, inflammation, malignancy and tissue breakdown. For example, bacterial pathogenesis is the mechanism by which bacteria cause infectious illness. Most diseases are caused by multiple processes.

Stages.

1. Transmission

In order to begin infection and eventually cause disease, pathogens must find a transmission route.

Transmission of an infectious agent can occur in many ways, but it is typically through exposed skin (e.g., a cut, abrasion, puncture, or wound) or mucous membranes (e.g., gastrointestinal tract, respiratory tract, or urogenital tract).

2. Adherence

Once the pathogen has gained access to the body, it must have some means of attaching itself to the host's tissues.

This attachment is called adherence and is a necessary step in pathogenicity.

Microbes contain ligands, which are projections that attach host receptors or surface proteins.

If a microorganism cannot adhere to a host cell membrane, disease will not occur.

3. Invasion

At this point, microbes begin to invade the host and produce a bacteremia (i.e., presence of bacteria in the bloodstream) or viremia (presence of a virus in the bloodstream).

Some bacteria are able to cause disease while remaining on the epithelial barriers, while many need to penetrate that barrier.

Once this barrier has been penetrated, these pathogens can multiply without competition.

4. Colonization

Colonization is the multiplication of pathogenic organisms where toxins are produced and the normal flora are overcome.

During this stage, pathogens compete with normal flora for space and nutrients.

Pathogens usually colonize host tissues that are in contact with the external environment.

Q 4.

Ans.

Horizontal gene transfer is a process in which an organism transfers genetic material to another organism that is not its offspring. Mechanisms of bacterial horizontal gene transfer include transformation, transduction, and conjugation. ... In Gram-negative bacteria it involves a conjugation pilus.

Conjugation-

Conjugation is the transfer of DNA directly from one cell to another through cell-cell contact. The DNA transferred by conjugation often involve plasmids. Plasmids are circular pieces of DNA that can replicate in the bacterial cell, independently of the chromosome. The conjugative transfer of plasmids is carried out by cell surface structures that act like syringes, injecting the plasmid into neighbouring cells.

You can watch a video describing conjugation by clicking [here](#).

Transformation-

Unlike humans, bacteria are capable of taking up DNA directly from their environment and incorporating it into their genomes. This process is known as natural transformation. This DNA usually comes from dead bacteria lysing (splitting open) and releasing their genetic contents into the surrounding area.

Transduction-

Transduction is the transfer of DNA from one cell to another by a virus. These viruses are known as bacteriophage and they specifically infect bacteria. Bacteriophage don't have the machinery to replicate their own genomes or express their own genes, so instead, they hijack the bacterial machinery to do so. Host cells will continue to express phage proteins and replicate the phage genome forming new virus particles. This

process continues until the cell is so full of phage particles that it splits open (lyses), releasing phage into the surrounding area. This is known as the lytic cycle. Some phage can switch between this life cycle and a state of lysogeny, where they combine their genome with the bacterial chromosome, and remain silent for many generations. When lysogenic phage remove (excise) their genomes from the host chromosome, they occasionally take small sequences of bacterial DNA with them. Phage genome containing bacterial DNA is then packaged into phage coat proteins to form a complete, recombinant virus particle. When these phage lyse the bacterial cell and re-infect a new host, they take bacterial DNA with them.

Q 5.

Ans. 1. Symbiotic relationships.

Symbiotic relationships are a special type of interaction between species. Sometimes beneficial, sometimes harmful, these relationships are essential to many organisms and ecosystems, and they provide a balance that can only be achieved by working together. There are five main symbiotic relationships: mutualism, commensalism, predation, parasitism, and competition

2. Antimicrobial drugs.

Antimicrobial resistance occurs when microorganisms such as bacteria, viruses, fungi and parasites change in ways that render the medications used to cure the infections they cause ineffective

Chemotherapy: The use of drugs to treat a disease

Antimicrobial drugs: Interfere with the growth of microbes within a host •

Antibiotic: A substance produced by a microbe that, in small amounts, inhibits another microbe •

Selective toxicity: A drug that kills harmful microbes without damaging the host

3. ANTIMICROBIAL RESISTANCE.

Antimicrobial resistance occurs when microorganisms such as bacteria, viruses, fungi and parasites change in ways that render the medications used to cure the infections they cause ineffective

MAIN CAUSE

The main cause of antibiotic resistance is antibiotic use. When we use antibiotics, some bacteria die but resistant bacteria can survive and even multiply. The overuse of antibiotics makes resistant bacteria more common. The more we use antibiotics, the more chances bacteria have to become resistant

5. Probiotics

Probiotics are often called "good" or "helpful" bacteria because they help keep your gut healthy. Probiotics are live bacteria and yeasts that are good for you, especially your digestive system. We usually think of these as germs that cause diseases. But your body is full of bacteria, both good and bad.

A+ Culturelle Digestive Health Probiotic.

A+ Schiff Digestive Advantage Daily Probiotic.

A Trunature Digestive Probiotic.

5. Probiotic

Prebiotics are compounds in food that induce the growth or activity of beneficial microorganisms such as bacteria and fungi. The most common example is in the

