

Paper:

*microbiology*

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**Submitted By:**

Abdullah

(ID#15897)

**Submitted to:**

Mr. fazil zahir main

Department of MLT

Iqra national university, peshawar, pakistan.

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 **Bacteriostatic**
4. Microbes that are always present are called **normal flora**
5. The symbiotic relation in which one organism benefits, the other is neither helped nor harmed is known as **Commensalism**.
6. **conjugation** 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 flora**
9. The expression of a gene into a protein occurs **transcription** and **Translation**

**Q2: What is normal flora, advantages and disadvantages of normal flora?**

**Answer.**

**normal flora**

Normal flora are microorganisms, mostly bacteria that continuously inhibited the human body. Under normal conditions in a healthy human they are harmless and may even be beneficial.

Also called commensals i.e. organisms that dine together.

**advantages and disadvantages of normal flora**

1. Normal flora synthesizes and excretes vitamins in excess of their own needs. These vitamins are absorbed as nutrients by the human body.

2. It prevents colonization of pathogens by competing for attachment sites or for essential nutrients. In this way the normal flora of the human organs inhibits the growth of pathogenic bacteria through competitive exclusion. This is thought to be the most important beneficial effect of normal bacterial flora.

3. Normal flora of bacteria may antagonize other bacteria through production of substances which inhibit or kill non-indigenous bacteria. The intestinal bacteria produce many substances which inhibit or kill other bactena.

4. Normal flora stimulates the production of natural antibodies inducting immunological response. Such antibodies are lacking in germ-free individuals.

**Q3: Write in detail different stages of Pathogenesis.**

**Answer.**

**Stages of Pathogenesis**

1. Transmission from the source of infection into the portal of entry.

2. Evasion of primary host defense.

3. Adherence to mucous membrane.

4. Colonization by growth of the bacteria at the site of adherence.

5. Disease symptoms caused by bacterial toxin or invasion.

6. Host immune response during steps 3,4,5. Progression or resolution of the disease

**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)

**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.

**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.

**4. Colonization**

Colonization is a process by which a central system of power dominates the surrounding land and its components.

* 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.

**Evasion of Host Defenses**

Evasion Bacteria that primarily reside in the extracellular milieu possess virulence factors that prevent uptake and destruction by phagocytes

Bacteria that primarily reside within host cells possess factors that promote survival in this potentially inhospitable location

Some bacteria strike a balance between these locations and stringently regulate virulence factor expression (facultative intracellular bacteria of Host Defenses

**Exiting the Host**

* A pathogen must exit the body.
* This occurs through various routes.
* Examples include sneezing, coughing, diarrhea, coitus, pus, blood, or insect bites.

**Q4: How the Gene Transfer for one bacterium to another.**

**Answer.**

Ways that bacteria can acquire new genetic info

* Transformation
* Taking up of" naked DNA" from soleus
* Transduction
* Transfer of DNA one to cell to another by a virus
* Conjugation
* "Mating": transfer of DNA from one bacterium to another by direct contact.

Uptake of "naked" DNA from medium.

**transformation**

* Uptake of "naked" DNA from medium.
* Classic experiment from Genetics history, 1920's. Virulent cells have genes for making capsule which assists in infection. Mutant cells lack capsule, are Harmless

**Conjugation**: bacterial sex

* If sex is the exchange of genetic material, this is as close las bacteria get. Conjugation is widespread/and does NOT require bacteria to bel closely related
* Bacteria attach by means of ales pilus, hold each other close. land DNA is transferred.
* Plasmids such as F plasmids and R plasmids can be exchanged, leading to antibiotic-resistant bacteria

**Q5: Write short notes on the following:**

**Answer.**

**(1) Symbiotic Relationships**

Symbiosis refers to relationships between organisms of DIFFERENT species that show an intimate association with each other Symbiotic relationships provide at least ONE of the participating species with a nutritional advantage

**6 types** of symbiosis have been recognized depending on the nature of the relationship:

* Mutualism
* both species benefit
* Commensalism
* one species benefit, the other is unaffected
* parasitism
* one species benefit, the other is harmed.
* Predation
* one organism captures and consumes another.
* Cooperation
* Organisms work together to improve their chances of survival.
* Competifion
* organisms compete for the resources they need to survive- air, water, food, and space.

***(2) Antimicrobial Drugs:***

Antibiotic: Substance produced by a microorganism that in small amounts inhibits the growth of another microbe.

Antibiotic producing microbes include:

* Gram-Positive Rods:
* Bacillus subtilis: Bacitracin
* Bacillus polynya: Polymyxin
* Fungi
* Penicillium notatum: Penicillin
* Cephalosporium spp.: Cephalothin
* Actinomycetes:
* Streptomyces Venezuela: Chloramphenicol
* Streptomyces griseus: Streptomycin
* Streptomyces nodoses: Amphotericin B
* Micromonospora purpura: Gentamycin

***(3) Antimicrobial resistance***

Antimicrobial resistance is the ability of microorganisms such as bacteria, fungi or protozoans to grow despite exposure to antimicrobial substances designed to inhibit their growth.

Microbes can evolve antimicrobial resistance wheat for example, populations are subjected to selective pressure through drug use in medicine

Factors contributing to Antibiotic Resistance

1- Environmental Factors.

2- Drug Related Factors.

3- Patient Related Factors.

4- Physician Related Factors

***(4) Prebiotic***

A nondigestible food ingredient that benefits the host by selectively stimulating the favorable growth and/or activity of 1 or more indigenous probiotic bacteria

Prebiotic oligosaccharides

Contains fructose chains with a terminal glucose

Typically consist of 10 or fewer sugar molecules

Examples

* Fructo-oligosaccharides (FOSs)
* Inulin
* Galactic-oligosaccharides (GOSs), And
* soybean Oligosaccharides

***(5) PROBIOTICS***

* Probiotic - Probiotics defined as microorganisms that have a beneficial effect on the host intestinal microbial balance.
* Probiotic organisms are live microorganisms thought to be beneficial to the host organism.
* According to the currently adopted definition by FAO/WHO, probiotics are: "Live microorganisms which when administered in adequate amounts confer a health benefit on the host"
* Lactic acid bacteria (LAB) and batido bacteria are the most common types of microbes used as probiotics;
* but certain yeasts and bacilli may also be used.

***CHARACTERISTICS OF PROBIOTICS***

Probiotic microorganisms are:

* Able to survive the passage through the digestive system
* Able to attach to the intestinal epithelia and colonize
* Able to Maintain good viability
* Able to utilize the nutrients and substrates in a normal diet
* Non-pathogenic and non-toxic

Capable of exerting evening beneficial effect on the hot