

4. MICROBIOLOGY

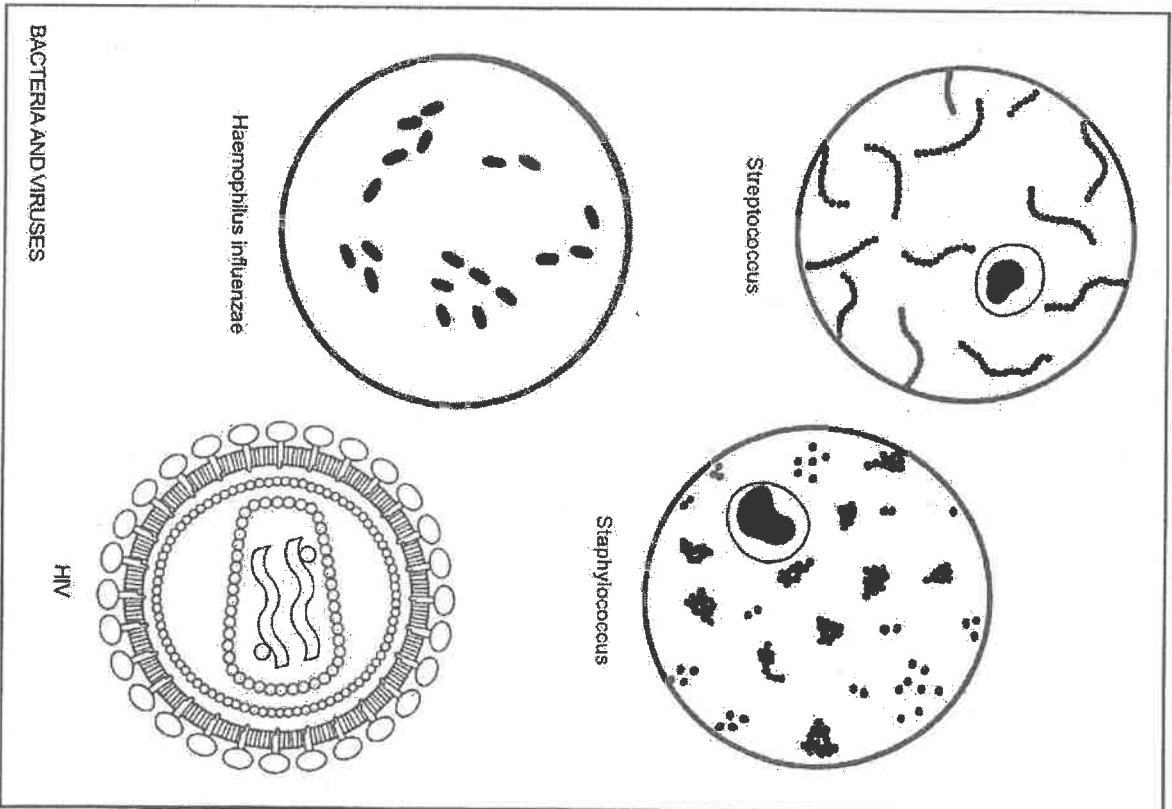
Since the beginning people live in a microbial biosphere composed of innumerable micro-organisms of different types, variants, strains and species.

Organisms that are not harmful are called **non-pathogenic** organisms and are normally present in or on certain parts of the body: nose, mouth, skin, intestines etc. The persistent findings of micro-organisms are also in blood.

On the other hand in a human body there are also usually sterile areas as larynx, trachea, bronchi and alveoli, where the various defence mechanisms of these organs remove occasional micro-organisms quickly and efficiently. But these areas may be heavily colonized as well, if diseased. Organisms that can cause the disease are called **pathogens** or infectious agents and include bacteria, viruses, fungi, protozoa and parasitic worms. **Bacteria** (e.g. cocci, bacilli) are living small organisms which can be seen only under a microscope and require specific conditions for growth, otherwise they do not reproduce or they die. They are cultivated on special culture media that can enhance their growth. Most bacteria do not cause disease, and if they do, they can be damaged by antibiotics.

Some bacteria protect themselves by a covering called a spore. The spore can resist many antiseptic procedures, such as disinfection, drying and even boiling. For instance, tetanus is caused by spore-forming organisms. Spores are present in the dirt, in the dust of a room, and are not destroyed by ordinary laundering, so they can be transferred even by clean sheets and towels.

Viruses cannot be seen under an ordinary microscope, they are injected to a laboratory animal to develop certain symptoms. They survive only in living tissues so they can be transmitted by direct contacts (touching, secretion from mouth, nose or urine, sexual contact etc.). There are many varieties or strains of viruses and their intracellular location within the host. This has made effective therapy and control more difficult. Examples of viral disease are the common cold, influenza, measles, mumps, or AIDS. **Fungi** are multicellular organisms that cause a disease called mycosis. Thrush, ringworm and histoplasmosis are examples of mycotic diseases. **Protozoa** are single-celled organisms that belong to the animal kingdom and can cause such diseases as malaria or amoebic dysentery and some others.



BACTERIA AND VIRUSES

The most common parasitic worms which can cause an infection are the roundworm, pinworm and tapeworm.

The clinical microbiologist has been charged with the responsibility to the clinician and to the patient of identifying micro-organisms in a clinical specimen as quickly and accurately as possible and making a decision which of the micro-organisms isolated from the clinical specimen are involved in the disease. He is expected to decide the casual relationship between a micro-organism and a disease even though most of the organisms from clinical materials are pathogenic only sometimes. Not all the micro-organisms that may be present in a given specimen can be cultivated – some of them are very difficult to cultivate normally or they still have not been cultivated at all. Therefore conclusion concerning the significance of a micro-organism isolated from usually sterile areas must be based on properly obtained specimens (directly from the suspected lesion) that are very properly handled and transported, were examined as soon as possible and that yielded a large number of micro-organisms which have been isolated from the area (either pathogenic or indigenous).

The invasion, establishment and growth of a specific pathogenic organism in the tissues are defined as the **infection**. It leads to the process called the **inflammation**. Fever (of a raised body temperature) is the most common manifestation of the inflammatory response and a signal response in an infectious disease.

The **infectious diseases** are those caused by such micro-organisms and capable of being transmitted to another person by direct or indirect contact. Infection results, if the body's defence barriers do not prevent pathogens from entering the body, especially when the immune system is broken. Infection may be classified in various ways:

1. A **local infection** is when the pathogens are confined to one area.
2. A **general infection** is one in which pathogens are spread throughout the body (for example through blood).
3. An **acute infection** is manifested by severe symptoms usually connected with high fever.
4. A **chronic infection** is one that has less severe symptoms and usually lasts over a period of weeks or months.

Besides, the infection may occur as the **secondary** one – if it is caused by a different organism than the one causing the **primary** infection, for example pneumonia may be a complication of influenza which was the primary infection but not treated properly.

If the body's system is in order, it produces substances called **antibodies**, which are in the blood and attack things foreign to the body such as micro-organisms. The substances which force the body to make antibodies are known as **antigens** (proteins). When the body meets an infective organism, it produces antibodies against it which protect the person, so that the next time he/she comes across the same organism, he/she will not be infected by it. The immune system prevents the person from getting infection.

There are two types of immunisation: active and passive.

Passive immunisation means that a person is injected with antibodies against a disease that are taken from someone else. It gives immediate protection.

Active immunisation is also called vaccination. It involves injecting a person with harmless substances that stimulate the body to produce antibodies against harmful organisms. It takes longer to work than passive immunisation but its effects last much longer, too.

There are three types of vaccination:

1. You can use a weakened form of the infective agent, such as with measles and tuberculosis.
2. You can use killed organisms, this is what is done with influenza.
3. This type is for bacteria that cause harm by producing poisons. A person is injected by a weakened form of the poison, such as with tetanus.

Various disorders of the immune system are now very common, especially in children, e.g. allergies. They are caused by the immune system's over-reacting to the presence of some type of foreign substance (e.g. hypersensitivity to the pollen, house dust, some food, drugs or bacteria). The most typical allergic diseases are:

1. Erythema – a rash and redness of the skin which is an allergic reaction to some food of drugs.
2. Rhinitis – also called hay fever, which is an inflammation of nasal mucus and causes redness of the eyelid and "watery eyes".
3. Anaphylaxis – which is a serious allergic reaction that can reach a critical state in some minutes. It can be a reaction to drugs (penicillin), insect bites, or vaccines, especially those made from horse serum, and some others.

VOCABULARY

antibody [ˈæntibɒdi]	protilátka
antigen [ˈæntidʒən]	antigen
bacillus, pl. bacilli [bəˈsɪləs]	bacil, bacily
bacterium, pl. bacteria [bækˈtɪəriəm]	baktérie
colony [ˈkɒləni]	kolonie
cultivation [kʌltɪˈveɪʃn]	kultivace
cutaneous [kjuːˈteɪniəs]	kožní
coccus, pl. cocci [ˈkɒkəs, ˈkɒksaɪ]	kokus, kulovitá baktérie
diphtheria [dɪfˈθɪəriə]	záškrt
dysentery [dɪsˈentəri]	úplavice
indigenous [ɪnˈdɪʒənəs]	domorodý
infection [ɪnˈfekʃn]	infekce
inoculation [ɪnɒkjʊˈleɪʃn]	očkování
intranasal [ɪnˈtrəˈneɪzəl]	do nosu
measles [ˈmiːzlz]	spalničky
microorganism [maɪkrəˈɔːɡənɪzəm]	mikroorganismus
mumps [mʌmps]	příušnice
nutrient [njuːˈtrɪənt]	živý
per os [peːˈɒs]	ústý
poisoning [ˈpɔɪzənɪŋ]	otrava (jedem)
poliomyelitis (polio) [pəʊlɪˈaɪtɪs]	dětská obrna
proliferate [prəˈlɪfereɪt]	bujet, rozmnožovat
rabies [ˈreɪbz]	vzteklina
salmonella [sælˈmɒneˈlelə]	salmonela
saline [ˈseɪlɪn]	fyzilogický roztok
small-pox [smɔːˈpɒks]	pravé neštovice
species těž. pl. [spiːˈʃiːz]	druh
stain [steɪn]	histologické barvivo
strain [streɪn]	1. napětí, vypětí; 2. kmen bakterií
typhoid fever [ˈtaɪˈfɔɪd fiːvə]	bríšní tyfus
virus [ˈvaɪərəs]	virus
worm [wɔːm]	červ
pinworm [ˈpɪnwɔːm]	roup dětský
roundworm [raʊndˈwɔːm]	škrkavka
tapeworm [ˈteɪpwɔːm]	tasemnice

QUESTIONS AND EXERCISES

Answer:

1. What are nonpathogenic organisms?
2. What are the pathogens?
3. Describe some types of bacteria.
4. What are the viruses?
5. Talk about some other pathogenic organisms.
6. What is microbiology?
7. How can the micro-organisms be identified?
8. What is infection?
9. How can infection be transmitted?
10. How is the infection classified?
11. What are antigens and antibodies?
12. What do you know about immunisation?
13. What is the importance of vaccination?
14. Talk about some allergies.

Translate:

mikroorganismy různých typů; nejsou škodlivé; jsou přítomny na určitých částech těla; obvykle sterilní oblasti; rychle odstranit přiležitostné mikroorganismy; vyžadovat speciální podmínky pro růst; odolat mnohým antiseptickým procedurám; být přítomny ve špině a prachu; pokusné zvíře; přežívají pouze v živých tkáních; mít zodpovědnost; identifikovat klinický vzorek; kultivovat bakterie v půdě; správně získany vzorek; obsahovat velké množství mikroorganismu; infekční choroby; obranné tělesné mechanismy; zabránit patogenním látkám ve vstupu do těla; imunitní systém je porušený; akutní infekce; komplikace chřipkového onemocnění; pasivní imunita; oslabená forma infekční látky; produkce jedovatých látek; mrtvé mikroorganismy; zvýšená reakce na přítomnost cizí látky; bezpečně množství; senná rýma; jed