

# Transmission of pathogens

The route of transmission is the process by which the **infectious agent (etiologic agent, EA)** reaches a susceptible individual. It is somehow excreted from its source, it must have resistance to the external environment and mechanisms to enter the susceptible organism. There are both EA with a single specific route of transmission and EA with multiple possible routes of transmission.

## Direct transmission

Some EAs are transmitted by *direct transmission* during close contact between susceptible organism and the source of infection.

- **Contact transmission** - touching, kissing, sexual contact, biting, scratching - e.g. agents of infectious mononucleosis, AIDS, rabies, cat-scratch disease.
- **Droplet transmission** - EA is transmitted in a droplet from an HDC (or aerosol) source to the HDC of a susceptible individual - e.g., acute respiratory infections (influenza, parainfluenza, etc.).
- **Perinatal transmission** - infection of a susceptible individual during passage through the birth canal - e.g. streptococcus sc. B, *E. coli*, *N. gonorrhoeae*.

## Indirect transmission

- **Indirect contact transmission** - EA reaches a susceptible individual via a contaminated object (usually an everyday object).
- **Transmission by inoculation** - EA enters a susceptible individual via a contaminated instrument, device (injection, surgery, invasive testing techniques) or is contained in administered biological products (blood, blood products, blood plasma, transplants) - e.g. HBV, HCV, CMV, HIV, nosocomial EA.
- **Airborne transmission** - infected HDC droplets can contaminate objects, dry and form contaminated dust, remain airborne (below 100 µm) for varying periods of time, and spread relatively far from the source - e.g. Respiratory infections (acute respiratory disease, exanthematous diseases, pertussis, diphtheria, pulmonary TB, etc.), skin infections (staphylococcus), alimentary infections (oxyuria), zoonoses (tularemia, pneumonic plague, anthrax).
- **Alimentary transmission** - after ingestion of contaminated vehicle, EA enters the susceptible individual via the GIT.
  - *Water* - from drinking or utility water during drinking, washing, bathing, washing containers or preparing cold foods. When water is contaminated, explosive epidemics occur, depending on the number of people supplied with the contaminated water and the length of time EA is present in the water (which depends on the characteristics of the water). Waterborne diseases include typhoid fever, paratyphoid fever, cholera, HAV, poliomyelitis, leptospirosis.
  - *Food* - also the cause of explosive epidemics, EA often multiply and produce toxins. The source of infection can be food of animal origin (contaminated primarily by EA from the animal or secondarily during processing), but also vegetables fertilised by faeces and unpeeled fruit.
  - *Milk* - may be contaminated primarily with zoonoses (bovine TB, Q fever, tick-borne encephalitis, brucellosis).
  - *Eggs* may be a source of salmonella, which is effectively destroyed by boiling for 8-10 min.
  - *Meat products* may contain salmonella, trichinella, toxoplasma or *Clostridium botulinum*.
- **Transmissible transmission** - by **vectors** (vectors), especially by various arthropod species.
  - *Biological* - the vector plays an active role in the life of the EA (reproduction, part of the cycle); especially blood-feeding arthropods - e.g. malaria, trypanosomiasis, leishmaniasis, arboviruses, tularemia, rickettsiosis, plague, reversible typhus, Q fever.
  - *Mechanical* - a vector contaminated with its own feces rubs against food (salmonella, shigella, enteroviruses).
  - These infections often occur in certain *natural foci*, i.e. sites characterized by: animals (reservoir), vectors (vector), flora and fauna (biocenosis), maintenance without human presence (humans are a random element in the outbreak, usually a blind link, but sometimes can carry the infection into the city and cause an urban form of the disease with natural foci).
- **Transplacental transmission** - from mother to fetus - e.g. rubella, HIV, CMV, toxoplasma, *Treponema pallidum*.
- **Soil transmission** - e.g. tetanus, anaerobic clostridia, mycoses (with the source always being human or animal).

## Factors influencing the spread of diseases

The process of infection propagation is furthermore complexly influenced by various factors.

1. **Natural factors** - climate, geographical location, altitude, rainfall, humidity - affect the biocenosis, which in turn affects the survival of vectors, reservoir or intermediate hosts; this is most relevant for diseases with natural outbreaks. Climatic conditions are related to the seasonal occurrence of infections.

2. **Social and economic factors (socio-economic f.)** - hygiene and health security; health awareness of the population, which is closely related to the level of personal hygiene itself. Adverse consequences stem from collectivisation, due to transport easier distribution of diseases and possible introduction of exotic diseases; communal eating; industrial food production.

## Links

### Related articles

- Process of Infection Propagation
- Source of Infection
- A susceptible organism in the process of spreading infection
- blood-borne diseases

### Literature used

- GEIZEROVÁ, H, et al. *Epidemiologie – vybrané kapitoly pro seminární a praktická cvičení*. 1. edition. Praha : Karolinum, 1995. ISBN 80-7184-179-X.