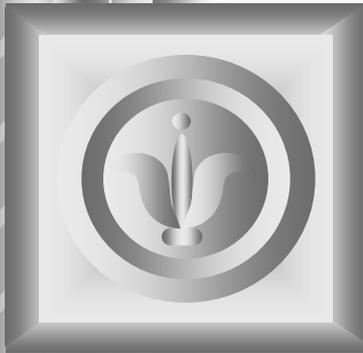


**"Victor Babeș" UMP, Timișoara**



***Course 7***  
**Infections with a digestive entry**



***Emilian Damian Popovici, M.D.,PhD***  
***Head Department of Epidemiology***

# ***Cholera***



## **Definition**

✓ It is the most serious acute infectious diarrhoeic disease, with a sudden onset, manifested by watery diarrhoeic stool, sometimes vomiting, followed by rapid dehydration with acidosis and hypovolaemic shock.

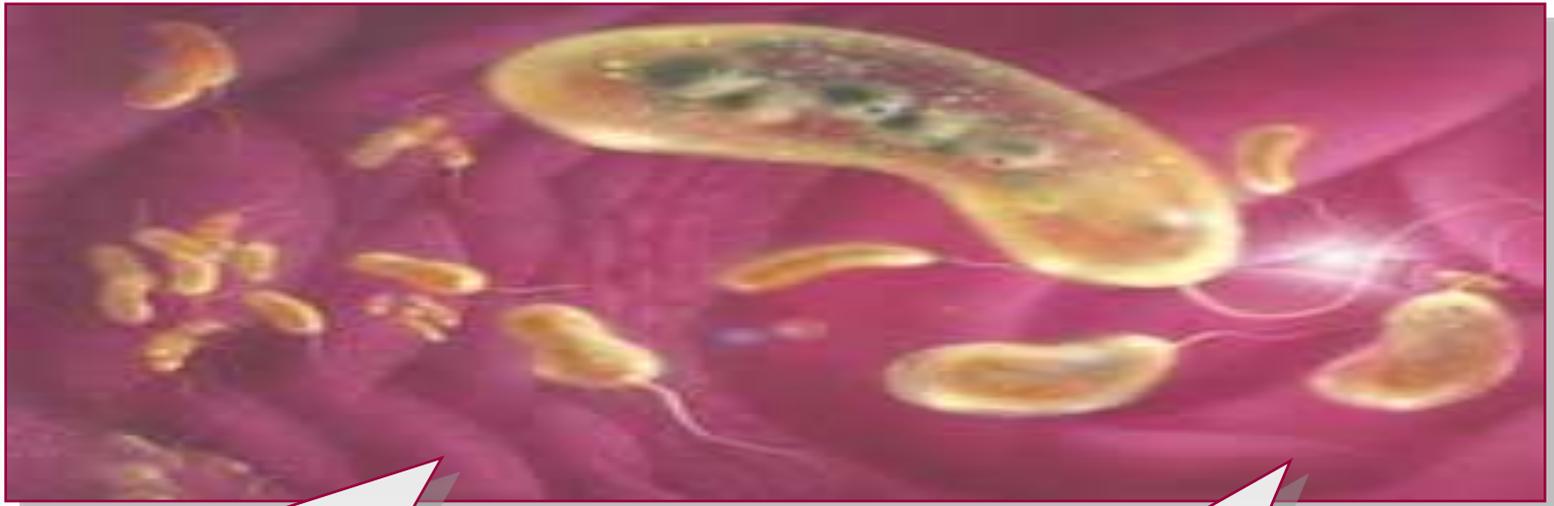


## Prognosis

✓ The disease prognosis depends on how early the right therapy is started:

- ⑩ Fatality is over 50% in the absence of therapy and
- ⑩ under 1% with optimal therapy;

✓ With all the apparent progress made in cholera control, specific mortality is rising worldwide.



### Characteristics of the aetiological agent

- ✓ it is caused by *Vibrio cholerae* O-1 and O-139, a Gram-negative, aerobic, comma-shaped germ, mobile, pathogenic only to humans;
- ✓ There are 2 biotypes – classic and El Tor, the latter being more widespread and more resistant in the external environment and to antibiotics (co-trimoxazole and ampicillin);

### Clinically

- ✓ Short incubation – several hours up to 5 days;
- ✓ The classic characteristic array more frequently occurs in the classic biotype cholera and less frequently in the El Tor

# *The epidemiological process*

**The infection source is represented by:**

- ⑩ **Ill people;**
- ⑩ **Subclinically infected people;**
- ⑩ **Carriers;**
- ✓ **The ill person is contagious from the onset of the disease, through faeces and the vomit fluid;**
- ✓ **The cholera vibrio is eliminated massively, but over a short duration, even in the absence of antiinfectious treatment;**
- ✓ **The carrier state, lasting a few days, occurs rarely;**
- ✓ **Chronic carriers are exceptional cases occurring on the background of cholecystopathy.**

# *The epidemiological process*



## Transmission routes and mechanisms

- ✓ Complex indirect transmission, by faecal-oral mechanism;
- ✓ It is the prototype of infectious diarrhoeic disease with water-based transmission – the infecting dose is between  $10^4$ - $10^6$  for the classic biotype and  $10^3$ - $10^4$  for the El Tor biotype;
- ✓ It is also transmitted through:
  - ⑩ Contaminated food, especially seafood fished in contaminated waters;
  - ⑩ Dirty hands, objects, vectors.

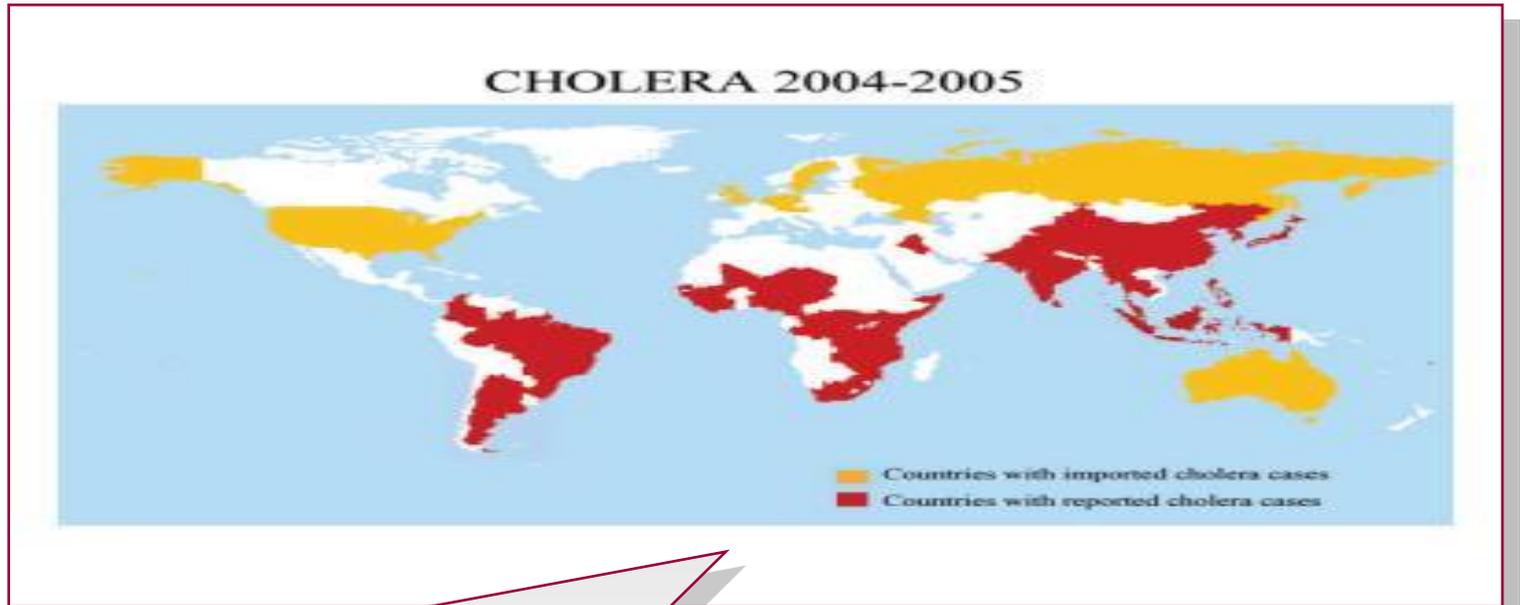
# *The epidemiological process*



## The receptive population

- ✓ Receptivity to the infection is general;
- ✓ The receptivity to the disease is average in the classic biotype cholera (50% disease, 50% subclinical forms) and lower in the El Tor biotype (25% disease, 25% atypical diarrhoea, 50% subclinical forms);
- ✓ Receptivity is maximum among children, in endemic areas and among adults, in import cholera areas;
- ✓ Postinfectious immunity is serotype-specific, long-term, consolidated through subsequent reinfections.

# *The epidemiological process*



## The favouring factors

- ✓ The scarcity of drinkable water in endemic areas;
- ✓ Faulty hygiene;
- ✓ Low economic and cultural level;
- ✓ Unsatisfactory medical assistance.

# *Prevention and control*



## Measures regarding the ill

- ✓ **Discovery with urgent “Contact” type isolation in the infectious disease clinic;**
- ✓ **Nominal announcement of the confirmed cases, as cholera is on the list of quarantinable diseases established by the WHO.**
- ✓ **Disinfection of the faeces, vomit fluids, linen, objects used by the ill person, either by heating or chemically;**
- ✓ **Compulsory final disinfection;**

# *Prevention and control*



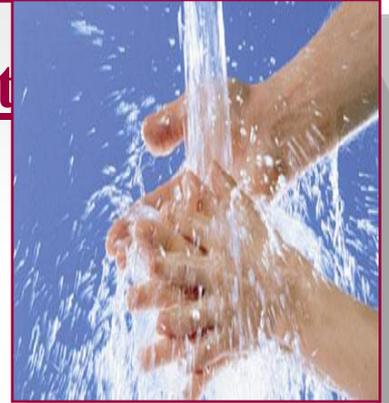
## Measures regarding contacts

- ✓ Contacts are monitored for 5 days after the last known infecting contact;
- ✓ Chemoprophylaxis is administered to family contacts using:
  - ⑩ Tetracycline (1g/day for adults and 50 mg/body kg for children over 9 years of age – 5 days);
  - ⑩ Doxycycline (200 mg for adults in a single dose or 4-6 mg/body kg/day for children);
  - ⑩ Furazolidone (4x100 mg/day for adults or 5 mg/body kg/day for children, 3 days);
  - ⑩ Co-trimoxazole (48 mg/body kg/day for children);
- ✓ Vaccination is not recommended.

# *Prevention and control*

## Measures regarding the transmission route

- ✓ **Washing hands;**
- ✓ **Hygienic storage of discharged matter;**
- ✓ **Provision of drinkable water;**
- ✓ **Rigorous food hygiene;**
- ✓ **Promoting natural feeding of sucklings;**
- ✓ **Disinsection and preventing vectors from reaching food;**
- ✓ **Moral isolation of carriers;**
- ✓ **Using lab tests to check the water and the population in the focus site;**



## Specific prophylaxis

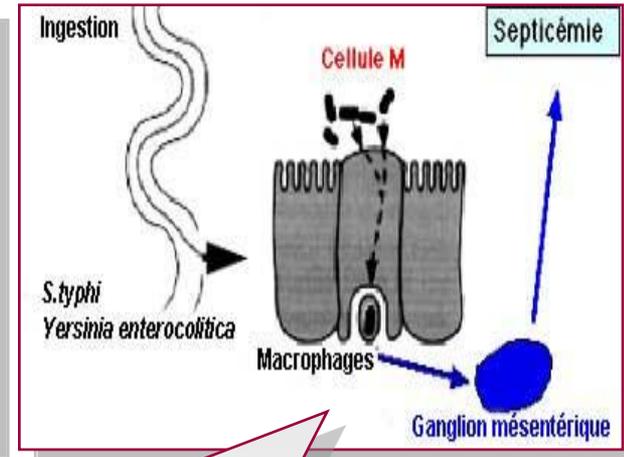
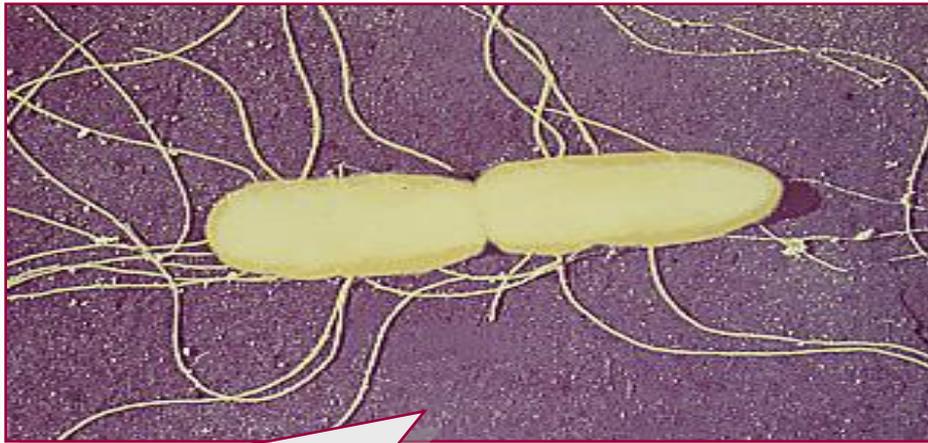
- ✓ **Anti-cholera vaccination !**

# ***Typhoid fever***



## **Definition**

✓ It is a major, systemic salmonellosis with an insidious onset, characterized by high fever, headache, anorexia, bradycardia, splenomegaly, rose-coloured spots on the trunk, irritative coughing, constipation.



## Characteristics of the aetiological agent

- ✓ *Salmonella typhi* is a Gram-negative, unsporulated bacillus, a member of group D of the genus Salmonella;
- ✓ There are 106 major epidemiological lysotypes;
- ✓ It has average resistance in the external environment, being sensitive to chloramphenicol, ampicillin, 3rd generation cephalosporins, quinolins;

- The entry is oral;
- ✓ the disease starts at infecting doses of  $10^6$ - $10^9$  germs;
  - ✓ Asymptomatic infection is triggered at doses 100 times smaller.

# *The epidemiological process*

**The infection source** is exclusively human and represented by:

⑩ **Ill people;**

⑩ **Carriers;**

- ✓ Ill people not receiving antibiotic treatment are contagious in the last 2 days of incubation, throughout the latency period and 2-6 weeks during convalescence;
- ✓ 10% of them excrete typhoid bacilli for over 3 months, and 2-5% become chronic carriers;
- ✓ Chronic carriers are formerly ill or inapparently infected people, usually with cholelithiasis;
- ✓ Family contacts can be temporary carriers;
- ✓ Elimination occurs mainly through faeces, less frequently through urine.

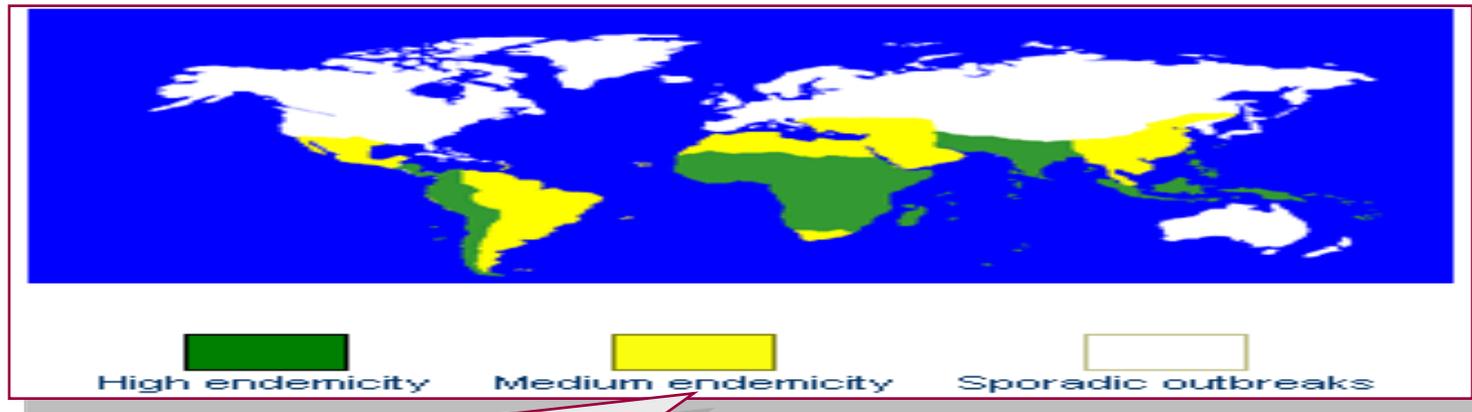
# *The epidemiological process*



## Transmission routes and mechanisms

- ✓ Complex indirect transmission, by faecal-oral mechanism;
- ✓ It is done through water, faecally/urinarily contaminated food, with the participation of dirty hands and vectors;
- ✓ It requires a high infecting dose, which explains the reduced contagiousness.

# *The epidemiological process*



## The receptive population

- ✓ Receptivity is general;
- ✓ The risk is higher among people with gastric hypoacidity;
- ✓ Postinfectious immunity is variable, consolidated through subsequent infecting contacts, but it does not always provide protection;
- ✓ Receptivity is maximum among children and youth in endemic areas, but homogeneous among all age groups in reduced-incidence areas.

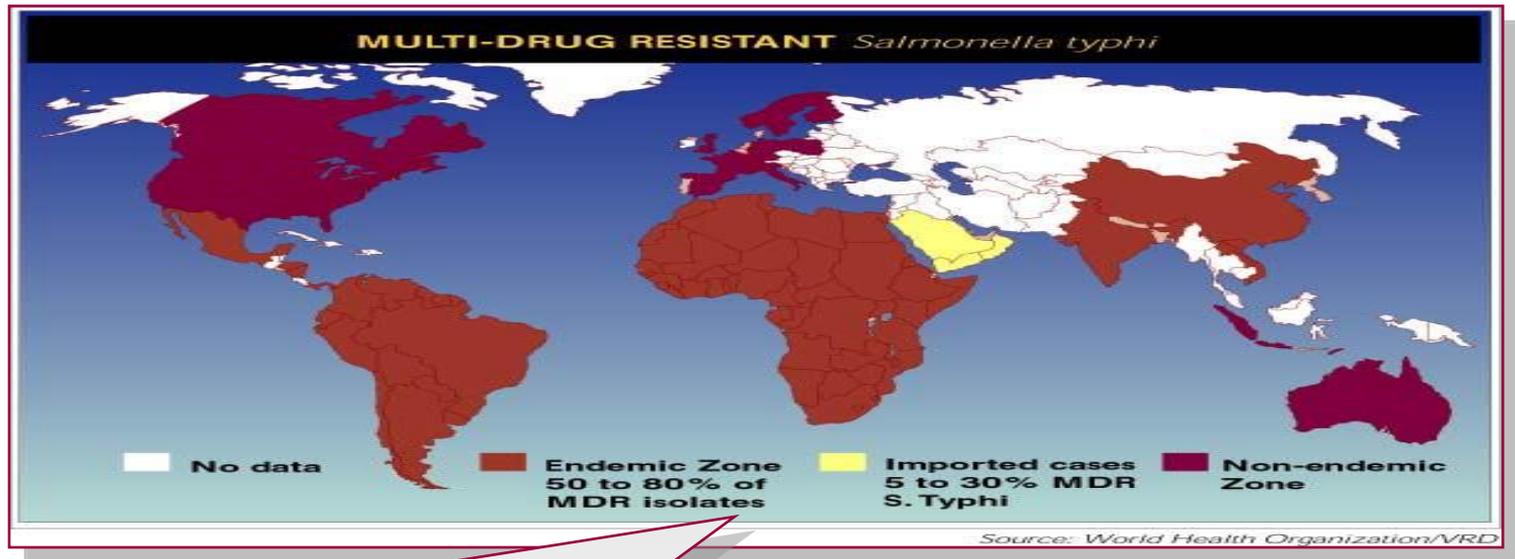
# *The epidemiological process*



## **The favouring factors**

- ✓ **Heavy rain, sudden melting, floods;**
- ✓ **Vector abundance.**

# *The epidemiological process*



## Manifestations of the epidemiological process

- ✓ In most areas, typhoid fever currently has an endemic-sporadic manifestation;
- ✓ A spring-summer seasonal feature of the disease is recorded in the temperate zone;
- ✓ There are regions in Asia, South America, in which epidemic with multiresistant strains have emerged.

# *Prevention and control*

## **Measures regarding the ill**

- ✓ **Discovery with compulsory isolation at the infectious disease clinic;**
- ✓ **Nominal declaration of the cases confirmed;**
- ✓ **Disinfection of the faeces, of the vomit fluid, of the linen, the objects used by the ill person;**
- ✓ **Final disinfection is compulsory, as well as an epidemiological investigation at the focus site;**
- ✓ **The patient can only be released from hospital when the typhoid bacillus is no longer excreted;**
- ✓ **Former patients receive dispensary care for 1 year.**

# *Prevention and control*

## Measures regarding contacts

- ✓ Contacts are monitored for the maximum incubation period (3 weeks);
- ✓ Family contacts of the ill people and of the carriers are protected by anti-typhoid vaccine, which has a protecting effect for a maximum of 5 years, or 4 years for the Ty 21a-strain vaccine and 2 years for the AgVi vaccine;
- ✓ Chemoprophylaxis is not recommended for the contacts.

## Measures regarding carriers

- ✓ Active discovery and systematic vaccination of carriers in the risk sectors:
  - ⑩ Garbage disposal staff;
  - ⑩ People working in the food sector and the drinkable water supply sector;
- ✓ Moral isolation of carriers.

# *Prevention and control*



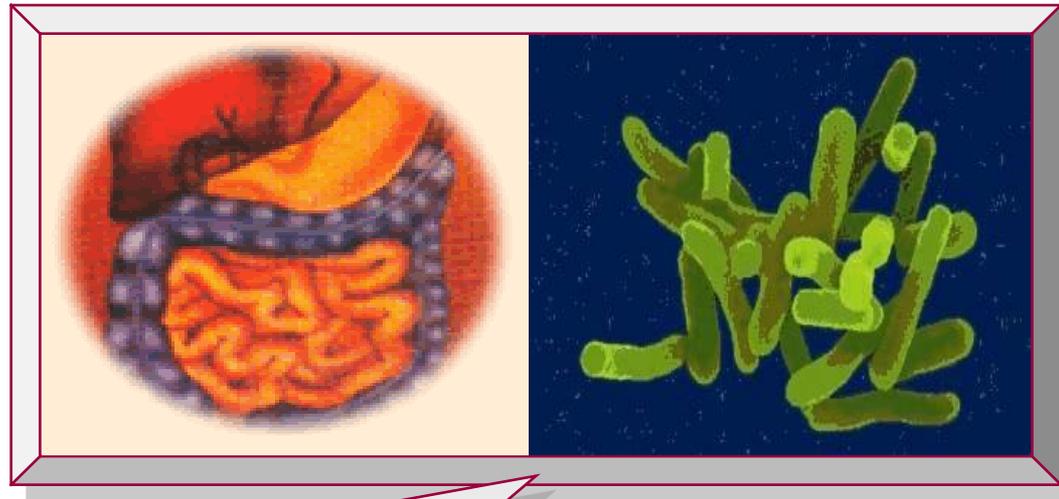
## Measures regarding the transmission routes

- ✓ **Washing hands;**
- ✓ **Hygienic storage of discharged matter;**
- ✓ **Providing drinkable water through compulsory chlorination;**
- ✓ **Rigorous food hygiene;**
- ✓ **Disinsection and preventing vectors from reaching food;**
- ✓ **Using lab tests to check the water and the population in the focus site.**

## **Paratyphoid fever epidemiology**

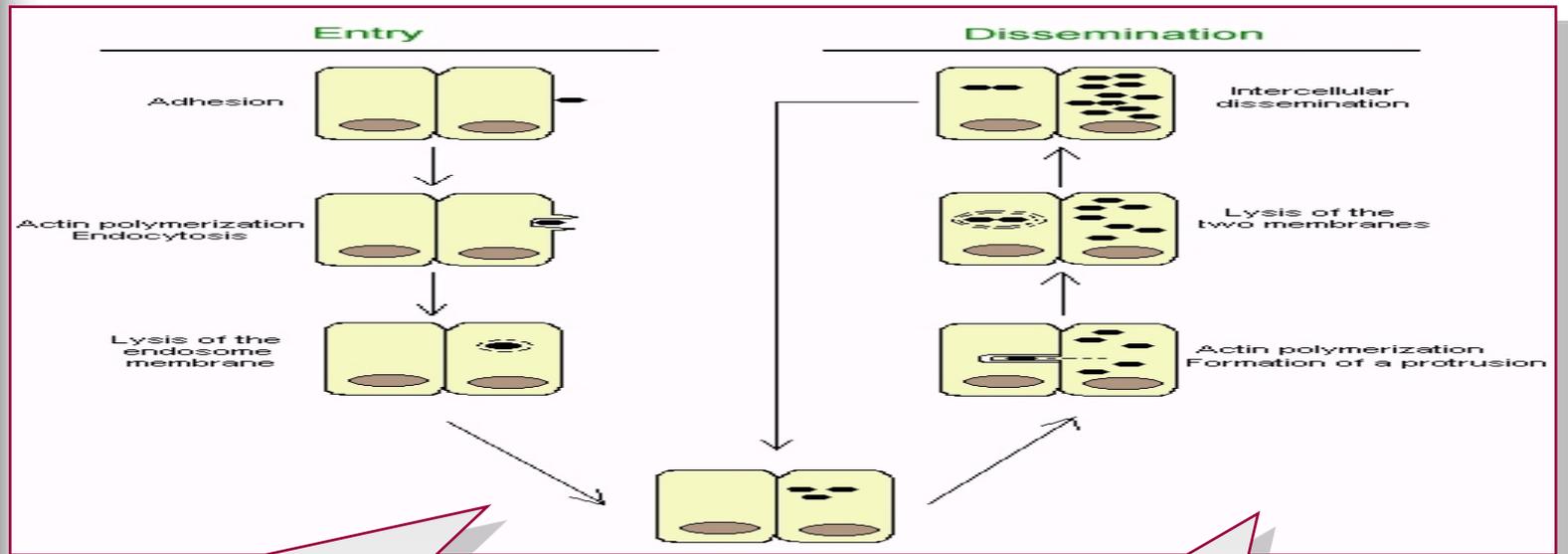
- **It resembles the previous type;**
- **There is no efficient vaccine;**
- **Prevention and control are based on the same rules.**

# *Bacterial dysentery*



## Definition

✓ It is an acute, bacterial, feverish diarrhoea, characterized through a generally degraded condition, colics, tenesmus, diarrhoeic stool containing mucus, blood, pus.



## Characteristics of the aetiological agent

- ✓ Bacterial dysentery is caused by germs of the genus *Shigella* sp.;
- ✓ The most severe forms are caused by type I *Shigella dysenteriae* and the most benign ones by *S. sonnei*;
- ✓ Resistance in the external environment is average, resembling that of salmonellas;

## Clinically

- ✓ Incubation – 7 days maximum;
- ✓ Invasive-type diarrhoea.

# *The epidemiological process*

The infection source is exclusively human and represented by:

- ⑩ Ill people with typical dysentery forms, contagious from the end of the incubation period, sometimes during convalescence as well;
  - ⑩ Ill people with forme fruste and atypical forms, more frequent and more difficult to discover and neutralize – mostly children;
  - ⑩ Convalescing carriers that can excrete germs up to 3 months after the acute episode;
  - ⑩ Chronic carriers that excrete germs for several months – rare;
  - ⑩ Subclinically infected people – unknown and not neutralized, with maximum efficiency;
- ✓ Elimination is done through faeces.

# *The epidemiological process*



## **Transmission routes and mechanisms**

- ✓ **Complex indirect transmission, by faecal-oral mechanism;**
- ✓ **It can be transmitted by:**
  - ⑩ **Dirty hands, vectors;**
  - ⑩ **Contaminated food and water;**
- ✓ **Transmission is easy due to the very low infecting doses, of 10-100 germs;**
- ✓ **Favouring factors – low personal hygiene.**

# *The epidemiological process*

## The receptive population

- ✓ Higher receptivity among children aged between 6 months and 10 years;
- ✓ The disease is more serious among old people and those suffering from malnutrition;
- ✓ Disease contagiousness is the highest among preschool children, up to 40%;
- ✓ Postinfectious immunity is type-specific and reflects the spectrum of the strains in circulation in a particular area.

## Manifestations of the epidemiological process

- ✓ It is spread worldwide;
- ✓ In temperate zones, it has an estival seasonal feature;
- ✓ *S. flexneri* prevails among the paediatric population and in hospitals, while *S. sonnei* is frequent among adults and the general population;
- ✓ Subreporting is constant and very significant.

# *Prevention and control*



## **Measures regarding the ill**

- ✓ **Discovery with isolation at the infectious disease clinic;**
- ✓ **Treatment using disinfectants or intestinal eubiotics;**
- ✓ **Antibiotics are reserved for serious cases and restoring the carriers' health;**
- ✓ **Current and final disinfection is compulsory, as well as an epidemiological investigation at the focus site;**
- ✓ **The patient is released only after 3 negative coprocultures, the first of them at 24 hours after completing the antiinfectious treatment;**
- ✓ **Education regarding personal hygiene and proper hand washing.**

# *Prevention and control*

## **Measures regarding contacts**

- ✓ **Immunoprophylaxis or chemoprophylaxis is not indicated;**
- ✓ **The people in the epidemiological risk sector can resume their activity only after 3 negative coprocultures;**
- ✓ **Education regarding personal hygiene and proper hand washing;**

## **Measures regarding the transmission routes**

- ✓ **Identical with the ones for all acute infectious diarrhoeic diseases.**

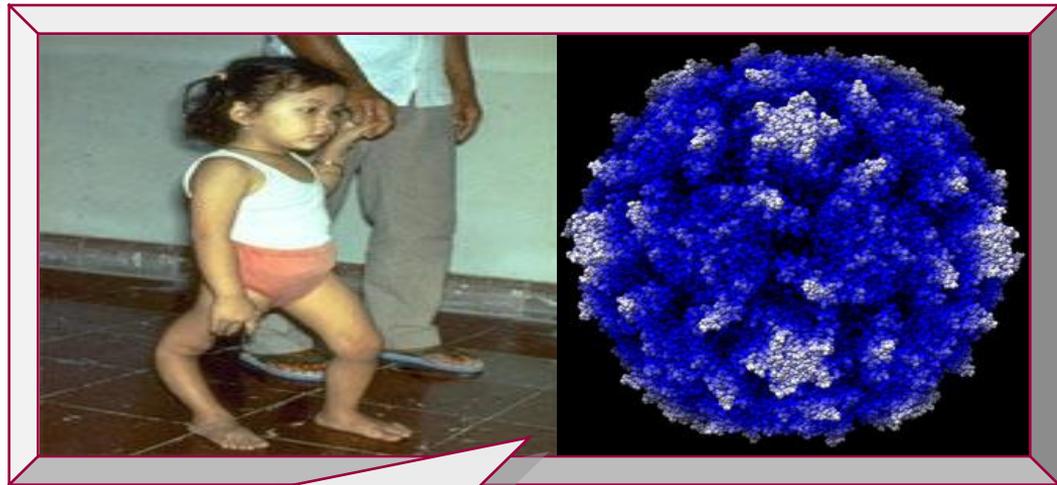
# *Prevention and control*



## **Specific prophylaxis**

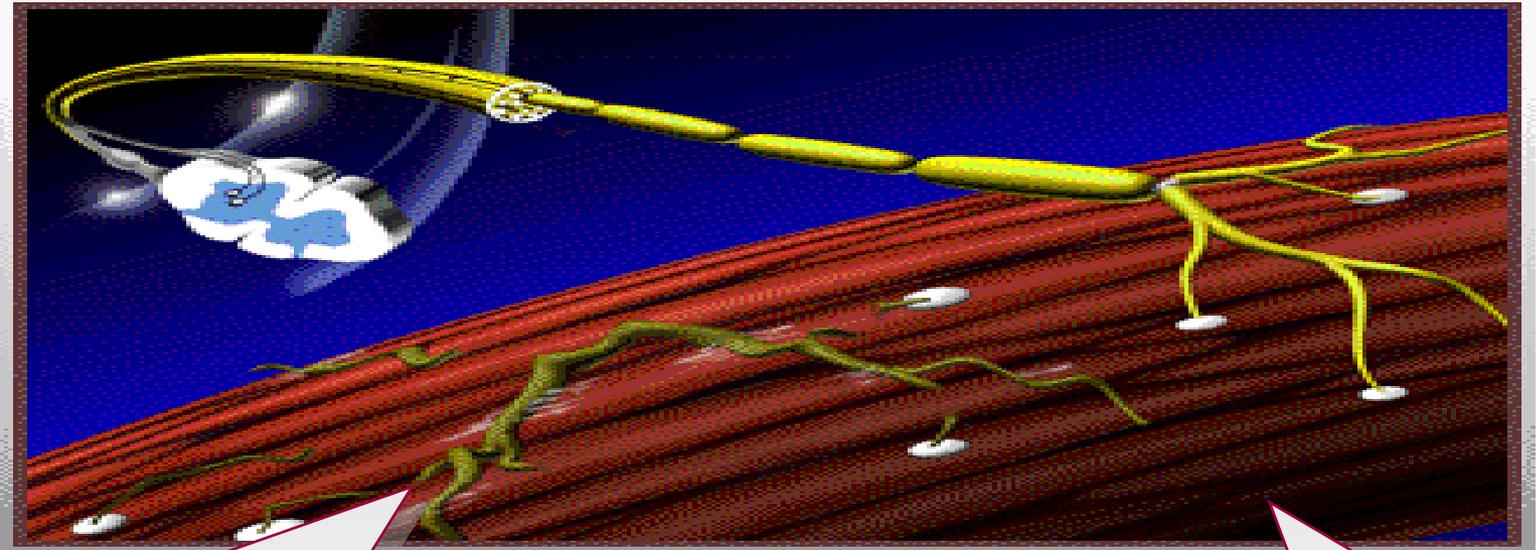
- ✓ Antidysentery vaccination
- ✓ It is recommended in collectivities of children above 1 year of age, with high annual morbidity caused by dysentery due to functional deficiencies that are difficult to influence.

# ***Poliomyelitis***



## **Definition**

✓ It is an acute systemic infectious disease with widely varying degrees of seriousness – from inapparent forms to nonspecific disease forms, clear-fluid meningitis, paralytic disease, and death.



### Characteristics of the aetiological agent

- ✓ All the 3 polio viruses – 1, 2, 3 – can produce the paralytic disease;
- ✓ Type 1 is the most frequently isolated from paralytic disease cases;
- ✓ Types 2 and 3 are more frequently involved in postvaccinal poliomyelitic paralysis;

### Clinically

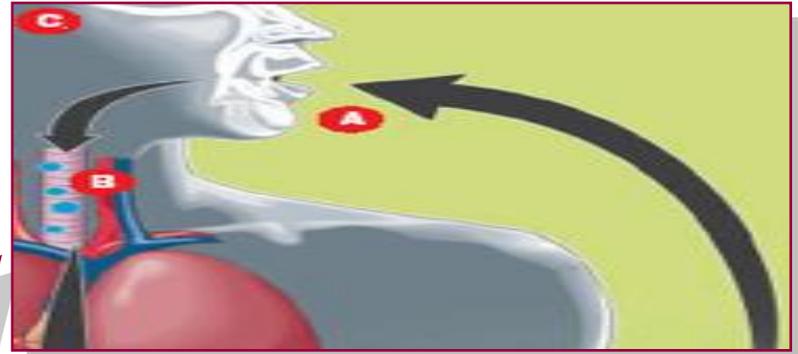
- ✓ Disease incubation is average;
- ✓ The fatality of paralytic cases varies between 2-10% and increases with the age at which the disease occurs.

# *The epidemiological process*

**The infection source** is exclusively human and represented by:

- ⑩ **Polio-infected people;**
- ⑩ **People inapparently infected** with wild viruses or vaccinal viruses;
- ⑩ **Healthy carriers,** excreting the virus for a short period;
- ✓ **Contagiousness starts 36 h after the infecting moment, through pharyngeal excretion, and 72 hours after that moment through faecal excretion;**
- ✓ **Pharyngeal excretion lasts 1 week, while faecal excretion lasts 3-6 weeks or even longer;**
- ✓ **Contagiousness is maximum during the few days before and after the onset of the disease.**

# *The epidemiological process*



## Transmission routes and mechanisms

### Complex indirect transmission:

- ✓ Mostly through the faecal-oral mechanism, by:
  - ⑩ Dirty hands, objects, possibly vectors;
  - ⑩ Rarely, contaminated food (dairy) and water;
- ✓ This transmission is significant under circumstances of poor hygiene;
- ✓ Airborne transmission through Flüge's droplets is dominant among populations with a high sanitary standard.

# *The epidemiological process*

## **The receptive population**

- ✓ The infection receptivity is general;
- ✓ The major disease occurs in 1-2% of infected people, the minor disease in 4-8%, while the other 90-95% only undergo inapparent infection;
- ✓ The collective receptiveness behaviour in the case of polio is typical for the “iceberg” model, with the tip represented by the few paralytic cases and an enormous, invisible base of inapparently infected people;
- ✓ The paralytic form is more frequent among male subjects up to 15 years of age and after that among the female gender – due to pregnancy and intimate contact with the child excreting the viruses.

# *The epidemiological process*

## **The receptive population**

- ✓ Postinfectious immunity is type-specific and permanent, with humoral and enteral manifestation;
- ✓ There is no cross-immunity reaction among the polio viruses, except for some weak reactions between types 1 and 2;
- ✓ Maternal immunity is transmitted transplacentally and through milk secretion and is thus transient;
- ✓ The risk of postinfection is maximum among sucklings and then gradually decreases with age;
- ✓ Collective receptivity depends on the immune background of the population and ultimately reflects the accuracy of immunoprophylaxis.

# *The epidemiological process*

## The favouring factors

- ✓ The natural factors generate summer-autumn seasonal features in the temperate zone;
- ✓ Economical and social factors condition the epidemiological manifestation of polio:
  - ⑩ In the populations with high sanitary standards, where the transmission is airborne, the primary infection takes place at an older age and frequently results in a major disease;
  - ⑩ In population with mediocre sanitation, transmission is faecal-oral and favours a primary infection at an early age, which forms the specific immunity;
  - ⑩ A collective anti-polio immunity is formed among these population, consolidated in time through frequent successive reinfections, with low risk of occurrence of the major disease.

# The epidemiological process

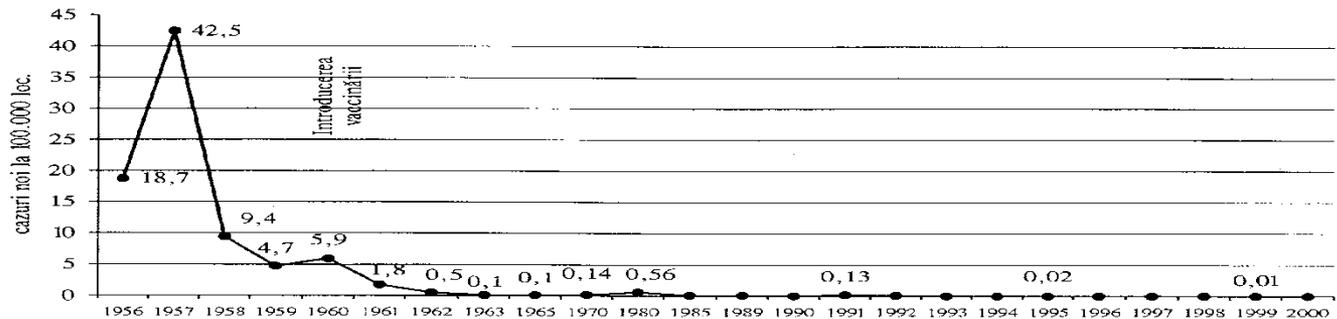
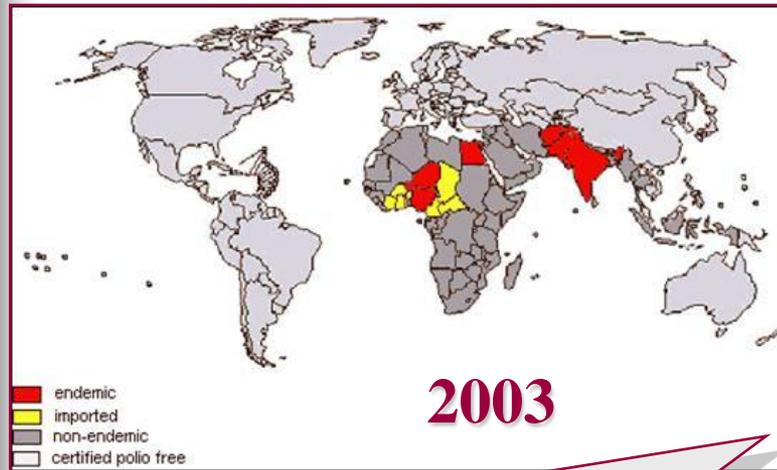


Fig. 1. Evoluția valorilor incidenței poliomielitei, în România, în perioada 1956-2000 (după: CCSSDM-MSF)

## Epidemiological process manifestation

- ✓ Polio is pending global eradication through an intensive generalized Polio + vaccination;
- ✓ Currently, the following polio cases may occur:
  - ⑩ With a wild (non-vaccinal) virus, in unvaccinated people;
  - ⑩ With a vaccinal virus in vaccinated people or their contacts;
- ✓ Poliomyelitis is declared eradicated in a country only 3 years after the last polio case was declared.

# *Prevention and control*



## Measures regarding the ill

- ✓ **Discovery with compulsory isolation at the infectious disease clinic;**
- ✓ **Nominal declaration of the cases;**
- ✓ **Current and final disinfection is compulsory, as well as an epidemiological investigation at the focus site;**
- ✓ **Disinfection of the patient's faeces for 3-6 months following the acute episode.**

# *Prevention and control*

## **Measures regarding contacts**

- ✓ **Contacts are monitored for at least 21 days after the discovery of the last case at the focus site;**
- ✓ **They must be isolated at home, at relative physical rest;**
- ✓ **They are vaccinated or revaccinated with an anti-polio vaccine;**

## **Measures regarding the transmission routes**

- ✓ **Identical with the ones recommended for all digestive-transmission infectious diseases.**

# *Prevention and control*



## **Specific prophylaxis**

- ✓ The main preventive measure that makes polio susceptible to eradication is anti-polio vaccination at an age as young as possible;
- ✓ Proper vaccinal coverage makes it possible to:
  - ⑩ Reduce morbidity to sporadic occurrences;
  - ⑩ Eliminate the seasonal and period feature of cases;
- ✓ Anti-polio vaccination is also maintained in countries where polio has been declared as eradicated, due to the risk of transmitting the virus from one geographical area to another, even at very long distances.

# *Prevention and control*



## Specific prophylaxis

✓ Anti-polio vaccination is done using:

- ⑩ Inactivated anti-polio vaccine – IPV, which contains strains of the 1,2,3 serotypes of polio virus, inactivated with formaldehyde. The main advantage is the lack of the risk of postvaccinal development of polio;
- ⑩ Trivalent, live attenuated anti-polio vaccine – TOPV. It has the advantage of easy oral administration and low cost, but it can lead to paralytic accidents among vaccinated people or their contacts.

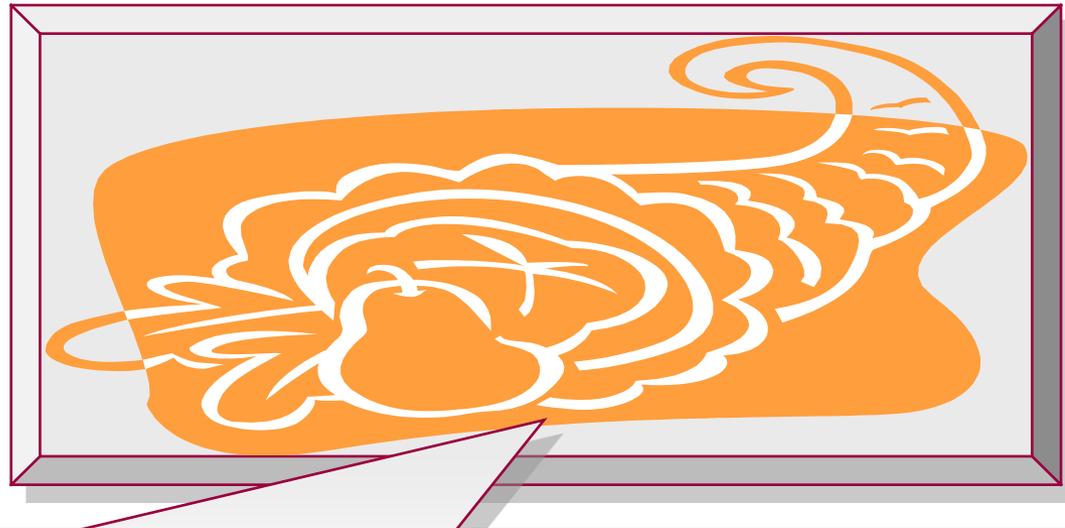
# *Prevention and control*



## **Specific prophylaxis**

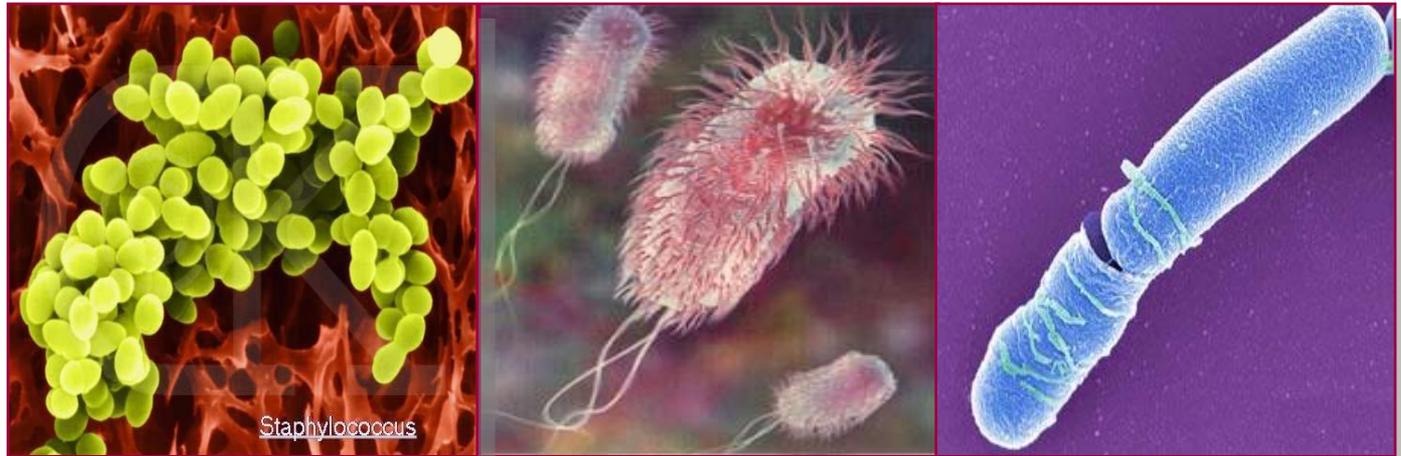
- ✓ Postvaccinal poliomyelitis may occur after 3-30 days following vaccination in the case of the vaccinated person;
- ✓ and 3-75 days after the vaccination in the case of the contacts;
- ✓ The risk of postvaccinal polio is higher in the case of primary vaccination and lower after the booster shots, which is why a combination of IPV and OPV is taken into consideration in countries using OPV vaccination as well.

# ***Food poisoning***



## **Definition**

✓ This term refers to acute disorders of various causes, toxic or infectious, occurring no longer than 72 h after the consumption of food contaminated with microorganisms, microbial toxins or toxic chemical substances.



## Characteristics of the aetiological agent

Among the germs most frequently involved in FP are:

- ✓ Enterotoxigenic cocci, especially staphylococci;
- ✓ Enterobacteria – minor salmonellas, shigellas, *E.coli*, *Proteus* sp.;
- ✓ Aerobic sporulated bacilli (*B. cereus*) or anaerobic ones (*Clostridium botulinum*, *C.perfringens*);
- ✓ Other aetiologies: *Campylobacter* sp., *Vibrio cholerae* O1, non-O1, *Yersinia enterocolitica*.



## Clinically

2 categories of clinical manifestations can occur:

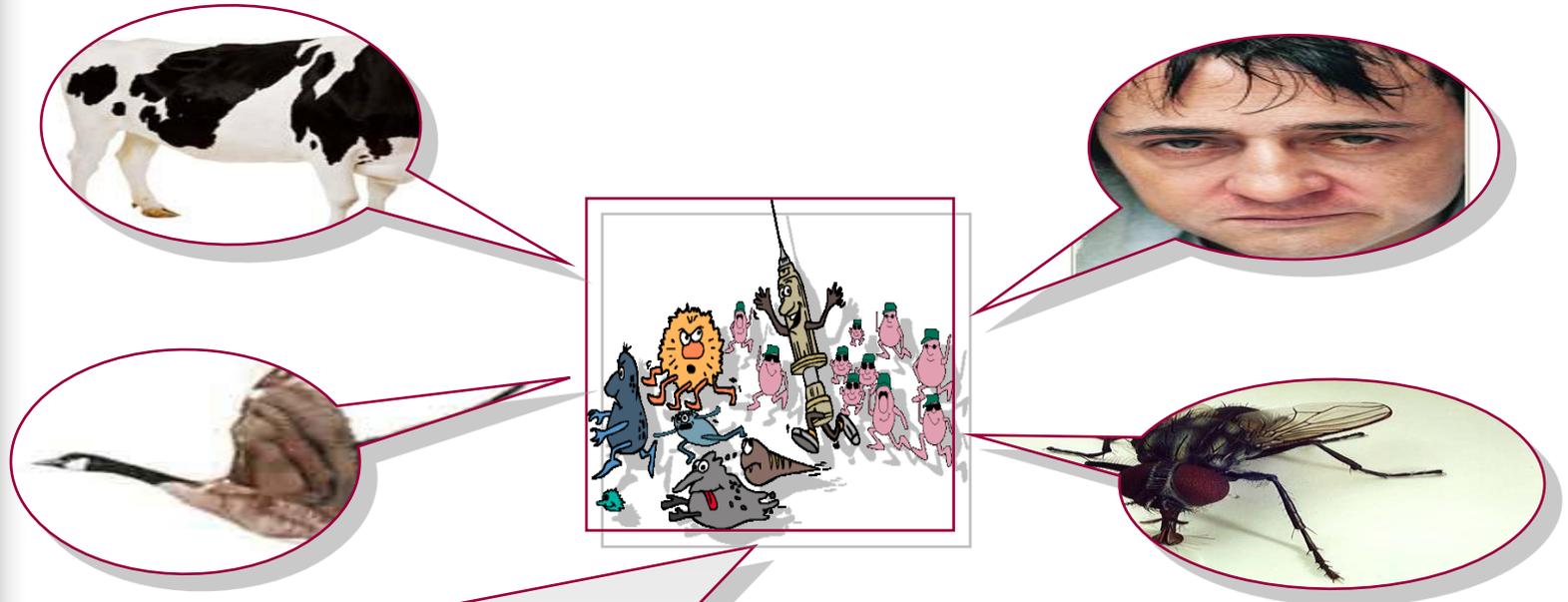
✓ Toxic food poisoning:

- ⑩ These have a short incubation, from 15-30 minutes to 6-12 hours;
- ⑩ Degrading of the general condition, toxic phenomena (nausea, vomiting, vertigo, shock), fever, and, less frequently, diarrhoea;
- ⑩ E.g.: Staphylococcal FP, botulism;

✓ Infectious FP:

- ⑩ Incubation between 12-72 h;
- ⑩ Manifested as an acute, feverish gastroenterocolitis;
- ⑩ E.g.: Minor salmonellosis.

# *The epidemiological process*



**The infection source** is very heterogenous:

- ✓ It can be represented by humans;
- ✓ Animals, birds, insects that can disseminate the infection at long distance;
- ✓ The food contamination can occur at any stage, from the source to its consumption.

# *The epidemiological process*

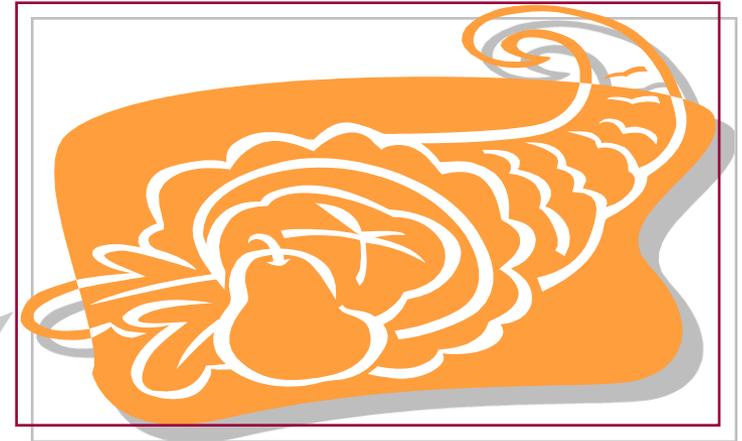


## Transmission routes and mechanisms

### Complex indirect transmission:

- ✓ Food is the last part of the relay race in the transmission of the pathogen from the infection source to the consumer;
- ✓ The foods most frequently involved in the transmission of FP are:
  - ⑩ Eggs, meat;
  - ⑩ Dairy;
  - ⑩ Creams, mayonnaise, salads.

# *The epidemiological process*



## **The receptive population**

- ✓ The receptiveness is conditioned by the intake of an infecting dose (of the germs or the toxin) high enough to trigger the symptom complex;
- ✓ The size of the infecting dose varies with the cause of FP;
- ✓ Postinfectious immunity generally does not occur.

# *The epidemiological process*



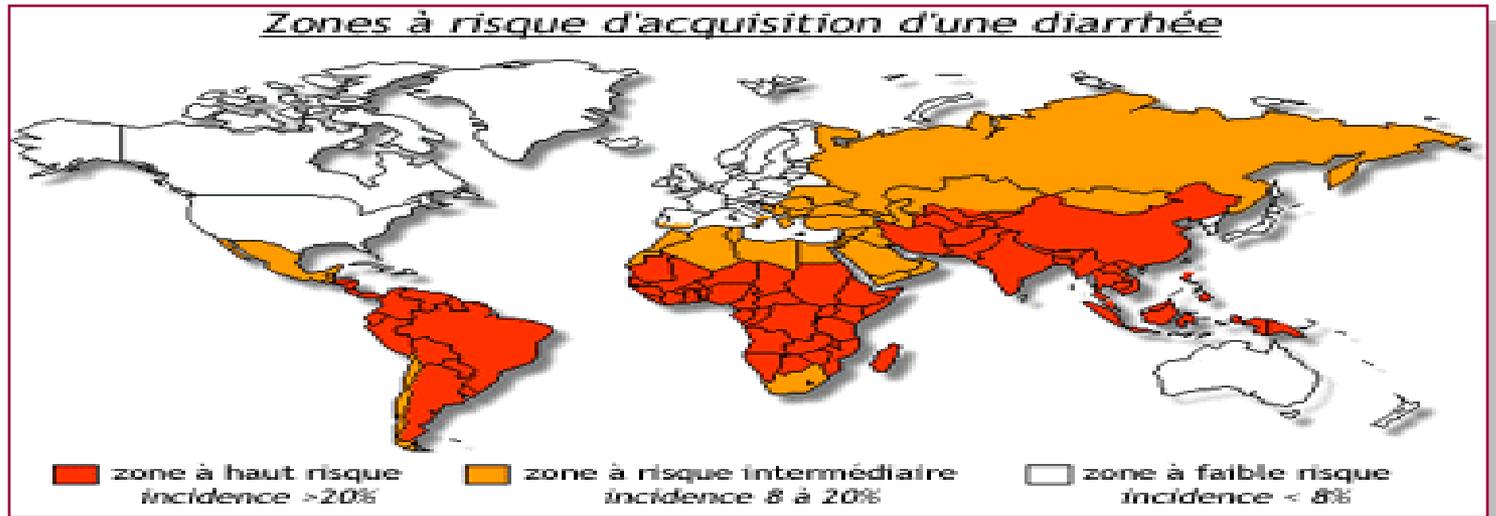
## The favouring factors

✓ The warm season favours both food contamination through the biological activity of extra-human factors and the multiplication of microorganisms in food kept at improper temperatures;

✓ Social and economic factors favour the occurrence of FP through:

- ⑩ Low sanitary education;
- ⑩ Faulty hygiene;
- ⑩ Insalubriousness.

# *The epidemiological process*



## Epidemiological process manifestation

- ✓ These are diseases with a net estival seasonal feature;
- ✓ They are manifested as isolated, sporadic cases, much more frequent in the summer than in winter;
- ✓ Or in the form of collective epidemics;
- ✓ The clinical seriousness depends on the aetiology and the dose ingested.

# *Prevention and control*

## Measures regarding the ill

- ✓ **Discovery and isolation at the infectious disease clinic, depending on the clinical-epidemiological context;**
- ✓ **Hospitalization is compulsory if botulism is suspected;**
- ✓ **Numerical declaration of the cases;**
- ✓ **The epidemiological investigation at the focus site aims to identify the contaminated food, its origin, the method of contamination, and the list of consumers;**
- ✓ **The food involved is taken out of human consumption;**
- ✓ **Pathological samples are taken from the ill person (faeces, vomit fluid, haemocultures), food and environmental samples, in order to determine the etiology.**

# *Prevention and control*

## **The 10 golden rules for proper food preparation**

- 1. Choosing properly processed foods;**
- 2. Complete processing of the food;**
- 3. Consumption of food immediately after preparation;**
- 4. Proper storage of prepared food;**
- 5. Full reheating of prepared food;**
- 6. Avoiding contact between raw, unprocessed foods and the food prepared;**
- 7. Repeated hand washing;**
- 8. Maintaining meticulous cleanliness in the kitchen;**
- 9. Protecting food against access by insects, rodents, and other animals;**
- 10. Using only drinkable water for preparing food.**



## **Tegumental entry infections**

# ***Tetanus***



## Definition

✓ It is an acute infectious disease with a serious evolution, determined by exotoxin, which is produced in anaerobiosis by *Clostridium tetani*, manifested clinically by tonic spasm of skeletal muscles, paroxistic spasm fits, and neurovegetative disorders.

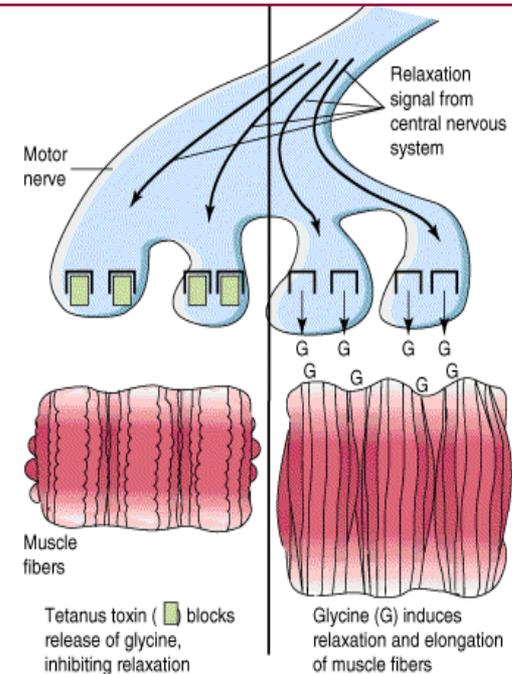


- ❑ The prognosis of the disease is reserved;
- ❑ The high fatality – 30-40%, influenced by age, incubation duration, severity of the symptoms, and earliness of the therapeutic intervention;
- ❑ **Neonatal tetanus** is a serious clinical form, with a fatality of 50-90%, with the infected umbilical wound as an entry;
- ❑ It occurs in the lack of asepsis, in newborns whose mothers have not been administered ATPA prophylaxis during pregnancy.



### Characteristics of the aetiological agent

- ✓ *Clostridium tetani* in a vegetative form is sensitive to heat and cannot survive in the presence of oxygen;
- ✓ The spores have high resistance in the external environment (dust, soil, animal faeces, surfaces), under circumstances of dryness, temperature variation, and sheltered from light – they can survive for years;
- ✓ They resist common antiseptics, alcohol, boiling, and are destroyed by autoclaving for 15-20 minutes and by oxidizing disinfectants (hydrogen peroxide, potassium permanganate) in a few minutes;
- ✓ They are sensitive to penicillin, tetracycline, erythromycin and resistant to aminoglycosides.



## Clinically

- ✓ The diagnostic is made clinically and by excluding other causes;
- ✓ Incubation is of 3-30 days, short incubation periods being associated with intensely contaminated wounds, severe forms, and a serious prognosis.

# *The epidemiological process*



**The natural infection reservoir** is represented by:

- ✓ Herbivores (horses, sheep, cattle);
- ✓ Other domestic animals, birds, which host tetanic bacilli in their intestine, which they eliminate in high quantities into the external environment through their faeces;
- ✓ Through the surface water, fodder, these bacilli end up in animals' digestive tract again, completing the natural circulation of the bacilli.

# *The epidemiological process*



## **Transmission routes and mechanisms**

- ✓ Through the contact of tegumental or mucous wounds with the soil, dust or objects contaminated with tetanic bacilli or spores;
- ✓ The tetanic risk is real if 2 conditions are fulfilled:
  - ⑩ Wound contamination and
  - ⑩ Conditions for anaerobiosis present at the level of the wound;
- ✓ It is not transmitted from human to human.

# *The epidemiological process*

## **Tetanic potential wounds:**

- ✓ Wounds pierced with splinters, thorns, nails, even after the closing of the wound;
- ✓ Animal biting wounds;
- ✓ Foreign body retention wounds;
- ✓ Wounds with deep, irregular margins, with devitalised tissue;
- ✓ Wounds occurring in traffic accidents;
- ✓ Open fractures;
- ✓ Empirical abortion;
- ✓ 2nd and 3rd degree burns;
- ✓ Chronic infected varicose ulcers;
- ✓ Wounds dirty with soil, street dust;
- ✓ Wounds pierced for the parenteral administration of drugs;
- ✓ Umbilical wounds occurred in the absence of asepsis;
- ✓ Very rarely, through sutures, contaminated hospital instruments.

# *The epidemiological process*

## **The receptive population**

- ✓ The receptivity is general, strongly influenced by anti-tetanus vaccination, which induces an immune response of a solid and durable humoral type;
- ✓ The receptivity depends on the existence of the tetanic potential wound and the lack of specific immunity;
- ✓ The immunity after the disease is weak or absent, which calls for active immunization with ATPA;
- ✓ Relapses are possible;
- ✓ Transplacental immunity is present if the pregnant woman is immunized; newborns whose mothers are not immunized are receptive from the first day of life.

# *The epidemiological process*

## The favouring factors

- ✓ The warm season favours injuries, especially in rural areas;
- ✓ The economic-social factors can favour the occurrence of the disease by:
  - ⑩ Deficiencies in the vaccination plan;
  - ⑩ Neglecting tetanic potential wounds;
  - ⑩ Tardive medical consultation;
  - ⑩ Empirical abortive practices;
  - ⑩ Unskilled birth assistance, under precarious hygiene conditions, and faulty postpartum bandaging of the umbilical stump;
  - ⑩ The use of injectable drugs without observing asepsis;
  - ⑩ Lack of sanitary education among the population.

# *The epidemiological process*

## Epidemiological process manifestation

- ✓ The disease is spread universally, with great differences regarding the application of prophylaxis measures;
- ✓ More frequent in areas with warm and moist climate, with a soil rich in organic matter; in temperate areas, it is more frequent in the warm months;
- ✓ In the developed countries, most cases occur in persons aged over 60, after pierced traumatic wounds;
- ✓ In Romania, the annual incidence during the past 10 years has been between 0.1-0.2 in 100,000 inhabitants, more frequent among children and old people, following wounds of the lower limbs.
- ✓ The current manifestation is sporadic.

# *Prevention and control*

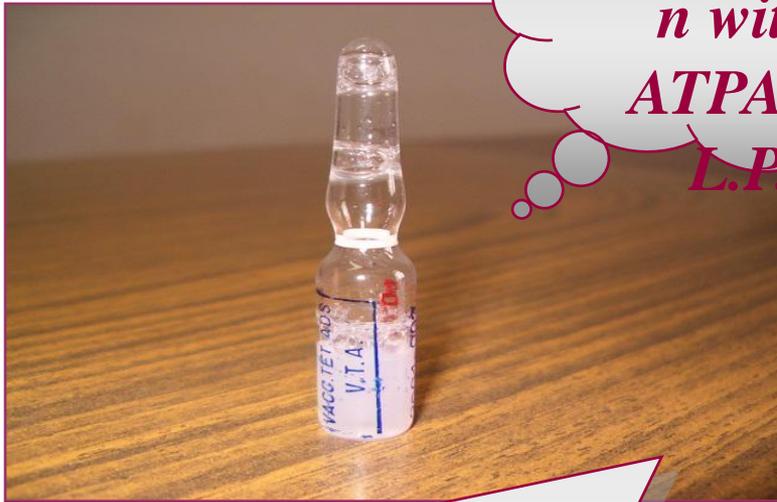


## Measures regarding the ill

- ✓ **Discovery with isolation at the infectious disease clinic and application of specific therapy;**
- ✓ **Nominal declaration of the confirmed cases and operative information on the day of discovery;**
- ✓ **The epidemiological investigation aims to identify the vaccinal history, to perform serological tests regarding the level of anti-tetanic immunity in the territory where the case has occurred, with a reevaluation of the immune potential and differentiated measures for mass vaccination.**

# Prevention and control

*Vaccination with ATPA in L.P.*



## Specific prophylaxis

✓ Tetanus is the typical example of a disease that cannot be eradicated, but can be controlled up to elimination through vaccination and proper care regarding the tetanic potential wound.

# *Prevention and control*

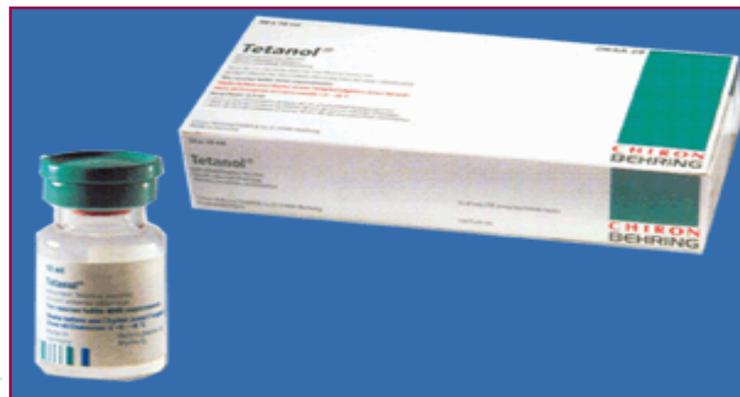
## Preventive behaviour in case of a tetanic potential wound

- ✓ Surgical sterilization of the wound with large debridement, elimination of the foreign body, excision of the devitalised tissue, achieving of haemostasis – Not to be sutured;
- ✓ Making the wound aseptic using hydrogen peroxide 3%, cetrimonium bromide 1%;
- ✓ Antibiotic therapy: penicillin 1,200,000 U./day or erythromycin 2 g/day - 10 days;

### **Post-exposure anti-tetanic prophylaxis:**

- ✓ People with a proper vaccination history: 1 dose of 0.5 ml ATPA, IM in the shoulder. In case of severe severe multiple trauma, with massive blood loss, immunoprophylaxis is added as well passive, by administering 3,000-15,000 IU anti-tetanic serum or 200 - 500 IU specific anti-tetanic Ig.

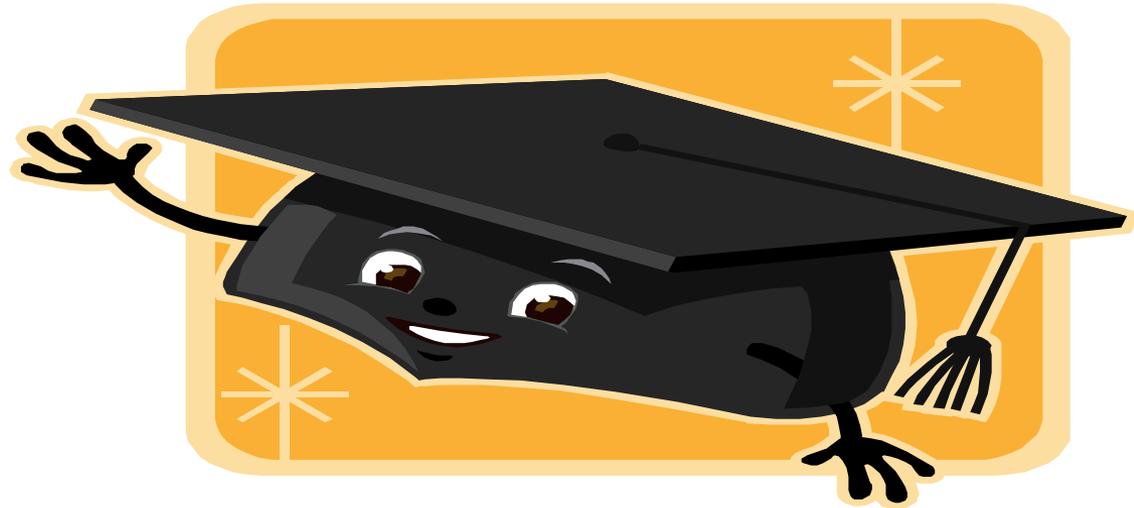
# *Prevention and control*



## **Post-exposure anti-tetanic prophylaxis:**

- ✓ Non-vaccinated people/people with unknown vaccinal history – administration of anti-tetanic serum 3,000 – 15,000 IU (after desensitization) or specific anti-tetanic Ig 200 - 500 IU + accelerated vaccination with 3 doses of 0.5 ml ATPA IM, at a 14-day interval;
- ✓ In case of superficial wounds, only the anti-tetanic vaccination is administered.

# Thankyou!



*Images – sources  
The Internet*