"Victor Babeş" UMF, Timişoara

Course 5
Respiratory entry viral/bacterial infections

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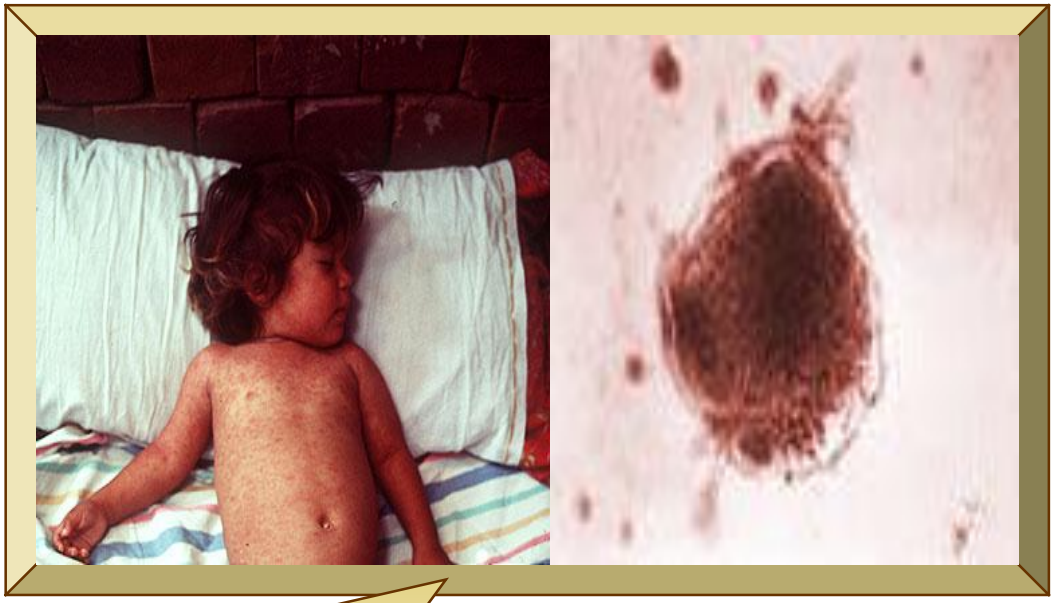
MEASLES



Definition

✓ **It is a transmissible eruptive viral infection, highly contagious, human-specific, frequent during childhood.**

Characteristics of the aetiological agent

✓ The measles virus has low resistance in the external environment and is quickly inactivated by heat, light, UV, acid pH, common disinfectants, dryness;

The entry is:

✓ the airway mucosa and

✓ the conjunctiva.

The epidemiological process

The infection source is represented by:

- **Ill people with typical/atypical clinical forms of the disease;**

✓ **Contagiousness arises at the end of the incubation period, peaks in the catarrhal period, and is maintained 4-6 days after the appearance of the exanthem;**

✓ **The virus is eliminated through:**

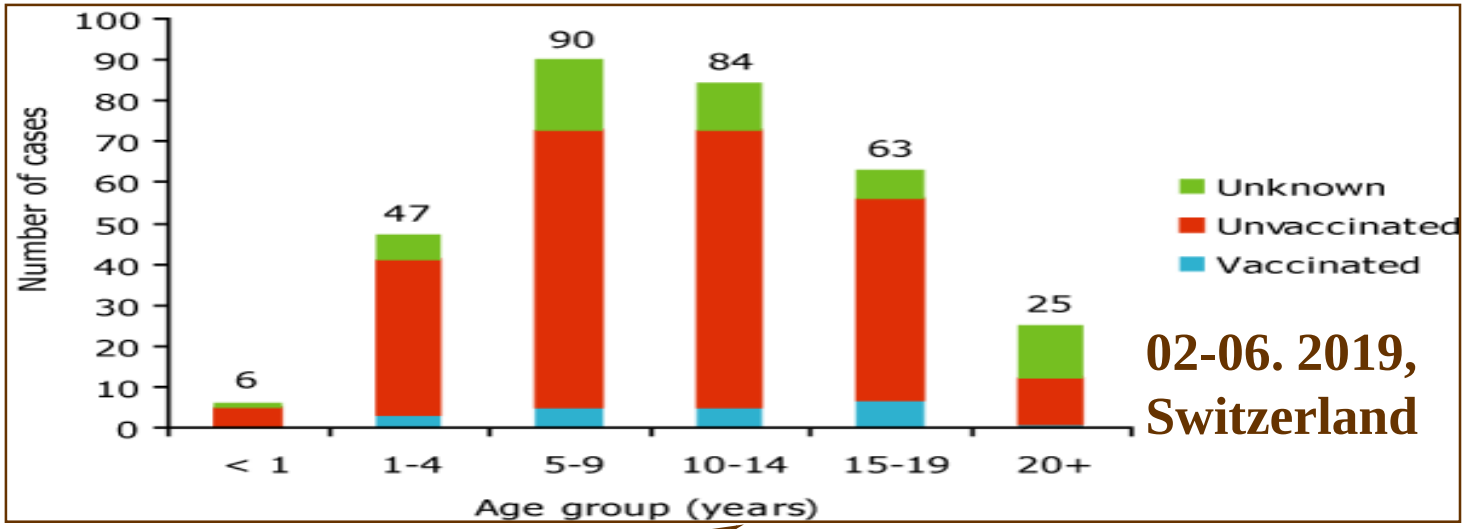
- **Respiratory secretions;**
- **Conjunctival secretions, tears;**
- **Urine;**
- **Blood;**
- **Eruptive elements;**

The epidemiological process

Transmission routes and mechanisms

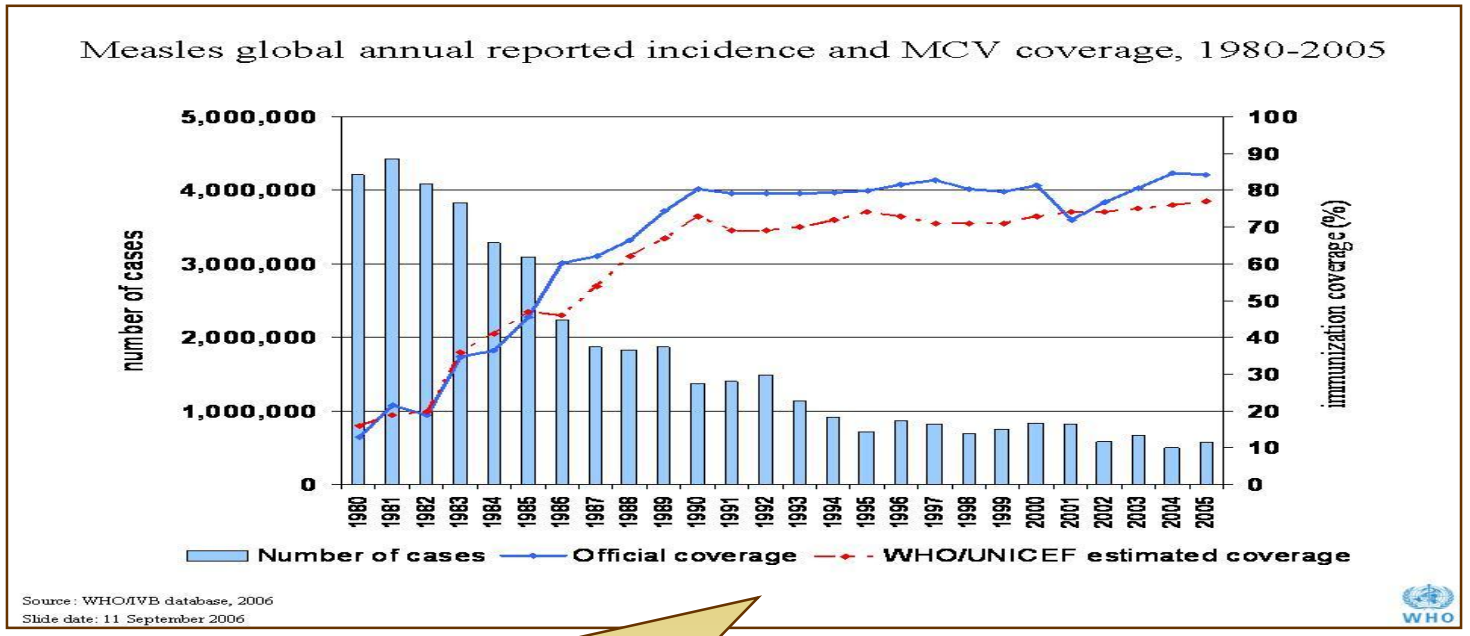
✓ **Direct (simple indirect) transmission, through Flügge's droplets, with a high contagiousness index – over 95 %;**

✓ **In exceptional cases, indirect transmission.**



The receptive population

- ✓ Population receptivity is general, with a peak at the age of 3-5 and a gradual decrease after that;
- ✓ After the introduction of the anti-measles vaccine, it more frequently affects persons aged between 5 and 14, adolescents, and youth;
- ✓ Sucklings have maternal antibodies during the first 6 months of life, sometimes up to 12 months;
- ✓ Postinfectious immunity is solid and life-long.



Manifestations of the epidemiological process

- ✓ **Morbidity can be sporadic, endemic or epidemic, depending on the immunological state of the population;**
- ✓ **Before the vaccination, the evolution used to be endemic-epidemic, with outbreaks at 3-5-year intervals, especially in the cold season;**
- ✓ **After the vaccination, the periodicity is influenced by the accumulation of a percentage of more than 10% susceptible persons.**

Prevention and control

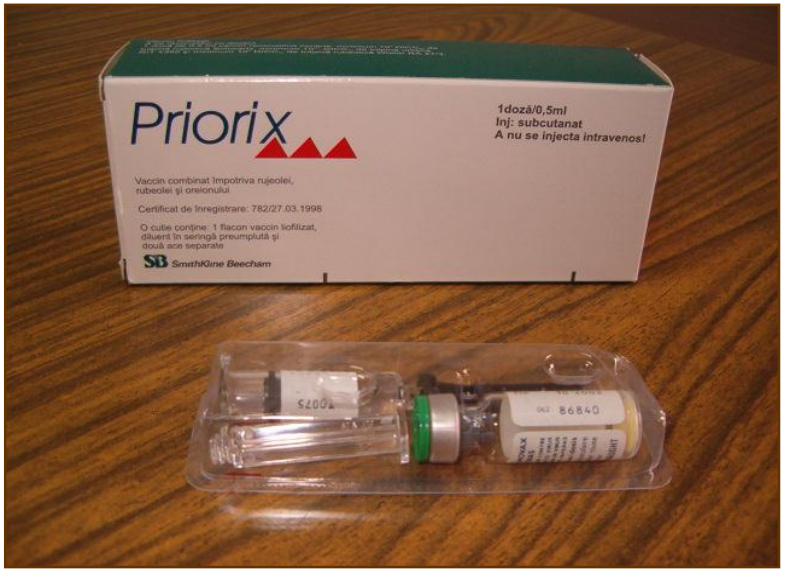
Measures regarding the ill

- ✓ Identification with isolation at home;
- ✓ Or in the infectious disease clinic – only for the serious and complicated forms;
- ✓ The isolation period is assessed up to the disappearance of fever and of the exanthem;

Measures regarding contacts

- ✓ Contacts are monitored during the maximum incubation period;
- ✓ They benefit from post-exposure prophylaxis through standard immunoglobulin administration during the first 72 hours following the infecting contact;
- ✓ Clinical-epidemiological monitoring of the pre-school and school collectivities, as well as of closed collectivities.

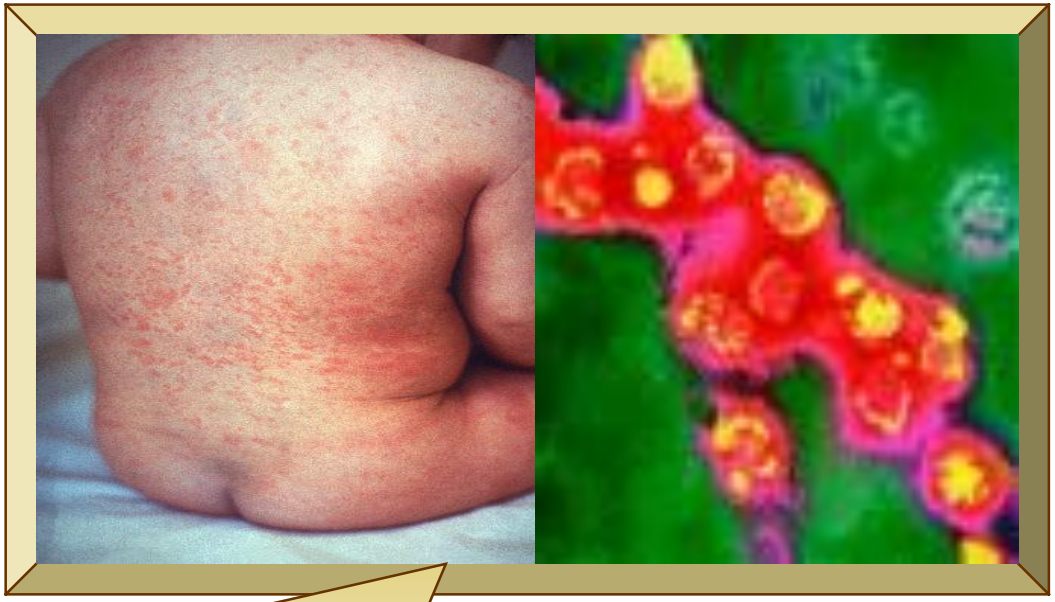
Prevention and control



Specific prophylaxis

✓ **It consists in the anti-measles vaccination of children.**

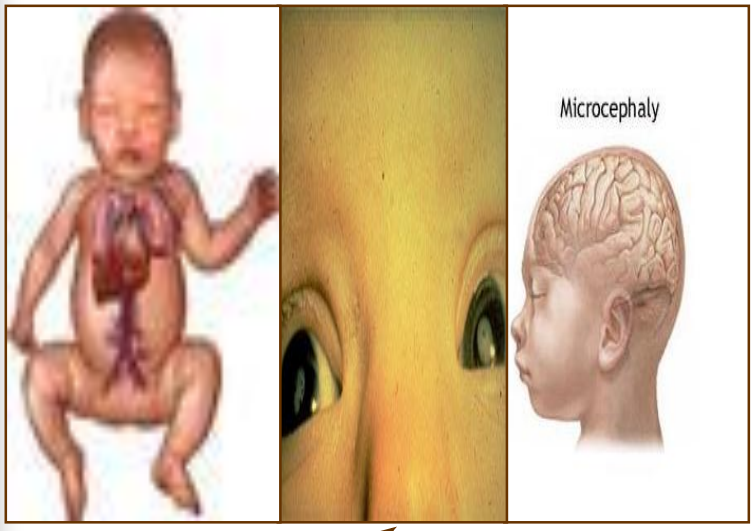
RUBELLA

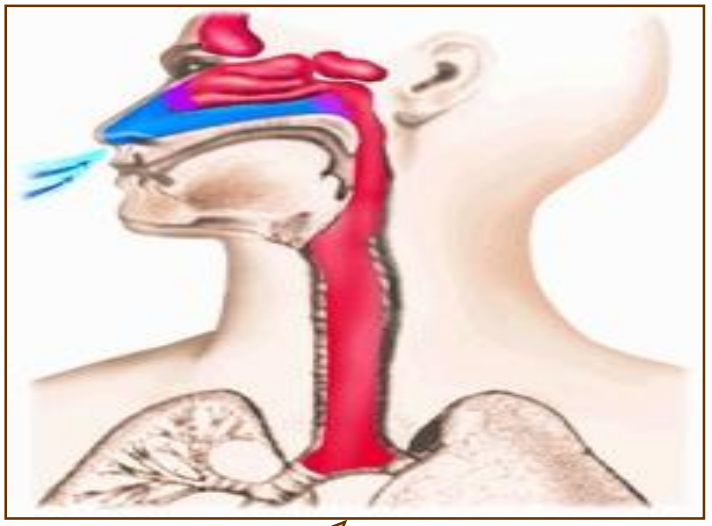


Definition

✓ **A transmissible eruptive viral infection, endemic-epidemic, frequent during childhood, with a benign clinical evolution.**

Congenital rubeola syndrome





Characteristics of the aetiological agent

✓ **The rubella virus has low resistance in the external environment and to the action of common disinfectants;**

The entry

is:

✓ **the airway mucosa and**

✓ **the conjunctiva.**

The epidemiological process

The infection source is represented by:

- ill people with typical/atypical clinical forms of the disease;
- People with inaparent infections;
- Children with congenital rubella syndrome;

✓ **The rubella virus is eliminated by following routes:**

- Nasopharyngeal secretions,
- Urine,
- Fecal matter;
- Blood, as well as
- The placenta and organs coming from infants with congenital rubella;

✓ **The ill person is contagious 4-7 days before the eruption and 6-7 days after the onset of the eruption, or up to 14 days in exceptional cases.**

The epidemiological process

Transmission routes and mechanisms

- ✓ **Direct (simple indirect) transmission, through Flügge's droplets;**
- ✓ **Transplacental transmission from the mother to the foetus;**
- ✓ **In exceptional cases, the transmission is indirect.**

The epidemiological process

The receptive population

✓ Population receptivity is general, with a peak at the age of 4-6 and a gradual decrease after that;

✓ Up to the age of 6 months, sucklings are protected due to the immunity transmitted from the mother;

✓ Postinfectious immunity is solid and life-long;

Manifestations of the epidemiological process

✓ Morbidity can be sporadic, endemic or epidemic, depending on the immunological state of the population;

✓ Epidemic outbreaks can be noticed at 5-9-year intervals among children, adolescents, young adults, especially in the cold season.

Prevention and control

Measures regarding the ill

✓ **Identification and isolation at home or at the hospital, with serious and complicated forms being isolated at the infectious disease clinic; the isolation duration is assessed up to the disappearance of fever and of the exanthem;**

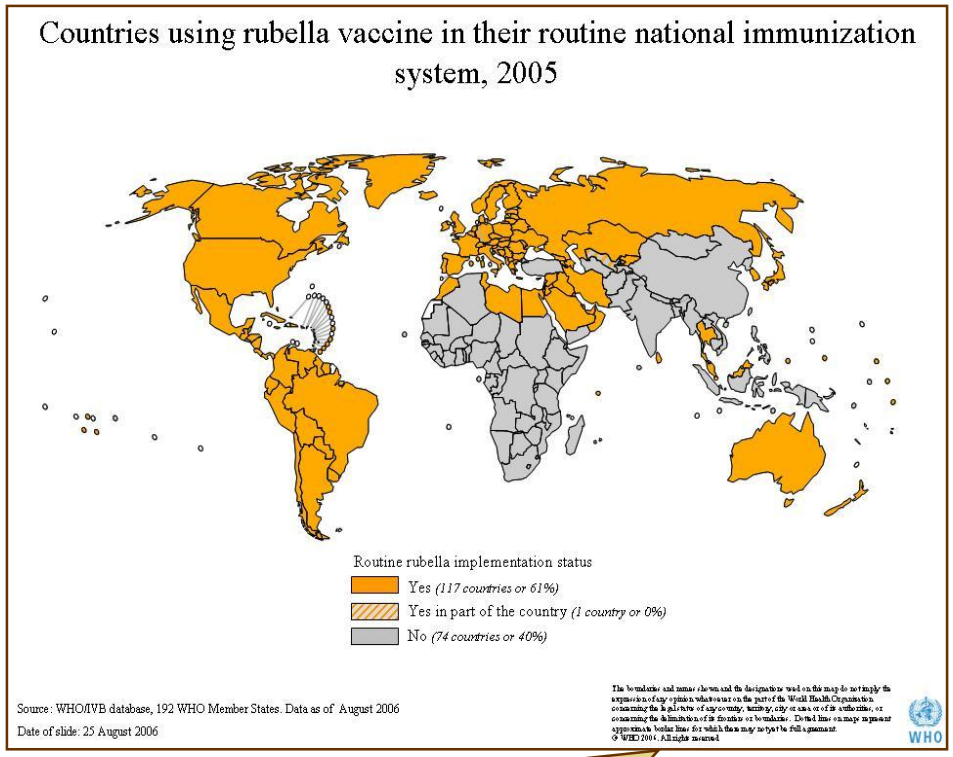
Measures regarding contacts

✓ **The contacts are monitored during the maximum incubation period. Additional recommendations include:**

✓ **Clinical-epidemiological monitoring of the pre-school and school collectivities, as well as of closed collectivities;**

✓ **Quarantine in the closed pre-school collectivities, for children coming back from the infectious disease clinic.**

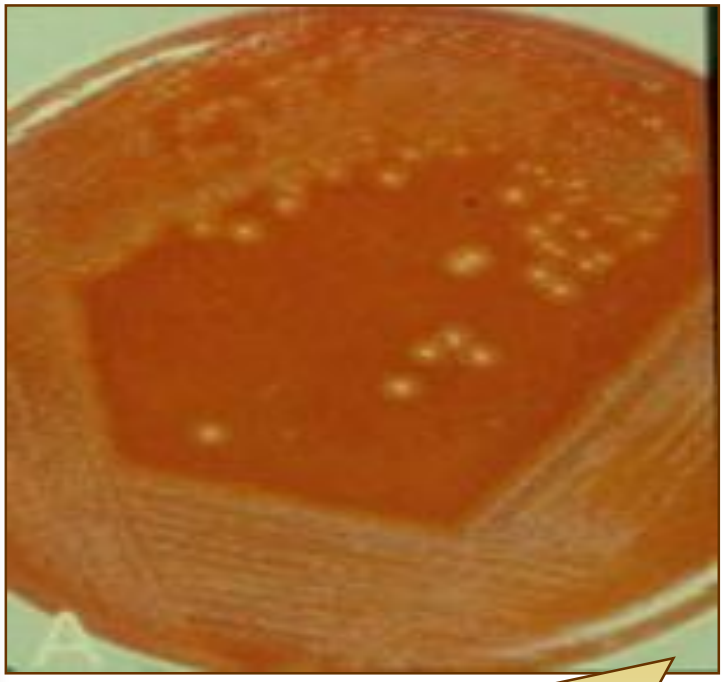
Prevention and control

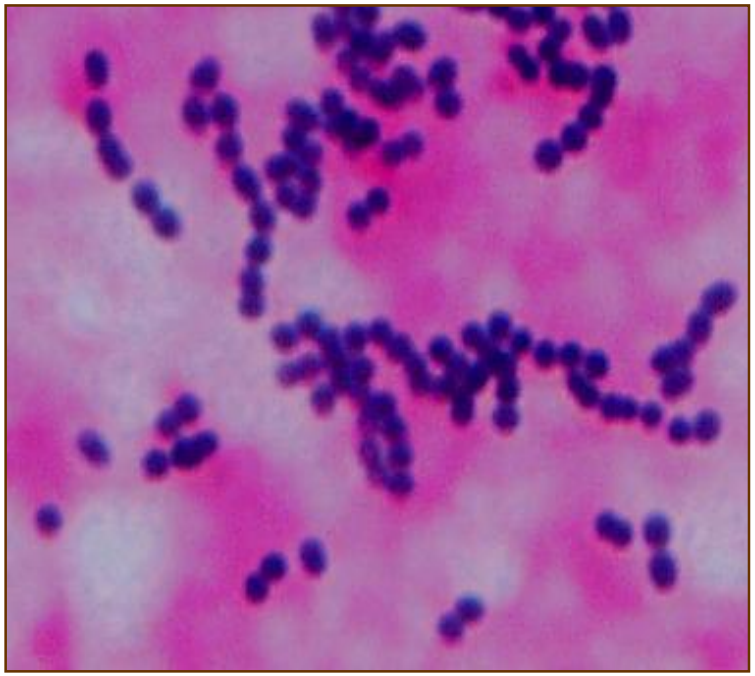


Specific prophylaxis

✓**Anti-rubella vaccination of children and fertile-age women (who have no rubella history and are not in their first pregnancy trimester).**

Scarlet fever





Characteristics of the pathogen

- ✓ **Caused by Group A haemolytic streptococci**
  - **Gram-positive cocci, arranged in chains;**
  - **On gelose-blood environments, they produce a β-type full hemolysis around the colony within 24-48 hours.**

The epidemiological process

The infection source may be represented by:

- **Persons with typical disease, contagious from the end of the incubation period, during the onset phase and the latency period of the disease;**
- **Convalescing carriers – up to 10 weeks;**
- **Persons with an non apparent infection or**
- **Apparently healthy carriers;**

✓ **Formerly ill persons that remain carriers during convalescence can infect other people;**

✓ **The appearance of convalescing carriers is caused by an inoperative penicillin treatment, in cases with:**

- **cryptic tonsils or**
- **co infections with *Staphylococcus aureus*, which secretes penicillinase.**

The epidemiological process

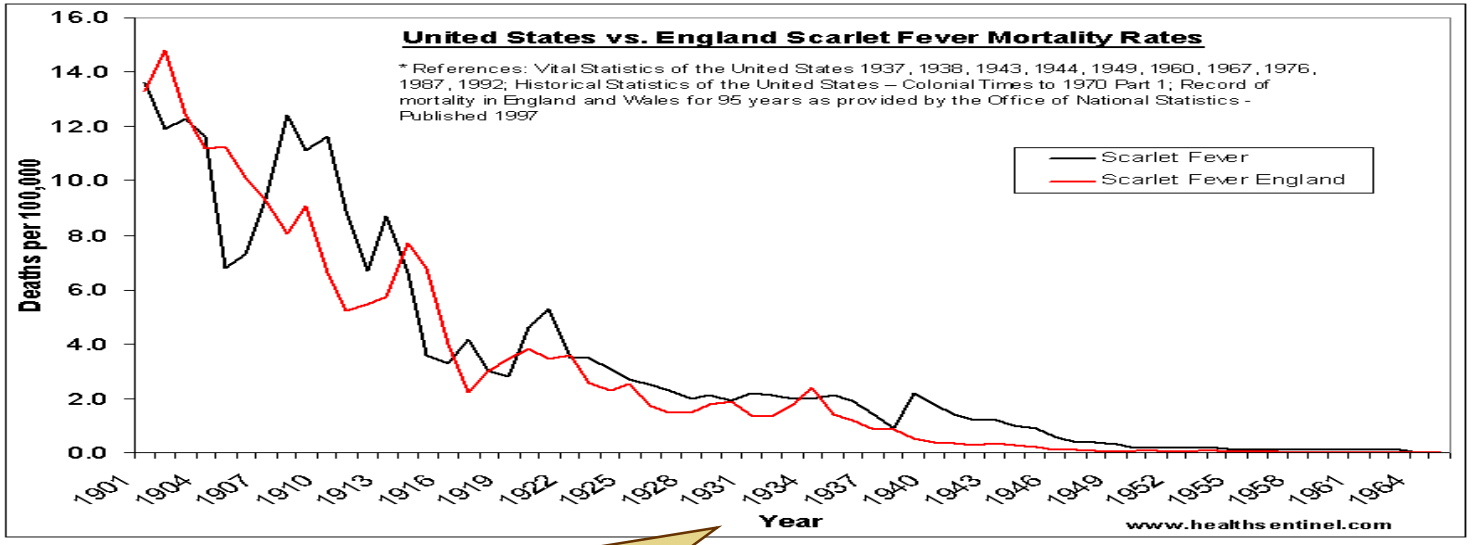
Transmission routes and mechanisms

- ✓ Direct (simple indirect) transmission, through Flügge's droplets or
- ✓ Indirect transmission – through contaminated objects;

The receptive population

- ✓ Population receptivity is general, with a peak between 2-10 years of age;
- ✓ The only ones protected are newborns and sucklings up to the age of 6 months, thanks to transplacental immunity;
- ✓ Post-disease immunity can be:
  - ❿ Bacterial, type-specific;
  - ❿ Antitoxic, with regard to the erythrogenic toxin (those that contract scarlet fever a second time are infected with a streptococcus with a different erythrotoxin);
- ✓ The contagiousness index is 40%.

The epidemiological process



Manifestations of the epidemiological process

- ✓ Characterized by prolonged endemicity, with slight epidemic manifestations;
- ✓ The disease displays a multiannual periodicity;
- ✓ The most frequently affected age groups are:
  - ➓ 5-9 years;
  - ➓ 1-4 years;
  - ➓ 10-14 years.

Prevention and control

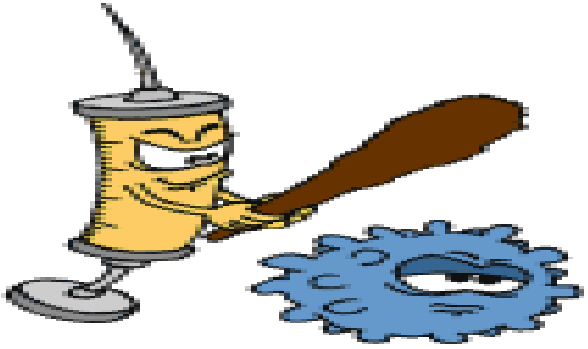
Measures regarding the ill

- ✓ **Early discovery;**
- ✓ **Nominal declaration;**
- ✓ **Isolation in the infectious disease clinic;**
- ✓ **Epidemiological investigation;**
- ✓ **Disinfection of the focus site using formaldehyde, cetrimonium bromide, chloramine;**

Measures regarding contacts

- ✓ **Discovery;**
- ✓ **Bacteriological monitoring of the contact during the maximum incubation period;**
- ✓ **Retard penicillin treatment of the contacts with a cardiovascular or renal history.**

Prevention and control



Measures regarding carriers

✓ **Discovery and treatment of the carriers of Group A β-haemolytic streptococcus;**

✓ **Epidemiological triage in units or collectivities affected by streptococcal infections;**

Measures regarding the convalescents

✓ **Monitoring those people in order to discover any nonsuppurative complications.**

Prevention and control

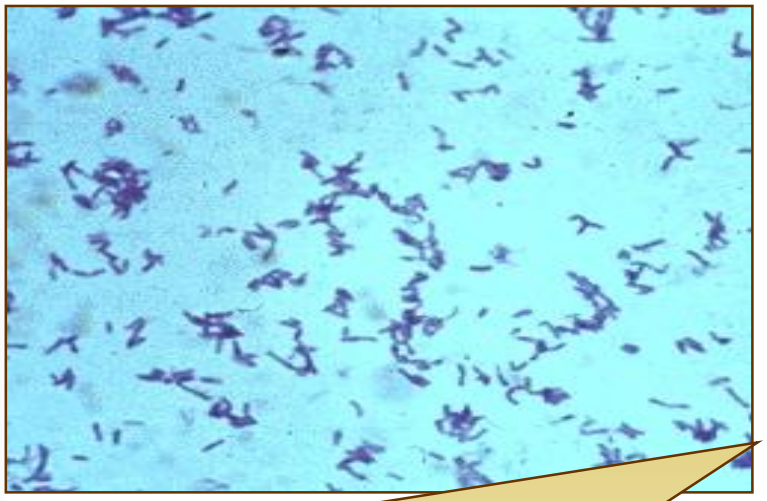
Other measures

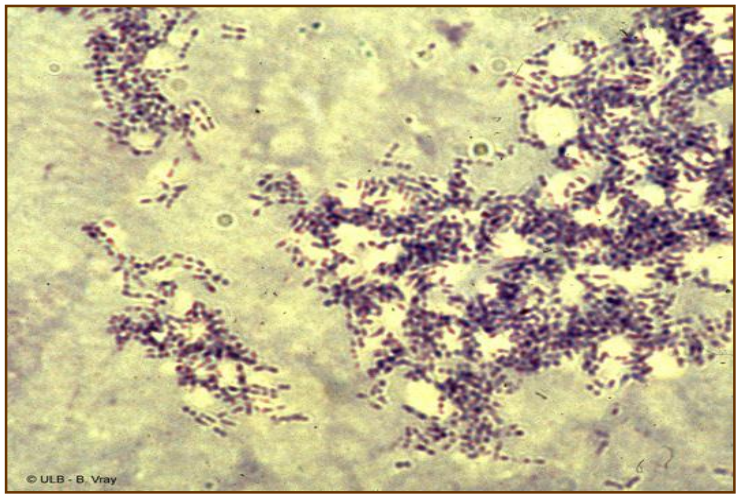
- ✓ **Prophylactic epidemiological triages in pre-school/school children collectivities after the holidays;**
- ✓ **Epidemiological triages in closed collectivities of children (foster homes) – using the nasopharyngeal exudate;**
- ✓ **Prophylactic disinfection;**
- ✓ **Observing asepsis and antisepsis measures in hospital units.**

Diphtheria

Definition

✓ It is an acute transmissible disease of a toxic-infectious type, caused by *Corynebacterium diphteriae*, currently characterized by a sporadic evolution;





Characteristics of the aetiological agent

- ✓ It is relatively resistant in the external environment, especially if enclosed in albuminous substrates;
- ✓ The most virulent and toxigenic strains belong to the gravis type;
- ✓ Sensitivity to the specific phages of the diphtheric bacillus strains , makes it possible to establish the origin and filiation of cases in epidemic focus sites;
- ✓ It is sensitive to disinfectants and some antibiotics.

The entry

- ✓ Tegumental lesion and the nasopharyngeal, laryngeal, ocular, and genital mucosas;
- ✓ At the level of the entry passage, the pathogen releases the exotoxin that will then spread in the body;
- ✓ Considering the entry passage and location of the causal agent, the most frequent clinical form is diphtheritic angina;
- ✓ Laryngeal diphtheria (diphtheritic croup) is less frequent;
- ✓ In exceptional cases – other forms (the incidence of cutaneous forms has recently increased).

The epidemiological process

The infection source is represented by:

- **People suffering from diphtheria with typical or atypical clinical forms and**
- **Germ carriers;**

✓ **The ill person can eliminate the pathogen during 10-30 days following the onset of the disease in the absence of antibiotic treatment;**

✓ ***Corynebacterium diphteriae* carriers may be:**

- **Convalescent (eliminating the pathogen for 2-3 weeks, up to 2-3 months in the absence of antibiotic treatment);**
- **Healthy – with a carrying time of 3 weeks.**

The epidemiological process

Transmission routes and mechanisms

- ✓ **Direct (simple indirect) transmission, through nasopharyngeal secretions expelled in the form of droplets by ill people or germ carriers;**
- ✓ **Indirect transmission – through contaminated objects, especially when contaminated with nasopharyngeal secretions or secretions/false membranes of other mucosas.**

The receptive population

- ✓ The receptivity of the population is general;
- ✓ Morbidity has been influenced through vaccination;
- ✓ Postinfectious immunity is relative;

Manifestations of the epidemiological process

- ✓ Currently, sporadic morbidity prevails,
- ✓ The endemic-epidemic aspect is encountered in areas that do not have a vaccination plan;
- ✓ Relaxed vaccination requirements for adults is currently causing a new emergence of diphtheria.

Prevention and control

Measures regarding the ill

- ✓ **Early discovery of typical or atypical forms;**
- ✓ **Separate isolation at the infectious disease clinic;**
- ✓ **Titrating the diphtheritic antitoxin in the blood upon admission, as well as confirming diphtheria from a clinical, epidemiological, and bacteriological point of view by highlighting the presence of *Corynebacterium diphteriae* in the pharyngeal and nasal exudate;**
- ✓ **Isolation duration – until clinical healing is reached; the ill person stops being contagious 2-3 days after starting the antibiotic treatment;**
- ✓ **The patient is released from hospital after clinical healing, ridding of C.d. and a normal ECG exam; the patient is then monitored for 3 months, by clinical and ECG examination;**
- ✓ **The declaration is nominal;**
- ✓ **The epidemiological investigation and disinfection are compulsory.**

Prevention and control

Measures regarding contacts

✓ **Adult contacts are monitored at their workplace for 10 days, performing repeated bacteriologic examinations (nasopharyngeal exudate);**

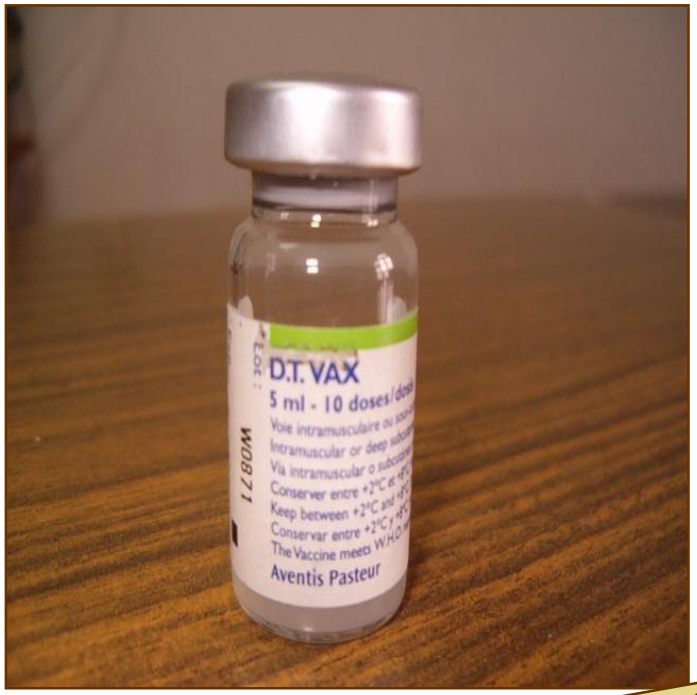
✓ **Child contacts are isolated at home until the bacteriologic examination result is known;**

✓ **Antidiphtheritic vaccine is administered or re administered, depending on the vaccinal history or the immunological tests;**

Measures regarding carriers

✓ **Erythromycin is administered in doses of 40 mg/body kg/24 h for children and 1 g/24 h for adults, for 7-10 days.**

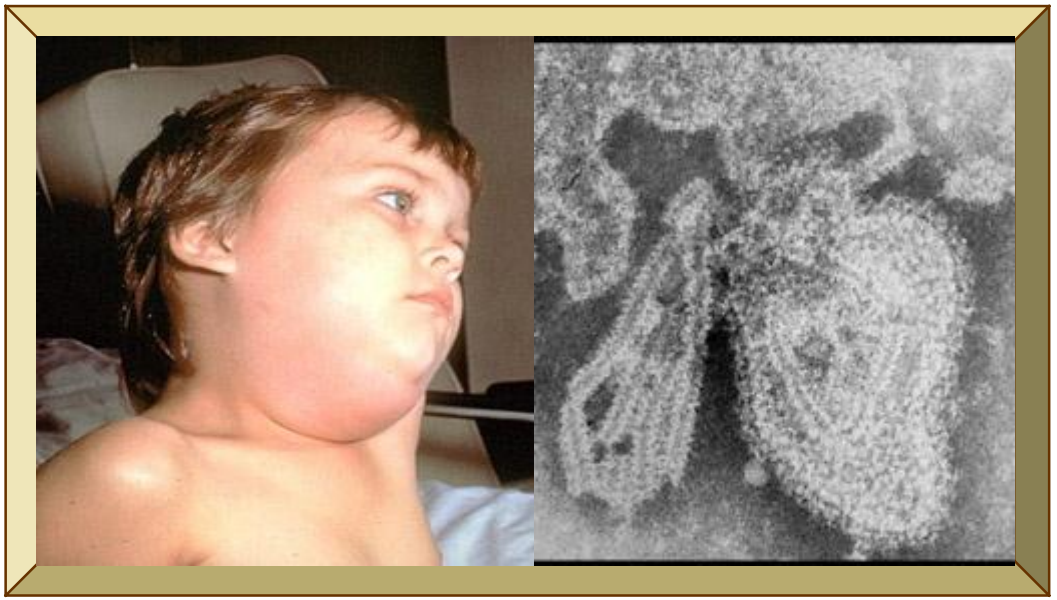
Prevention and control



Specific prophylaxis

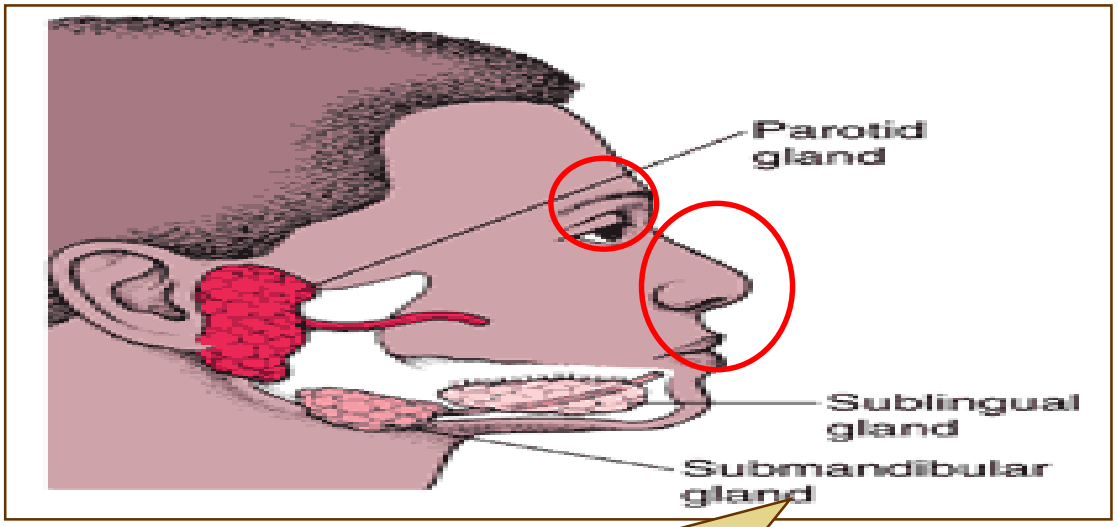
✓ **Through antidiphtheritic vaccination.**

Epidemic parotitis



Definition

✓ It is an acute transmissible viral infection, endemic-epidemic, clinically characterized by inflammation and swelling of the salivary glands, as well as other glands and tissues.



Characteristics of the aetiological agent

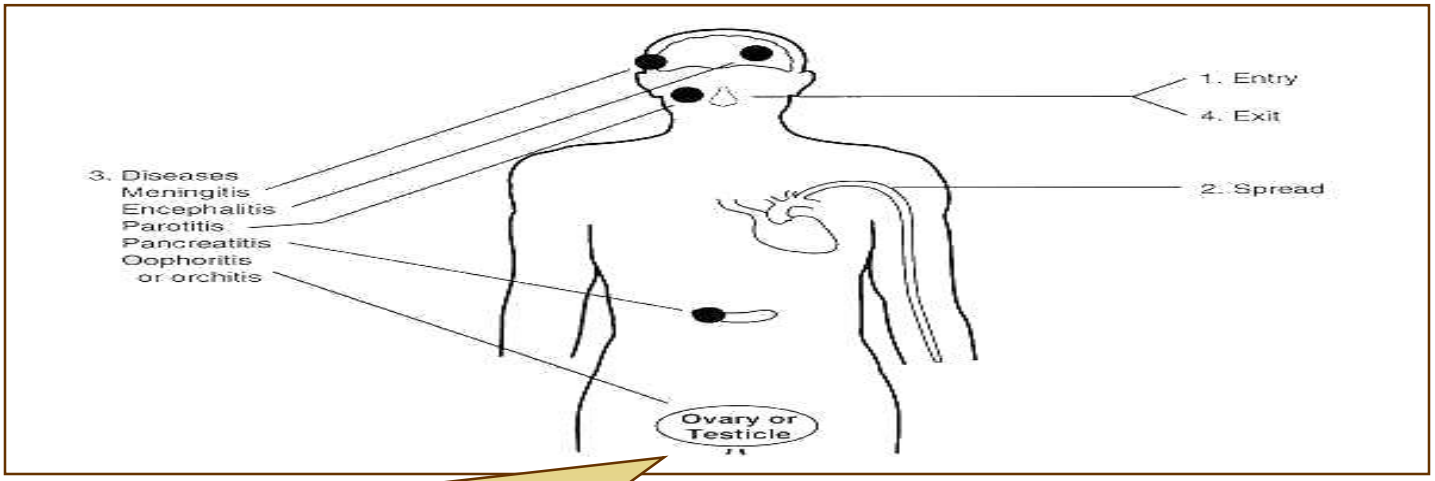
✓ The mumps virus has low resistance in the external environment and is inactivated by UV radiation, formaldehyde, and phenols;

The entry is:

✓ the rhinopharyngeal and conjunctival

✓ mucosas.

The epidemiological process



<u>The infection source</u> is represented by:

- **<u>People suffering from typical or atypical forms</u>;**
- **<u>Persons with an in-apparent infection</u>;**

✓ **The virus is eliminated through saliva and urine;**

✓ **The ill person is contagious 2-6 days before the onset of the disease and remains contagious until the 12th or even the 16th day of the disease;**

✓ **Generally, the contagious period is assessed at 21 days.**

The epidemiological process

Transmission routes and mechanisms

✓ Direct (simple indirect) transmission, through saliva droplets, after prolonged contact and

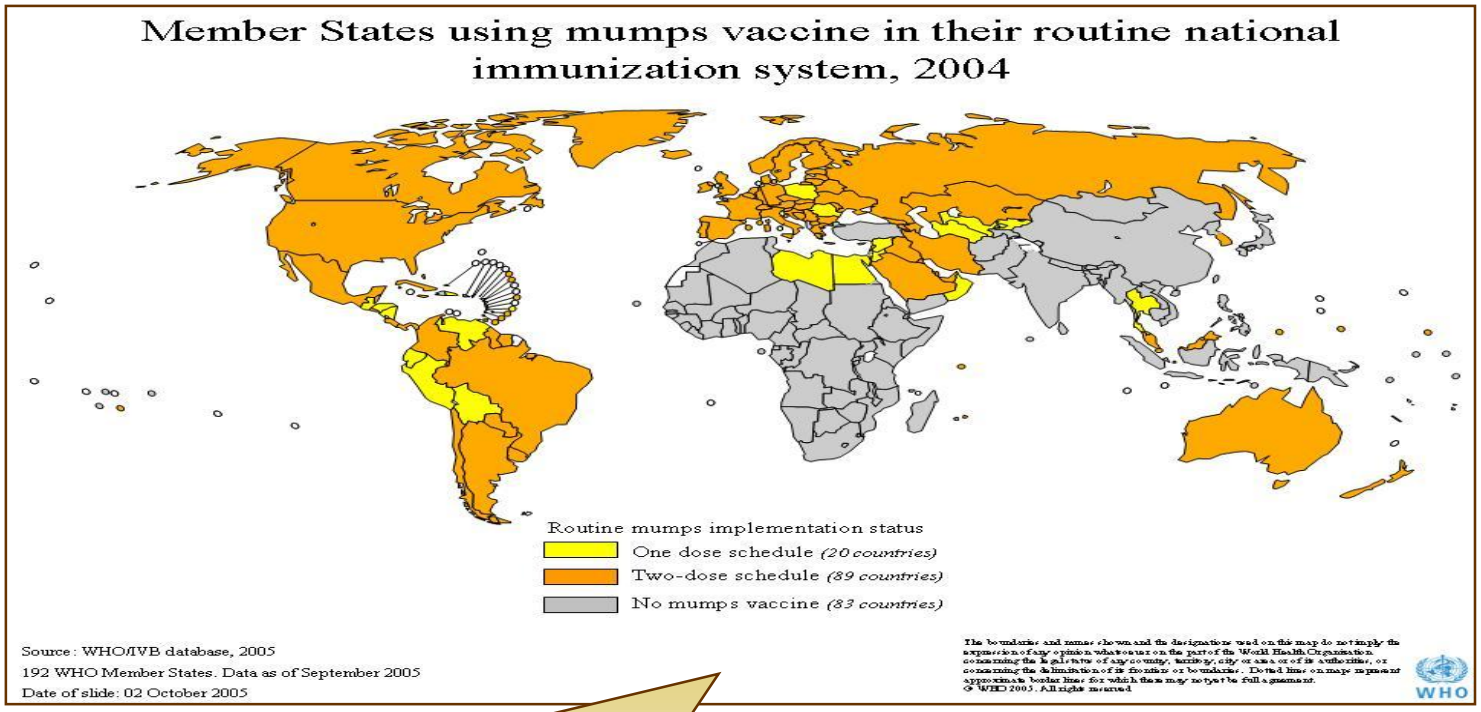
✓Indirect transmission – very rarely;

The receptive population

✓ The receptivity of the population is general, but it is higher among children, adolescents, and young adults;

✓ Post infectious immunity is long-lasting, solid.

The epidemiological process



Manifestations of the epidemiological process

- ✓They can be sporadic or
- ✓ Endemic-epidemic,
- ✓ with frequent cases in winter.

Prevention and control

Measures regarding the ill

✓ **Early discovery with isolation in the infectious disease clinic**

- ❿ **For children - for 10 days counting from the disease onset;**
- ❿ **For adults – until the clinical phenomena disappear;**

✓ **The declaration is numerical;**

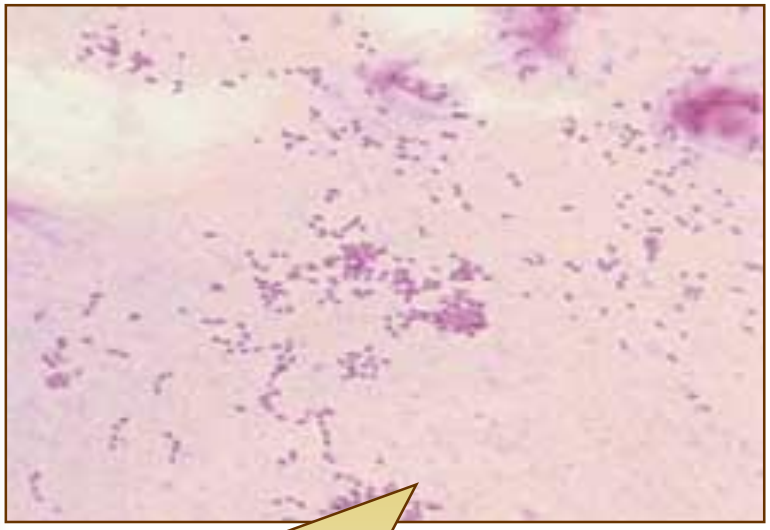
Specific prophylaxis

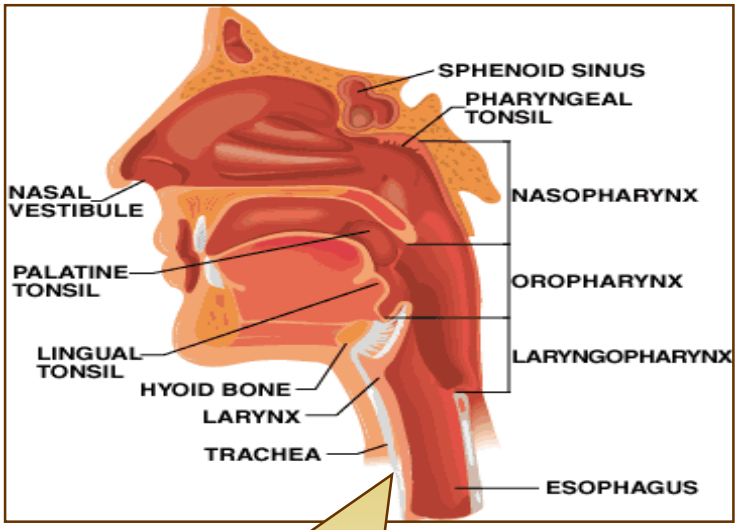
✓ **Through anti-mumps vaccination.**

Whooping cough

Definition

✓ It is an acute bacterial disease with a typically airborne transmission route, affecting mainly children in the absence of active immunization.



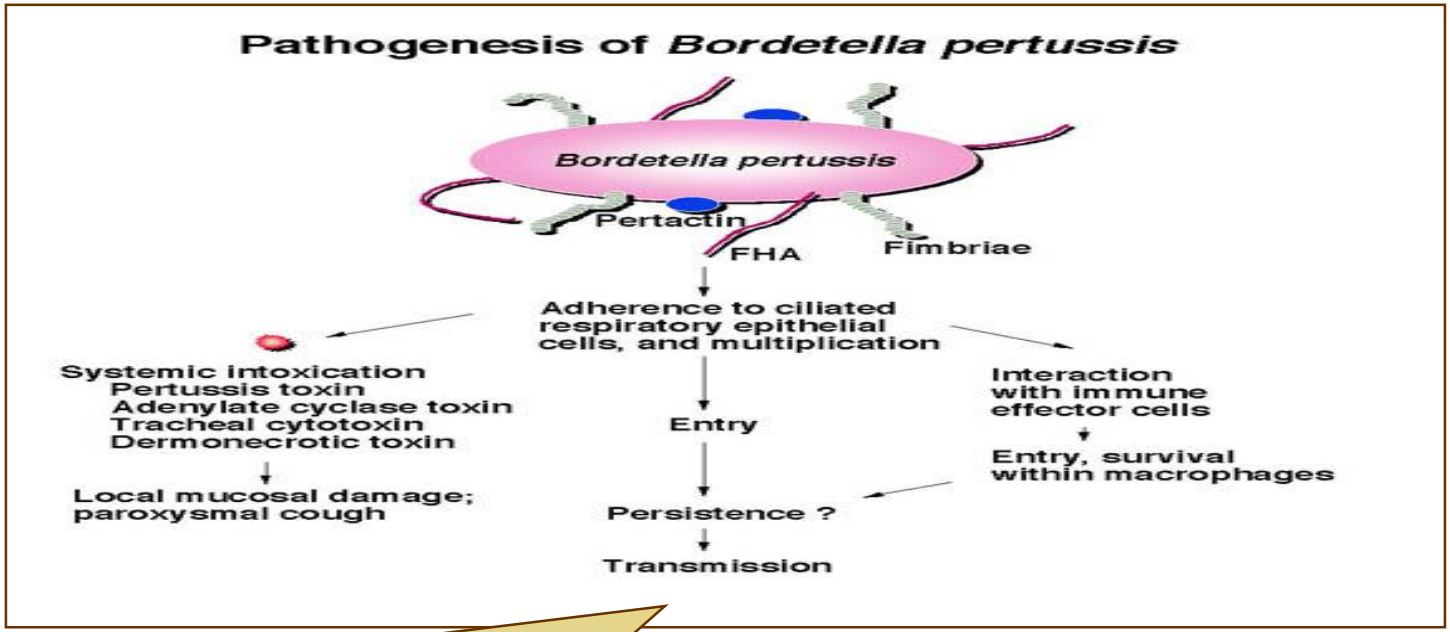


Characteristics of the aetiological agent

✓ *Bordetella pertussis* has low resistance in the external environment, being sensitive to the action of common disinfectants and antibiotics;

The entry is:

✓ upper respiratory tract mucosa.



The infection source is represented by:

- ✓ **Ill people with typical or atypical forms, eliminating *Bordetella pertussis* through sputa or nasopharyngeal secretions;**
- ✓ **Ill people are contagious from the prodromal period up to 3-4 weeks following the onset of the disease, in the absence of antibiotic treatment;**
- ✓ **The role of so-called healthy carriers is debatable.**

The epidemiological process

Transmission routes and mechanisms

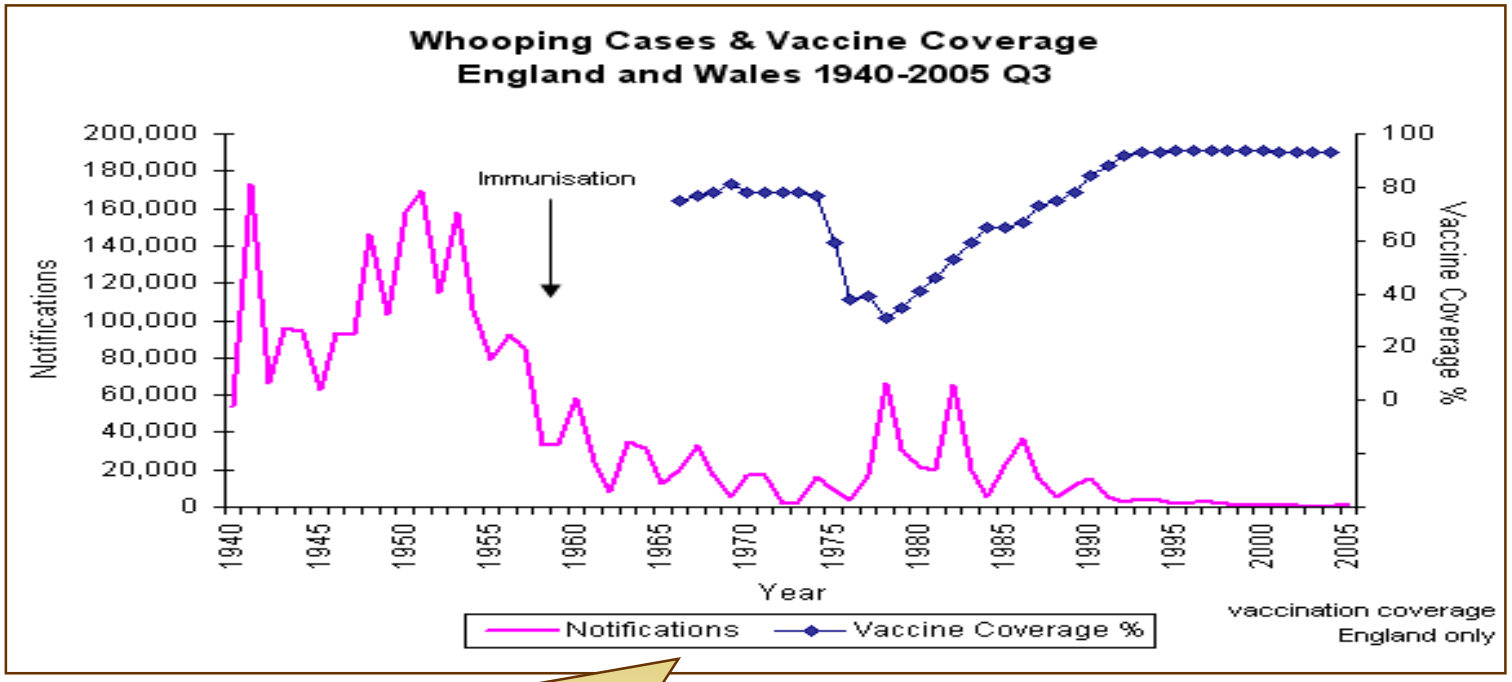
✓ **The transmission is direct (simple indirect), especially during the coughing fits, through secretions of the bronchial, laryngeal, and pharyngeal mucosas, in the form of Flügge's droplets;**

The receptive population

✓ **The receptivity of the population is general, with a peak of morbidity among children, in the absence of active immunization;**

✓ **Post infectious immunity is solid.**

The epidemiological process



Manifestations of the epidemiological process

- ✓ It currently has a sporadic evolution, thanks to the anti pertussis immunization plan;
- ✓ It is considered a re-emerging disease in some regions.

Prevention and control

Measures regarding the ill

✓ **Early discovery with compulsory isolation at the infectious disease clinic, for 14 days, of the cases treated with antibiotics;**

✓ **The declaration is numerical;**

✓ **Final disinfection is not necessary;**

Measures regarding suspects

✓ **Identical with the ones above;**

✓ **Separate isolation from confirmed ill people;**

✓ **In closed or half-closed children's collectivities, after the onset of whooping cough, no new members shall be accepted for 3 weeks after the discovery of the last case.**

Measures regarding contacts

✓ Contacts under 3 years of age and those currently undergoing DTP immunization , are administered 0.5 ml of DTP;

✓ Children over 3 years of age or with neurological pathology are given anti pertussis Ig of 0.2-0.3 ml/body kg during the first 3-4 days following the suspected infecting contact;

✓ Antibiotic-based prophylaxis can be used, with:

- Erythromycin,
- Amoxycillin;
- Cotrimoxazole – 10-14 days or
- Ampicillin 100 mg/body kg, for 7-10 days;

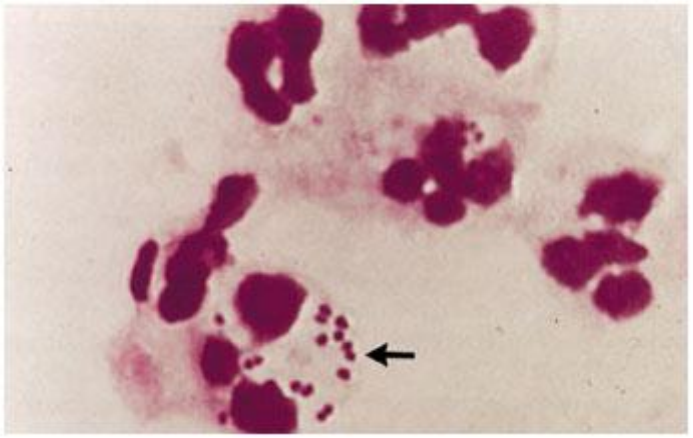
Specific prophylaxis

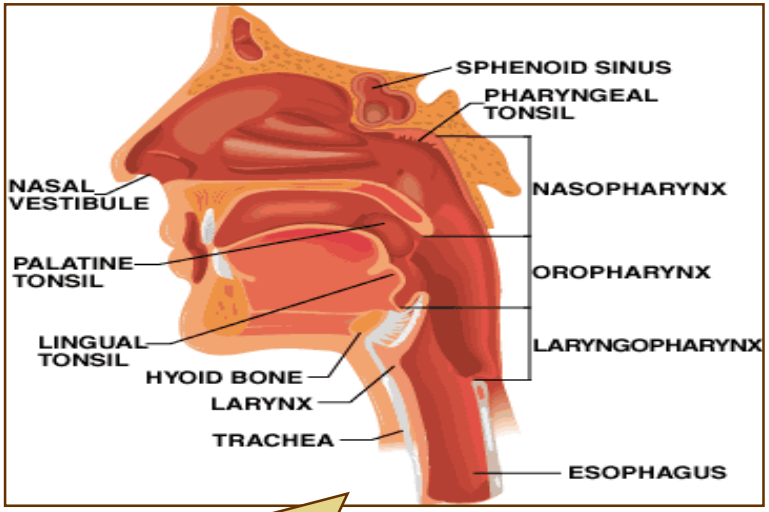
✓ Through anti pertussis vaccination.

Meningococcal meningitis

Definition

✓ It is an acute bacterial infection with a typically airborne transmission route and sporadic endemic or epidemic manifestations.





Characteristics of the etiological agent

✓ *Neisseria meningitidis* is a Gram-negative diplococcus, fragile in the external environment and sensitive to antibiotics;

The entry

is represented by the rhinopharyngeal mucosa.

The infection source is represented by:

- ❿ **People suffering from rhinopharyngitis, meningococcal meningitis or other meningococcal infections;**
- ❿ **Possibly by rhinopharyngeal carriers of the meningococcus;**

✓ **Ill people eliminate the meningococcus through the nasopharyngeal secretions, starting from the incubation period and continuing in the latency and convalescence period (in the absence of suitable antibiotic treatment);**

✓ **The meningococci disappear from the rhinopharynx 24-48 hours after the beginning of suitable antibiotic therapy.**

The epidemiological process

The infection source

✓ The carrier is a debated category, but it is mentioned in the literature;

✓ Theoretically, the following carrier categories can exist in meningococcal meningitis:

- Convalescent carriers;
- Long-term carriers (under 3 months);
- Healthy carriers – contact-type (1-2 weeks);

Transmission routes and mechanisms

✓ Mainly direct (simple indirect) transmission through Flügge's droplets of nasopharyngeal secretion.

The epidemiological process

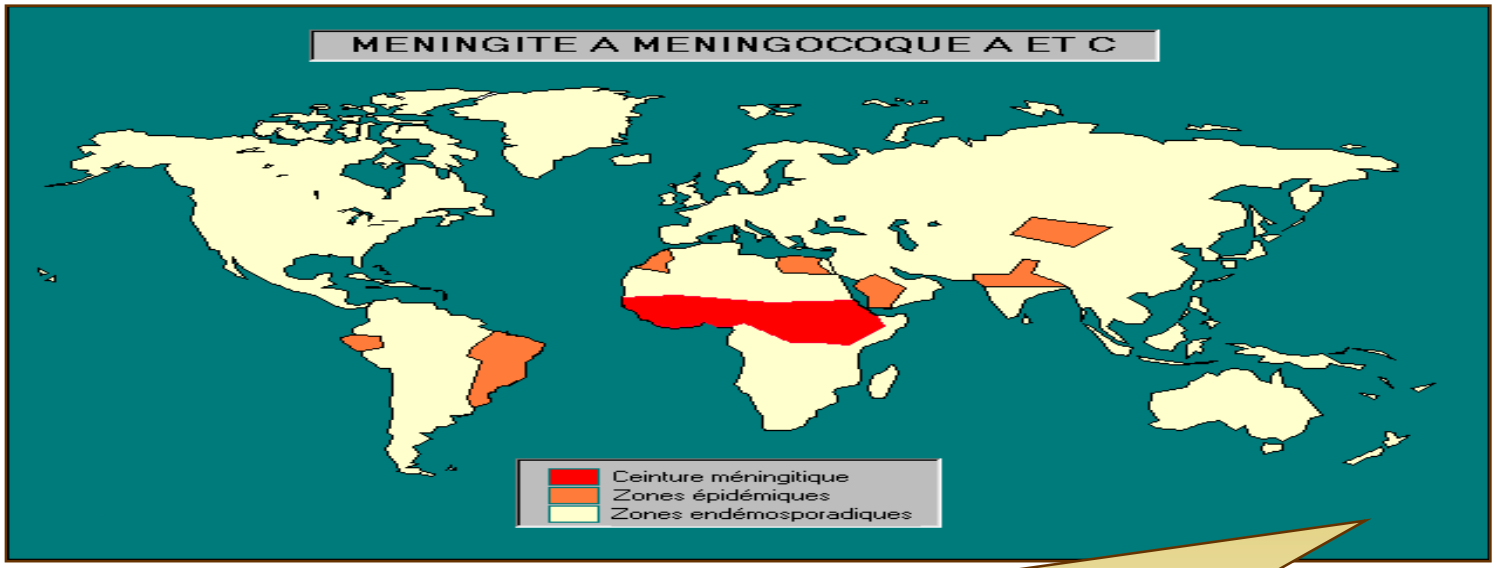
The receptive population

✓ **The receptivity of the population is reduced for the clinically manifested disease (meningococcal meningitis), but the infected people often develop either rhinopharyngitides or inapparent infections or remain healthy carriers;**

✓ **Generally, the receptivity is higher among children under 4 years of age and lower as the age increases, due to the immunizing infections in the patient's history;**

✓ **Post infectious immunity is type-specific.**

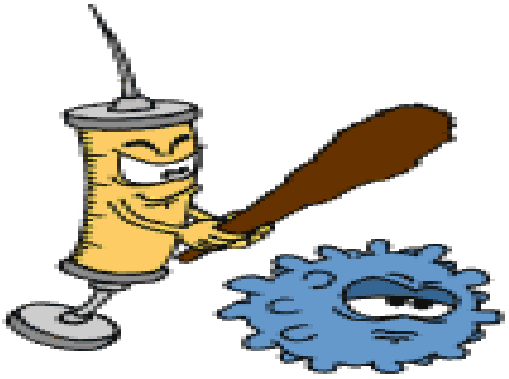
The epidemiological process



Manifestations of the epidemiological process

- ✓ **The epidemiological process may have a sporadic, endemic or epidemic evolution;**
- ✓ **Epidemics generally occur in closed collectivities, with cold season periodicity and epidemic waves at intervals of 5-10 years.**

Prevention and control



Measures regarding the ill

- ✓ **Early discovery with compulsory isolation at the infectious disease clinic until the clinical healing, normalization of the CSF and disappearance of the meningococcus from the rhinopharynx;**
- ✓ **A bacteriological check-up is performed 7-10 days after clinical healing;**
- ✓ **The declaration is nominal;**
- ✓ **Continuous and final disinfection are compulsory.**

Measures regarding contacts

✓ Clinical monitoring for 10 days after the discovery of the last case;

✓ Antibiotic prophylaxis depending on the sensitivity of the meningococcal strain;

✓ For the contacts in the focus site, chemoprophylaxis shall be performed without investigating the carrier state;

✓When an epidemic is imminent, bacteriological monitoring of the children's and youth collectivities is recommended, with:

- ❿ Chemoprophylaxis;
- ❿ Hygienic-sanitary measures, generally valid in respiratory infections:
  - ✓ Avoiding human agglomerations;
  - ✓ Ventilating homes;
  - ✓ Avoiding long-term exposure to the cold;
  - ✓ Avoiding excessive fatigue;
  - ✓ Measures for boosting the body's non-specific resistance.

Prevention and control

Specific prophylaxis

✓**It is done using antimeningococcal vaccination with monovalent or tetravalent vaccines of the Mencevax type.**

Thank you!

Images – sources
Internet + original