Bordetella pertussis

Template:Infobox - bacteria 'Bordetella pertussis' is a short stationary rod of ovoid shape. It has a unique ability to colonize epithelial cilia in the airways. *B. pertussis* is a human pathogen. It is the causative agent of pertussis, which was considered one of the most serious diseases of infants and children until vaccination was introduced.

Morphology

- ovoid immobile rod
- gram negative

Physiology

- strictly aerobic, immobile, non-sporulating
- needs enriched soils

Bordetella pertussis – agar after 7 days of cultivation

Cultivation

- suitable culture medium is Bordet-Gengou soil, agar with defibrinated sheep blood, potato infusion and glycerol
- colonies grow after 36-72 hours, are small, translucent with a pearlescent luster and a narrow zone of hemolysis around them

Laboratory diagnostics

- nasopharyngeal swab collection, first the swabs are rinsed with a drop of penicillin, which prevents the growth of gram-positive microorganisms, and then spirally inoculated on Bordet-Gengou soil
- identification by agglutination with a specific antiserum, agglutination, precipitation antibodies can be detected within three weeks

Antigens and toxicity

B. pertussis generates many unique immunological and pathophysiological responses in the macroorganism. Most of these effects are caused by the pertussis toxin (PT).

- Pertussis toxin is composed of two types of subunits A (active enzyme) and B (binding subunit). The A-subunit is an ADP-ribosyl transferase that transfers the ADP-ribosyl portion of NAD to the membrane-bound regulatory protein. This protein physiologically inhibits adenyl cyclase, resulting in stimulation by toxin inactivation.
- Pertussis toxin causes hypoglycemia by stimulating insulin production. PT also increases histamine sensitivity and enhances capillary permeability.
- *B. pertussis* produces a lethal toxin (dermonecrotic toxin) causing local necrosis after intradermal injection.
- Another product is tracheal cytotoxin, which is toxic to the ciliated airway epithelium.

Pathogenesis

B. pertussis adheres to the mucosal surface of the trachea and bronchi, where it rapidly multiplies and blocks cilia function. Residues of microorganisms contain a toxin that is released and it irritates the mucous membranes, induces lymphocytosis and causes catarrhal inflammation or necrosis of epithelium of mucous membranes. However, the bordetellas do not get into the bloodstream. Peribronchitis and, due to the blockage of mucociliary transport, an irritating cough develops.

Disease

- Pertussis

Treatment

Hyperimmune immunoglobulin can be used in children less than two years old in the early stage of the disease. Antibiotic treatment reduces acute toxicity and prevents pulmonary complications, chloramphenicol is given. Erythromycin or ampicillin are suitable.

Prevention

Vaccination in the Czech Republic since 1958. Since 2007 as a part of hexavaccine.

Links

Related articles

- Pertussis
- Vaccination
- Bordetella parapertussis

References

Source

- ws:Bordetella pertussis

Used literature

- BEDNÁŘ, Marek – SOUČEK, Andrej – FRAŇKOVÁ, Věra, et al. *Lékařská mikrobiologie : Bakteriologie, virologie, parazitologie.* 1. edition. Praha : Marvil, 1999. 558 pp. ISBN 8023802976.
- VOKURKA, Martin – HUGO, Jan, et al. *Velký lékařský slovník.* 5. edition. Praha : Maxdorf, 0000. 1008 pp. ISBN 80-7345-058-5.

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