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Agents of respiratory diseases – II

The 2nd lecture for 3rd-year students of dentistry
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Common respiratory flora – revision

- To differenciate between the pathologic or normal finding it is necessary to know which bacteria are typically found in the respiratory tract of a healthy person
- Nasal cavity: usually *Staph. epidermidis*, less often sterile, coryneform rods, rarely *Staph. aureus*, pneumococci
- Pharynx: always neisseriae and streptococci (viridans group), usually haemophili, rarely pneumococci, meningococci, enterobacteriae, yeasts
- LRW: rather sterile; nevertheless, materials from these sites are often contaminated by URW flora

Etiology of rhinitis and nasopharyngitis – revision

- **Viruses – the most common („common cold“):**
  - **more than 50 % rhinoviruses**
  - **coronaviruses (2nd position)**
  - **other respiratory viruses (but not flu!)**
- **Bacteria:**
  - **Acute infections: usually secondary**
    - ***Staph. aureus, Haem. influenzae, Strep. pneumoniae, Moraxella catarrhalis***
  - **Chronic infections:**
    - ***Klebsiella ozaenae, Kl. rhinoscleromatis***

Etiology of sinusitis and otitis media I – revision

- **Acute sinusitis and otitis media is usually started by respiratory viruses, *M. pneumoniae* (myringitis)**
- **Secondary pyogenic inflammations are due to:**
- ***S. pneumoniae*, *H. influenzae* type b, *Moraxella catarrhalis*, *Staph. aureus*, *Str. pyogenes***
- **even anaerobes: genus *Bacteroides*, *Prevotella*, *Porphyromonas*, *Peptostreptococcus***
- **Complications: mastoiditis, meningitis purulenta**

Etiology of sinusitis and otitis media II – revision

- **Otitis externa acuta: *Staph. aureus***
- **Sinusitis maxillaris chronica, sinusitis frontalis chronica: *Staph. aureus*, genus *Peptostreptococcus***
- **Otitis media chronica: *Pseudomonas aeruginosa, Proteus mirabilis***

Etiology of conjunctivitis I – revision

- Conjunctivitis is usually of viral origin
- It usually accompanies acute URT infections

  In adenovirus infections typically: follicular conjunctivitis, pharyngoconjunctival fever (adenoviruses 3, 7), epidemic keratoconjunctivitis (adeno 8,19)
- Viral conjunctivitis of other origin:

  hemorrhagic conjunctivitis (enterovirus 70)

  herpetic keratoconjunctivitis (HSV)

Treatment is usually only local

Etiology of conjunctivitis II – revision

- **Bacterial conjunctivitis**
- **Acute:**
  - ***suppurative* conjunctivitis:**

    ***S. pneumoniae, S. aureus*, in children also other bacteria**
  - ***inclusion* conjunct.: *C. trachomatis* D – K**
- **Chronic:**
  - ***S. aureus*, *C. trachomatis* A – C (trachoma)**

- **Allergic, mechanic (alien body)**

Oropharyngeal infections – revision

- **Acute tonsillitis and pharyngitis:**
  usually viral (rhinoviruses, coronaviruses, adenoviruses, Epstein-Barr virus – inf. mononucleosis, coxsackieviruses – herpangina)
- **Among bacterial, the most important: ac. tonsillitis or tonsillopharyngitis due to *S. pyogenes* (= β-haemolytic streptococcus, group A according to Rebecca Lancefield)**
- **More bacterial agents: streptococci group C, F, G, pneumococci, *Arcanobacterium haemolyticum*, *H. influenzae*?, *N. meningitidis*?, anaerobes?**
- **Rare, but significant: *Corynebacterium diphtheriae, Neisseria gonorrhoeae***

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A note on respiratory viruses and other „virologically examined“ microoorganisms

- Respiratory viruses are related to many types of respiratory infections, therefore it is useful to know them
- Virology laboratories examine patients´ sera labelled „examination of antibodies against respiratory viruses“ – usually, they perform tests for the most common agents
- Such examinations often include non-viral agents – atypical bacteria that cannot be detected by bacteriological cultivation

Respiratory viruses – I

- **The most important and most common:**
  - **influenzavirus A a B**
  - **adenoviruses**
  - **RSV and metapneumoviruses**
  - **parainfluenzaviruses (type 1+3 = *Respirovirus*, type 2+4 = *Rubulavirus*)**
  - **rhinoviruses**
  - **coronaviruses (incl. SARS agent)**

Respiratory viruses – II

Less common viral agents:

- **HSV**
- **coxsackieviruses**
- **echoviruses**
- **EBV**
- **Ťahyňa virus**

Respiratory agents – III

- **Bacterial agents causing atypical pneumoniae (but diagnosed in virological laboratories):**

- ***Mycoplasma pneumoniae* – the most common**
- ***Coxiella burnetii* – Q-fever**
- ***Chlamydia psittaci* – ornithosis**
- ***Chlamydia pneumoniae***

Etiology of epiglottitis

- **Epiglottitis acuta:**

  Serious disease – medical emergency

  The child may suffocate!

- **Practically one and only important agent:**

  ***Haemophilus influenzae* type b**

Etiology of laryngitis and tracheitis

- **Again respiratory viruses, but other than agents of nasopharyngitis:**

  parainfluenza and influenza A viruses & RSV
- **Bacteria:**

  C. pneumoniae*, possibly *Mycopl. pneumoniae*, secondarily: *S. aureus* and *Haem. influenzae

  laryngotracheitis pseudomembranosa (croup): *Corynebacterium diphtheriae*

Etiology of bronchitis

- **Acute bronchitis:**

  Viruses: influenza, parainfluenza, adenoviruses, RSV

  Bacteria, secondarily after viruses: pneumococci, Haem. influenzae, Staph. aureus, moraxellae

  Bacteria, primarily: *Mycoplasma pneumoniae, Chlamydia pneumoniae, Bordetella pertussis*

- **Chronic bronchitis (cystic fibrosis):**
- ***Pseudomonas aeruginosa, Burholderia cepacia***

Etiology of bronchiolitis

- **Isolated bronchiolitis in newborns and infants only:**

  ***Pneumovirus* (= RSV)**

  Metapneumovirus

Different types of pneumoniae have different etiologies

1. Acute – community-acquired pneumoniae
   - in originally healthy (1)
     - adults (2)
     - children (3)
   - in debilitated persons (4)
   - after a contact with animals (5)

2. Acute – nosocomial pneumoniae
   - VAP = ventilator-associated (6)
     - early (7)
     - late (8)
   - others (9)

3. Subacute and chronic pneumoniae (10)

Etiology of pneumoniae – I

- Acute, community-acquired, in healthy adults
- bronchopneumonia and lobar pneumonia:
  - *Streptococcus pneumoniae*
  - *Staphylococcus aureus*
  - *Haemophilus influenzae* type b
- atypical pneumonia:
  - *Mycoplasma pneumoniae*
  - *Chlamydia pneumoniae*
  - Influenza A virus (during an epidemic only)

Etiology of pneumoniae – II

- Acute, community-acquired, in healthy children
- bronchopneumonia:
  - *Haemophilus influenzae*
  - *Streptococcus pneumoniae*
  - *Moraxella catarrhalis*
  - In newborns: *Streptococcus agalactiae*
    enterobacteriae
- atypical pneumonia:
  - respiratory viruses (RSV, infl. A, adenoviruses)
  - *Mycoplasma pneumoniae*
  - *Chlamydia pneumoniae*
  - in newborns: *Chlamydia trachomatis* D-K

Etiology of pneumoniae – III

- **Acute, community-acquired, in debilitated individuals:**
  - **pneumococci, staphylococci, haemophili**
  - ***Klebsiella pneumoniae* (alcoholics)**
  - ***Legionella pneumophila***
- **In more serious immunodeficiency:**
  - ***Pneumocystis jirovecii***
  - **CMV**
  - **atypical mycobacteria**
  - ***Nocardia asteroides***
  - **aspergilli, candidae**

Etiology of pneumoniae – IV

- **Acute, community-acquired, after a contact with animals:**

- **Bronchopneumonia**
  - ***Pasteurella multocida***
  - ***Francisella tularensis* (tularemia)**

- **Atypical pneumonia**
  - ***Chlamydia psittaci* (ornithosis)**
  - ***Coxiella burnetii* (Q-fever)**

Etiology of pneumoniae – V

- Acute, nosocomial:
- VAP (ventilator-associated pneumonia)
  - early (up to the 4th day of hospitalization): sensitive community strains of respiratory agents
  - late (from the 5th day of hospitalization): resistant hospital strains
- Others
  - viruses (RSV, CMV)
  - legionellae

Etiology of pneumoniae – VI

- **Subacute and chronic:**
  - **aspiration pneumonia and lung abscesses**
    - ***Prevotella melaninogenica***
    - ***Bacteroides fragilis***
    - **peptococci and peptostreptococci**
  - **lung tuberculosis and mycobacterioses**
    - ***Mycobacterium tuberculosis***
    - ***Mycobacterium bovis***
    - **atypical mycobacteria (e.g. the complex *M. avium–M. intracellulare*)**

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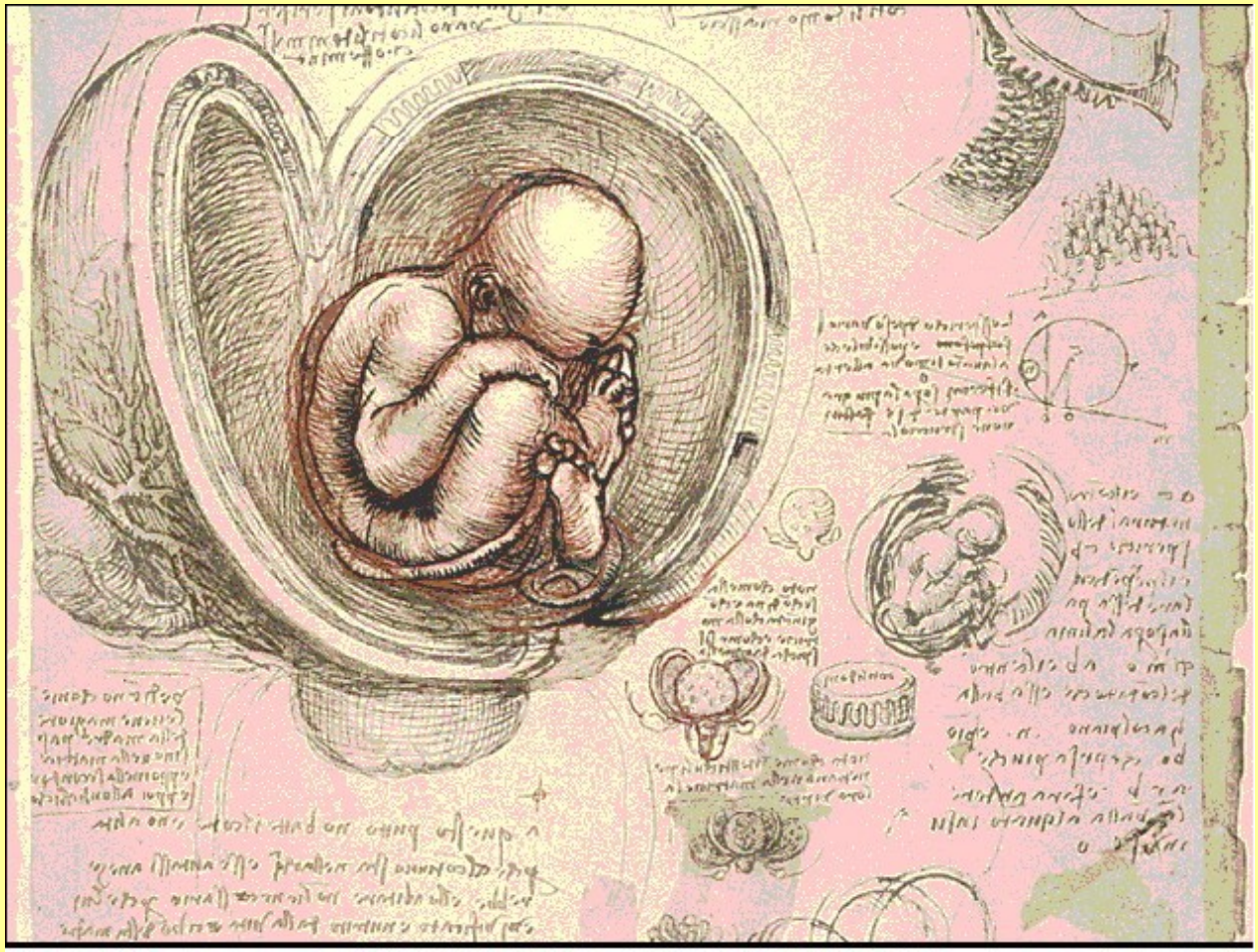
Homework 2

Who is the author of this drawing and what is its name?



Answer and questions

The solution of the homework and possible questions please mail (on 6.30 a.m. at the latest) to the address

mvotava@med.muni.cz

Thank you for your attention