University of Jordan
Faculty of Medicine

Medical Committee
The University of Jordan

Introduction to

Microbiology

Title :

Gram negative coccobacilli and cocci

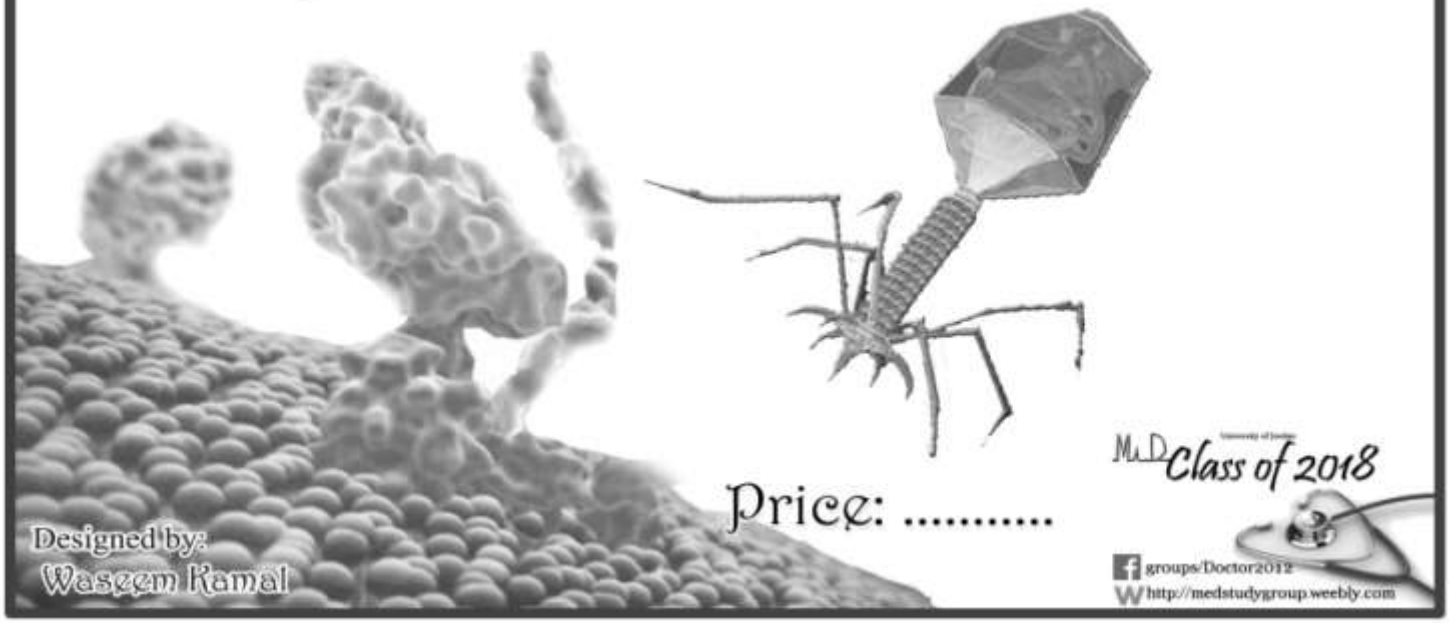
Professor:

Dr. Asem Al-Shehabi

: 18

○ Slides
○ Handout
● Sheet

Done by: Ramiz Alyacoub



Price: .....

Designed by:
Waseem Kamal

M.D Class of 2018

groups/Doctor2012
http://medstudygroup.weebly.com

Gram negative coccobacilli and cocci

- **Haemophilus Group**:

-many types associated with normal flora of upper respiratory tract
-might look like small bacilli or long bacilli consist of small bacilli attached together . no single cocci or bacilli .

Haemophilus influnzae type b :-

-haemophilus :- haemo --- blood / philus --- loving , means blood-loving organism (love to be associated with blood)
-influnzae : in relation to outbreak of influenza in 1918-1920 in Europe (in that time they didn't know that influenza caused by virus and found H.influenzae in the respiratory tract of the patients)
-more invasive than other species which can produce localized infections but less pathogenic
-it's an fastidious organism which means require certain environmental factors (not easily cultured) , can be easily die at room temperature due to activation of lysins in cell wall (specimens must be cultured without delay)
-requires 2 nutritional factors (V,X factors) which found in cell membrane of red blood cells

***virulence factors :**

1)presense of capsule.
2)endotoxins , part of cell wall similar to lipopolysaccharide in gram –ve cells but in less amount
3) certain pili for attachment and investment

***pathogenesis** :-

-common cause of children meningitis (especially 6 months to 5 years)
-first causes sore throat , then might disseminated to blood stream causing sepsis , and to CSF causing meningitis
-might also cause otitis media, sinusitis, conjunctivitis and bronchopneumonia (if there is immunodeficiency)
-type b is responsible of 90% of H.influenae infections .

***lab diagnosis :**

1) to detect it, we collect specimens as the following :

*in case of meningitis ---CSF sample

*in case of sore throat --- throat swap

*in case of sepsis ---- blood sample

*but in children < 5 years --- all of these types .

2)gram staining

3) culture :-

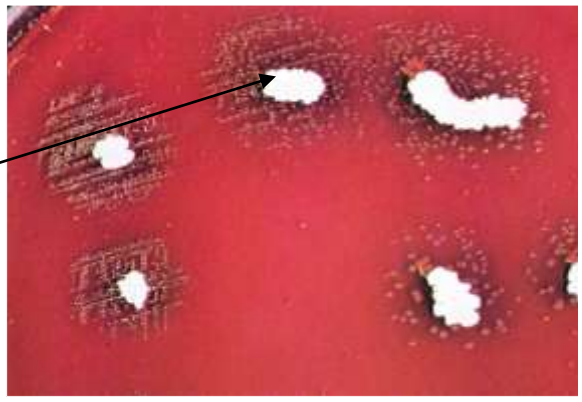
*blood agar with growth factors V (NAD), X(part of hemoglobin - hemin)

*chocolate agar (which is heated blood which causes the destruction of red blood cells and releasing of growth factors)

*blood agar with hemolytic staph :- hemolytic staph will cause hemolysis of RBCs , releasing growth factors , H.influenzae appear in colonies surrounding the white color of staph ,this is called **satellitism**

-this picture shows the growth of H.influenzae in blood agar with Hemolytic staph

Satellitism : small colonies around large ones



4)biochemical test (in case of CSF sample) to recognize if there is *Increase of the amount of protein and decrease of the amount of sugar*

Because any organism multiplication in CSF utilizes glucose and causes lysis of cell , releasing proteins

5) pathological test to look for the presence of white blood cells , polymorphic nuclear cells which indicates the presence of infection

*clinical feature of meningitis : fever and rigidity in the neck

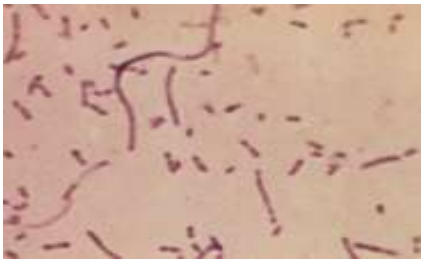
***treatment and vaccination :-**

-Treatment by antibiotics

-there is a vaccine called Hib-vaccine , recently added to the triple vaccine

-rare now in Jordan for causing meningitis

-this pictures shows a CSF sample containing H.influenzae



- **Bordetella pertussis :**

-bordetella : scientist from Belgium, who discovered it

-pertussis **= whooping cough** which is form of prolong cough for 2 min and might reach 30 min.

-release pertussis toxin which produce a form of hemolytic reaction to the hair like structures in bronchi of lung + can damage RBC .

-child suffer from cyanosis (lack of O_2 in blood) --> disstress --> paralysis in respiratory tract --> death

- If adult no immunized can gain the disease from their children .

-might result in damage of respiratory tract

-killer number 1 for children who aren't immunized

-any delay in the treatment will result in long life damage and allergic reactions in the respiratory tract (asthma)

-if the person isn't immunized the body might to some extent produce antibodies originated from organisms which has similar pathogenicity called bordetella para-pertussis (produce less toxins)

-**vaccination :** triple vaccine (DTP) with diphtheria and tetanus in form of inactivated or depleted pertussis cells (not virulent)

-**treatment :** antibiotics (at early stage) before releasing of large amount of toxins.

***diagnosis :** very difficult

-less culture (lab diagnosis) .
-by using a molecular technique called PCR
-symptoms: fever , pale face
but might be confused with other cases such as b. Para-pertussis (newest physicians haven't seen cases of pertussis that's why they might misdiagnose similar diseases and think it's para-pertussis)
-no pertussis in Jordan due to immunization

- **Neisseria and Moraxella group** :-

-gram –ve diplococci (kidney-shape)
-oxidase and catalase +ve
-susceptible to environmental factors , damaged autolysis, can't survives in cold temperatures , must be cultured without delay .
-many Neisseria group are not pathogenic , part of respiratory tract normal flora such as (N.sicca, N.flava, N.subflava, N.mucosa)
-the pathogenic species are :

1) *Neisseria gonorrhea* :
-related to genital tract of humans and animals .
-intracellular organism
-causative agent for gonorrhea (مرض السيلان)
-gonorrhea : in relation to flow of fluids

***Virulent factors :**
-attach to mucosa by pili
-release of enzyme called IgA-protease (damage receptor that prevent attachment ,which allow to attach firmly)
-release endotoxins (Lipooligopolysaccharides) which are shorter chains than lipopolysaccharides but produce the same effect which is endotoxicity which contributes to the inflammatory process
***Pathogenesis:**
-gonorrhea :- sexually transmitted disease can be in form of :-

*Acute inflammation :-sever inflammatory reaction in the urethra associated with high fever and severe abdominal pain and pain during urination
*subacute
*chronic or asymptomatic : more in women without symptoms (and if there is symptoms like vaginal discharge , might be from other organisms such as candida) .
*men often develop acute infection while women often develop chronic.
-causes urethritis (inflammation in the urethra), cervicitis (inflammation of the cervix), salpengitis
-rarely produce sepsis (generally not invasive)
-might produce localized infection in the oral cavity

***Lab diagnosis :**
-can be detected from urethral discharge in men and vaginal discharge in women
-means releasing of thick yellowish fluid contain large amount of polymorphic nuclear cells in addition to the organism (pus)
-if we do gram staining we will recognize the following :-
Intracellular presence of gram –ve diplococci, if it's outside the cell it's other than Neisseria
-culture media in blood agar - chocolate agar (to confirm)
-no vaccine available
-Treatment by antibiotics (generally no resistance)

2)Neisseria meningitiditis :-
-in relation to meningitis
-might found in the respiratory tract without producing inflammation
-in children ages 6 months – 5 years are susceptible to meningitis if they aren't immunized
*This is because infants before 6 months have immunity from the mother called maternal immunity .
-start infection as sore throat , tonsillitis then might reach blood stream causing sepsis and CSF causing meningitis
-similar in invasiveness with H.influnzae but more than group A streptococcus
*always acute

***virulence factors :** 1)presence of capsule 2)presence of IgA-protease
3) LPS
-there are serotypes A, B, C (middle east A+B / sub-Sahara Africa – A+B+C and other)
-not common in Jordan, acquired from outside
-if one case discovered in any community we have to expect other 100 cases asymptomatic (other 100 cases undetectable) (highly infectious) .
-close family members should be treated with antibiotics to prevent developing of other cases
***treatment** : antibiotics in hospital with supportive fluids and isolation for at least 48 hours (same thing as H. influenza and strep. pneumonae)
-there is a vaccine especially for persons going to endemic areas for at least one year

3) Moraxella catarrhalis
-first called Neisseria catarrhalis but then it's changed due to change of classification of this organism
-catarrhalis : in relation to catarrhal stage –inflammation in the larynx
-Moraxella same as Neisseria gram –ve diplococci
-in certain persons who are heavy smokers or have damage in lungs (have compromised lung)
-despite that it's part of the normal flora , of less pathogenicity compared to N.meningitiditis and H.influenzae but might be associated with infection in the larynx and might produce pneumonia
***Lab diagnosis** :
1)gram staining
2)culturing
3)biochemical test (oxidase and catalase) --> +ive
4) full biochemical test
***Treatment** : antibiotics .

GOOD LUCK