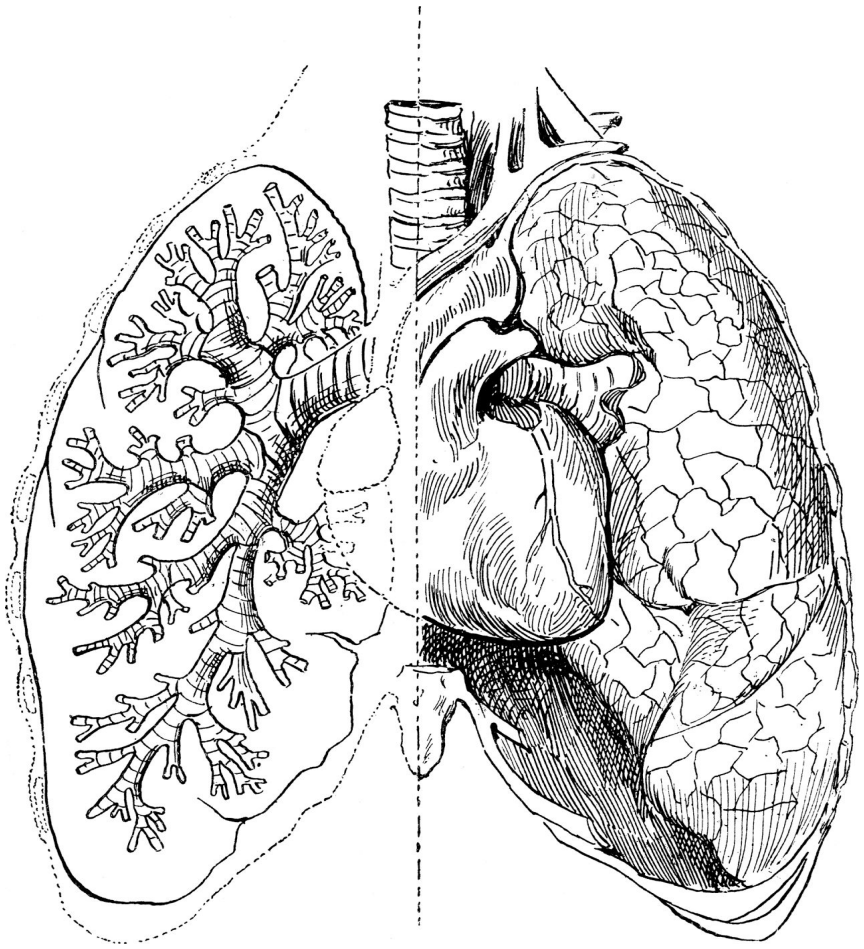
Practical Microbiology

435's Teamwork
Respiratory Block



المقدمة اجتهاد منا يهدف لفهم الجزء العملي، وليست للدراسة النظرية. قبل البدء في بعض الحالات، سنخوض في المبادئ الأساسية للتعرف على مسببات المرض فيها، مع توضيح موجز للآليات المعتمدة عالميًا التي يتم من خلالها حسم المواقف في مختبر المايكروبايولوجي. تذكر دومًا أن تسليح نفسك بفهم شامل قوي يسهل عليك -بإذن الله- أي اختبار قد يواجهك كيفما كانت صيغة السؤال فيه، فلا تحرم نفسك الفائدة.

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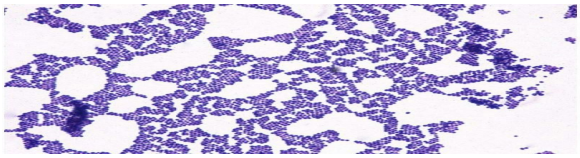
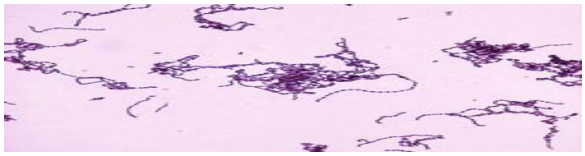
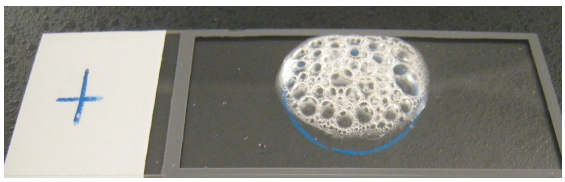
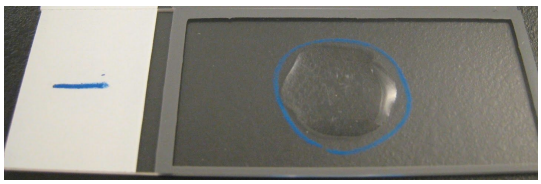
Introduction to case 1 and 2:

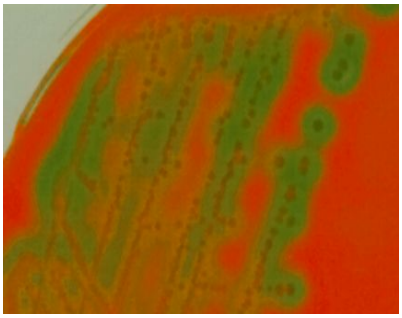
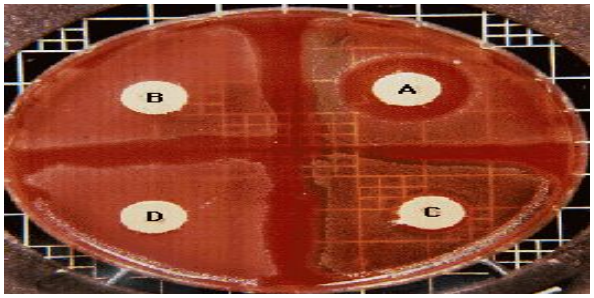
نفرق بين **أنواع** البكتيريا بعدد من الاختبارات التراكمية، هذه الاختبارات قد يُطلب منك كتابتها من معرفتك المسبقة لمسبب المرض، أو تكون مذكورة في السؤال بمثابة الدليل الذي يتم التشخيص والتحديد من خلاله.

How can I know if the bacteria is Gram positive or Gram negative? **GRAM STAIN IS THE ONLY WAY**			
+ve		-ve	
Purple / Blue		Red / Pink	
Should I know their shapes? **YES**			
Coccus	Bacillus	Coccus	Bacillus

نوجه تركيزنا الآن على البكتيريا الموجبة، وبالتحديد الكروية، يندرج أسفلها مجموعتين أساسيتين كالتالي:

Gram +ve Cocci	
Staphylococcus (in clusters)	Streptococcus (in chains or pairs)
	
We differentiate between the two by using the "Catalase test" **The result shows as follows**	
	
Bubbles → Catalase Positive	No reaction → Catalase Negative

أهم وآخر خطوة في التشخيص، نقسم مجموعة الـ Streptococcus الآن إلى فئتين بمساعدة الزراعة على الطبق "Blood culture" ونحدد ذلك بناءً على **اللون** الذي تكونه البكتيريا حول نفسها بعد زراعتها، بعد ذلك، نقسم كل فئة أيضًا إلى أنواع عبر اختبارات الحساسية ضد مواد معينة تتفاعل معها البكتيريا أو لا تتفاعل، وبذلك نصل لمسبب المرض بدقة، وهذا يكون كالتالي:

<table>
<tr><th colspan="3">Streptococcus</th></tr>
<tr><td colspan="3">Alpha Hemolytic (α) → تُكون لون أخضر من حولها في الطبق</td></tr>
<tr><td>Species</td><td>Further test</td><td>Result</td></tr>
<tr><td>Streptococcus viridans
Streptococcus pneumoniae</td><td>We differentiate between them by using the “Optochin Test”</td><td>Pneumoniae = Sensitive
Viridans = Resistant</td></tr>
<tr><td>  </td><td colspan="2"> 
"السنسيتيف أو البوزيتيف دائمًا هو المتفاعل"</td></tr>
<tr><td colspan="3">Beta Hemolytic (β) → تُحلل الدم من حولها في الطبق وينتج عن ذلك ظل باللون الأبيض</td></tr>
<tr><td>Species</td><td>Further test</td><td>Result</td></tr>
<tr><td>Group A (Pneumonia)
Group B (Agalactiae)
Group C</td><td>We differentiate between them by using the “Bacitracin Test”</td><td>Group A = Sensitive
Group B and C = Resistant</td></tr>
<tr><td>  </td><td colspan="2"> 

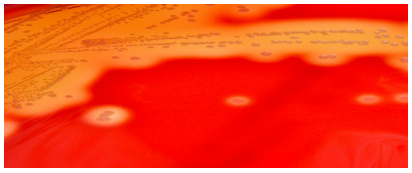
"لاحظ/ي تفاعل الـ A دون سواها من الأنواع"</td></tr>
</table>

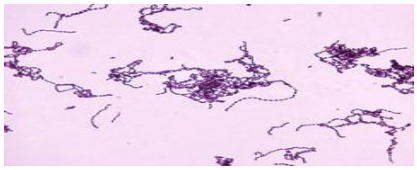
Case 1:

A **5-year-old** boy was brought to KKUH, outpatient department, complaining of fever and sore throat. He had regular vaccination history. On examination his temperature was **38.5°C**, the tonsil area and **pharynx** were obviously **inflamed** with some foci of **pus**.

- What is your differential diagnosis?
  - Acute Pharyngitis and\or Tonsillitis.
- What type of investigation should be the most helpful?
  - Throat swab.
  - Culture of the throat swab on blood agar.
  - Gram stain of the throat swab.
  - Rapid Antigen Detection Test (RADT).
  - Catalase test.
  - Bacitracin susceptibility test.

The full blood count showed a total white cell count of 15000ml. Throat swab culture showed colonies with **clear haemolysis on blood agar**. They were **catalase negative**. The gram stain of these colonies showed **gram positive cocci in chains.**





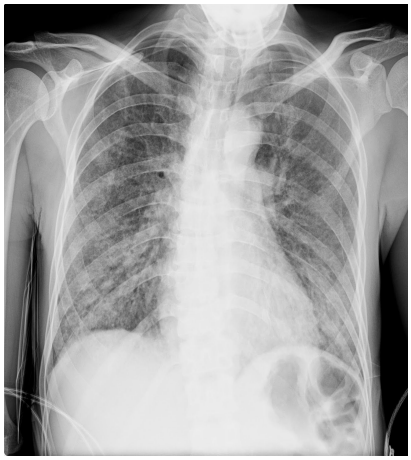
- What likely is the organism?
  - Beta haemolytic Group A Streptococcus.
- What is the best antibiotic recommended for this child?
  - Penicillin for 10 days. If allergic, use Erythromycin.
- What would happen if the child was not well treated?
  - Complication such as:

  ➔ Rheumatic fever.

  ➔ Acute glomerulonephritis.

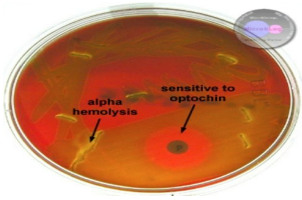
Case 2:

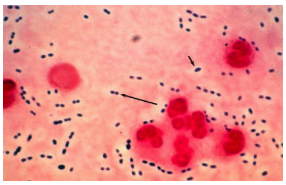
A **28-year-old** female was presented to KKUH emergency with a sudden onset of fever, right sided chest pain and productive **cough** of **purulent sputum**. On examination, her temperature was **39°C**. There were rhonchi and **dullness** on the right side of the chest. X-ray showed massive **consolidation** on the right side of the chest.



- What is your differential diagnosis?
  - Chest infection (Lobar pneumonia).
- What is the best investigation for this case?
  - Sputum culture.
  - Blood culture.
  - CBC.
  - X-ray.
  - Gram stain of the sputum.
  - Catalase test.
  - Optochin susceptibility test.
  - Antibiotic susceptibility test.

The blood counts showed a total white cell count 45,000/ml. 90% of the cells were **neutrophils**. Sputum culture showed **alpha haemolytic** colonies on blood agar. The gram stain showed **gram positive diplococci** which were **catalase negative.** This organism was confirmed to be **optician susceptible.**





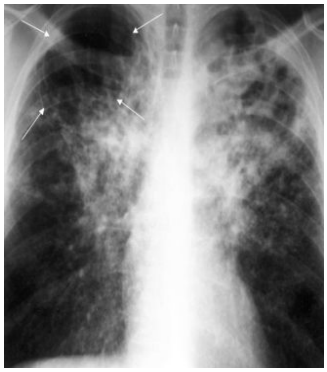

- What is the most likely organism?
  - *Streptococcus Pneumoniae* and/or *Streptococcus pyogenes.*
- What should have been the empirical therapy for this case, and why?
  - Ceftriaxone + Vancomycin.
  - Because the organism may be Penicillin resistant.

Case 3:

Abdul Karim is a **45-year-old** Saudi man who was admitted to KKUH because of 2-3 month history of **loss of appetite**, **weight loss**, and on and off **fever** with attacks of **cough**. On examination Abdul Karim looked weak with a temperature **38.6 °C**, CVS and Respiratory system examination was unremarkable.
Two days before admission, he coughed blood (**haemoptysis**), Abdul karim is diabetic for the last 5 years. **His father died of tuberculosis** at the age of 45.

- What is the differential diagnosis?
  - Pulmonary TB.

On examination Abdul Karim looked weak with a temperature **38.6°C**, CVS and Respiratory system examination were unremarkable. The chest X- ray done showed **multiple opacities and cavities**. The **ESR was increased** (85 m /hour).



- What is the most likely organism?
  - *Mycobacterium Tuberculosis.*
- What further tests should be done?

1) Sputum Microscopy:
   - Ziehl-Neelsen stain (Shows Acid Fast Bacilli)
2) Culture:
   - Growth on L.J medium (Selective for *Mycobacteria*)

- How can the diagnosis be confirmed?
  - Measurement of Interferon–Gamma (IFN□).
  - If the morphology on LJ media showed buf rough and tough colonies.
  - If the growth occurred at 37°C and produced 5-10% CO2.

Case 4 :

A 5-year-old boy attended to the emergency department complaining of **sore throat**, fever (**38.5°C**), and a noticed pharyngeal **pseudomembrane**.

- What is the differential diagnosis?
  - Diphtheria.
- What investigation should be done?
  - Throat swab culture on blood tellurite.
  - Gram stain From culture.
  - ELEK test.
- What is the likely identity of the organism?
  - *Corynebacterium diphtheriae*
- What is the best antibiotic therapy for this case?
  - Penicillin or Erythromycin.
- What complication may develop?
  - The bacteria produces toxins that will cause heart failure, adrenal infarction or nerve paralysis if not well treated.