#SHEET(15) PART 2

SALMONELLA & SHIGELLA

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DATE: 10/11
Slide 19:
Salmonella
• Salmonella enterica and Salmonella bongori

• S. enterica is subdivided into six subspecies, S. enterica subsp. enterica

• the two species have been subdivided into more than 2500 unique serotypes

• S. enterica subspecies enterica serotype Typhimurium or S. typhimurium

* it can’t be a normal flora (pathogenic)

* enterica is more important than bongori

*the six subspecies is actually five . but one of them has 2 types (A,B)

Slide 20:

Media used
• Enrichment broth: Tetrathionat, selenit broth (those are selective for salmonella)

• Selective media: MacConkey, SS agar, Hektoen Enteric Agar, Bismuth sulfide agar

Bismuth sulfide agar: we use it in the lab because salmonella give H2S
Which give black colonies

Slide 21:

• Tolerant to acids in phagocytic vesicles (lysosomes)

• Can survive in macrophages and spread from the intestine to other body sites (particularly true of S. typhi) : s. typhi

• Endotoxin activity: because it is gram -
**Slide 22:**

**Salmonella-Diseases**
- *Salmonella paratyphi* A (serogroup A)
- *Salmonella paratyphi* B (serogroup B)
- *Salmonella choleraesuis* (serogroup C1)
- *Salmonella typhi* (serogroup D).

• These spp. are associated with Enteric fever (Typhoid)

➢ Most infections are acquired by eating contaminated food products (or water)

➢ Direct fecal-oral spread in children.

➢ Strict human pathogens. (تسبب التيفوئيد للإنسان فقط)

➢ Individuals at risk for infection include those who
  1. eat improperly cooked poultry or eggs (أو اللحوم غير المطبوخة بشكل جيد)
  2. patients with reduced gastric acid levels
  3. immunocompromised patients: inactive immune system such as AIDS or autoimmune disease

**Slide 23:**

The ingested Salmonellae reach the SI (small intestine), from which they enter the lymphatics and then the BS (blood circulation). They are carried by the blood to many organs, including the intestine. The organisms multiply in intestinal lymphoid tissue and are excreted in stools. After an incubation period of 10–14 days, fever, malaise, headache, constipation, bradycardia, and myalgia occur. The fever rises to a high plateau, and the spleen and liver become enlarged.

it takes 10-14 days for the salmonella to go through this circulation until it returns back to the intestine

Q: if we take a sample of stool in the beginning of the infection (before 10 days), does it give positive result?
Answer: No. but a sample of blood will give positive result because it takes 10 days for the bacteria to leave the intestine to the lymphatics then to the blood circulation and finally return back to the intestine.
لا تسبب اصابة اثناء وجودها في الامعاء لاول مرة قبل دخولها الدورة الدموية، ولكن بعد عودتها للامعاء

* تسبب الاصابة في حال وجود البكتيريا فان فترة العلاج 3-4 أسابيع

(العصارة الصفراوية) (Gall bladder) إذا لم يتم اخذ العلاج بشكل كامل يمكن ان يبقى حامل للبكتيريا في ال
وبالتالي فان عينة البراز ستحتوي على البكتيريا ويمكن ان تنتقل للأخرين
المريض يكون حامل للبكتيريا ولكن ليس لها اعراض

يمكن الكشف عن وجود البكتيريا عن طريق عينة البراز أو عن طريق x-rays

Slide 24:

* **dendritic cells:** خلايا بلعمية

* **enterocyte:** intestinal cells

* **peyers’s patches:** جزء من الجهاز المناعي الثانوي
Slide 25:

Bacteremia with focal lesions this is associated commonly with *S. choleraesuis* after oral infection, there is early invasion of the bloodstream (with possible focal lesions in lungs, bones, meninges, and so on). Intestinal manifestations are often absent. 

So it causes bacteremia

Slide 26:

Enterocolitis

• This is the most common manifestation of salmonella infection.
• *Salmonella typhimurium* (عن طريق تناول لحوم الدجاج والبيض)
• *Salmonella enteritidis* are prominent
• Eight to 48 hours after ingestion of salmonellae, there is nausea, headache, vomiting, and profuse diarrhea, with few leukocytes in the stools.
• Inflammatory lesions of the small and large intestine are present.
• Bacteremia is rare (2–4%) except in immunodeficient persons.

Slide 27:

Diagnosis

• Culture
• Stool, urine, blood
• Selective media
• Typhoid fever ➔ after first week ➔ blood culture ➔ after third week ➔ stool culture
• Widal test for Typhoid fever

Anti-O Ab (antibody)
Anti-H Ab
Anti-Vi Ab (Long term carriers) (rare)
wedal test to use serum and accordingly take a sample of the antbody

s.typhi

s.paratyphy A

s.paratyphy B

all of them contain H & O antigen

(overall: 6 antigens as in the figure)

* titer of antibody:

Titer means concentration of antibody in serum

* It is given to treat the disease until the titer decreases to zero

* Titer can distinguish between the new or old case

* This test is repeated to confirm the new or old case of typhoid

* The test is repeated with a new antibody to determine the severity of the infection

* Only serum for antibodies and not for bacterial culture
Slide 28:

Therapy

• Replacement

• Quinolones, ampicillin, Co-trimoxazole

• Cephalosporin first & second Generation and aminoglycosides are ineffective

• Oral attenuate and Vi parenteral vaccines available

Slide 29:

Shigella

• *S. dysenteriae, Shigella flexneri, Shigella boydii, and Shigella sonnei*

• *S. sonnei* is the most common cause of shigellosis in the industrial world

• *S. flexneri* is the most common cause in developing countries

• They are very much like *Escherichia*

• *Nonmotile, Noncapsulated, H2S negative* (note that salmonella is H2S positive so it gives black colony on bismuth sulfite agar)

Slide 30:

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Effective Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shigella</td>
<td>$10^3$ ID</td>
</tr>
<tr>
<td>C. jejuni</td>
<td>$10^2-10^6$</td>
</tr>
<tr>
<td>Salmonella Typhi</td>
<td>$10^3$</td>
</tr>
<tr>
<td>E. coli</td>
<td>$10^8$</td>
</tr>
<tr>
<td>V. cholerae</td>
<td>$10^{10}$ with water $10^{2-4}$ with food</td>
</tr>
</tbody>
</table>
c. jejuni → responsible for diarrhea for children.

*V. cholerae is halophilic.

كلما كانت البكتيريا ممرضة أكثر كلما كانت الجرعة أقل

الدكتورة سالت سؤال: ليش الكوليرا بتختلفبحالة الطعام عن الماء؟

بس المحاضرة خلصت وما جاوبت عليه

GOOD LUCK