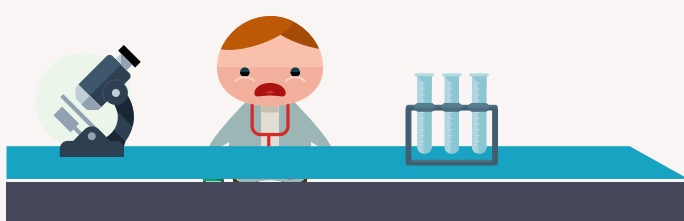


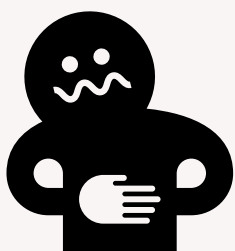


# Salmonella

## Microbiology Laboratory



### The Raw Food Diet



25-year-old Johnny has been eating raw eggs as part of his new body building diet. One week into his new diet, he develops a mild fever, severe abdominal cramps and watery diarrhea. After 4 days of diarrhea, he goes to a walk-in clinic where the doctor finds that Johnny is volume depleted and has some abdominal tenderness. She gives him a container to collect a stool sample to send to the Microbiology Laboratory and suggests that he stop eating the raw eggs. Johnny's stool sample grows Salmonella serotype Enteritidis.

### Possible Bacterial Causes



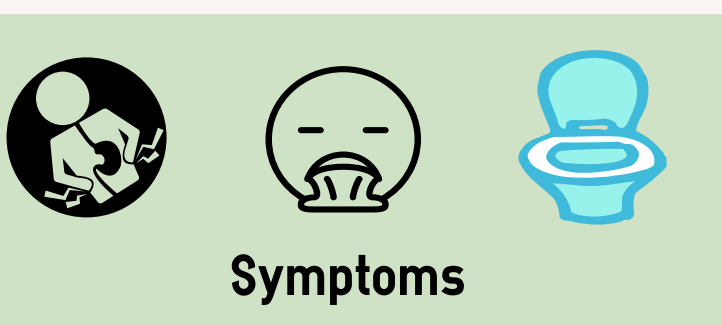
#### Bacillus cereus



- Gram positive bacteria
- When incubated for 1-6 hrs has symptoms of vomiting, cramps
- When incubated for 8-16 hrs has symptoms of diarrhea



- Caused by Enterotoxins produced by bacteria called Hemolysin B, non hemolytic enterotoxins and enterotoxin E
- Targets the intestinal cell walls
- Hemolysin B creates membrane pores to activate cAMP



### Symptoms

#### Campylobacter jejuni

- Gram negative bacteria
- Found in chicken meat, raw eggs and contaminated food
- Infective dose of 500 cells
- Additional symptom of fever

#### Staphylococcus aureus

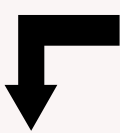
- Gram positive facultative anaerobic bacteria
- Symptoms occur between 30mins to 6 hrs
- Staphylococcal Enterotoxins are the cause of illness

#### Additional Bacterial species that can cause gastroenteritis

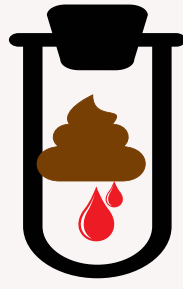
- Clostridium species - C. difficile and C. perfringens
- E. coli species - the most common being Shiga toxin-producing E. coli
- Listeria monocytogenes
- Shigella
- Vibrio Cholera
- Yersinia species

### Microbiology Laboratory Diagnosis

#### Stool



- Obtained from stool collection kit or rectal swabs
- Fresh stool sample must be sent for testing within 2 hrs or preserved against contamination and protected for transport
- Occasionally collected over successive days and patient may be subjected to certain dietary and medical restrictions



- Symptoms can be tied to other pathogens including bacteria, fungi and viruses
- Used to isolate, and grow potential pathogens
- Patients who are asymptomatic can still transmit to healthy hosts possibly through fecal oral route
- Allows differentiation between normal flora and pathogenic microbes



- Must be handled hygienically to prevent spread of illness
- Before Plating, samples are inoculated and incubated at 37C for 18-24 hrs



#### Diagnostic Tests

- GI Pathogen Panel
- Antigen Testing
- Typing
- Biochemical and Serological Testing
- Ova and Parasite Exam

### Tests



Plating on selective, non-selective media and differential media



Gram staining



Antibiotic Sensitivity



PCR

- Presence vs absence of growth
- Colony and media colour
- Colony morphology
- Isolation of bacteria

- Gram positive stain purple
- Gram negative stain pink
- Morphology observed

- Gram positive and negative have different antibiotic sensitivities
- Identification of resistant strains

- Serotype confirmation
- Rapid detection of infections

### Results

#### Non-Selective

- Hektoen Enteric (HE): Blue or green colonies due to lack of lactose fermentation, black precipitate due to H2S production.
- MAC: Colourless plate
- SS: Colourless with black precipitate
- XLD: Red colonies and black precipitate

#### Selective/Differential

- Bismuth Sulfite: Black precipitate
- Brilliant Green: Red, pink or white with a halo, inhibition of S. Typhi and S. Paratyphi



S. enteritidis are gram negative rod shaped bacteria

Sensitivity to antibiotics against gram negative bacteria

- Amoxicillin
- Ampicillin
- Chloramphenicol
- Ciprofloxacin

Comparison of sample genome to other bacterial species and Salmonella serotypes for confirmation