

SALMONELLA

INTRODUCTION_

- **Gram negative facultative anaerobic bacilli**
- **Non lactose fermenting colonies**
- **highest during the rainy season in tropical climates and during the warmer months in temperate climates.**

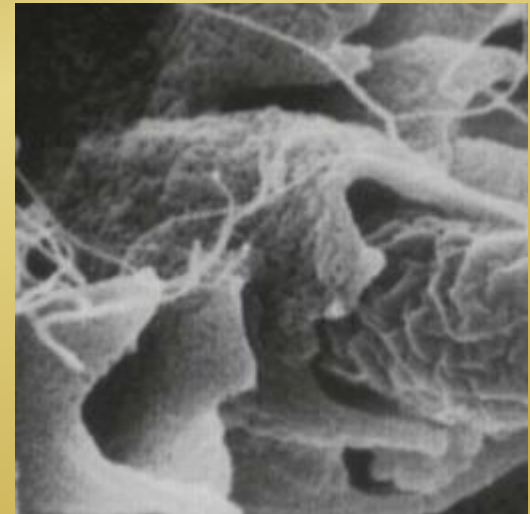
CLASSIFICATION

- **Has two species *S.enterica* (six subspecies I, II, III, IV, V, VI) *S.borgori* (rare)**
- **Cold blooded animal, birds, rodents, turtles, snake and fish**

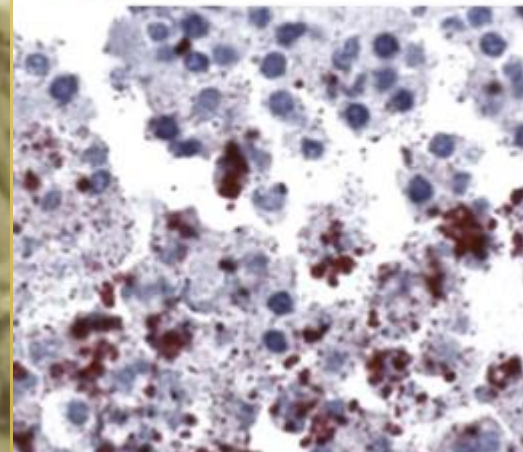
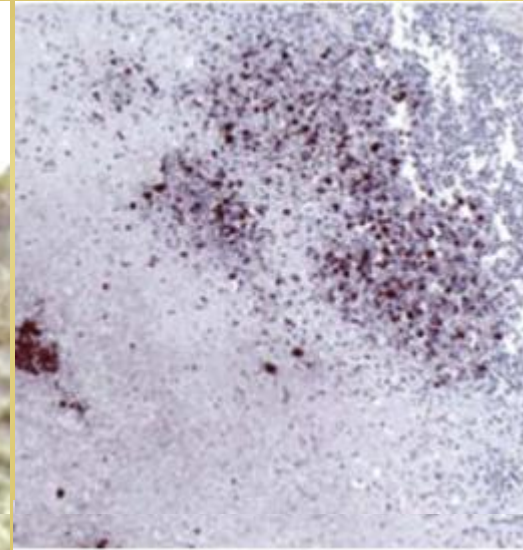
SALMONELLA SPECIES AND SUBSPECIES	NO. OF SEROTYPES WITHIN SUBSPECIES	USUAL HABITAT
<i>S. enterica</i> subsp. <i>enterica</i> (I)	1504	Warm-blooded animals
<i>S. enterica</i> subsp. <i>salmae</i> (II)	502	Cold-blooded animals and the environment*
<i>S. enterica</i> subsp. <i>arizonae</i> (IIIa)	95	Cold-blooded animals and the environment*
<i>S. enterica</i> subsp. <i>diarizonae</i> (IIIb)	333	Cold-blooded animals and the environment*
<i>S. enterica</i> subsp. <i>houtenae</i> (IV)	72	Cold-blooded animals and the environment*
<i>S. enterica</i> subsp. <i>indica</i> (VI)	13	Cold-blooded animals and the environment*
<i>S. bongori</i> (V)	22	Cold-blooded animals and the environment*
Total	2541	

VIRULENCE FACTORS

- ▣ Fimbria - Adherence
- ▣ Endocytosis
 - SPI 1 T3SS
 - TLR
- ▣ Replication in microphage
- ▣ Enterotoxin



Histopathology



Antigenic structures

- ▣ O. somatic antigen
- ▣ H. Flagellar antigen
- ▣ K. capsular antigen

- ▣ **V_I** in *Salmonella serotype typhi* (virulence heat-labile capsular homopolymer of N-acetyl-galactosamino-uronic acid) *vs* phagocytosis
- ▣ **O** Antigen (Heat - stable) is lipopolysaccharide in the outer membrane **A,B,C1,C2,D,E**
- ▣ **H** antigen (Heat labile)

CLINICAL FEATURES

- ▣ Acute gastroenteritis
- ▣ Typhoid fever
- ▣ Nontyphoidal bacteremia
- ▣ Carrier state following *Salmonella* infection

Source

- ❖ Water food and milk contaminated with human or animal excreta
- ❖ *Salmonella typhi* and *S. paratyphi* the source is human

GASTROENTERITIS

- ❖ Food poisoning through contaminated food
- ❖ *S. enterica* subsp. *enterica*
- ❖ Source poultry, milk, egg & egg products and handling pets
- ❖ Infective dose 10^6 bacteria
- ❖ IP 8 – 36 hrs.
- ❖ fever, chills, watery diarrhea and abdominal pain, self limiting
- ❖ In sickle cell, hemolytic disorder and ulcerative colitis, elderly or very young patient the infection may be very severe.
- ❖ At high risk for dissemination & antimicrobial indicated

ENTERIC FEVER

- Prolonged fever
- Bacteremia
- Involvement of the reticulo endothelial system (liver, spleen, intestines and mesentery)
- Dissemination to multiple organs
- Ingestion of contaminated food by infected or carrier individual
- By salmonella serotype typhi or S. paratyphi A, B and C (less severe)
- Tropical ,subtropical, Traveler (sewage, poor sanitation)
- IP : 9 - 14 days.

First week fever, malaise, anorexia, myalgia and a continuous dull frontal headache then,

- ❖ Patient develops constipation
- ❖ Mesenteric lymph node → blood stream liver, spleen and bone marrow
- ❖ Engulfment of salmonella by mononuclear phagocytes (multiply intercellularly)
- ❖ Released into the blood stream again that can lead to high fever (blood culture positive)

2nd and 3rd week

- ❖ Sustain fever prolonged bacteremia
- ❖ Invade gallbladder and Peyer's patches
- ❖ Rose spots 2nd week of fever
- ❖ Biliary tract → GIT
- ❖ Organism isolated from stool in large number



ANTIBIOTIC & management

- ▣ Ceftriaxone
- ▣ Ciprofloxacin
- ▣ Trimethoprim - Sulfamethoxazole
- ▣ Ampicillin
- ▣ Azithromycin or Ceftriaxone from patients from India and SE Asia due to resistance of strains. and Ciprofloxacin from patients from other areas.
- ▣ *Salmonella* gastroenteritis uncomplicated cases require fluid and electrolyte replacement only.

COMPLICATION_

- ▣ **Necrotizing cholecystitis**
- ▣ **Bowel hemorrhage and perforation**
- ▣ **Pneumonia and thrombophlebitis**
- ▣ **Meningitis, osteomyelitis, endocarditis and abscesses.**

SHIGELLA

CLINICAL INFECTION

- ▣ *S. sonnei* (group D1) most predominant in USA (fever, watery diarrhea)
- ▣ *S. flexneri* (group B15) 2nd most common
- ▣ Young adult (man who have sex with man)
- ▣ *S. dysenteriae* (group A 6)and *S. boydii* (group C 20) are most common isolates in developing countries
- ▣ *S. dysenteriae* type 1 associated with morbidity and mortality.
- ▣ Human is the only reservoir

- ▣ **Cause bacillary dysentery
(blood, mucus and pus in
the stool)**
- ▣ **Non lactose fermenter**

ANTIGENIC STRUCTURE

- ▣ Has 4 species and 4 major O antigen groups
- ▣ All have O antigens some serotype has K antigen (heat labile removed by boiling)
- ▣ *Shigella* are non motile, lack H antigen

- **Person to person through fecal -oral route**
- **Flies, fingers**
- **Food and water**
- **Young children in daycare, people in crowded area and anal oral sex in developed countries**
- **Low infective dose < 200 bacilli**
- **Penetrate epithelial cells leads to local inflammation, shedding of intestinal lining and ulcer formation**

SYMPTOMS

- ▣ **High fever, chill, abdominal cramp and pain accompanied by tenesmus of bloody stool with mucus & WBC**
- ▣ **IP 24 - 48 hrs**
- ▣ **Can lead to rectal prolapsed in children**
- ▣ **Complication ileus, obstruction dilatation and toxic mega colon**
- ▣ **Bacteremia in 4 % of severely ill patient**
- ▣ **Seizures, HUS**

Diagnosis

- ▣ Stool culture on selective selenite enrichment broth media MAC, SS and XLD,HEA BS
- ▣ Sero-grouping based on O and H antigen
 1. Sereny test



TREATMENT

Antibiotics used to reduce duration of illness
ampicillin , oral TMP-SMX or IV ceftriaxone and
ciprofloxacin or doxycycline.