Typhoid Fever & Brucellosis

Learning Objectives:

1.Define the Concept,

2.Identify the etiology

3.Describe the clinical presentation of Typhoid fever& Brucellosis

4.Mention the differential diagnosis of Typhoid fever & Brucellosis

5.Identify the complications of Typhoid fever & Brucellosis

6.Explain the methods of prevention Typhoid fever & Brucellosis

7.Outline treatment

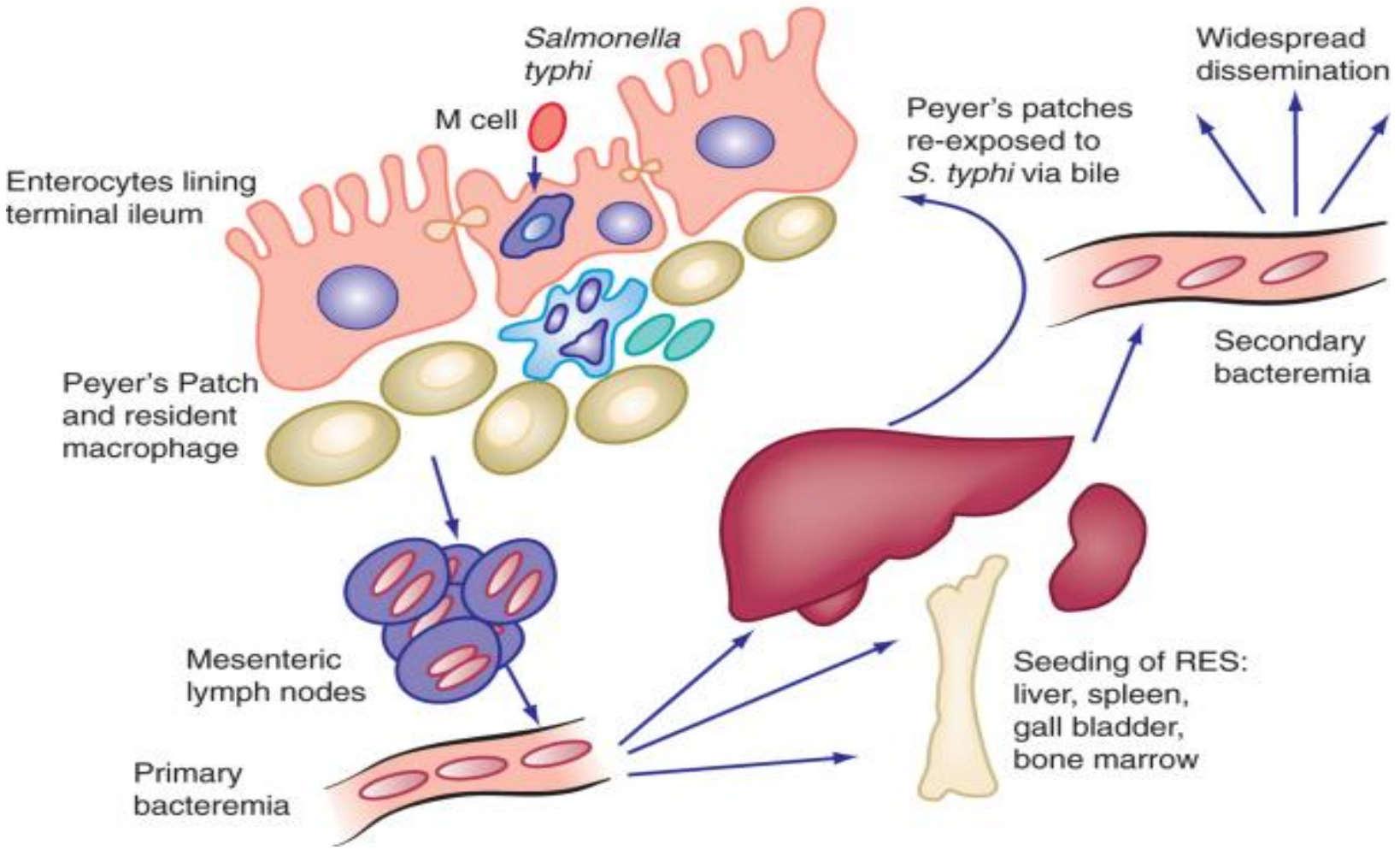
Six year old child developed fever of 10 days duration ,abdominal pain & decreased appetite with malaise…….

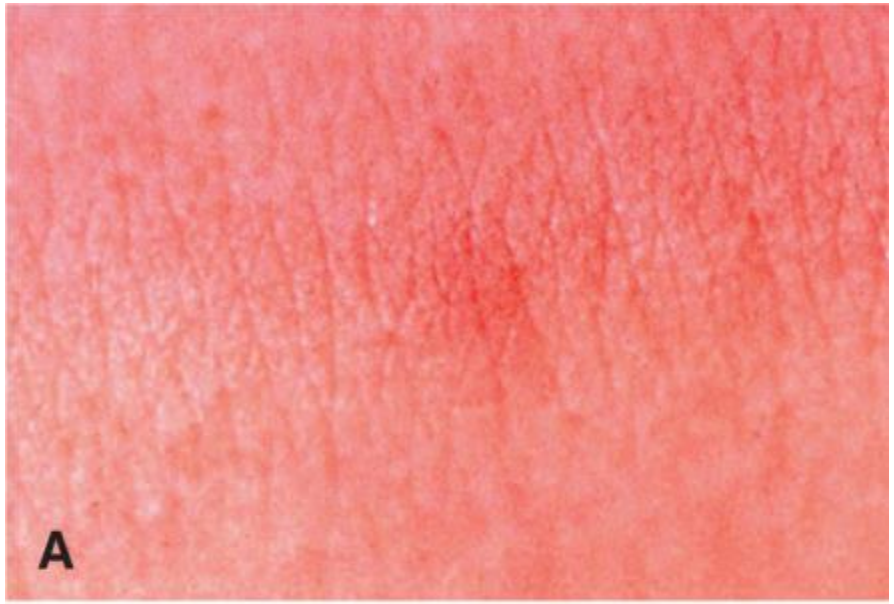
Typhoid fever **is caused by *Salmonella enterica* serovar Typhi (*S.* Typhi), a G-ve bacterium. A very similar but often less severe disease is caused by *S.* Paratyphi A & rarely by *S.* Paratyphi B (Schotmulleri) & *S.* Paratyphi C (Hirschfeldii).**

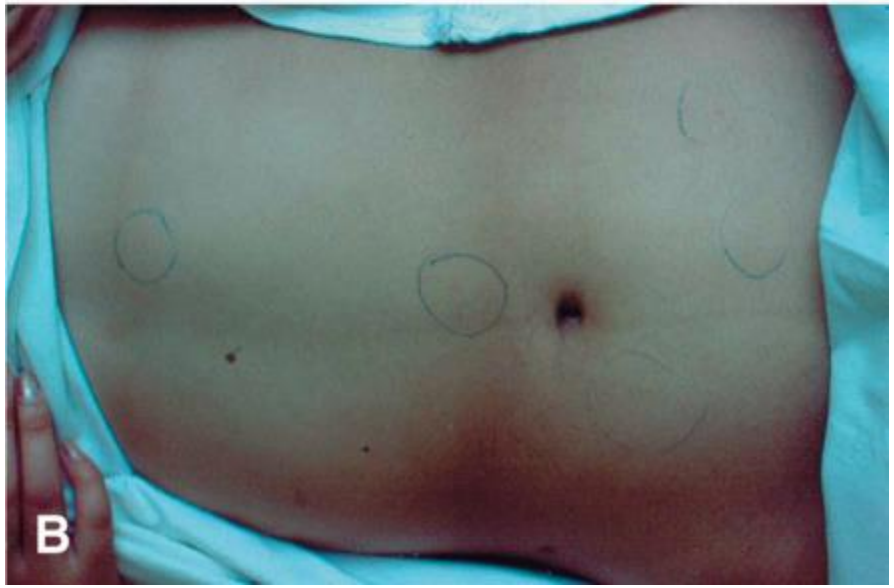
The disease occurs by the ingestion of the organism, & a variety of sources of fecal contamination have been reported, including street foods & contamination of water reservoirs

The IP of typhoid fever is usually 7–14 days but is also dependent on the infecting dose (range 3–30 days).

Pathogenesis of typhoid fever

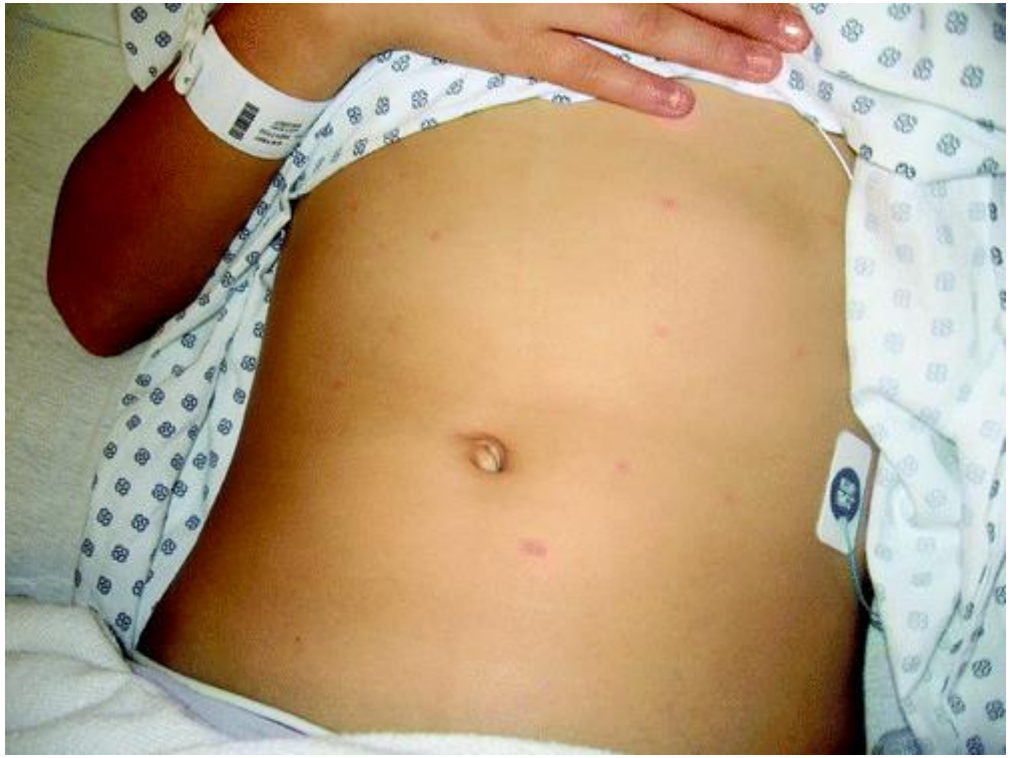


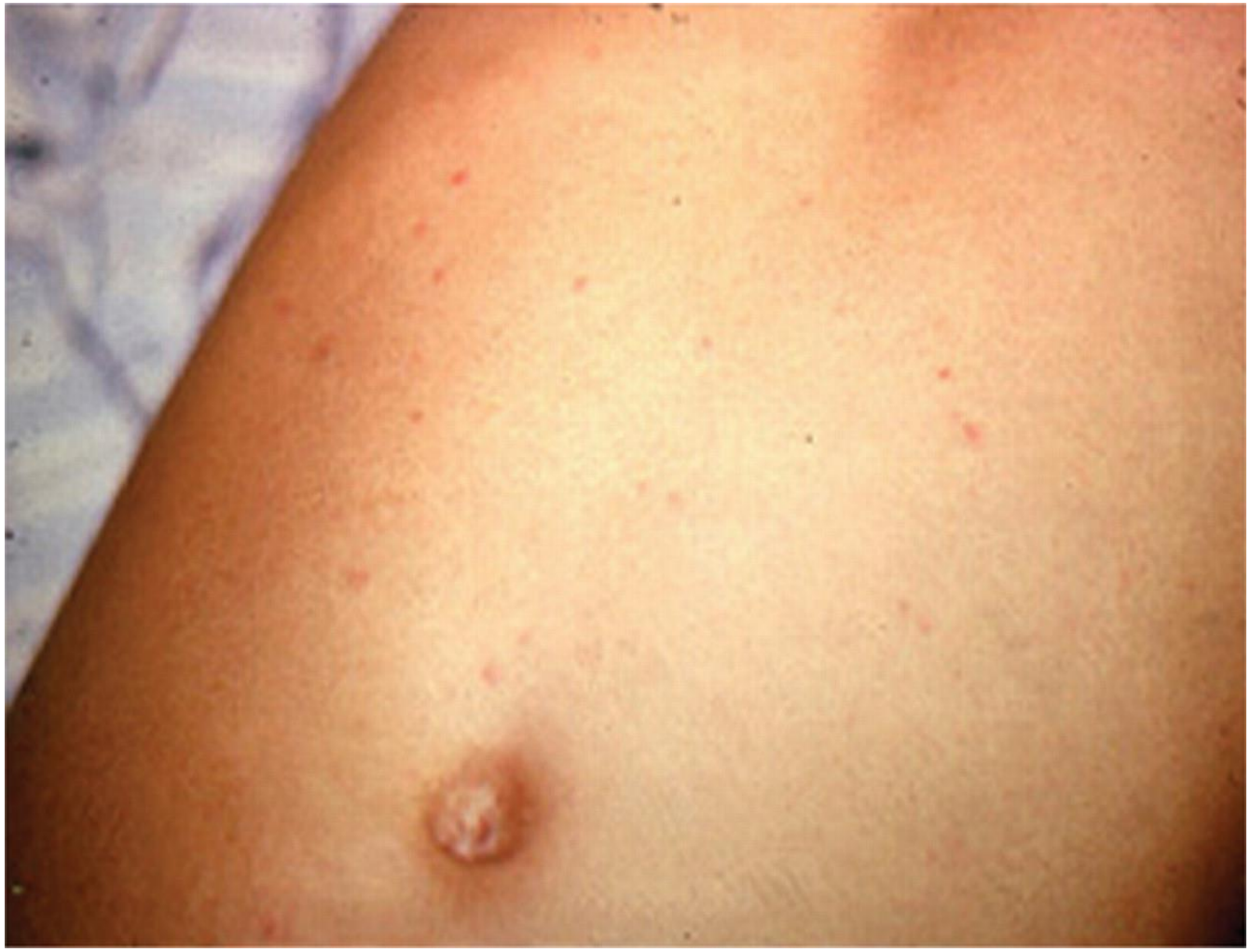




***A,* A rose spot in a volunteer with experimental typhoid fever. *B,* A small cluster of rose spots is usually located on the abdomen.**
These lesions may be difficult to identify, especially in dark-skinned people

Nelson Textbook of Pediatrics 20th ed.





Nelson Textbook of Pediatrics 20th ed

Common Clinical Features of Typhoid Fever in Children[*]

The clinical presentation varies from a mild illness with low-grade fever, malaise, & slight dry cough to a severe clinical picture with abdominal discomfort & multiple complications

High-grade fever	95%
Coated tongue	76%
Anorexia	70%
Vomiting	39%
Hepatomegaly	37%
Diarrhea	36%
Toxicity	29%
Abdominal pain	21%
Pallor	20%
Splenomegaly	17%
Constipation	7%
Headache	4%
Jaundice	2%
Obtundation	2%
Ileus	1%
Intestinal perforation	0.5%

Karachi, Pakistan, from 2,000 children.

Extraintestinal Infectious Complications of Typhoid Fever

ORGAN SYSTEM INVOLVED	PREVALENCE	RISK FACTORS	COMPLICATIONS
CNS	3–35%	malignancy, endocarditis, CHD, paranasal sinus infections, pulmonary infections, meningitis, trauma, surgery, & osteomyelitis of the skull	Encephalopathy, cerebral edema, subdural empyema, cerebral abscess, meningitis, ventriculitis, transient parkinsonism, MND , ataxia, seizures, GBS, psychosis
Cardiovascular system	1–5%	Cardiac abnormalities—e.g., existing valvular abnormalities RHD , or CHD	Endocarditis, myocarditis, pericarditis, arteritis, CHF
Pulmonary system	1–6%	, past pulmonary infection, sickle cell anemia, alcohol abuse, diabetes, HIV infection	Pneumonia, empyema, bronchopleural fistula
Bone &joint	<1%	SCA DM, SLE, lymphoma, liver disease, previous surgery or trauma, those at extremes of age, & steroid use	Osteomyelitis, septic arthritis
Hepatobiliary system	1–26%	Residence in endemic region, pyogenic infections, intravenous drug use, splenic trauma, HIV, hemoglobinopathy	Cholecystitis, hepatitis, hepatic abscesses, splenic abscess, peritonitis, paralytic ileus
Genitourinary system	<1%	Urinary tract, pelvic pathology, & systemic abnormalities	UTI, renal abscess, pelvic infections, testicular abscess, prostatitis, epididymitis
Soft tissue infections		Diabetes	Psoas abscess, gluteal abscess, cutaneous vasculitis
Haematologic			Hemophagocytosis syndrome

Nelson Textbook of Pediatrics 20th ed

The mainstay of the Diagnosis of typhoid fever is a positive culture from the blood or another anatomic site.

Results of blood cultures are positive in 40–60% of the pts seen early in the course of the disease,

Stool & urine cultures become positive after the 1st wk. The stool culture result is also occasionally positive during the IP.

BM cultures are difficult to obtain & relatively invasive.

The classic Widal test measures antibodies against O & H Ag of *S.* Typhi but lacks sensitivity & specificity in endemic areas

A nested PCR using *H1-d* primers has been used to amplify specific genes of *S.* Typhi in the blood of pts, & given the low level of bacteremia in enteric fever, is a promising means of making a rapid Dx.

DDX

AGE , bronchitis, or bronchopneumonia. malaria; sepsis with other bacterial pathogens; infections caused by intracellular microorganisms, such as TB , brucellosis, tularemia, leptospirosis, & rickettsial diseases; & viral infections such as Dengue fever, acute hepatitis, & EBV

The classic heat-inactivated whole cell vaccine is associated with an unacceptably high rate of S/E
Globally, 2 vaccines are currently available for potential use in children.
An oral, live-attenuated preparation of the Ty21a strain of *S.* Typhi has been shown to have good efficacy (67–82%) for up to 5 yrs. Significant adverse effects are rare.

The Vi capsular polysaccharide can be used in people ≥2 yr of age. It is given as a single i.m dose, with a booster every 2 yr & has a protective efficacy of 70–80%.

The recent Vi-conjugate vaccine has been shown to have a protective efficacy > 90% in younger children

Treatment of Typhoid Fever in Children

OPTIMAL THERAPY				ALTERNATIVE EFFECTIVE DRUGS		
SUSCEPTIBILITY	Antibiotic	Daily Dose (mg/kg/day)	Days	Antibiotic	Daily Dose (mg/kg/day)	Days
UNCOMPLICATED TYPHOID FEVER						
Fully sensitive	Chloramphenicol	50–75	14–21	Fluoroquinolone, e.g., ofloxacin or ciprofloxacin	15	5–7
	Amoxicillin	75–100	14			
Multidrug resistant	Fluoroquinolone or cefixime	15	5–7	Azithromycin	8–10	7
		15–20	7–14	Cefixime	15–20	7–14
Quinolone resistant[†]	Azithromycin or ceftriaxone	8–10	7	Cefixime	20	7–14
		75	10–14			
SEVERE TYPHOID FEVER						
Fully sensitive	Ampicillin or ceftriaxone	100	14	Fluoroquinolone, e.g., ofloxacin or ciprofloxacin	15	10–14
		60–75	10–14			
Multidrug resistant	Fluoroquinolone	15	10–14	Ceftriaxone or cefotaxime	60	10–14
					80	
Quinolone resistant	Ceftriaxone	60–75	10–14	Fluoroquinolone	20–30	14

Nelson Textbook of Pediatrics 20th ed

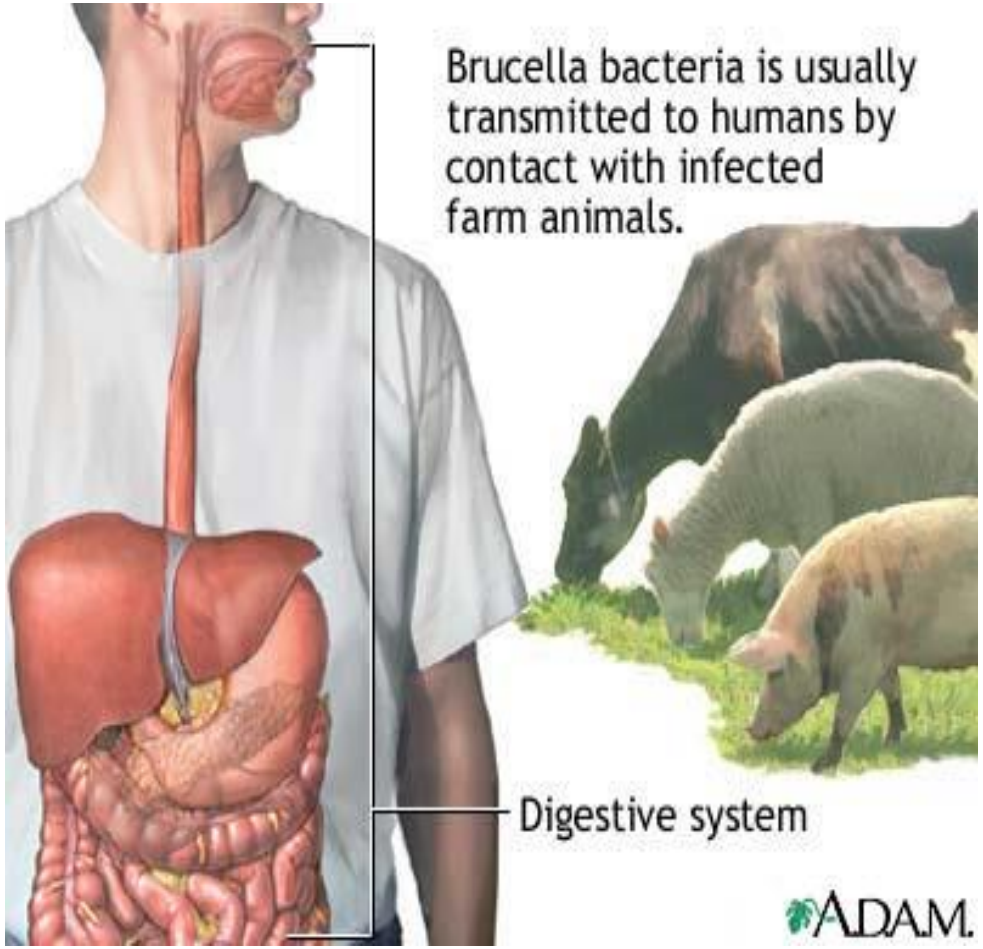
Brucellosis

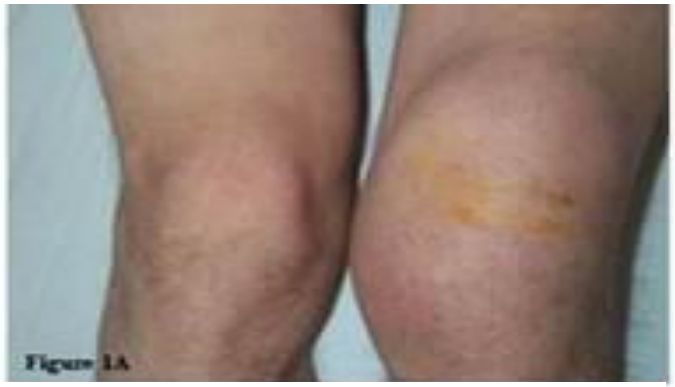
Brucella abortus **(cattle),** ***B. melitensis*** **(goat/sheep),** ***B. suis*** **(swine), &** ***B. canis*** **(dog) are the most common organisms responsible for human disease.**

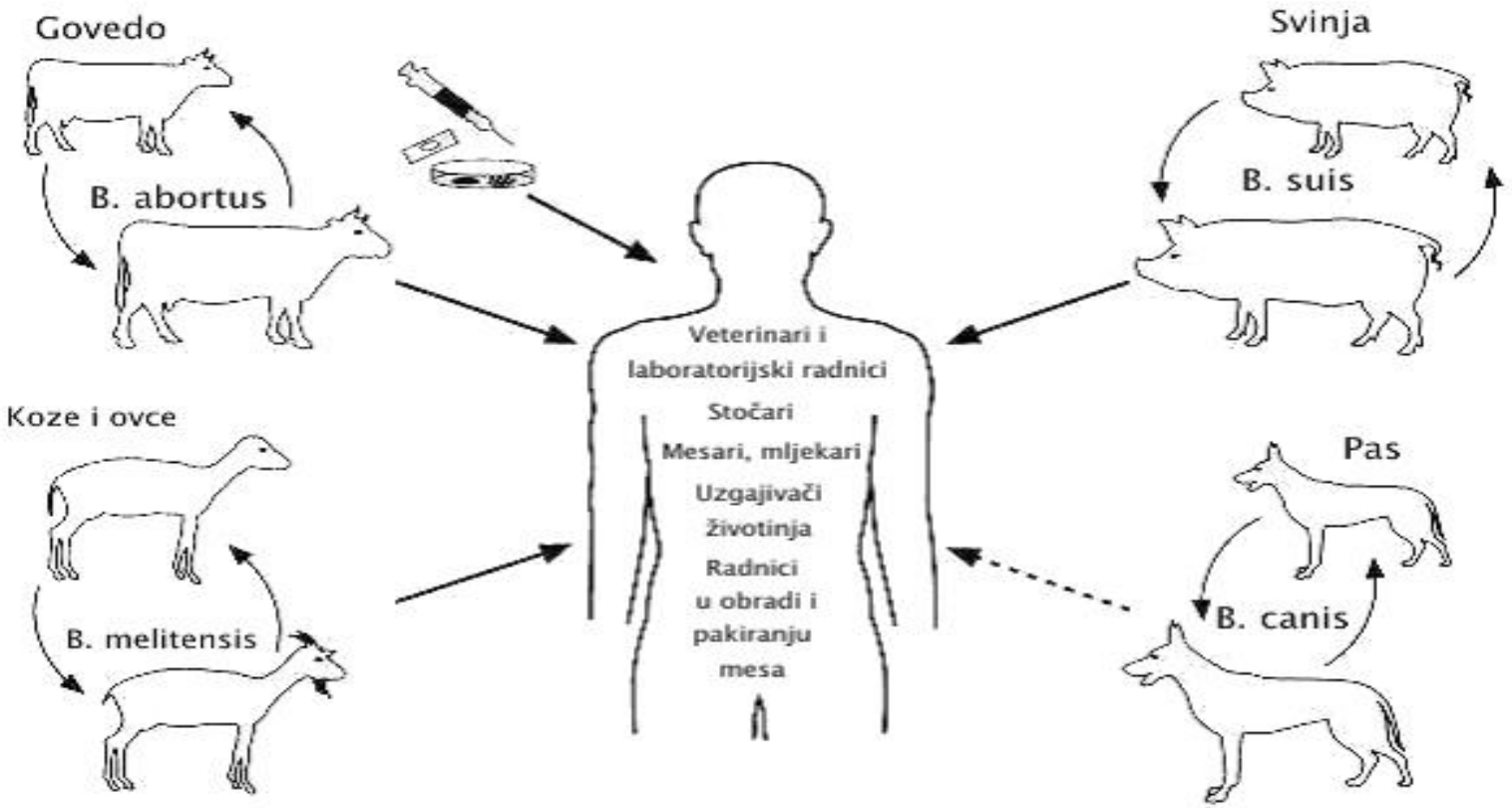
These organisms are small, aerobic, non-spore-forming, nonmotile, G-ve coccobacillary bacteria that are fastidious in their growth but can be grown on various lab. media including blood & chocolate agars.

Routes of infection **for these organisms**

include inoculation through cuts or abrasions in the skin, inoculation of the conjunctival sac of the eye, inhalation of infectious aerosols, or ingestion of contaminated meat or dairy products


Brucella bacteria is usually transmitted to humans by contact with infected farm animals.
Digestive system
A.D.A.M.




Govedo
B. abortus
Svinja
B. suis
Veterinari i
laboratorijski radnici
Stočari
Mesari, mljekari
Uzgajivači
životinja
Radnici
u obradi i
pakiranju
mesa
Koze i ovce
B. melitensis
Pas
B. canis

Clinical features : can be acute or insidious in nature & are usually nonspecific, beginning 2–4 wk after inoculation.

the classic triad of fever, arthralgia/arthritis, & HSM can be demonstrated in most pts. Some present as PUO .

Other associated symptoms include:

abdominal pain, headache, diarrhea, rash, night sweats, weakness/fatigue, vomiting, cough, & pharyngitis.

A common symptoms in children is refusal to eat, lassitude, refusal to bear weight, & FTT . Besides HSM, the physical findings on exam. are usually few, with the exception of arthritis.

The fever pattern can vary widely, & virtually any organ or tissue can be involved.

NN &congenital infections with these organisms have also been described. These have been transmitted transplacentally, from breast milk, & through blood transfusions.

A definitive diagnosis is established by recovering the organisms in the blood, bone marrow, or other tissues

Isolation of the organism still may require as long as 4 wk from a blood culture sample .lab should be informed

Serologic tests have been applied to the Dx. The serum agglutination test (SAT) is the most widely used & detects Ab against *B. abortus, B. melitensis,* & *B. suis.* This method does not detect Ab against *B. canis* because this organism lacks the smooth lipopolysaccharide.
No single titer is ever diagnostic, but most pts with acute infections have titers of ≥1 : 160.

Enzyme immunoassay appears to be the most sensitive method for detecting *Brucella* Ab .
PCR assays are also becoming available .

Brucellosis may be confused with other infections such as

- Tularemia,
- Cat scratch disease,
- Typhoid fever,
- Fungal infections due to histoplasmosis, blastomycosis, or coccidioidomycosis.
- Infections caused by *TB,* atypical mycobacteria,
- Rickettsiae,
- *Yersinia* can present in a similar fashion to brucellosis

Recommended Therapy for the Treatment of Brucellosis

AGE AND CONDITION	ANTIMICROBIAL AGENT	DOSE	ROUTE	DURATION
≥8 yr	Doxycycline	2–4 mg/kg/day;maximum 200 mg/day	PO	4–6 wk
	+			
	Rifampin	15–20 mg/kg/day;maximum 600–900 mg/day	PO	4–6 wk
	Alternative:			
	Doxycycline	2–4 mg/kg/day;maximum 200 mg/day	PO	4–6 wk
	+			
	Streptomycin or Gentamicin	20–30 mg/kg/day;maximum 1 g/day	IM	1–2 wk
		3–5 mg/kg/day	IM/IV	1–2 wk
<8 yr	Trimethoprim-sulfamethoxazole (TMP-SMZ)	TMP (10 mg/kg/day;maximum 480 mg/day) and SMZ (50 mg/kg/day;maximum 2.4 g/day)	PO	4–6 wk
	+			
	Rifampin	15–20 mg/kg/day	PO	4–6 wk
Meningitis, osteomyelitis, endocarditis				
	Doxycycline	2–4 mg/kg/day;maximum 200 mg/day	PO	4–6 mo
	+			
	Gentamicin	3–5 mg/kg/day	IV	1–2 wk
	±			
	Rifampin	15–20 mg/kg/day;maximum 600–900 mg/day	PO	4–6 mo

Nelson Textbook of Pediatrics 20th ed