

**Brucella s-**

- The brucellae are **obligate parasites** of animals and humans and are characteristically located **intracellularly**.
- Brucella melitensis* (MC in middle east) typically infects goats; *Brucella suis*, swine; *Brucella abortus*, cattle; and *Brucella canis*, dogs.
- Although named as species, **DNA relatedness studies** have shown there is **only one species** in the genus, *B. melitensis*, with multiple **biovars**.
- The disease in humans, brucellosis, also called **undulant fever** or **Malta fever**, is characterized by an **acute bacteremic phase** followed by a **chronic stage** that may extend over **many years** and may involve many tissues

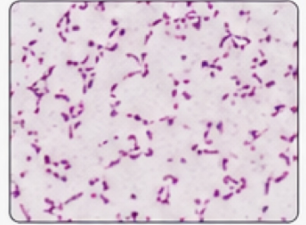
**melitensis**      **suis**      **abortus**      **canis**

(MC in middle east) typically infects goats      swine      cattle      dogs

→ Animal host and species

**MORPHOLOGY AND IDENTIFICATION**

- The appearance in young cultures varies from **cocci to rods** (1.2) **um** in length, with short coccobacillary forms predominating.
- They are **Gram-negative**.
- They are **aerobic nonmotile**, and **nonspore forming**.
- Small, convex, smooth colonies** appear on **enriched media** in **2-5 days**.
- Brucellae are adapted to an **intracellular habitat**, and their **nutritional requirements are complex**.
- Fresh specimens from animal or human sources are usually inoculated on **trypticase-soy agar** or **blood culture media**.
- B. abortus* requires **5-10% CO<sub>2</sub>** for growth, whereas the other three species grow in air



Gram-negative coccobacillary forms



Small, convex, smooth colonies on enriched media (2-5 days)

**GROWTH CHARACTERISTICS AND ANTIGENIC STRUCTURE**

- Catalase** and **oxidase** are produced by the four species that infect humans.
- Hydrogen sulfide** is produced by many strains.
- Brucellae are **moderately sensitive to heat and acidity** and are killed in milk by **pasteurization**.
- Because brucellae are **hazardous in the laboratory**, tests to classify them should be performed only in reference public health laboratories using **appropriate biosafety precautions**

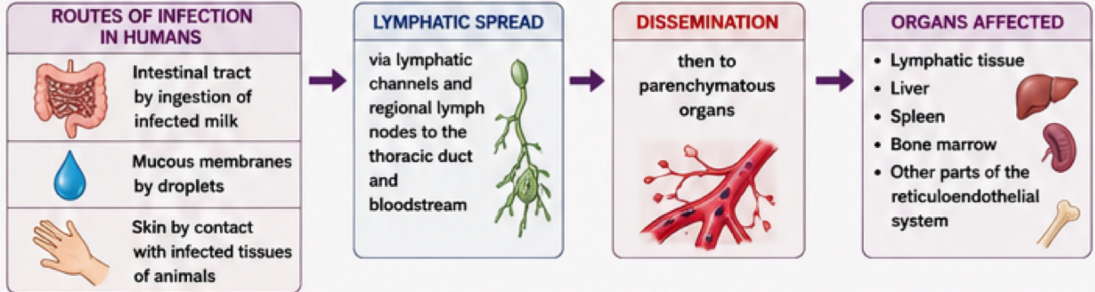
Characteristic	<i>Brucella melitensis</i>	<i>Brucella suis</i>	<i>Brucella abortus</i>	<i>Brucella canis</i>
Catalase	+	+	+	+
Oxidase	+	+	+	+
Hydrogen sulfide (H <sub>2</sub> S)	+ / -	+	+ / -	+ / -
Heat & acidity sensitivity	Moderately sensitive			
Killed in milk by	Pasteurization			
CO <sub>2</sub> requirement	Grows in air	Grows in air	Requires 5-10% CO <sub>2</sub>	Grows in air



Because brucellae are **hazardous in the laboratory**, tests to classify them should be performed only in reference public health laboratories using **appropriate biosafety precautions**

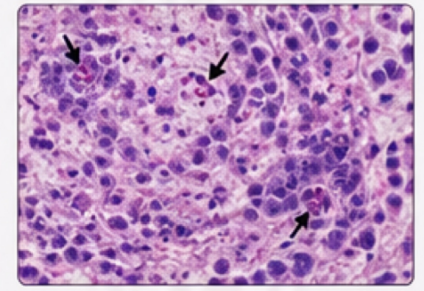
**PATHOGENESIS AND PATHOLOGY**

- Although each species of *Brucella* has a preferred host, **all can infect a wide range of animals**, including humans.
- Routes of infection in humans are the **intestinal tract** by **ingestion of infected milk**, **mucous membranes by droplets**, and **skin by contact with infected tissues of animals**.
- Cheese** made from **unpasteurized goats' milk** is a particularly common vehicle.
- The organisms progress via **lymphatic channels** and **regional lymph nodes** to the **thoracic duct** and **bloodstream** then to **parenchymatous organs**.
- Granulomatous nodules** that may develop into **abscesses** form in **lymphatic tissue**, **liver**, **spleen**, **bone marrow**, and other parts of the **reticuloendothelial system**.
- In such lesions, the brucellae are principally **intracellular**



**GRANULOMATOUS LESIONS**

Granulomatous nodules that may develop into abscesses form in lymphatic tissue, liver, spleen, bone marrow, and other parts of the reticuloendothelial system. In such lesions, the brucellae are principally **intracellular**



Brucellae (intracellular) in a granulomatous lesion

**PATHOLOGY BY SPECIES AND HISTOLOGIC REACTION**

Species	Disease Pattern	Lesions / Histologic Reaction	Notes
<i>B. abortus</i>	usually causes <b>mild</b> disease <b>without</b> <b>suppurative</b> complications	<b>noncaseating granulomas</b> of the reticuloendothelial system are found	<b>Osteomyelitis, meningitis, or cholecystitis</b> also occasionally occurs.
<i>B. canis</i>	also causes <b>mild</b> disease	(similar mild lesions)	Placentas and fetal membranes of cattle, swine, sheep, and goats contain <b>erythritol</b> , a growth factor for brucellae; there is <b>no erythritol in human placentas</b> , and abortion is not part of <i>Brucella</i> infection of humans
<i>B. suis</i>	infection tends to be <b>chronic</b> with <b>suppurative</b> lesions	<b>caseating granulomas</b> may be present	
<i>B. melitensis</i>	infection is <b>more acute and severe</b>		

**ERYTHRITOL IN PLACENTAS**

Animals (cattle, swine, sheep, goats)	Humans
Contain <b>erythritol</b>	<b>No erythritol in human placenta</b>
Growth factor for brucellae	Abortion is not part of <i>Brucella</i> infection of <b>humans</b>

# CLINICAL FINDINGS

- The **incubation period** ranges from **1 to 4 weeks**.
- The onset is **insidious**, with **malaise, fever, weakness, aches, and sweats**.
- The **fever** usually **rises in the afternoon**; it **falls during the night** and is accompanied by **drenching sweat**. *very heavy*
- There may be **gastrointestinal** and **nervous** symptoms.
- Lymph nodes enlarge**, and the **spleen** becomes **palpable**.
- Hepatitis** may be accompanied by **jaundice**.
- Deep pain** and **disturbances of motion**, particularly in **vertebral bodies**, suggest **osteomyelitis**.
- A **chronic stage** may develop, characterized by **weakness, aches and pains, low-grade fever, nervousness** (psychoneurotic symptoms)

<b>Malaise</b> 	<b>Fever</b> (rises in afternoon, falls at night) 	<b>Drenching sweat</b> 	<b>Gastrointestinal symptoms</b> 
<b>Nervous symptoms</b> 	<b>Lymph nodes enlarge</b> 	<b>Spleen becomes palpable</b> 	<b>Hepatitis with jaundice</b> 
	<b>Osteomyelitis</b> (deep pain, disturbances of motion in vertebral bodies) 	<b>Chronic stage</b> (weakness, aches and pains, low-grade fever, nervousness (psychoneurotic symptoms)) 	

## DIAGNOSTIC LABORATORY TESTS: SPECIMENS AND CULTURE

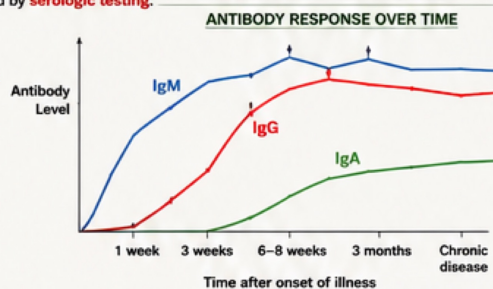
- Specimens include **blood for culture, biopsy material for culture**, such as lymph nodes or bone, and **serum for serologic tests**.
- grown* *acute phase* *recurrence of activity* **Brucella** species bacteria grow on **commonly used media**, including **trypticase-soy medium with or without 5% sheep blood, brain-heart infusion medium, and chocolate agar**.
- All cultures should be incubated in **8–10% CO<sub>2</sub>** at **35–37°C** and observed for **3 weeks** before being discarded as negative.
- Bone marrow** and **blood** are the specimens from which brucellae are most often isolated.
- Media used in **automated blood culture systems** readily grow brucellae, usually **within 1 week**; holding the cultures for **3 weeks is recommended**.
- Negative culture results for Brucella do not exclude the disease**, brucellae can be cultivated only during the **acute phase** or during **recurrence of activity**.
- Tiny Gram-negative coccobacilli** that are **catalase positive** and **oxidase positive** suggest **Brucella** species.
- A **positive urease test** result is characteristic of **Brucella** species

SPECIMENS			
<b>Blood</b> (for culture) 	<b>Biopsy material</b> (for culture) (lymph node) 	<b>Biopsy material</b> (for culture) (bone) 	<b>Serum</b> (for serologic tests) 
MEDIA FOR CULTURE			INCUBATION CONDITIONS
<b>Trypticase-soy medium</b> (with or without 5% sheep blood) 	<b>Brain-heart infusion medium</b> 	<b>Chocolate agar</b> 	<b>8–10% CO<sub>2</sub></b> at 35–37°C observe for 3 weeks 

<b>Bone marrow and blood</b> are the specimens from which brucellae are most often isolated. 	<b>Media used in automated blood culture systems</b> readily grow brucellae, usually within 1 week; holding the cultures for 3 weeks is recommended. 	<b>Negative culture results for Brucella</b> do not exclude the disease, brucellae can be cultivated only during the acute phase or during recurrence of activity. 	<b>Tiny Gram-negative coccobacilli</b> that are catalase positive and oxidase positive suggest <b>Brucella</b> species. 	<b>Catalase test</b> (positive) <b>Oxidase test</b> (positive) 	<b>A positive urease test</b> result is characteristic of <b>Brucella</b> species. 
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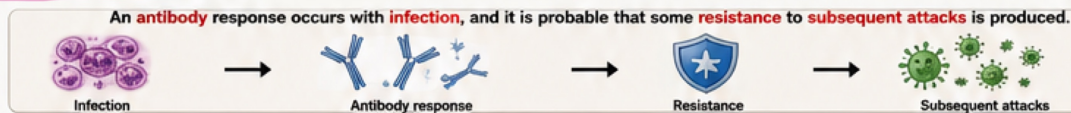
## DIAGNOSTIC LABORATORY TESTS: SEROLOGY AND IMMUNITY

- Laboratory diagnosis of brucellosis is most frequently accomplished by **serologic testing**.
- IgM** antibody levels rise during the **first week** of acute illness, **peak at 3 months** and may persist during **chronic disease**.
- IgG** antibody levels **rise about 3 weeks** after onset, **peak at 6–8 weeks**, and remain **high during chronic disease**.
- IgA** levels parallel the **IgG** levels.
- A **combination** of serological tests, usually **agglutination tests with nonagglutinating assays**, is recommended
- In the agglutination test, **IgG agglutinin titers above 1:80** indicate **active infection**.
- ELISA assays** detect **IgG, IgA, and IgM** antibodies and tend to be **more sensitive and specific** than the **agglutination test**, especially in **chronic disease**.
- An **antibody response** occurs with **infection**, and it is probable that **some resistance to subsequent attacks** is produced



**SEROLOGIC TESTS**

<b>Agglutination test</b> (IgG agglutinin titers) <p>1:20 1:40 1:80 1:160 Titers</p> <p><b>Titers above 1:80 indicate active infection.</b></p>	<b>ELISA assays</b> (detect IgG, IgA, IgM) <p><b>More sensitive and specific than the agglutination test, especially in chronic disease.</b></p>
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### TREATMENT

- Brucellae may be susceptible to **tetracyclines, rifampin, trimethoprim-sulfamethoxazole, aminoglycosides**, and some **quinolones**.
- Because of their **intracellular** location, the organisms are **not** readily eradicated **completely from the host**; for best results, **treatment must be prolonged**.
- Combined treatment with a tetracycline, such as **doxycycline**, and either **streptomycin or gentamicin** for 2–3 weeks or **rifampin** for 6–8 weeks is recommended.
- In patients with **endocarditis** or evidence of **neurological disease**, triple therapy with **doxycycline, rifampin, and an aminoglycoside** is suggested.

#### RECOMMENDED REGIMENS

<b>Doxycycline</b> + <b>Streptomycin or Gentamicin</b> for <b>2–3 weeks</b>	<b>Doxycycline</b> + <b>Rifampin</b> for <b>6–8 weeks</b>	<b>Doxycycline</b> + <b>Rifampin</b> + <b>Aminoglycoside</b> (triple therapy)
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### EPIDEMIOLOGY

- Brucellae are animal pathogens transmitted to humans by **accidental contact with infected animal feces, urine, milk, or tissues**.



Common sources include **unpasteurized milk, milk products, cheese**, and occupational contact among **farmers, veterinarians, and slaughterhouse workers**.



### PREVENTION AND CONTROL

- Pasteurization** of milk and milk products, and reduction of occupational hazards wherever possible.



- ✓ Pasteurize milk and milk products
- ✓ Reduce occupational hazards
- ✓ Use protective equipment (gloves, masks, aprons) in high-risk occupations
- ✓ Proper hygiene and handwashing
- ✓ Safe handling and disposal of animal waste and tissues

# MYCOBACTERIA

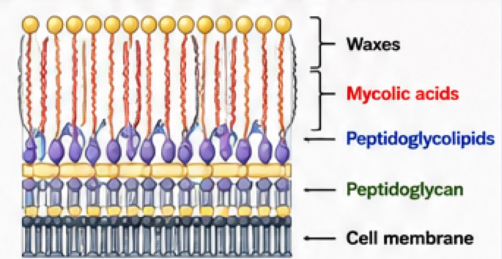
- Mycobacteria are **rod-shaped, obligate aerobic** bacteria that **do not form spores**. سميت بنا علي
- Their **cell wall** contains **peptidoglycolipids, mycolic acids, fatty acids, and waxes**. These cell wall compounds explain **slow growth, acid fastness, resistance to detergents, and resistance to common antibiotics**.
- Because of the **high lipid content**, mycobacteria **do not stain well** with Gram stain and require special stains such as **carbolfuchsin**.
- more than 200 Mycobacterium species**, including many saprophytes. The most common human pathogens are **M. tuberculosis Complex (MTBC), M. leprae, and M. ulcerans**. (leprosy)
- MTBC causes **tuberculosis**; **M. leprae** causes **Hansen's disease**; **M. ulcerans** causes **necrotizing skin and soft tissue infections**.
- Mycobacterium avium Complex, or MAC**, and other nontuberculous mycobacteria are **opportunistic pathogens** in patients with **AIDS** and other **immunocompromised** persons

## MORPHOLOGY



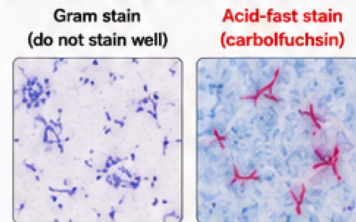
Rod-shaped (obligate aerobic)

## CELL WALL STRUCTURE



Contains **peptidoglycolipids, mycolic acids, fatty acids, and waxes**

## STAINING



Require special stains such as **carbolfuchsin**

## PROPERTIES EXPLAINED BY CELL WALL COMPOUNDS

- Slow growth**
- Acid fastness**
- Resistance to detergents**
- Resistance to common antibiotics**

## IMPORTANT MYCOBACTERIUM SPECIES

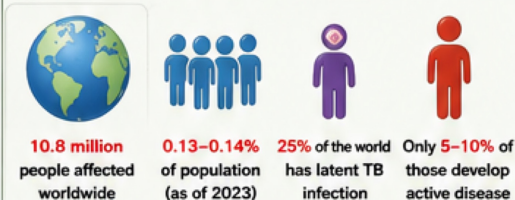
Species / Complex	Abbreviation	Disease / Association	Key Features
<i>Mycobacterium tuberculosis Complex</i>	MTBC	Causes <b>tuberculosis</b>	Pulmonary and extrapulmonary TB
<i>Mycobacterium leprae</i>	—	Causes <b>Hansen's disease</b>	<b>Leprosy (chronic infection of skin and nerves)</b>
<i>Mycobacterium ulcerans</i>	—	Causes <b>necrotizing skin and soft tissue infections</b>	<b>Buruli ulcer (necrotizing skin infection)</b>
<i>Mycobacterium avium Complex</i>	MAC	<b>Opportunistic pathogens</b> in patients with <b>AIDS</b> and other immunocompromised persons	Nontuberculous mycobacteria

## SUMMARY OF KEY POINTS

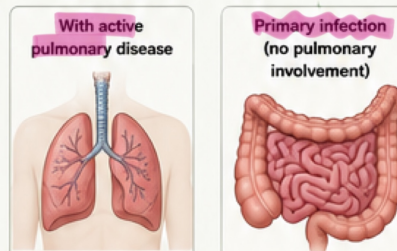
- Rod-shaped, obligate aerobic, non-spore forming bacteria.**
- Cell wall contains **peptidoglycolipids, mycolic acids, fatty acids, and waxes.**
- High lipid content → do not stain well with Gram stain.**
- Require special stains such as **carbolfuchsin (acid-fast).**
- Cell wall compounds explain **slow growth, acid fastness, resistance to detergents, and resistance to common antibiotics.**

# MYCOBACTERIUM TUBERCULOSIS

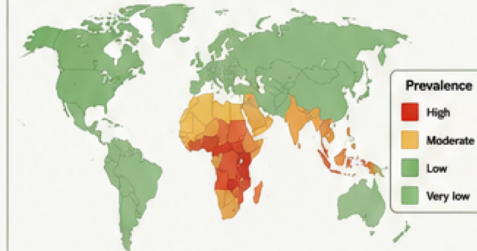
- Active tuberculosis (TB) affects **10.8 million** people worldwide (**0.13-0.14%** of population as of 2023); **25%** of the world has latent TB infection; only **5-10%** of those develop active disease.



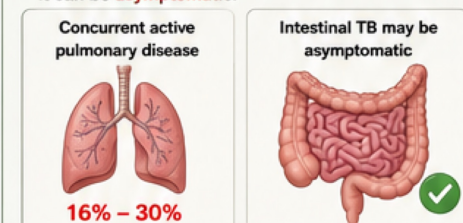
- Gastrointestinal TB** can be observed both in the context of active pulmonary disease and as a primary infection with no pulmonary involvement.



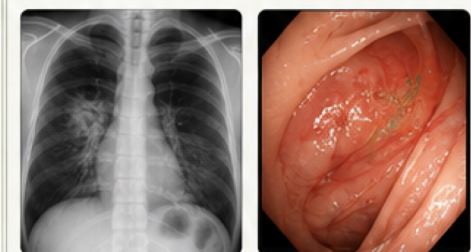
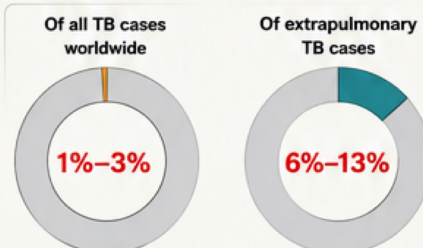
- Involvement of the **gastrointestinal tract** by TB remains prevalent in certain areas of the world and in certain at-risk patient populations.



- Only **16 to 30%** of patients with **intestinal TB** have evidence of concurrent active **pulmonary** disease, but **intestinal TB** may be **underrecognized** because it can be **asymptomatic**.



- Abdominal TB accounts for **1% to 3%** of all TB cases worldwide and represents **6% to 13%** of extrapulmonary TB cases, with rates varying by geography.



Pulmonary TB

Intestinal (GI) TB

**Mycobacterium tuberculosis**  
(Obligate aerobic, rod-shaped)

→ Transmitted by airborne droplets

→ Affects millions worldwide

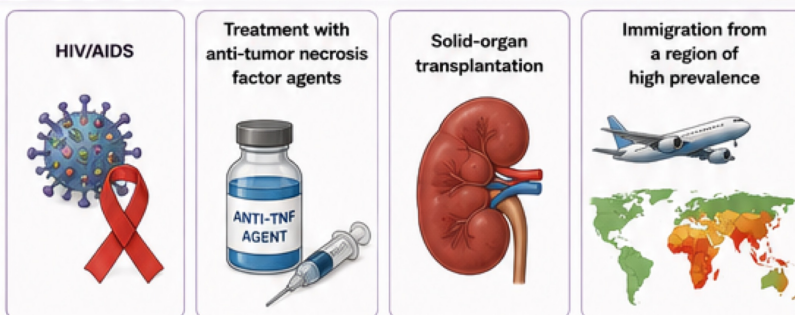


Can cause pulmonary TB or extrapulmonary TB (including gastrointestinal TB)

→ Preventable, diagnosable, and treatable

## RISK FACTORS

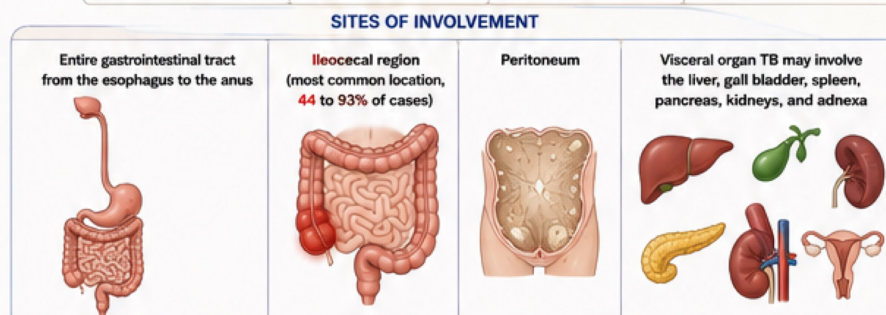
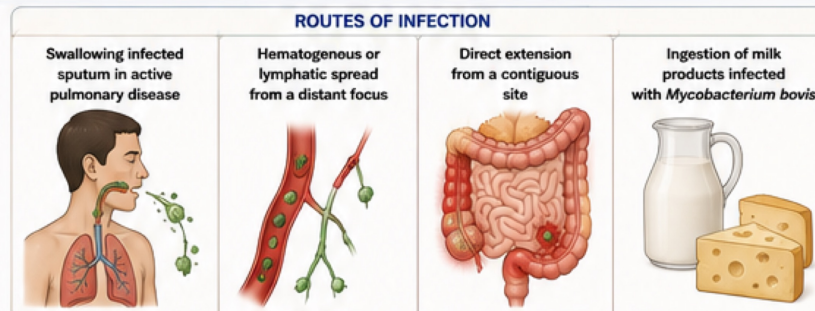
- Risk factors include **HIV/AIDS**, **treatment with anti-tumor necrosis factor agents**, and **solid-organ transplantation**.
- Reactivation of **latent TB infection** is a concern with **increased use of immunosuppressant medications** and **diseases of immunodeficiency**.
- **Immigration** from a region of **high prevalence** is an additional risk factor in industrialized nations.
- **Gastrointestinal TB** remains more significant in parts of the **Middle East, Africa, and Asia**



Gastrointestinal TB remains more significant in parts of the **Middle East, Africa, and Asia**

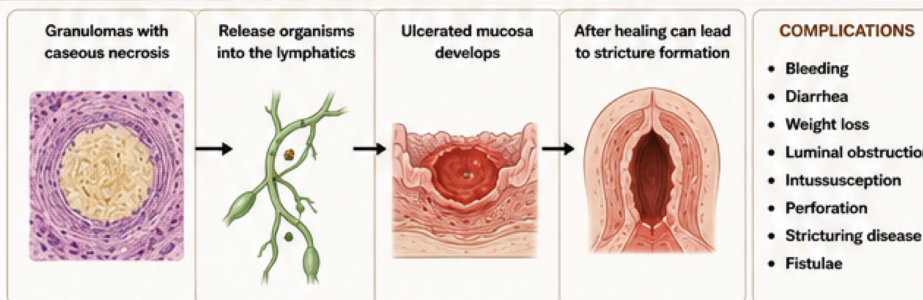
## PATHOGENESIS OF GASTROINTESTINAL TB: ROUTES AND SITES

- **Mycobacterial infections** of the gastrointestinal tract occur by: **swallowing infected sputum** in active pulmonary disease, **hematogenous** or **lymphatic spread** from a distant focus, **direct extension** from a contiguous site, or **ingestion of milk products** infected with **Mycobacterium bovis**.
- Milk products remain a viable means of mycobacterial infection in some countries, particularly where **raw milk** is consumed.
- The **entire gastrointestinal tract**, from the esophagus to the anus, can be involved.
- The **ileocecal region** is the most common location, involved in **44 to 93% of cases**, followed by the **peritoneum**.
- Visceral organ TB may involve the **liver, gall bladder, spleen, pancreas, kidneys, and adnexa**



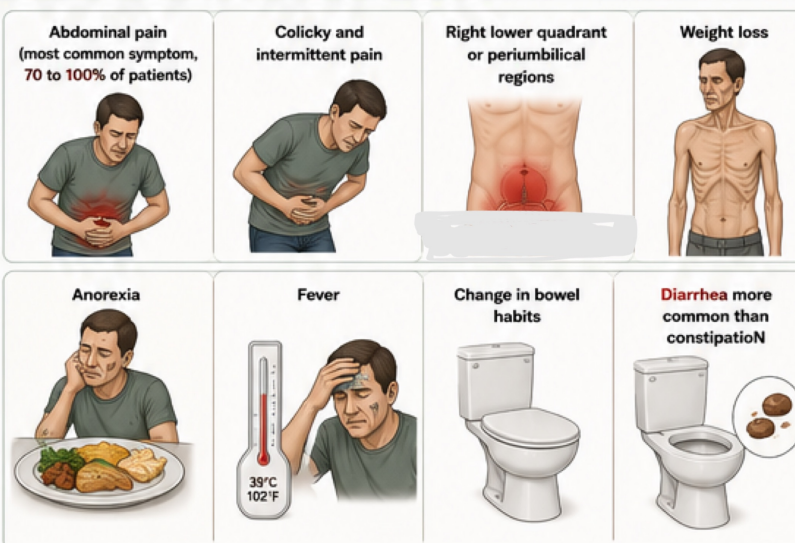
## PATHOGENESIS OF INTESTINAL LESIONS AND COMPLICATIONS

- **Granulomas** with **caseous necrosis** form and release organisms into the lymphatics.
- **Ulcerated mucosa** develops and after healing can lead to **stricture formation**.
- **Complications** include **bleeding, diarrhea, weight loss, luminal obstruction, intussusception, perforation, stricturing disease, and fistulae**



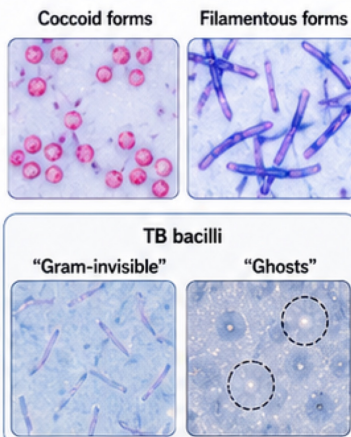
## CLINICAL MANIFESTATIONS OF GASTROINTESTINAL TB

- There are **no pathognomonic signs** for **enteric TB**, and it may mimic **Crohn's disease, colorectal cancer, appendicitis**, and other inflammatory conditions.
- Presentation is **chronic**; symptoms present for **several weeks to months**.
- **Abdominal pain** is the most common symptom, seen in **70 to 100% of patients**, and is usually **colicky and intermittent**, in the **right lower quadrant or periumbilical regions**.
- **Weight loss, anorexia** in addition to **fever** are commonly seen.
- A change in **bowel habits** occurs in **42 to 76% of affected patients**, with **diarrhea more common than constipation**.



## CULTURE AND MORPHOLOGY

- ✓ On artificial media, **coccoid** and **filamentous** forms may be seen.
- ✓ TB bacilli appear as **"Gram-invisible"** or as clear zones called **"ghosts."**
- ✓ The **Ziehl-Neelsen** technique is used for **acid-fast staining** from culture;
- ✓ fluorochrome stains such as **auramine** and **rhodamine** are the **preferred** stains for clinical specimens

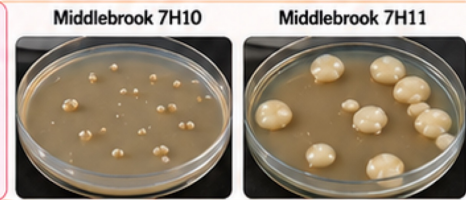


## ACID-FAST STAINING



## NONSELECTIVE AND SELECTIVE MEDIA (ANTIBIOTICS ADDED) USED FOR CULTURE

1. **Semisynthetic agar media**, such as **Middlebrook 7H10** and **7H11**



2. **Inspissated egg media**, such as **Löwenstein-Jensen** (growth in 3-6 weeks)



3. **Broth media**, such as **Middlebrook 7H9** and **7H12**, (e.g., **MGIT BACTEC** commercial system) (give more rapid growth)



Growth rate is slower than other bacteria



**CO<sub>2</sub> enhances growth**



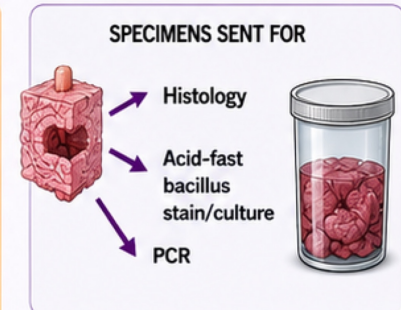
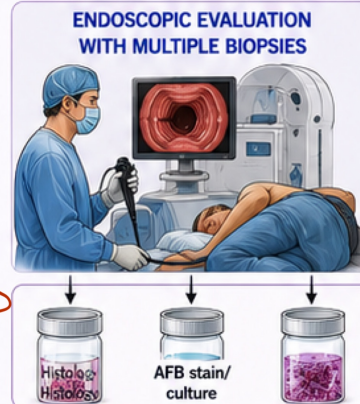
**Saprophytes** grow more rapidly and are less acid fast



Microorganisms that depend on decaying matter

## DIAGNOSIS OF GASTROINTESTINAL TB

- ✓ Diagnosis requires a **high index of suspicion**, especially in patients with abdominal symptoms from an area where TB is endemic.
- ✓ **Endoscopic** evaluation is best facilitated by **multiple biopsies**, with specimens sent for **histology**, **acid-fast bacillus stain/culture**, and **PCR**.
- ✓ Under ideal circumstances, mucosal biopsy specimens demonstrate **acid-fast bacilli** or **caseous necrosis**, but the prevalence of these findings is **low**.
- ✓ Acid-fast bacillus **staining and culture** has **low sensitivity** but **high specificity** and remains an important component of testing (**Abdominal TB is a paucibacillary disease**)



PCR analysis of mucosal biopsy specimens has **high specificity** and is **more sensitive** than acid-fast stains and culture.



## TUBERCULIN SKIN TEST (TST)



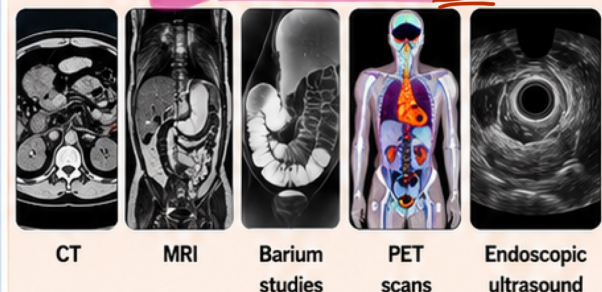
Can't differentiate between active and latent TB; TST often yield **false negative results**.

## INTERFERON GAMMA RELEASE ASSAYS (IGRAs)



IGRAs (such as **QuantiFERON-TB Gold Plus** or **T-SPOT.TB**) may help **differentiate** intestinal TB from **Crohn's disease**.

**IMAGING STUDIES PROVIDE SUPPORTIVE INFORMATION BUT RARELY ESTABLISH THE DIAGNOSIS ALONE**

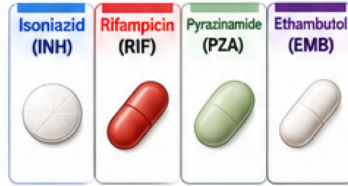


# TREATMENT OF ABDOMINAL TB

## 1. STANDARD 4-DRUG REGIMEN

A standard 4-drug regimen consisting of **isoniazid**, **rifampicin**, **pyrazinamide**, and **ethambutol** is recommended.

**RIPE**



## 2. TREATMENT DURATION

These 4 drugs are used for the **first 2 months**, followed by **isoniazid and rifampin** for an additional 4 months.



3. Most treatment guidelines recommend a **6-month** course of anti-TB therapy for luminal TB.



4. **Prolonged** therapy may be needed when concern for **disseminated disease** is present.

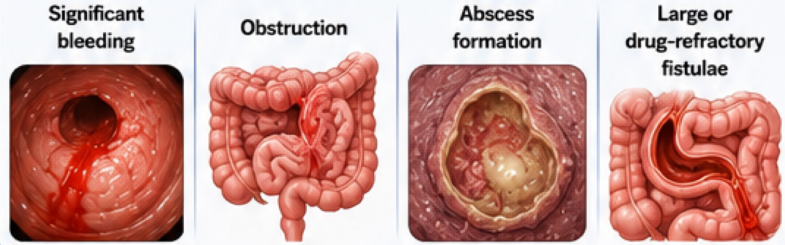


5. **Surgery** is an adjunct for complications such as **significant bleeding**, **obstruction**, **abscess formation**, and **large or drug-refractory fistulae**.

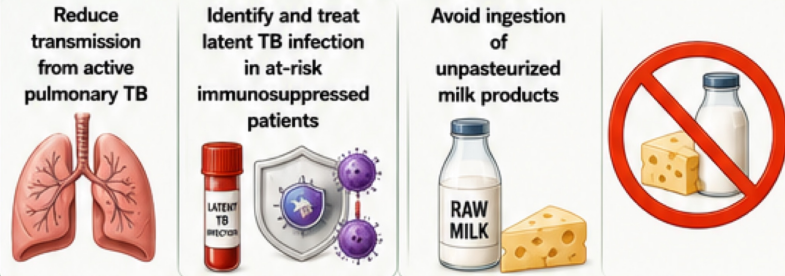


6. Prevention and control include **reducing transmission** from **active pulmonary TB**, identifying and treating **latent TB infection** in **at-risk immunosuppressed patients**, and avoiding ingestion of **unpasteurized milk products**.

## COMPLICATIONS REQUIRING SURGERY (ADJUNCT)



## PREVENTION AND CONTROL



## LEPTOSPIRA: MORPHOLOGY, CULTURE, AND GROWTH

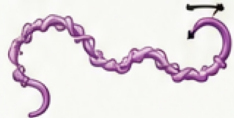
• **Leptospirosis** is a **zoonosis** of worldwide distribution caused by **spirochetes** of the genus *Leptospira*.



• There is **one** pathogenic species, *Leptospira interrogans*, but more than **200 serovars**.



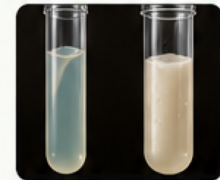
• Leptospirae are **tightly coiled, thin, flexible spirochetes** with one end forming a **hook**.



• They are **actively motile**, best seen using a **dark-field microscope**.



• Leptospirae grow best under **aerobic** conditions at **28–30°C** in semisolid medium, such as **Ellinghausen-McCullough-Johnson-Harris medium**.



• Leptospirae can **survive for weeks** in water, particularly at **alkaline pH**.



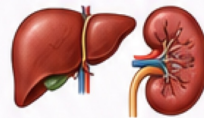
## PATHOGENESIS, CLINICAL FINDINGS, AND IMMUNITY



• Human infection usually results from leptospirae entering through **breaks in the skin and mucous membranes**; ingestion is considered less important.



• **Incubation period** is **1–2 weeks**, after which spirochete establish themselves in parenchymatous organs (particularly **liver** and **kidneys**).



• **Organ dysfunction** due to hemorrhage and necrosis may result in **jaundice**, **hemorrhage**, and **nitrogen retention**.



• The illness is often **biphasic**; the second phase develops when the **IgM antibody titer** rises.



• The second phase often manifests as **aseptic meningitis**, with intense headache, stiff neck, and pleocytosis of the CSF.



• **Many** infections are **mild or subclinical**.



• **Serovar-specific immunity** follows infection, but reinfection with **different serovars** may occur.

## LEPTOSPIROSIS: TRANSMISSION CYCLE



# LEPTOSPIROSIS: DIAGNOSIS, TREATMENT, EPIDEMIOLOGY, AND PREVENTION

التسلسل الكامل ببساطة  
 1. البكتيريا تدخل الدم → أعراض عامة.  
 2. الجسم يصنع IgM.  
 3. تبدأ المرحلة المناعية.  
 4. قد تلتفب السحايا → aseptic meningitis.  
 يعني المشكلة في المرحلة الثانية ليست من كثرة البكتيريا نفسها، بل من رد فعل المناعة ضدها

### SPECIMENS

Specimens include **blood** in a heparin tube, **CSF**, **tissues**, and carefully collected **urine**; **serum** is collected for **agglutination tests**.

### TREATMENT

Treatment of **mild leptospirosis**: **oral doxycycline, ampicillin, or amoxicillin**.

Treatment of **moderate or severe disease**: **intravenous penicillin, ampicillin, or ceftriaxone**.

### MICROSCOPIC EXAMINATION

Dark-field examination or **Giemsa-stained thick smears** may show **leptospirae** in **fresh blood** from early infections; dark-field examination of **centrifuged urine** may also be positive.

### CULTURE

Culture can be done in **semisolid medium**, but **growth is slow** and cultures should be kept for **at least 8 weeks**.

### EPIDEMIOLOGY

Human infection is **accidental** after contact with water or materials contaminated with **animal excreta** (**rats, mice, wild rodents, cattles** etc.).

### SEROLOGIC DIAGNOSIS

Diagnosis is most often confirmed **serologically**.

Agglutination test

agglutination AB → First appears 5-7 days after infection → Peaks 5-8 weeks

### PREVENTION

Prevention includes **avoiding contaminated water**, **rodent control**, and **doxycycline 200 mg orally once weekly** during heavy exposure as **prophylaxis**.



## COXIELLA BURNETII

*C. burnetii* causes **Q fever** and is a small obligate organism that **grows only in cytoplasmic vacuoles**.

It has a membrane similar to **Gram-negative** bacteria, but **does not stain with Gram stain**.

It is **resistant to drying**, survives for months in **dried feces** or **milk**, and may survive **60°C for 30 minutes**.

موجود في اللبن البودري

It is **found in nature**. **Phase I** is the **virulent infectious** form; **Phase II** is **not infectious** and occurs after serial passage in cell culture.

*C. burnetii* is found in **ticks**, which transmit the **agent** to **sheep, goats, and cattle**, but transmission by ticks to humans is **uncommon**.

cats in labor → because of placental aerosols during labor

Main reservoirs are **sheep, goats, cattle, and parturient cats**; infection occurs mainly by **inhalation** of contaminated dust or aerosols from **placenta, dried feces, urine, or milk**.

Ingestion of **unpasteurized dairy** less common.

## COXIELLA BURNETII: DISEASE, DIAGNOSIS, TREATMENT, AND PREVENTION

### DISEASE

**Acute Q fever** resembles influenza, atypical pneumonia, and hepatitis, with antibodies to **phase II antigen**.

### DIAGNOSIS

Diagnosis is mainly by **serology**.

### TREATMENT

Treatment of **acute Q fever**: **doxycycline**; newer macrolides may treat acute pneumonia.

**Chronic Q fever** lasts more than 6 months; **infective endocarditis** is the most common form, with high antibodies to **phase I antigen**.

**PCR** is useful in culture-negative endocarditis caused by *C. burnetii*.

**Chronic Q fever**: **doxycycline + hydroxychloroquine** for 18 months or longer; **valve replacement** may occasionally be required.

### PREVENTION

Prevention: **pasteurization at 71.5°C for 15 seconds** destroys viable *Coxiella* species.

