Zoonosis

Zoonosis

- **An infection or infestation shared in nature by humans and other animals**
  - **Stedman's Medical Dictionary, 27th Edition**

Zoonotic transmission

- **Possible routes:**
  - **Fecal Oral – bacterial, parasitic**
  - **Inhalation**
  - **Direct Contact**
  - **Vector Borne – mosquitoes and ticks**
  - **Penetrating Wounds**

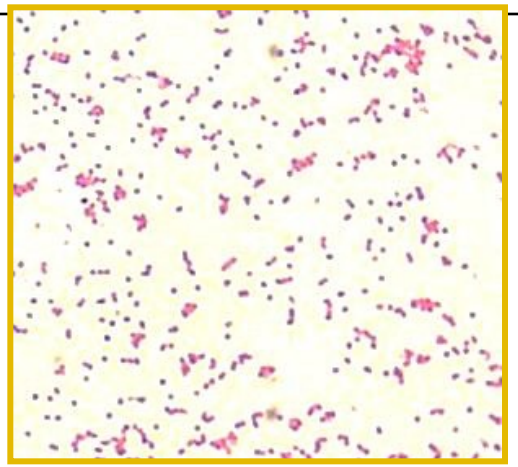
Brucella

- **Incubation variable (1-2 mo. common)**
- **Irregular fever, headache, sweats, chills**
- **No evidence of person to person spread**

Brucella

- **People become infected via direct contact with infected tissues, blood, urine, vaginal discharges, aborted material**
- **Can cause infection if inhaled**
- **Can cause infection if consumed**

Brucella spp.



- Gram negative coccobacillus
  - Facultative, intracellular organism
- Multiple species
  - Associated with certain hosts
- Environmental persistence
  - Withstands drying
  - Temperature, pH, humidity
  - Frozen and aborted materials, dust, soil

Populations at Risk

- Occupational disease
  - Cattle ranchers/dairy farmers
  - Veterinarians
  - Abattoir workers
  - Meat inspectors
  - Lab workers
- Hunters
- Travelers
- Consumers
  - Unpasteurized dairy products

Brucella melitensis

- Distribution
  - Mediterranean, Middle East, Central Asia, Central America
- Incidence
  - Mediterranean, Middle East
    - 78 cases/100,000 people/yr
  - Arabic Peninsula
    - 20% seroprevalence; 2% active cases
- 100 to 200 U.S. cases annually
  - Unpasteurized cheeses

Brucella abortus

- Distribution
  - Worldwide
  - Eradicated in some countries
- Notifiable disease in many countries
  - World Organization for Animal Health (OIE)
    - Poor surveillance and reporting due to lack of recognition
    - Fever of unknown origin (FUO)

Brucella canis

- Distribution
  - Probably worldwide
- Prevalence unknown
  - United States: 1 to 19%
  - Mexico: up to 28%
  - Central and South America: 30%
- Human infections
  - Possible but uncommon

Transmission in Humans

- Ingestion
  - Raw milk, unpasteurized dairy products
  - Rarely through undercooked meat
- Mucous membrane or abraded skin contact with infected tissues
  - Animal abortion products
    - Vaginal discharge, aborted fetuses, placentas

- Aerosol
  - Laboratory, abattoirs
  - Pens, stables, slaughter houses
- Inoculation with vaccines
  - *B. abortus* strain 19, RB-51
  - *B. melitensis* Rev-1
  - Conjunctival splashes, injection
- Person-to-person transmission rare

Disease in Humans

- Incubation period
  - Variable; 5 days to three months
- Multisystemic
  - Any organ or organ system
  - Cyclical fever
- Flu-like illness
  - Chronic illness possible

Complications of Brucellosis

- Most common
  - Arthritis, spondylitis, epididymo-orchitis, chronic fatigue
- Neurological
  - 5% of cases
- Other
  - Ocular, cardiovascular, additional organs and tissues

Congenital Brucellosis

- Variable symptoms
  - Premature delivery
  - Low birth weight
  - Fever
  - Failure to thrive
  - Jaundice
  - Hepatomegaly
  - Splenomegaly
- Abortion risk unclear

Diagnosis in Humans

- Isolation of organism
  - Blood, bone marrow, other tissues
- Serum agglutination test
  - Four-fold or greater rise in titer
  - Samples 2 weeks apart
- Immunofluorescence
  - Organism in clinical specimens
- PCR

Treatment and Prognosis

- Rarely fatal if treated
  - Case-fatality rate <2% (untreated)
  - Antibiotics necessary
  - Death usually caused by endocarditis, meningitis
- About 5% of treated cases relapse
  - Failure to complete treatment
  - Infections requiring surgical intervention

Toxoplasma gondii (toxoplasmosis)

Introduction

- *Toxoplasma gondii* has very low host specificity, and it will probably infect almost any mammal. It has also been reported from birds, and has been found in virtually every country of the world. Like most of the Apicomplexa, *Toxoplasma* is an obligate intracellular parasite. Its life cycle includes two phases called the intestinal (or enteroepithelial) and extraintestinal phases.

- The intestinal phase occurs in cats only (wild as well as domesticated cats) and produces "oocysts." The extraintestinal phase occurs in all infected animals (including cats) and produces "tachyzoites" and, eventually, "bradyzoites" or "zoitocysts." The disease toxoplasmosis can be transmitted by ingestion of oocysts (in cat feces) or bradyzoites (in raw or undercooked meat).

- In most humans infected with *Toxoplasma*, the disease is asymptomatic. However, under some conditions, toxoplasmosis can cause serious pathology, including hepatitis, pneumonia, blindness, and severe neurological disorders. This is especially true in individuals whose immune systems are compromised (e.g., AIDS patients). Toxoplasmosis can also be transmitted transplacentally resulting in a spontaneous abortion, a still born, or a child that is severely handicapped mentally and/or physically.

Symptoms

- Although Toxoplasma infection is common, it rarely produces symptoms in normal individuals. Its serious consequences are limited to pregnant women and immunodeficient hosts. Congenital infections occur in about 1-5 per 1000 pregnancies of which 5-10% result in miscarriage, 8-10% result in serious brain and eye damage to the fetus, 10-13% of the babies will have visual handicaps. Although 58-70% of infected women will give a normal birth, a small proportion of babies will develop active retino-chorditis or mental retardation in childhood or young adulthood.

- In immunocompetent adults, toxoplasmosis, may produce flu-like symptoms, sometimes associated with lymphadenopathy. In immunocompromised individuals, infection results in generalized parasitemia involvement of brain, liver lung and other organs, and often death.

Immunology

- Both humoral and cell mediated immune responses are stimulated in normal individuals. CMI is protective and humoral response is of diagnostic value.

Diagnosis

- Suspected toxoplasmosis can be confirmed by isolation of organism from tonsil or lymph gland biopsy.

Treatment

- Acute infections benefit from pyrimethamine or sulphadiazine. Spiramycin is a successful alternative. Pregnant women are advised to avoid cat litter, handle uncooked meat carefully and undercooked meat.