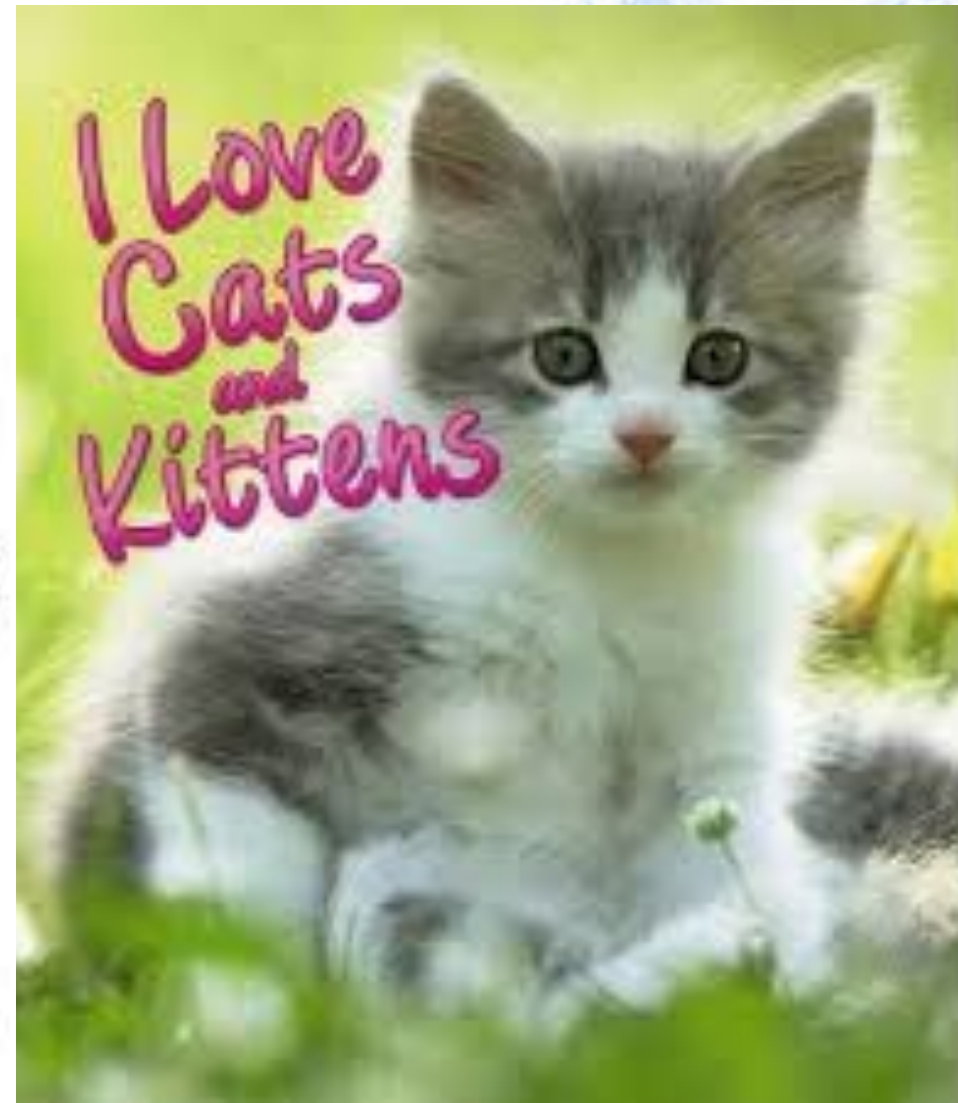
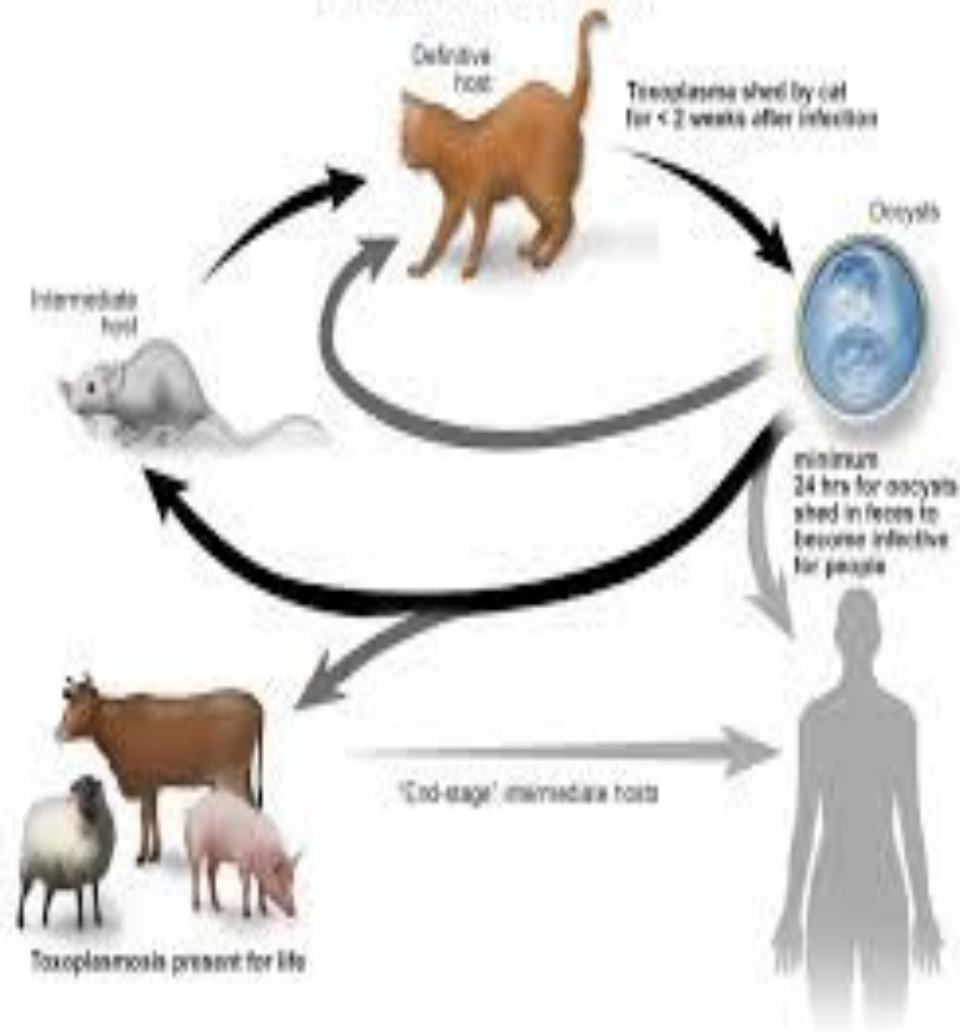


TOXOPLASMOSIS

Hazem Al-Khafaji

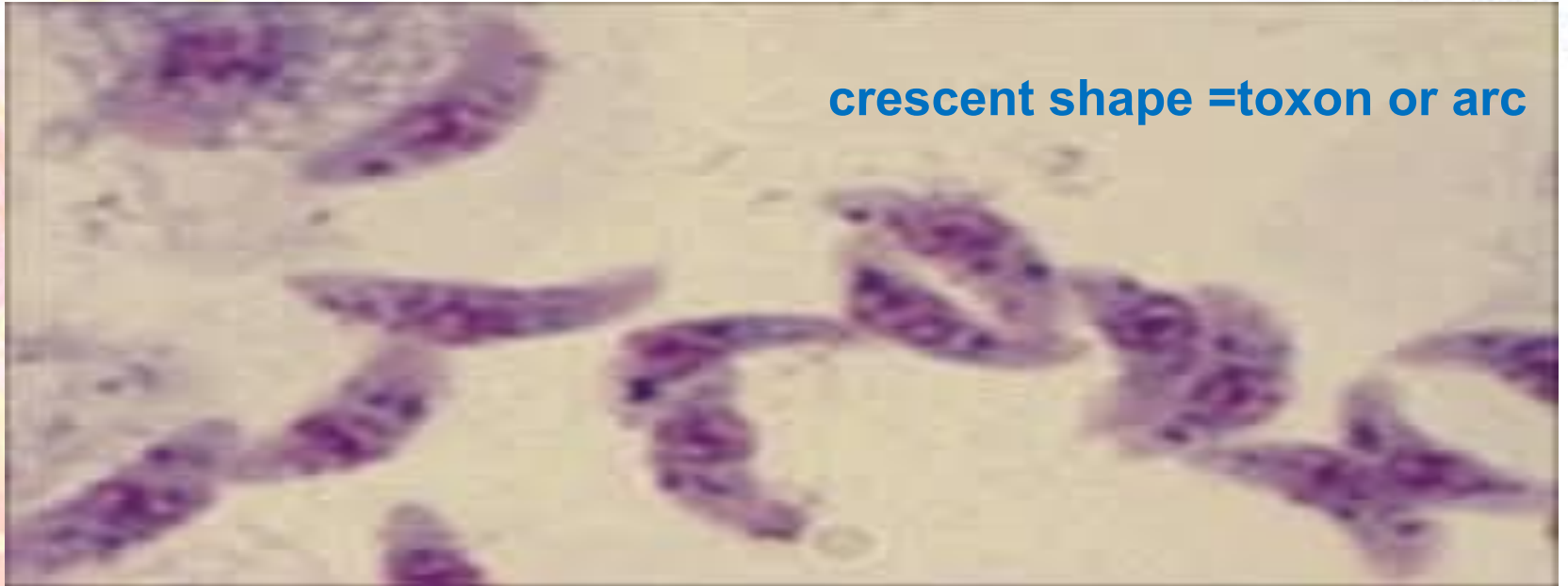
Lecture 8

Life cycle of Toxoplasma



Toxoplasmosis

- في القاموس الطبي العربي يدعى داء المقوسات الطفيلي على شكل قوس) وليس داء القطط.



Introduction

- **Toxoplasmosis, world-wide disease caused by the protozoan parasite *Toxoplasma gondii*, is one of the most common parasitic infections of man and other warm-blooded animals (birds & mammals)**
- Domestic cats & their relatives, the only known definitive hosts for *T. gondii*) are probably the major source of infection**
- Most cases of toxoplasmosis in humans are acquired by ingestion of infected meat containing tissue cysts with bradyzoites or food contaminated with cat feces containing oocysts**
- .Nearly one-third of humanity has been exposed to this parasite**
- . If the pregnant woman acquired the infection ,especially in 1st trimester .can cause stillbirth,blindness and mental retardation**
- T. Gondii* is still constitute a public health problem among pregnant .women and considered one of the abortion factor**

Introduction

Most immunocompetent adults asymptomatic (up to 90%), but the minority had mild mononucleosis like picture (fever & .lymphadenopathy)

It cause devastating disease including encephalitis in .immunocompromised individuals like patients with HIV infection

Recently discovered its association with mental disorders including .schizophrenia and bipolar disorder

Diagnosis is usually achieved by serology (4 folds increasing IgM Ab .titers, in the absence of IgG Ab indicates recent infection)

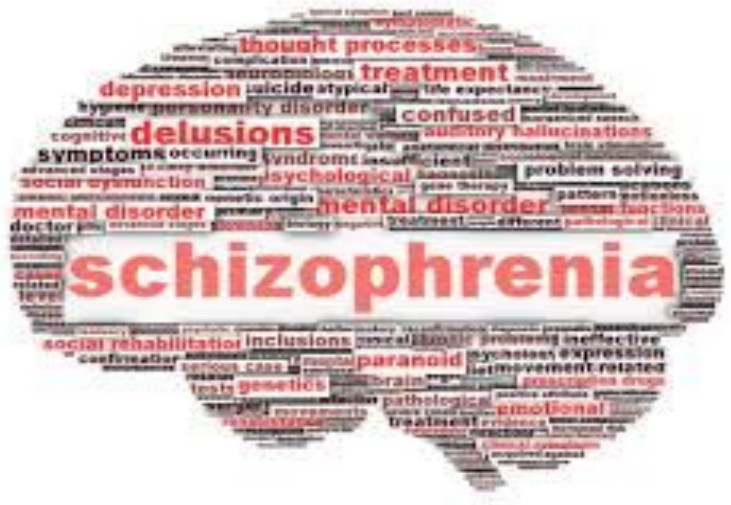
.Or high titer of IgG Ab

.Tissue cysts may be observed in stained biopsy specimens

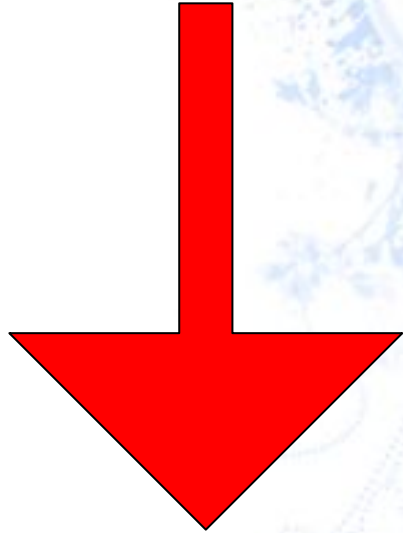
Diagnosis of congenital infections can be confirmed by detecting *T.*

gondii DNA in amniotic fluid using molecular methods such as PCR

.Obstetric ultrasonography can detect congenital malformations



Toxoplasmosis



schizophrenia



Historical Facts—Toxoplasmosis

- **T.Gondii was first discovered in 1908 in Tunis within the tissue of the gondi, in the same year it was also described in Brazil in rabbits.**
- **Re-discovered in 1935 in the brain tissue of guinea pigs.**
- **In 1939 it was found as the cause of encephalitis in a 31 day old infant.**
- **In 1969 infective cysts were detected in the stools of cats.**

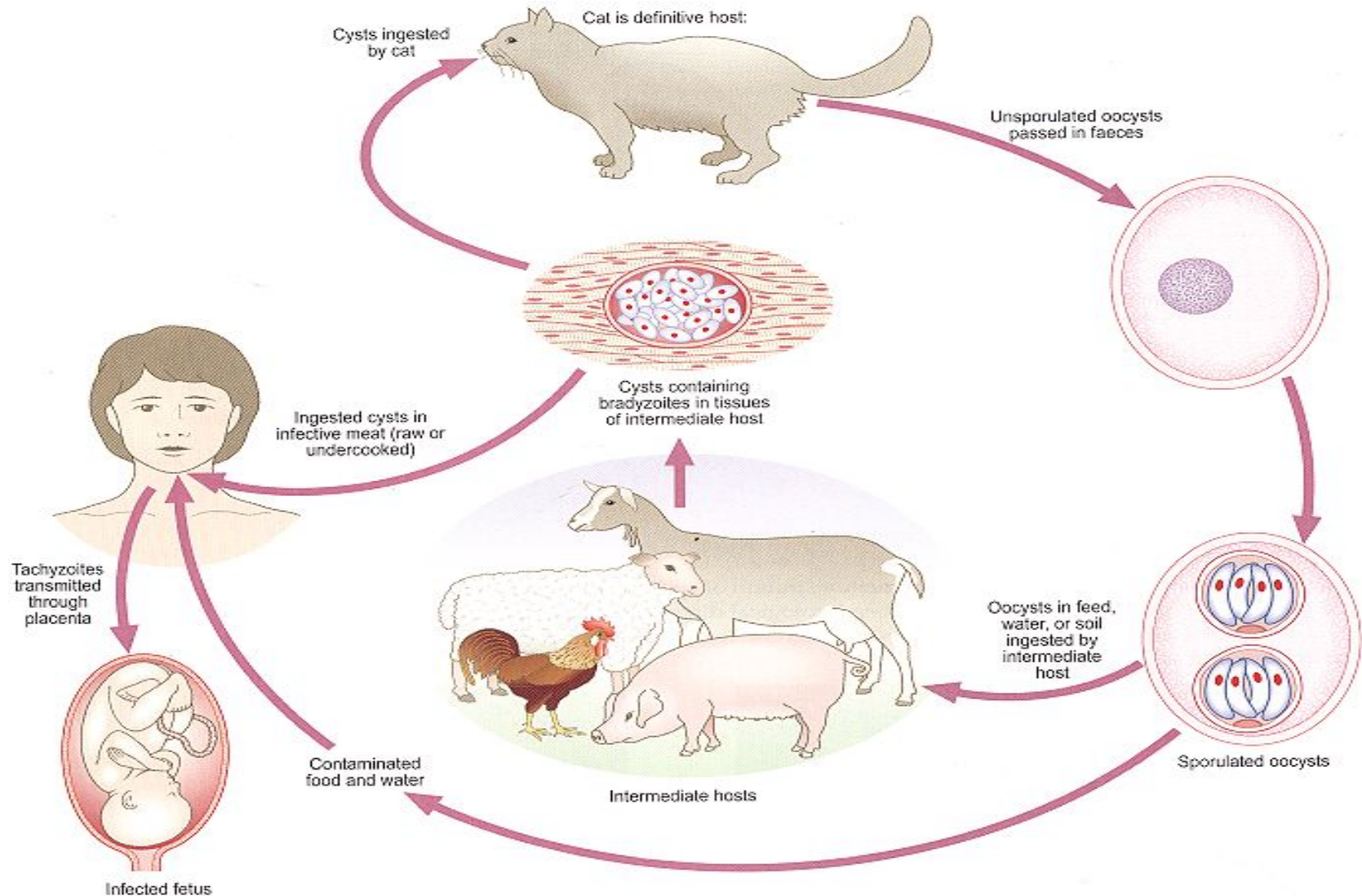
The gondi (*Ctenodactylus gondi*), a small rodent from North Africa



www.aids-images.ch

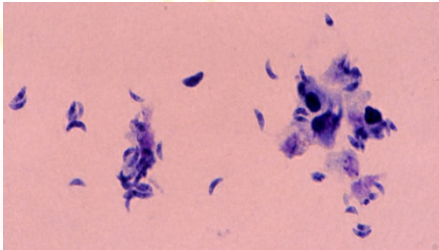
Toxoplasma gondii, Life-cycle

Life cycle



Toxoplasma gondii

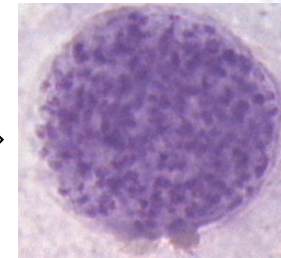
ACUTE PHASE



Tachyzoites: rapidly dividing forms in macrophages and lymphocytes as well as free in the plasma



CHRONIC PHASE



Bradyzoites: slowly dividing forms.

Enclosed by thin cyst so called tissue cyst which is infectious.

Most commonly in skeletal muscle, myocardium, brain, and eyes.

Immunity +

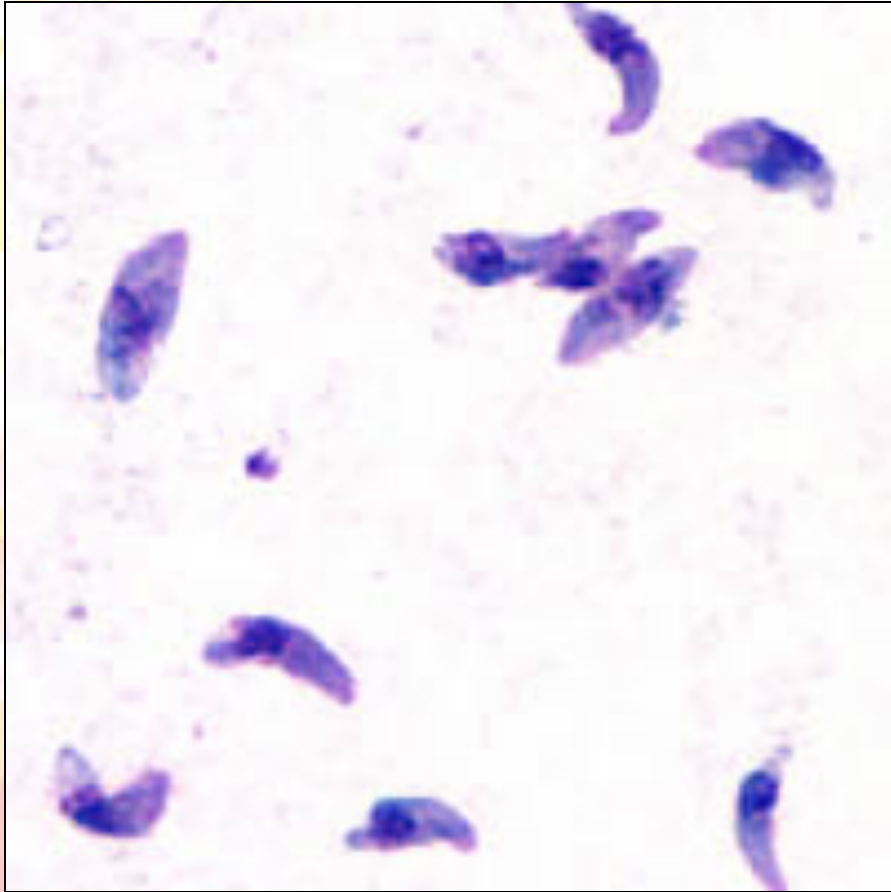
Immunity -

ACTIVATION

LIFE CYCLE

- :There are three forms of the parasite**
- The tachyzoite, which is the asexual -1**
 - .invasive form**
- The tissue cyst, containing -2**
 - bradyzoites, which persists in tissues of**
 - infected hosts during the chronic phase**
 - .of the infection**
- The oocyst, containing sporozoites, -3**
 - which is produced during the sexual**
 - cycle in the intestine of members of the**
 - .cat family, the definitive host**

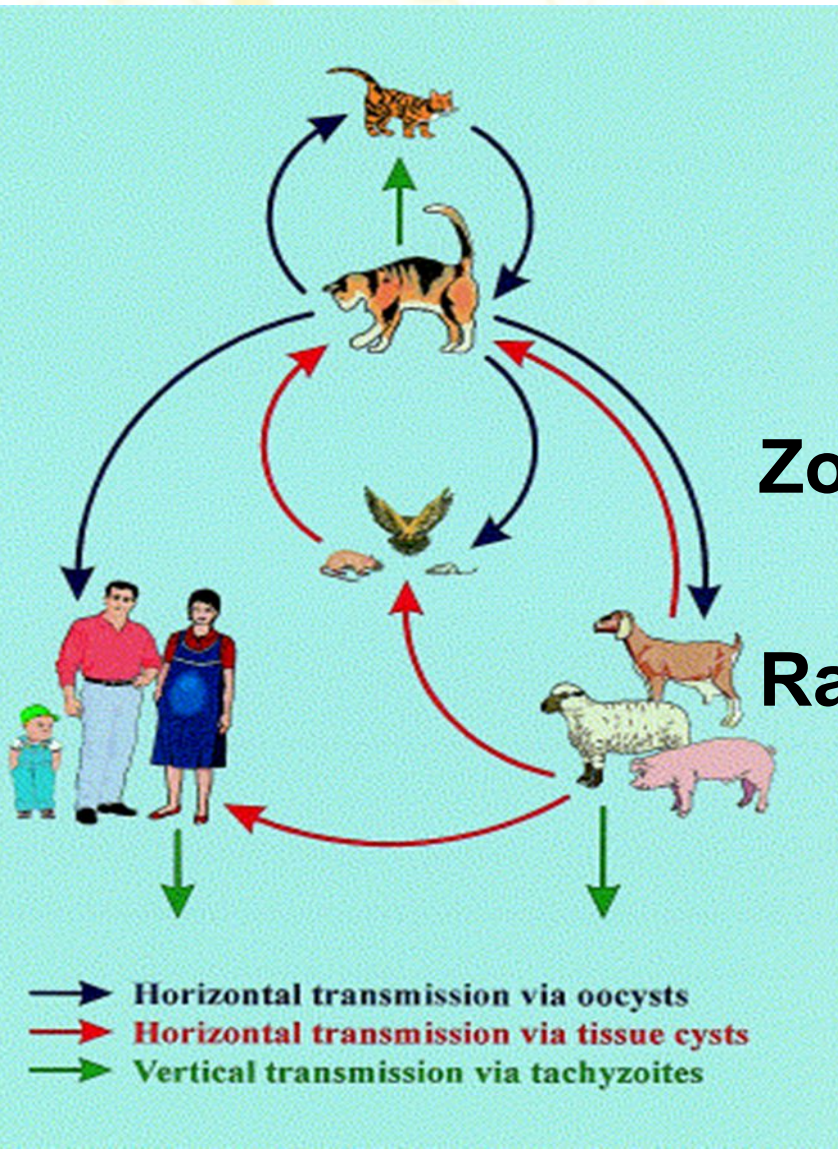
Tachyzoite stage



Toxoplasmosis oocyst



Transmission to humans



**Vertical (congenital)
transmission**

Foodborne transmission

Zoonotic transmission

Rare routes of transmission

Vertical (congenital) transmission

Vertical (congenital) :transmission of pathogen from mother to baby during pregnancy or immediately after birth

Transmission occur if immunocompetent pregnant women recently acquired T. gondii infection(during pregnancy) and in immunocompromised pregnant women with reactivation of their chronic

Babies are most at risk of acquired toxoplasmosis if their mothers become infected in the third trimester and least at risk if the mother .become infected during the first trimester

On the other hand, the earlier in pregnancy the infection occurs, the more .serious the outcome for baby

in 1st trimester ,the probability of transmission is low but if occur it may leads to severe consequences for the unborn child, such as stillbirth .stillbirth or miscarriage or diseases of the nervous system and eyes

Foodborne transmission

The tissue form of the parasite (a microscopic cyst containing the •
:bradyzoites) can be transmitted to humans by food. by

A- Eating undercooked, contaminated meat (especially pork, lamb)

B - Accidental ingestion of undercooked, contaminated meat after handling it and not washing hands thoroughly (Toxoplasma cannot be absorbed through intact skin)

C - Eating food that was contaminated by knives, utensils, cutting boards, or other foods that had contact with raw, contaminated meat

Commercial cuts of lamb, beef, and pork may contain tissue cysts that remain infectious unless the meat is frozen to (-20°C) or heated throughout to (66°C)

Zoonotic transmission

- **Cats play an important role in the spread of toxoplasmosis. They become infected by eating infected rodents, birds, or other small animals. Cats may excrete millions of oocysts after ingesting only one . bradyzoite or one tissue cyst**
- **.The parasite is then passed in the cat's feces in an oocyst form**
- **Kittens and cats can shed millions of oocysts in their feces for as long .as 3 weeks after infection**
- **It contaminates the litter box, soil or water in the environment as well.**
- **:People can be infected by**
 - **A- Accidental ingestion of oocysts after cleaning a cat's litter box**
 - **B- Accidental ingestion of oocysts after touching or ingesting anything that has come into contact with a cat's feces that contain Toxoplasma.**
 - **C- Accidental ingestion of oocysts in contaminated soil (e.g., not washing hands after gardening or eating unwashed fruits or vegetables .from a garden)**
 - **.D- Drinking water contaminated with the Toxoplasma parasite**

Rare routes of transmission

Blood transfusion-1

Organ transplantation:A-Solid organ-2

Heart

Liver

Pancreas

Kidney

Small bowel

B-Hematopoietic stem cells

Laboratory accident-3

Types of o infection

-1: Congenital .

**-2: Acquired :Primary or
Reactivation of latent
infection in case:**

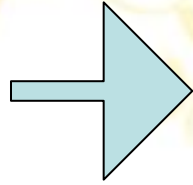
- Immunocompromised e.g.
AIDS**

- Immunosuppression e.g.
drugs**

Congenital Toxoplasmosis

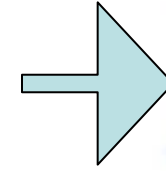


tissue cysts in the brain of the mice

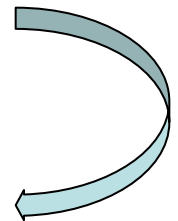


sexual cycle occurs
.only in cats

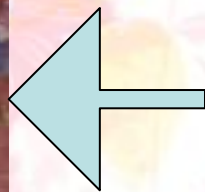
the oocysts can infect
humans and other
.intermediate hosts



Tachyzoites in
pregnant women
are capable of
infecting the
fetus



Congenital
toxoplasmosis



The earliest acquired
infection the worst outcome

congenital toxoplasmosis

Transplacental infection resulting in congenital infection can occur in immunocompetent pregnant women with recently acquired *T. gondii* infection and in immunocompromised pregnant women with .reactivation of their chronic infection

Congenital transmission has been shown to vary considerably, depending on the time during .gestation the mother acquired her infection .In the 1st trimester the least transmission
Approximately 85% of infants with congenital .infection appear normal at birth

Congenital Toxoplasmosis

- .Intracerebral calcification-1 toxoplasmic encephalitis
- Chorioretinitis . Ocular toxoplasmosis-2
- .Hydrocephaly-3
- . Microcephaly-4
- .Convulsions-5
- . Mental retardation-6
- . Cardiomegaly-7

Congenit
al
dis



Intracranial calcification



MONTREAL GEN. HOSP. D CLEMENT 08

Chorioretinitis

Inflammation of retina &
.choroid

The choroid is the
pigmented vascular layer

.(coat) of the eye



Clinical features

Immunocompetent

- **Infection is mostly asymptomatic in healthy individuals.**
- **Only 10-30% of toxoplasma infections are symptomatic in immunocompetent adults**
- **In acute infection:**
 - **Lymphadenitis is the most common feature.**
 - **(generalized lymphadenopathy)**
 - **Flu-like symptoms (Headache, fever, muscle pain) the infection is generally self limited & symptom usually resolve in few months.**
 - **Acute choroïdo-retinitis which may result in blindness.**

Clinical features

Immune compromised

- **Causes Encephalitis, for immunosuppressed patients and people infected with (AIDS). immunocompromised individuals, infection results in generalized parasitemia involvement of brain(encephalitis), liver ,lung and other organs, and often death.**

DIAGNOSIS

:Toxoplasmosis can be diagnosed by

.Isolation of the organism -1

.A- Polymerase chain reaction (PCR) methods

B- Direct identification & demonstration of tachyzoites in peripheral blood, amniotic fluid, body fluids & tissues & by histologic or cytologic analysis

.Serologic testing -2

Sabin-Feldman dye test

is a sensitive and specific neutralization •

.IgG&IgM antibodies test

IgG Antibodies positive test indicate •

exposure to infection & negative test rule

out exposure to infection(unless the

patients immune compromised), but

increasing titers of IgG suggest acute

.infection

single high IgM antibody positive test •

indicate infection in the past 3-6months, but

.rising 4 folds titers indicate acute infection

Obstetric ultrasound scan

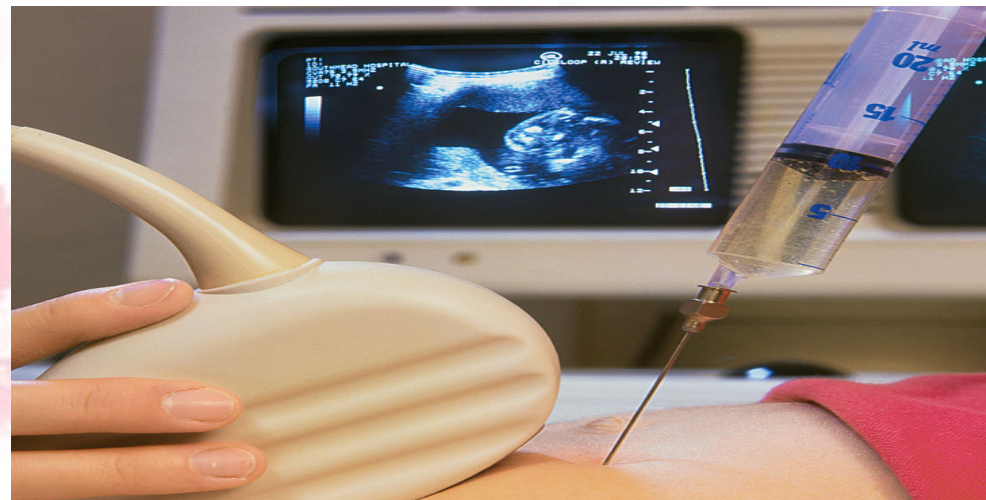
This test uses sound waves to produce images of the baby in utero. A detailed ultrasound can't diagnose toxoplasmosis. It can however, show whether the baby has certain signs, hydrocephaly, intracranial calcifications or hepatosplenomegaly. However, a negative ultrasound .doesn't rule out the possibility of infection



amniocentesis

Done around 18th week of pregnancy (if highly suspicion of fetal infection) •

A long needle is inserted into the Amniotic sac and •
.amniotic fluid is drawn



Treatment of acute INFECTION IN ■ PREGNANT WOMEN

Spiramycin :has been stated to reduce the incidence
of fetal infection by about 60%

If prenatal diagnosis reveals infection in the fetus,
the pregnant patient should receive Sulfadiazine and
pyrimethamine plus folic acid to treat the fetus

**Sulfadiazine and pyrimethamine plus folic acid for
patient with AIDS**

Prevention & Control

- **Hands should be washed after contact with raw meat or in contact with soil.**
- **Vegetables should be washed well .**
Avoid undercooked meats.
- **If you are owned by a cat**
 - **Keep it inside if possible.**
 - **Don't feed it raw meat.**
 - **Avoid contact with cat during pregnancy..**



**This is a cat, does not hate you because your ethnicity,
.your denomination, your gender & your appearance**
هذه القطة لا تكرهك بسبب اصلك العرقي ولا بسبب مذهبك ولا بسبب جنسك ولا بسبب
مظهرك



**Thank
you**