Lecture No. 29 PARASITOLOGY DR.Raad H.H. Protozology

## "Piroplasms"

* **Classification**

**Phylum Apicomplexa**

**Sub class PIROPLASMIA**

**Order PIROPLASMIDA**

**Family Theileriidae**

**Family Characters:**

* + 1. **merogony** in **vertebrate** host in various cell types such as **lymphocytes** , histiocytes, erythroblasts, or other cells prior to invasion of erythrocytes; lymph nodes common site.
    2. **stages invade erythrocytes**, which may or may not divide; if they divide, produce 2-4 daughter cells
    3. binary fission and merogony occur in tick
    4. transstadial transmission
    5. all known vertebrate hosts mammals
    6. **two genera** :
       1. ***Theileria*; about 40 known species**

1. small-medium exoerythrocytic meronts; 10-20 micrometers in diameter
2. meronts in lymphocytes
3. in ruminants
4. host specific
5. All blood stages have apical complex
6. pear- to rod-shaped **(smaller than Babesia**)
   * + 1. ***Cytauzoon***; only 4 known species

***Genus Theileria***

***Theileria parva***

**life cycle:**

1. sporozoites injected into cattle with bite of **ixodid** **ticks**, especially ***Rhipicephalus appendiculatus***.
2. enter lymphocytes
3. merogony in **lymphocytes**; about **90 "macromerozoites" or called "Koch's Blue Bodies" per "macromeront " or called "Macroschizont" ;it is the most risky stage in the disease.**
4. **liberated merozoites enter lymphoid tissues and undergo merogony; about 80-90 "micromerozoites" per second generation "micromeront."**
5. micromerozoites liberated in lymphoid tissues may invade new lymphoid cells and under merogony as micromeronts; if micromerozoites invade erythrocytes, undergo binary fission (some species undergo **erythrocytic** merogony)
6. micromeronts can induce clonal expansion of the infected host cells
7. some merozoites now initiate gamont formation
8. gamonts ingested along with blood meal by tick
9. **in** lumen of **tick**, **gamonts differentiate into macrogametes and microgametocytes ("ray bodies")**
10. 4 microgametes produced; one fertilizes macrogamete; **zygote** produced
11. **ookinete** (motile zygotes) form and migrate through gut wall
12. ookinete **enters hemolymph**, **migrates to salivary glands**
13. **sporogony** in acini of **salivary** glands, releasing numerous sporozoites which remain dormant in salivary glands

**Pathology** involves high fever, nasal discharge, swollen lymph nodes e.g. periscpular ; precrural ; parotid lymph nodes , runny eyes, weakness, diarrhea, emaciation, and death in 25-90% of the cases, depending upon the species of parasite ,strain , site of tick bite , multiplication rate of macromerozoits (lymph node) **,** multiplication rate of micromerozoits **(erythocytic).**

**\*similar species include *Theileria annulata* in cattle (Mediterranean coast fever)**

[](http://jcm.asm.org/cgi/content/full/43/12/5907/F1)FIG.: Blood smear photograph showing *Theileria* sp. (sable) schizonts in lymphoblastoid cells. Magnification, x250.

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**THEILERIOSIS:**

Disease caused by Small **piriform** parasites of red blood cells and lymphocytes of mammals. Theileria parva causes " East Coast Fever" , one of the most important diseases of cattle in eastern and central Africa. **transstadial transmission**

**Epidemiology**

1. Theileria spp. are transmitted by one, two or three host ticks.
2. Theileria parva is transmitted primarily by the brown cattle tick Rhipicephalus appendiculatus
3. Geographic distribution: worldwide
4. Transstadial transmission
   * Stage-to-stage transmission, i.e. larval to nymph, nymph to adult.
5. **Factors** involved in animal **susceptibility** :
   * + 1. **Species** of animal
       2. **Breed** : local breed more resistant than imported .
       3. **Strain**
       4. **Virulence**
       5. **Species of Theileria are host specific**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***T.annulata*** | **cattle** | **pathogenic** | **++** | **Mediterranean Coast Fever** | **Hyalomma** |
| ***T.parva*** | **=** | **Most =** | **+++** | **Bovine Tropical Thelieriosis** | **R. appendiculatus** |
| ***T.herci*** | **sheep** | **= =** | **+++** | **Ovine malignant Thelieriosis** | **Hyalomma** |
| ***T.ovis*** | **=** | **pathogenic** | **++** | **Ovine begnin Thelieriosis** | **Rhipicephalus** |
| ***T.camelensis*** | **camel** | **mild** | **+** | **Camel begnin Thelieriosis** | **Hyalomma** |

**Clinical signs:**

* 1. Clinical syndrome associated with schizogony
* 2. Incubation period 9-24 days
* 3. Enlargement of lymph nodes near site of tick bite
* 4. Fever **(41 C)**
* 5. Anorexia
* 6. Diarrhea
* 7. Cough and mucous discharge from eyes and nostrils
* 8. Leucopenia
* 9. Anemia
  + Anemia is caused by red cell rupture and by immune-mediated events

**Immunity**

* Premunition
  + Immunity is based on parasite's continued presence.

Humoral &cellular immunity.

**Diagnosis**

* 1. Samples of superficial lymph nodes from biopsy or necropsy -Giemsa stain
* 2 Thin blood smear
* 3. Serology
  + a. IFA
  + b. CF
  + c. HAT

**Treatment**

* **Menoctone** has been effective against parasites in tissue culture.
* **Berenil is not effective against Theileria spp**.

**Control**

* Control **tick** populations by frequent **dipping**, spraying, or dusting.