

EQUINE PIROPLASMOSIS

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Equines	Tick-borne	Acute, subacute or chronic disease characterised by erythrolysis: fever, progressive anaemia, icterus, haemoglobinuria (in advanced stages).	Sometimes fatal, in particular in acute <i>T.equi</i> infections. When haemoglobinuria develops, prognosis is poor.	Babesiosis: Imidocarb (Imizol, Carbesia, Forray) Dimenazene diacetate (Berenil) Theileriosis: Buparvaquone (Butalex)	<i>In houses</i> Tick control <i>in zoos</i> Tick control

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Susceptible animal groups Horse (<i>Equus caballus</i>), donkey (<i>Equus asinus</i>), mule, zebra (<i>Equus zebra</i>) and Przewalski (<i>Equus przewalskii</i>), likely all <i>Equus</i> spp. are susceptible to equine piroplasmosis or biliary fever.	
Causative organism <i>Babesia caballi</i> : belonging to the phylum of the Apicomplexa, order Piroplasmida, family Babesiidae; <i>Theileria equi</i> , formerly known as <i>Babesia equi</i> or <i>Nutallia equi</i> , apicomplexa, order Piroplasmida, family Theileriidae. <i>Babesia canis</i> has been demonstrated by molecular diagnosis in apparently asymptomatic horses. A single case of <i>Babesia bovis</i> and two cases of <i>Babesia bigemina</i> have been detected in horses by a quantitative PCR.	
Zoonotic potential Equine piroplasmoses are specific for <i>Equus</i> spp. yet there are some reports of <i>T.equi</i> in asymptomatic dogs.	
Distribution Widespread: <i>B.caballi</i> occurs in southern Europe, Russia, Asia, Africa, South and Central America and the southern states of the US. <i>T.equi</i> has a more extended geographical distribution and even in tropical regions it occurs more frequent than <i>B.caballi</i> , also in the Mediterranean basin, Switzerland and the SW of France.	
Transmission Species of vector ticks vary according to the region. In Europe and in Russia, the vectors are <i>Dermacentor marginatus</i> , <i>Dermacentor reticulatus</i> (= <i>pictus</i>), <i>Dermacentor silvarum</i> , <i>Hyalomma anatolicum</i> , <i>Hyalomma marginatum</i> , <i>Hyalomma volgense</i> , <i>Rhipicephalus bursa</i> and <i>Rhipicephalus sanguineus</i> . The vector in northern Africa is <i>Hyalomma dromedarii</i> and <i>Anocentor nitens</i> in north America. <i>D.reticulatus</i> is a 3-host tick, with larval and nymphal instars feeding on rodents, adult stages on dogs and ungulates, mainly horses. Vertical transmission is possible: adult females become infected and transmission to the vertebrate host is assured by the adults of the second generation. . <i>Anocentor nitens</i> is a one host (horse) tick. Larval, nymphal and adult (male and female) instars transmit <i>B.caballi</i> . to the vertebrate host. Mechanical transmission by syringe is possible, intra-uterine infection is not uncommon during the last three months of gestation but this happens probably more frequently when <i>T. equi</i> is involved. <i>T. equi</i> is transmitted by <i>Dermacentor reticulatus</i> (= <i>pictus</i>), <i>Rhipicephalus bursa</i> ; <i>Hyalomma anatolicum</i> , <i>Hyalomma marginatum</i> in southern Europe, <i>Hyalomma dromedarii</i> and <i>Rhipicephalus sanguineus</i> in central Asia. Where in general <i>Babesia</i> spp. can transovarially be transmitted, for <i>T.equi</i> the development to sporozoites in salivary glands and the transmission to the vertebrate host are typical for <i>Theileria</i> spp. i.e. the transmission is not transovarial but transstadial, larvae or nymphs are infected and transmission is done by	



nymphs or adults.

Incubation period

Incubation times for both species vary from 5 days to four weeks.

Clinical symptoms

Both species cause a destruction of the erythrocytes with all the consequences involved i.e. the typical symptoms (fever, anaemia, icterus, haemoglobinuria). Erythrolysis is less pronounced when *B.caballi* is involved than in case of *T.equi*. Foals are less susceptible and in an endemic region, clinical cases are rare because foals become infected while still being protected by maternal antibodies.

B.caballi is pathogenic though its virulence is variable. *B. caballi* can cause obstructions of capillaries and in a similar way as *B.bovis* does, it can cause vasodilatation and hypotension, leading to shock and sometimes sudden death.

Horses are more susceptible than the other equidae and adult horses more than foals. Naive horses introduced in an endemic region are highly susceptible. Patent infections can become clinical under stress conditions. In *B.caballi* babesiosis, anaemia and icterus are common but haemoglobinuria is rare, very often mobility is impaired even with posterior paralysis in acute cases (obstruction of brain capillaries). Although often the infection goes unnoticed, lesions similar to bovine babesiosis can develop. Upon recovery horses remain carriers for 10 months to 4 years.

In general, infections with *T. equi* are more serious than those caused by *B.caballi*. The parasitaemia in case of *T.equi* is sometimes very elevated hence erythrocyte destruction is massive. The process is acute or subacute, often fatal; mortality can reach 60 %.

Intra-uterine infection results often in abortions however infected foals may be born alive but showing the disease at / or soon after birth.

Foals are less affected than adult equidae, protective antibodies may persist for 8 to 9 months in the blood of recovered animals though long term immunity is cell-mediated.

Post mortem findings

The general aspect of equine biliary fever resembles bovine theileriosis: anaemic and icteric organs, hydrothorax, ascites, hydropericard, subcutaneous oedema, spleno- and hepatomegaly with distension of the gall bladder, lungcongestion and enlarged lymphnodes.

Haemorrhages on the external and internal mucosae and hypertrophy and inflammation of the lymph nodes are more pronounced in case of *T. equi*.

Diagnosis

Confirmation of the clinical diagnosis can be done by Giemsa-stained blood smears, usually not a problem in acute forms but practically impossible in chronic *B.caballi* cases, whereas occasionally possible in *T. equi* cases. Piroplasms of *B.caballi* are big and resemble those of *B.bigemina*. Paired forms (2 - 5 x 2 µm) lie in a sharp angle. Annular and oval shapes measure 1.5 - 3 µm. Parasitaemia of *B.caballi* is usually low in the peripheral blood circulation, exceeding rarely more than 10 %, parasites are more abundant in the capillary vessels of the organs.

Piroplasms of *T.equi* are small measuring 2.0 x 1.0 µm, circular, but mostly piriform and in the latter shape usually presented as a Maltese cross i.e. in a group of 4 united by their top ends in the shape of a cross, sometimes even 8 elements can be found in a single cell.

Complement fixation test (CFT) has been selected as the test of choice in several countries, allowing detection of acute cases and chronic carriers, becoming negative soon after treatment and with little cross-reactions between both species. IFAt is even more sensitive and recommended in combination with CFT.

Elisa is more useful in sero - epidemiological surveys, yet improved results for individual diagnosis with i.a. an indirect Elisa were reported, however obtaining specific antigens might be problematic.

Molecular diagnosis:

Material required for laboratory analysis

Thin blood smears or EDTA-blood samples.

Parasitaemias in latent infections are often too low to be detected.

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Relevant diagnostic laboratories ITM 155 Nationalestraat, B-2000 Antwerp, Belgium
Treatment In general, proper treatment (Dimenazene 3.5 mg/kg b.w. – x2 after 24 h in case of <i>T.equi</i> - or imidocarb 2.4 mg/kg b.w. – x2 after 24h for <i>T.equi</i>) usually cures the disease but does not always eliminate parasites from chronic carriers. Imidocarb is the treatment of choice for sterilization, but even 4 doses of 4 mg/kg with an interval of 3 days - a regimen already lethal for donkeys - are not always sufficient to eliminate <i>T.equi</i> (strain differences were reported in this respect). <i>T. equi</i> is distinctly less sensitive to drugs in use for treatment of <i>B.caballi</i> , anti-theilerial drugs can be used against <i>T. equi</i> : e.g. Buparvaquone (Butalex) at 2.5 - 6 mg/kg i.v. or i.m., yet even then sterilization is hard to achieve, better results are reported when combined with imidocarb. Tetracyclines (5.5 mg/kg b.w. IV for 2 days or longer) act against <i>T.equi</i> only.
Prevention and control in zoos Specific attention to tick prevention by acaricidal treatment in imported animals is recommended. Chemoprophylaxis for 3 to 6 weeks against <i>B.caballi</i> is reported with imidocarb (3 mg/kg b.w.)
Suggested disinfectant for housing facilities
Notification
Guarantees required under EU Legislation
Guarantees required by EAZA Zoos
Measures required under the Animal Disease Surveillance Plan
Measures required for introducing animals from non-approved sources
Measures to be taken in case of disease outbreak or positive laboratory findings
Conditions for restoring disease-free status after an outbreak
Contacts for further information
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