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## CLINICAL AND THERAPEUTIC ASPECTS IN CYTAUZOON FELIS INFESTATION IN DOMESTIC CATS-CASE REPORT

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### Abstract:

In Romania, studies on the protozoan infestation of the species *Cytauxzoon felis* in domestic cats, taxonomically included in the class Aconoidasida, order Piroplasma, family Theileriidae, genus *Cytauxzoon*, are relatively few. The purpose of this paper is to highlight the clinical and paraclinical aspects regarding the evolution following the infestation with the protozoan *Cytauxzoon felis* in domestic cats, which presented symptoms of anorexia, fever (>40°C), jaundice, ataxia, idiopathic subcutaneous edema. The clinical signs, in the cats taken in the study, were not eloquent, that is why we resorted to paraclinical examinations regarding the complete blood count, blood biochemical examination, May Grunwald Giemsa-stained peripheral blood smear and PCR examination, following which it was identified, in two, from the cases of cats studied, the presence of the protozoan *Cytauxzoon felis*, along with *Mycoplasma haemofelis*. According to the bibliographic studies, in addition to general supportive treatment, etiological medication was also administered, using a combination of two antibiotics, Azithromycin and Atovaquone, in therapeutic doses. Due to the intolerance to Atovaquone, it was necessary to replace it with Clindamycin, in therapeutic doses, obtaining a symptomatic improvement and a negative result in the PCR examination.

### Introduction

*Cytauxzoon felis* is a parasite known in the United States that shows an important expansion in Europe, it is often associated with a high degree of mortality in domestic felines being related to the presence of ticks (*Dermacentor variabilis*, *Amblyomma americanum*) or with certain wild felines that are considered natural reservoirs (*Lynx rufus*).

There was an increase in the incidence of *Cytauxzoon felis* infestation in the spring and summer in line with the activity of transmitting vectors, affecting mostly young cats.

For the purpose of diagnosing this condition, blood smears can be performed, colorful May Grunwald Giemsa and by PCR methods. (3,4)

Several studies indicate the use of Atovaquone (15 mg/kg) and Azithromycin (10 mg/kg) in the treatment of *Cytauxzoon* osis, which led to an increase in the survival rate and even the cure of patients. (2)

### Material and method

This study was carried out in Romania, on domestic felines that were diagnosed as suffering from *Cytauxzoon*osis, so felines that showed clinical signs and were associated with pathology but were not confirmed by laboratory tests for various reasons, were not noted and included in this study.

In the clinic of the Faculty of Veterinary Medicine, a number of two European felines, aged 1 and 4 years, with similar anamnesis and who showed clinical symptoms of severe anemia, hyperthermia and anorexia, were presented at the difference of a few days.

Differential diagnosis was initially made with *Mycoplasma haemofelis* and *Babesia felis*, by cytological examination and PCR.

### Results and discussions

Table 1  
Values of haematological blood parameters in cats infested with *Cytauxzoon felis*

Test	Result	Reference range	LOW/NORMAL/ HIGH
RBC	7,5M/μL	6,54-12,20	NORMAL
HCT	25,8%	30,3-52,3	LOW
HGB	9,0 g/dl	9,8-16,2	LOW
MCV	34,4 fL	35,9-53,1	LOW
MCH	12,0 pg	11,8-17,3	NORMAL
MCHC	34,9 g/dl	28,1-35,8	NORMAL
RDW	30,3%	15,0-27,0	HIGH
RETIC- HGB	14,4 PG	13,2-20,8	NORMAL
WBC	15,81 K/μL	3,0-50,0	NORMAL
NEU	12,01 K/μL	2,30-10,29	HIGH
LYM	2,72 K/μL	0,92-6,88	NORMAL
MONO	0,78 K/μL	0,05-0,67	HIGH
EOS	0,29 K/μL	0,17-1,57	NORMAL
BASO	0,01 K/μL	0,01-0,26	NORMAL
PLT	476 K/μL	151-600	NORMAL
MPV	20,0 fL	11,4-21,6	NORMAL
PCT	0,95%	0,17-0,88	HIGH

Table 2  
Values of haematological blood parameters in cats infested with *Cytauxzoon felis*

Test	Result	Reference range	LOW/NORMAL/ HIGH
RBC	11,4 M/μL	6,54-12,20	NORMAL
HCT	40,6%	30,3-52,3	NORMAL
HGB	14,6 g/dl	9,8-16,2	NORMAL
MCV	36,8 fL	35,9-53,1	NORMAL
MCH	13,2 pg	11,8-17,3	NORMAL
MCHC	36,0 g/dl	28,1-35,8	HIGH
RDW	27,4%	15,0-27,0	HIGH
RETIC- HGB	1,1 PG	13,2-20,8	LOW
WBC	9,88 K/μL	3,0-50,0	NORMAL
NEU	1,49 K/μL	2,30-10,29	LOW
LYM	6,07 K/μL	0,92-6,88	NORMAL
MONO	1,89 K/μL	0,05-0,67	HIGH
EOS	0,25 K/μL	0,17-1,57	NORMAL
BASO	0,18 K/μL	0,01-0,26	NORMAL
PLT	235 K/μL	151-600	NORMAL
MPV	16,3 fL	11,4-21,6	NORMAL
PCT	0,38%	0,17-0,88	NORMAL

Table 3  
Values of biochemical blood parameters in cats infested with *Cytauxzoon felis*

Test	Result	Reference range	LOW/NORMAL/ HIGH
GLU	240 mg/dL	74-159	HIGH
SDMA	8 μg/dL	0-14	NORMAL
CREA	0,4 mg/dL	0,8-2,4	LOW
BUN	12 mg/dL	16-36	LOW
PHOS	5,0 mg/dL	3,1-7,5	NORMAL
CA	7,8 mg/dL	7,8 - 11,3	NORMAL
TP	7,6 g/dL	5,7-8,9	NORMAL
ALB	2,7 g/dL	2,2-4,0	NORMAL
GLOB	4,9 g/dL	3,0-50,0	NORMAL
ALT	73 U/L	12-130	NORMAL
ALKP	15 U/L	14-111	NORMAL
GGT	0 U/L	0-4	NORMAL
TBIL	0,3 K/μL	0,0-0,9	NORMAL
CHOL	100 mg/dL	65-225	NORMAL
AMYL	1361 U/L	500-1600	NORMAL
LIPA	444 U/L	100-1400	NORMAL

Table 4  
Values of biochemical blood parameters in cats infested with *Cytauxzoon felis*

Test	Result	Reference range	LOW/NORMAL/ HIGH
GLU	254 mg/dL	74-159	HIGH
CREA	0,4 mg/dL	0,8-2,4	LOW
BUN	22 mg/dL	16-36	NORMAL
PHOS	3,4 mg/dL	3,1-7,5	NORMAL
CA	7,5 mg/dL	7,8 - 11,3	LOW
TP	6,7 g/dL	5,7-8,9	NORMAL
ALB	2,5 g/dL	2,2-4,0	NORMAL
GLOB	4,2 g/dL	3,0-50,0	NORMAL
ALT	47 U/L	12-130	NORMAL
ALKP	10 U/L	14-111	LOW
GGT	0 U/L	0-4	NORMAL
TBIL	0,7 K/μL	0,0-0,9	NORMAL
CHOL	179 mg/dL	65-225	NORMAL
AMYL	307 U/L	500-1600	LOW
LIPA	484 U/L	100-1400	NORMAL

Table 5  
The results of the PCR examination in the cat, infested with *Cytauxzoon felis*

Genome Identification	Result
<i>Babesia</i> spp.	Undetected
<i>Anaplasma</i> spp.	Undetected
<i>Ehrlichia</i> spp.	Undetected
<i>Dirofilaria immitis</i>	Undetected
<i>Mycoplasma haemofelis</i>	Detected
<i>Feline parvovirus</i>	Undetected
<i>Feline coronavirus</i>	Undetected
<i>Cytauxzoon</i> spp.	Detected
<i>Bartonella</i> spp.	Undetected
<i>Rickettsia</i> spp.	Undetected

Table 6  
The results of the PCR examination in the cat, infested with *Cytauxzoon felis*

Genome Identification	Result
<i>Mycoplasma haemofelis</i>	Undetected
<i>Cytauxzoon</i> spp.	Detected

For the differential diagnosis, of certainty, a PCR panel was performed that includes a wide range of parameters for the first cat, and at the second feline a PCR examination was performed only for the purpose of a differential diagnosis, tables 5 and 6.

The results of PCR examination in the case of the first cat indicate the presence of her *haemofelis Mycoplasma* in combination with *Cytauxzoon* spp., and in the second feline was identified only the presence of *Cytauxzoon* spp.

### Conclusions

We would like to draw attention to an increase in the number of clinical cases, correlated with the climatic changes occurring in Romania, regarding the symptomatology associated with the *Cytauxzoon* felis infestation for which certain diagnoses could not be made for various reasons.

It has been demonstrated the efficacy of Clindamycin associated with Azithromycin in treating this parasitosis, with rapid negativeness on PCR examination for both *Mycoplasma haemofelis* and *Cytauxzoon* spp.

The combination of Clindamycin with Azithromycin did not produce any side effects, allowing injectable treatment to be administered in the event of side reactions to Atovaquone.

The appearance of subcutaneous edema could not be correlated with the treatment or medical manipulations performed, so the mechanism of production could not be explained, but it was associated with the presence of pathogenic factor.

The main clinical symptoms such as anemia, fever, hemolytic jaundice may lead to a suspicion of infestation with *Cytauxzoon* spp.



Fig. 1- Clinical symptoms in cats infested with *Cytauxzoon felis* (original)

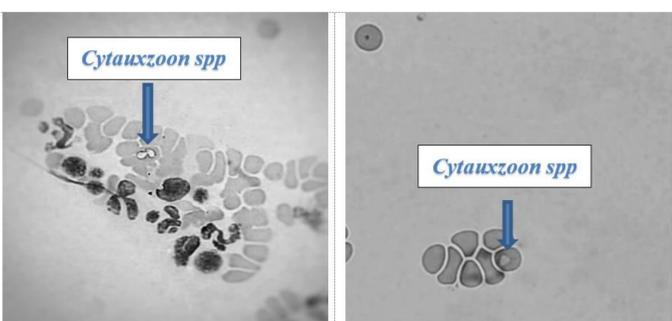


Fig. 2, 3. Microscopic images of *Cytauxzoon* spp. identification in cats (original)