

Hematological Disorders in Dogs and Cats



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Goals of 5 weeks

- First 2 weeks
 - Heart disease
 - Respiratory tract
- Following 2 weeks
 - *Haematological disease*
 - Systemic infections
- Last week
 - Other remarkable notes



SIXTH EDITION

Small Animal Internal Medicine



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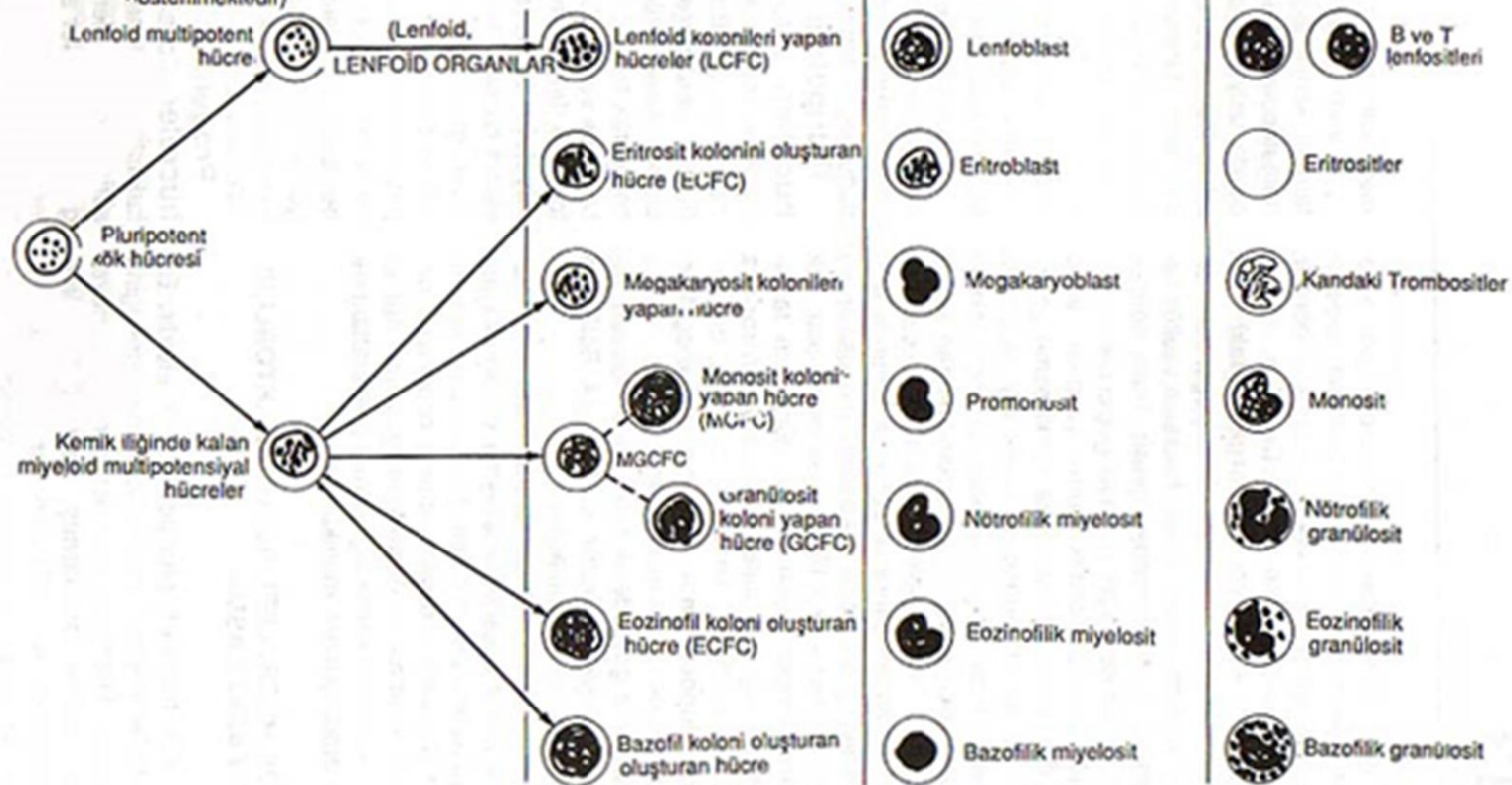
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ELSEVIER



FARKLILAŞMA AŞAMALARI	KÖK HÜCRELERİ		PROJENİTÖR HÜCRELER	ÖNCÜL HÜCRELER (BLASTİK HÜCRELER)	OLGUH HÜCRELER
	Pluripotent	Multipotent			
*Morfolojik özelliklerin ortaya çıkışı	Morfolojik olarak tanımlanamazlar. Lenfositlerin geneli, ürünlerini yansıtır.			Morfolojik farklılaşmanın başlaması	Belirgin morfolojik farklılaşmalar
Mitotik aktivite	Düşük mitotik aktivite, kendini yenisine kemik iliğinde az sayıda bulunur.		Yüksek mitotik aktivite, kendiliğinden yenilenme, ilk ve lenfoid organlarda yaygın mono ya da bipotansiyel	Yüksek mitotik aktivite; kendiliğinden yenilenme ilk ve lenfoid organlarda yaygın mono potansiyel	Mitotik aktivitesi yoktur hematopoietik dokularda bol miktarda bulunurlar.

*Res. 13-6 Bu bölümün başında renkli olarak gösterilmektedir)



Anemia

- Anemia is defined as a decrease in the red blood cell (RBC) mass .
- In practical terms, it can be defined as a decrease in the packed cell volume (PCV), hematocrit (HCT), hemoglobin (Hb) concentration

CBC Results		References
WBC $10^9/l$	7.70	6.00 – 17.00
LYM $10^9/l$	1.17	1.0 – 4.80
MONO $10^9/l$	0.59	0.2 – 1.5
NEUT $10^9/l$	5.84	3.00 – 12.00
EOS $10^9/l$	0.1	0.1 – 19
LY %	15.2	12 – 30
MONO %	7.66	3 – 10
NEUT %	75.8	62 – 87
EOS %	1.29	0.1 – 19
RBC $10^{12/l}$	3.30	5.5 – 8.5
HGB <i>g/dl</i>	8.90	12 – 18
HCT %	26.0	37 – 55
MCV <i>fl</i>	79.0	60 – 77
MCH <i>pg</i>	26.9	19.5 – 24.5
MCHC <i>g/dl</i>	34.1	31 – 34
RDWc %	15.6	
PLT $10^9/l$	38.0	200 – 500
PCT %	0.04	
MPV <i>fl</i>	9.60	3.9 – 11
PDWc %	34.5	

Etiology of Anemia

Disorders Commonly Associated With Anemia, Hepatomegaly, Splenomegaly, and/or Lymphadenopathy

DISORDER	FREQUENCY
Lymphoma	F
Mycoplasmosis	F
Acute leukemias	F
Ehrlichiosis, anaplasmosis, leishmaniasis	F*
Systemic mast cell disease	R
Bone marrow hypoplasia	R
Immune-mediated hemolytic anemia	F

C, Cat; D, dog; F, frequent; R, rare.

*Geographic variation.

Iron deficiency anemia
Leptospirosis

Drugs and Toxins That Can Cause Anemia in Cats and Dogs

Acetaminophen
Antiarrhythmics
Anticonvulsants
Antiinflammatories (nonsteroidal)
Barbiturates
Benzocaine
Chemotherapeutic agents
Chloramphenicol
Cimetidine
Gold salts
Griseofulvin
Levamisole
Methimazole
Methionine
Methylene blue
Metronidazole
Penicillins and cephalosporins
Phenothiazines
Propylthiouracil
Propylene glycol
Sulfa derivatives
Vitamin K
Zinc

Causes of Hemolytic Anemia in Dogs and Cats

DISORDER	SPECIES	BREED
Congenital (Inherited?)		
Pyruvate kinase deficiency	D, C	Dogs: Basenji, Beagle, West Highland White Terrier, Cairn Terrier, Poodle, Dachshund, Chihuahua, Pug, Beagle, Labrador Retriever, American Eskimo Cats: Abyssinian, Somali, Bengal, Egyptian Mau, La Perm, Maine Coon cat, Norwegian Forest cat, Savannah, Siberian, Singapura, domestic short-haired cat
PFK deficiency	D	English Springer Spaniel, Cocker Spaniel, Whippet, Wachtelhund
Stomatocytosis	D	Alaskan Malamute, Miniature Schnauzer
Nonspherocytic hemolytic anemia	D	Poodle, Beagle
Acquired		
IHA	D > C	All
Neonatal isoerythrolysis	C	British breeds, Abyssinian, Somali (other type B cats)
Microangiopathic hemolytic anemia	D > C	All
Infectious		
Mycoplasmosis	C > D	All
Babesiosis	D > C	All (Pitbulls and <i>Babesia gibsoni</i>)
Cytauxzoonosis	C	All
Ehrlichiosis (uncommon)	D > C	All
Hypophosphatemia		
Oxidants		
Acetaminophen	C	All
Phenothiazines	D, C	All
Benzocaine	C	All
Vitamin K	D, C	All
Methylene blue	C > D	All
Methionine	C	All
Propylene glycol	C	All
Zinc	D	All
Drugs That Can Cause Immune Hemolysis		
Sulfa drugs	D > C	Doberman, Labrador Retriever
Barbiturates	D	All
Penicillins and cephalosporins	D > C	All
Propylthiouracil	C	All
Methimazole	C	All
Antiarrhythmics (?)	D	All
Zinc	D	All

C, Cat; D, dog; IHA, immune hemolytic anemia; PFK, phosphofructokinase.

Modified from Couto CG et al.: Hematologic and oncologic emergencies. In Murtaugh R et al., editors: *Veterinary emergency and critical care medicine*, St Louis, 1992, Mosby, p 359.

Clinical Manifestations and Diagnosis of Hematological Disorders

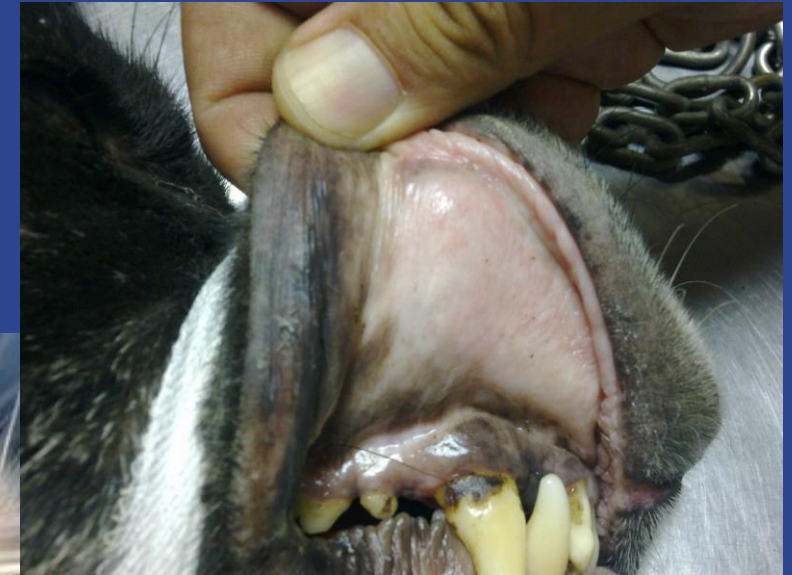
Clinical Manifestations of Anemia in Cats and Dogs

History

- Breed (e.g., congenital enzymopathies, babesiosis in Pitbulls)
- Family history
- Exercise intolerance, syncopal episodes
- Pallor, jaundice
- Localized or generalized bleeding
- FeLV or FIV infection
- Vector-borne diseases (e.g., ehrlichiosis, anaplasmosis, babesiosis)
- Malnutrition, malabsorption
- Chronic inflammation, cancer
- Travel history

Physical Examination

- Pallor, jaundice, petechiae, ecchymoses
- Lymphadenopathy
- Hepatomegaly, splenomegaly
- Tachycardia, heart murmur, cardiomegaly, left ventricular hypertrophy
- Occult blood in the stool
- Hematuria, bilirubinuria

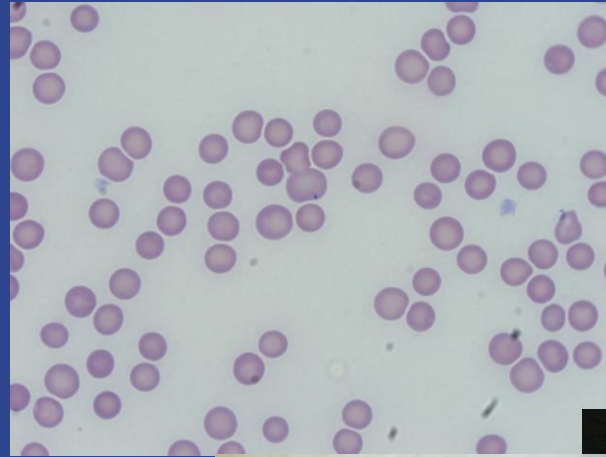


FeLV, Feline leukemia virus; FIV, feline immunodeficiency virus.

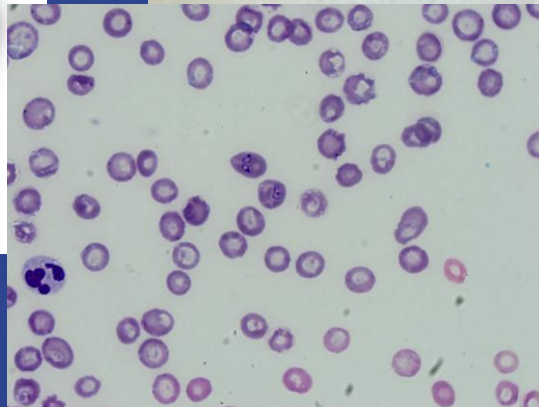
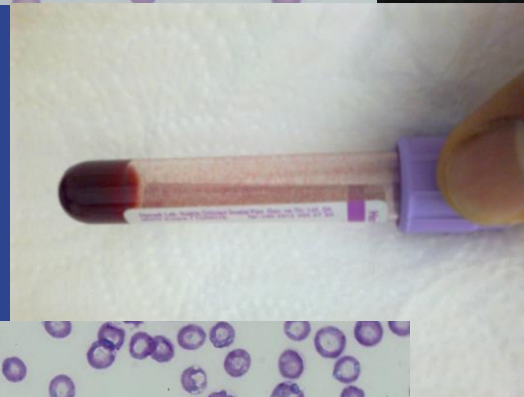


Diagnosis of the Hematological Disease

- CBC
- Serum profiles
- Blood smears
- Ultrasonography



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Treatment

- Iron supplementation
- Oncology---
- Antiparasytic therapy
- Enrofloxacin
- Doxycycline
- Prednisolone
- Imidocarb
- Transfusion



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