

Anämie bei Kleintieren



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Ennetseeklinik Okt 2015

Goldie, 12y Cocker Spaniel, wk

- 1-2 Tage Apathie und Anorexie
- 2x Erbrechen

Klinische Untersuchung

- Lethargie ++
- Shht : Blass/ Ikterus
- Herzgeräusch Li systolisch IV/VI
- Tachykardie / Tachypnoe (HF 140 ; AF 52)

Haematology

| | Alert | Reference Interval |
|---|-------|--|
| Sample condition | | Moderately haemolysed |
| Haemoglobin | L | 3.5 g/dL (12.0 - 18.0 g/L) |
| Red Blood Cells | L | 1.36 x10 ¹² /L (5.50 - 8.50 x10 ¹² /L) |
| Haematocrit | L | <u>0.108</u> L/L (0.370 - 0.550 L/L) |
| Mean Cell Haemoglobin | H | 25.7 pg (19.5 - 24.5 pg) |
| Mean Cell Volume | H | 79.4 fL (62.0 - 77.0 fL) |
| Mean Cell Haem. Conc. | | 32.4 g/dL (32.0 - 36.0 g/dL) |
| White Blood Cells | H | 21.2 x10 ⁹ /L (6.0 - 18.0 x10 ⁹ /L) |
| Band Neutrophils | H | <u>1.27</u> x10 ⁹ /L (0.00 - 0.50 x10 ⁹ /L) |
| Seg Neutrophils | H | <u>17.60</u> x10 ⁹ /L (4.00 - 12.00 x10 ⁹ /L) |
| Lymphocytes | L | 0.21 x10 ⁹ /L (1.00 - 4.80 x10 ⁹ /L) |
| Monocytes | H | 2.12 x10 ⁹ /L (0.10 - 1.80 x10 ⁹ /L) |
| Eosinophils | L | 0.00 x10 ⁹ /L (0.20 - 1.20 x10 ⁹ /L) |
| Basophils | | 0.00 x10 ⁹ /L (0.00 - 0.10 x10 ⁹ /L) |
| Nucleated RBCs % | | <u>3.80</u> % |
| Platelets | | 286 x10 ⁹ /L (200 - 500 x10 ⁹ /L) |
| Red cell morphology from smear | | Moderate visible haemolysis both on the blood smear and in the sample. Moderate <u>anisocytosis and polychromasia</u> with occasional <u>spherocytes</u> and very occasional basophilic stippling. |
| White cell morphology from smear | | The total wbc. has been adjusted for the nucleated rbc's. Vacuolated monocytes and an occasional Dohle body noted. |
| Platelet morphology from smear | | Some large and giant forms seen. |
| % Reticulocyte Count | | 8.60 % |
| Absolute Reticulocyte Count | | <u>117.0</u> x10 ⁹ /L |
| Absolute Retic Count | | An absolute count >60x10 ⁹ /l indicates regenerative response |
| Comment | | |

A microscopic view of several red blood cells (erythrocytes) against a light gray background. The cells are biconcave discs, appearing as light-colored, slightly irregular shapes with a darker center. They are scattered across the frame, with some in sharp focus and others blurred in the foreground or background.

Anämie – Wie soll ich weiter?

Anamnese

- Akut vs. chronisch
- Aufnahme von Toxinen
- Andere Krankheiten?
 - Medikamente



Klassifizierung

Knochenmarkstatus

- Regenerativ
- Nicht-regenerativ

Morphologische Klassifizierung

- MCV und MCHC

Pathophysiologische Klassifizierung

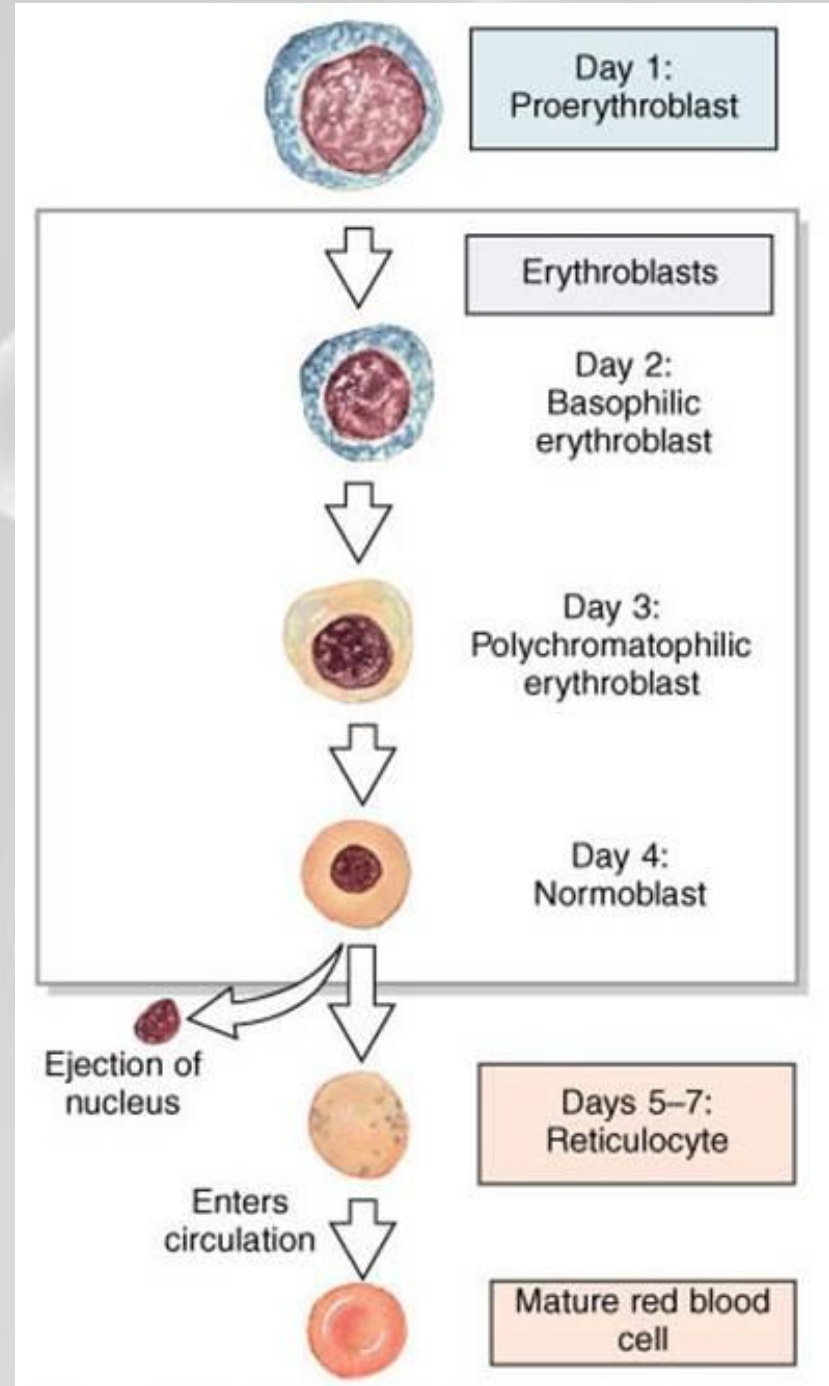
- Verlust (= Haemorrhagisch)
- Zerstörung (= Haemolytisch)
- Verminderte Produktion

The image shows a microscopic view of several red blood cells (erythrocytes) in a light gray background. The cells are biconcave discs, appearing as pale pinkish-red, oval shapes with a darker center. They are scattered across the frame, with some in sharp focus and others blurred in the foreground or background. The text "Regenerativ???" is overlaid in the center of the image.

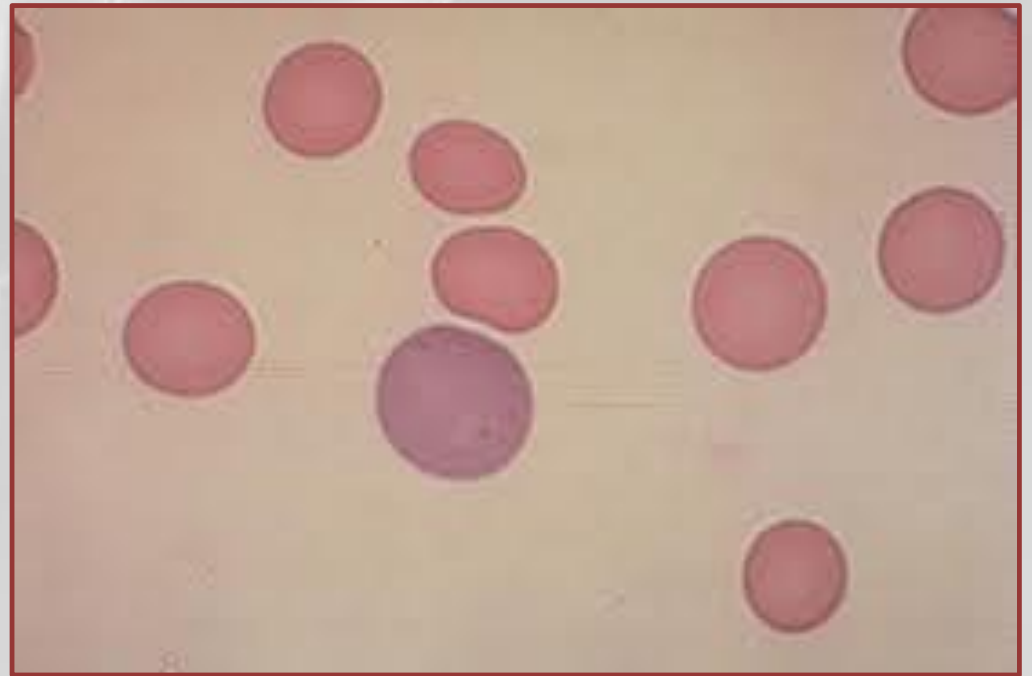
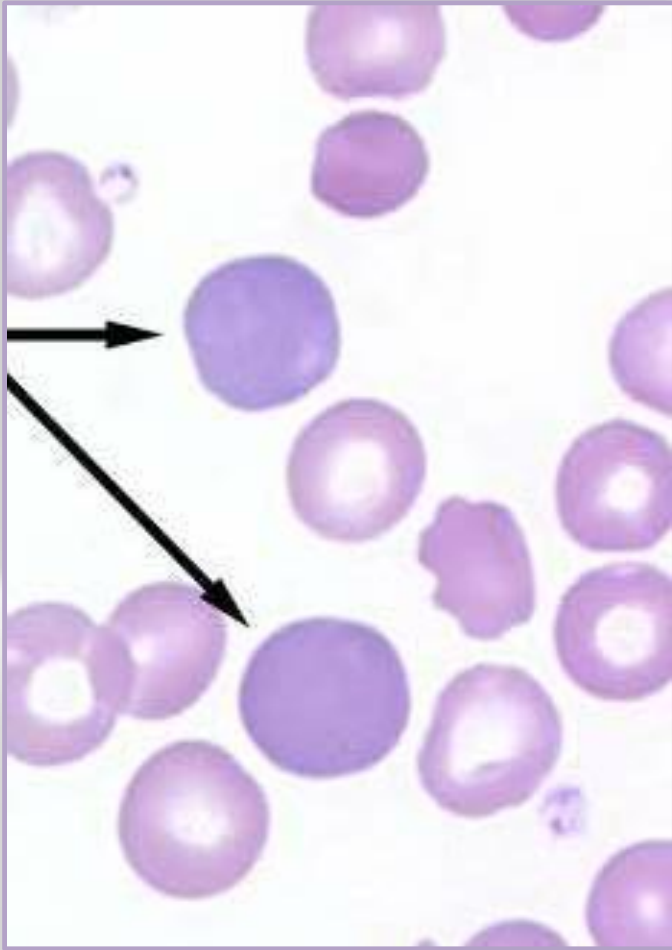
Regenerativ???

Erythropoiese

- Haupthormone:
Erythropoietin
- Normal: nur wenig
Retikulozyten im Blut



Retikulozyten



Knochenmarksantwort

Absolute Retikulozytenzahl ($\times 10^9/L$)

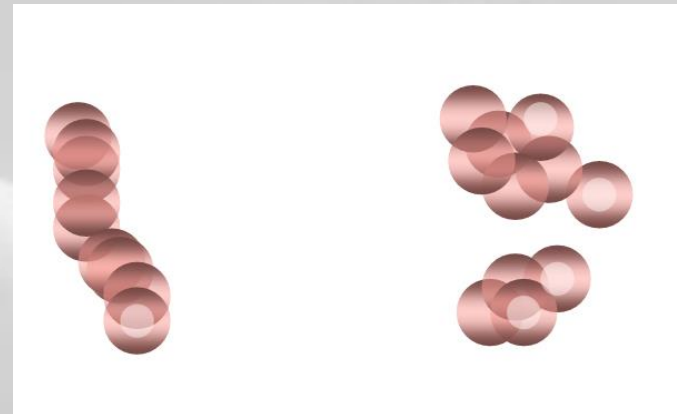
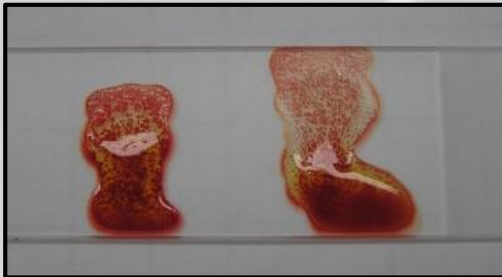
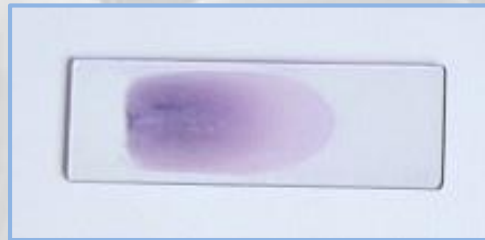
| | Hund | Katze | |
|--------------|---------|-----------|----------|
| | | Aggregate | Punctate |
| Keine | <60 | <40 | <200 |
| Schwach | 60-150 | 40-70 | 200-500 |
| Mittelgradig | 150-300 | 70-100 | 500-1000 |
| Hochgradig | >500 | >200 | >1000 |

Morphologische Klassifizierung

| | |
|-----------------------|---|
| Normozytär normochrom | <u>Nicht regenerative Anämie</u> <ul style="list-style-type: none">- KM Suppression- Entzündliche KH- Prä-regenerative Anämie |
| Makrozytär hypochrom | <u>Regenerative Anämie</u> <ul style="list-style-type: none">- Hämolyse- Blutverlust |
| Makrozytär normochrom | FeLV (Katze) Folatmangel |
| Mikrozytär hypochrom | Eisenmangel PSS Familiäre Microcytose (Akitas) |

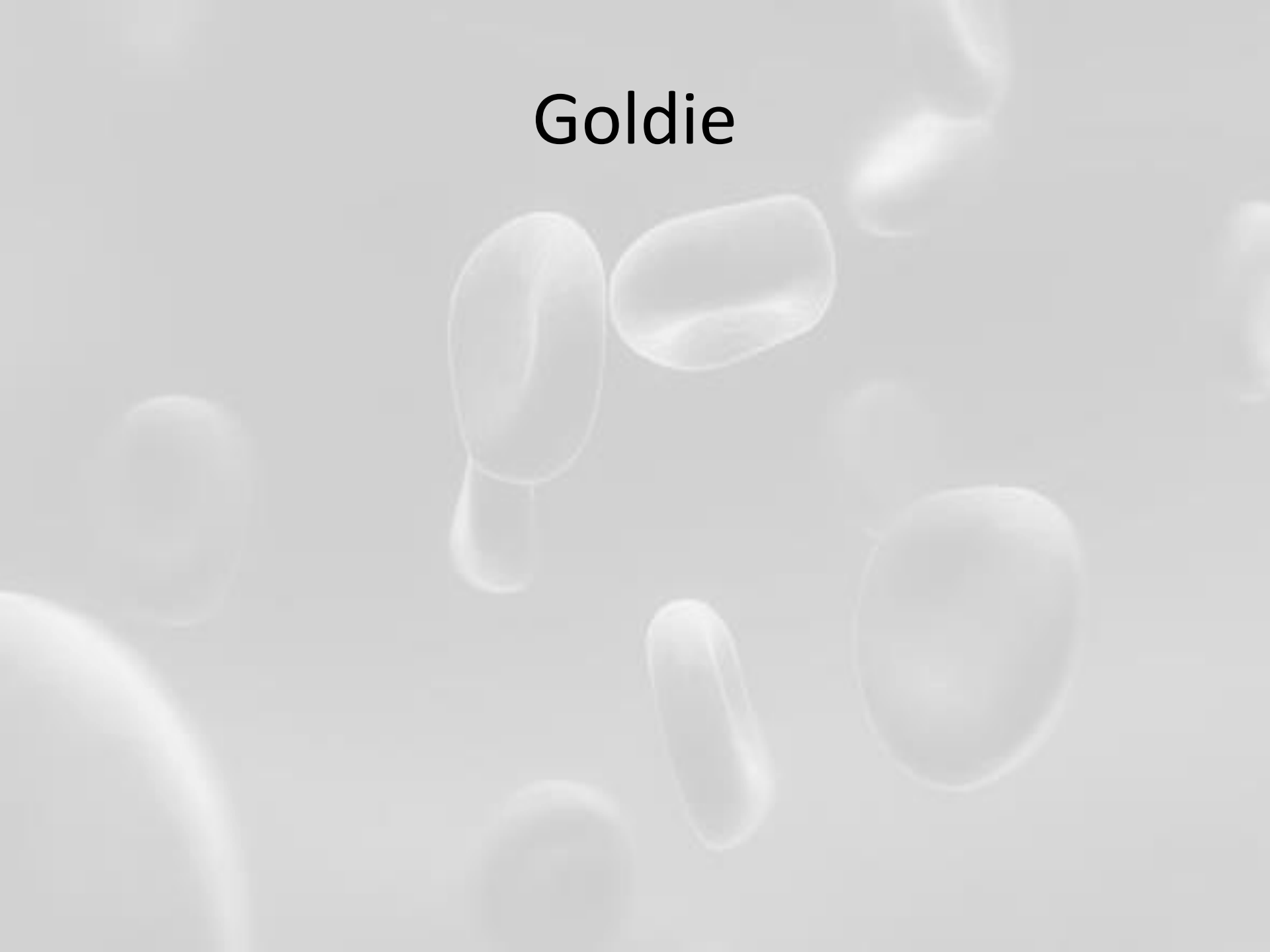
Spezifische Analysen

- Zahlen
- Blutausstrich !!
- Agglutinationstest



- Coomb's Test

Goldie



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| Basophils | | 0.00 x10 ⁹ /L (0.00 - 0.10 x10 ⁹ /L) |
| Nucleated RBCs % | | <u>3.80</u> % |
| Platelets | | 286 x10 ⁹ /L (200 - 500 x10 ⁹ /L) |
| Red cell morphology from smear | | Moderate visible haemolysis both on the blood smear and in the sample. Moderate <u>anisocytosis and polychromasia</u> with occasional <u>spherocytes</u> and very occasional basophilic stippling. |
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| % Reticulocyte Count | | 8.60 % |
| Absolute Reticulocyte Count | | <u>117.0</u> x10 ⁹ /L |
| Absolute Retic Count | | An absolute count >60x10 ⁹ /l indicates regenerative response |
| Comment | | |

Goldie

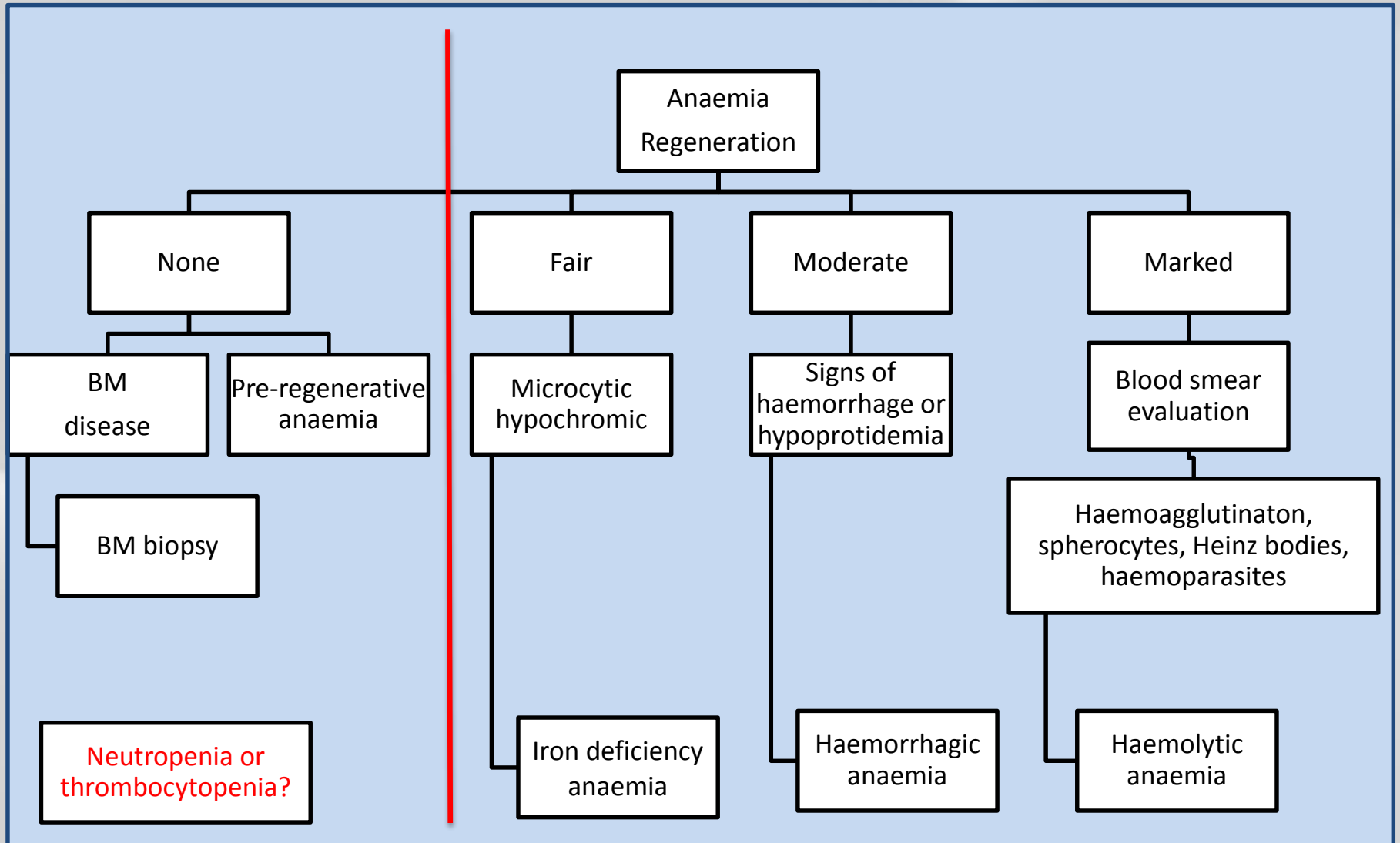
- Starke Auto-Agglutination
- Hyperbilirubinämie
- Sphärozyten
- Coomb's positiv



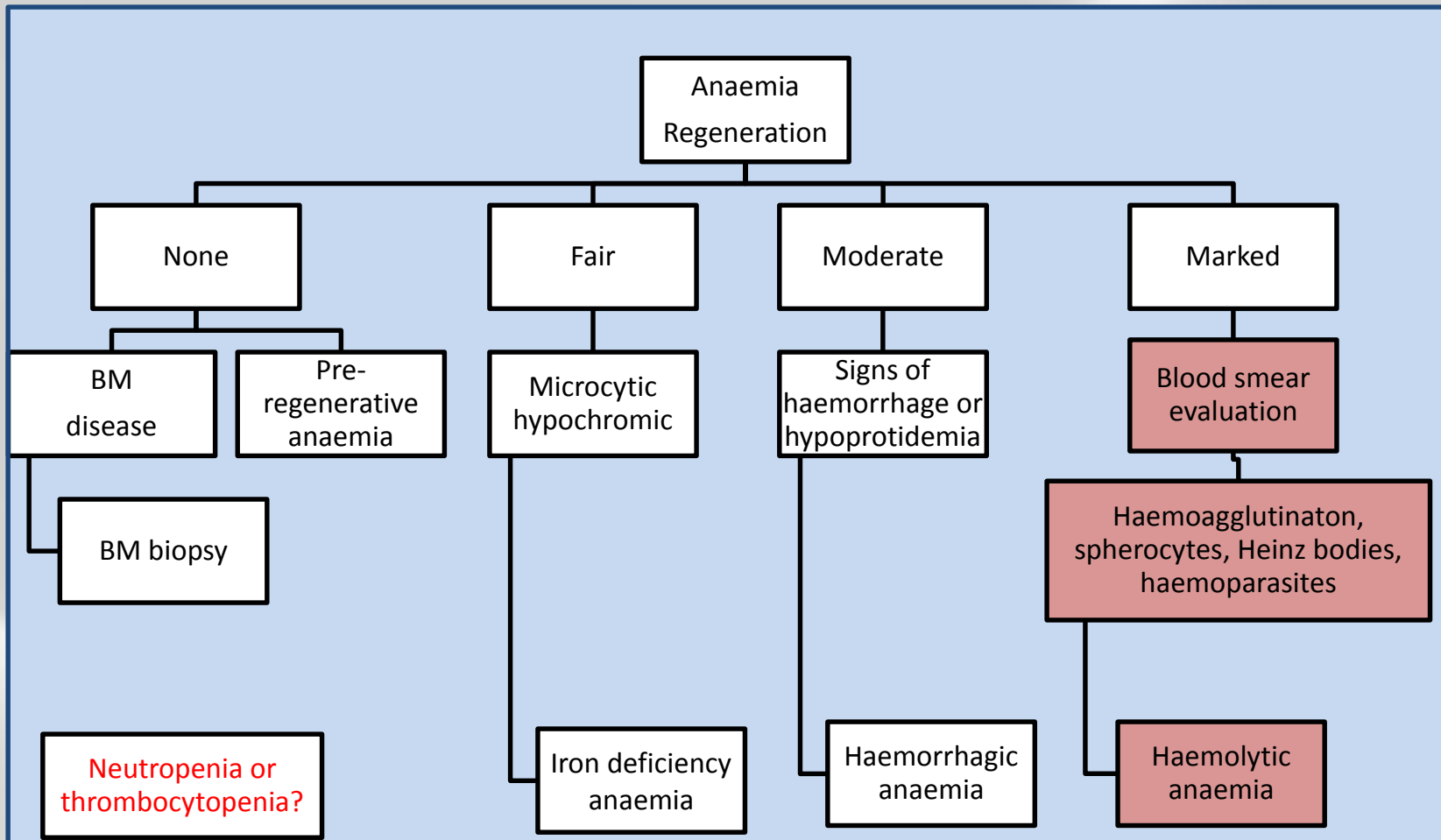
Goldie: Problemliste

- Anorexie, Lethargie, Ikterus
- Schwergr. Macrozytäre normochromische, leichtgr. regenerative Anaemie
 - Spherozyten, Agglutination +++, Coomb's +
- Neutrophilie mit Linksverschiebung
- Hyperbilirubinämie

Anämie: Algorithmus



Goldie



Hämolytische Anämie

Haemolytische Anaemie

HUND

- **IMHA** (1° vs. 2°)
- Babesiose

KATZE

- **M. haemofelis**
- **FeLV** (2°)
- **IMHA** (2° vs. 1°)

Oxidative Schäden (HB)
(Zinc/Zwiebeln/Parazetamol)
Hypophosphataemie
Erworbene RBZ Defekte

2° IMHA: Rules-out

- Zeckenkrankheiten
 - Babesia, Ehrlichia, (Leishmania), Mycoplasma
- FeLV
- Neoplasie
- Medikamente
- (Impfung)
- (Chronische Entzündung)

2° IMHA: Rules-out

- Zeckenkrankheiten: PCR
- FeLV: ELISA / PCR
- Neoplasie: Thorax Rö / Abd. US
- Medikamente: Anamnese
- (Impfung): Anamnese
- (Chronische Entzündung): Anamnese

Goldie: Diagnostics

- Imaging: Thorax Rö / Abd US
 - o.B.
- Herzschaft
 - Mitralklappeninsuffizienz
- A. phagocytophilum PCR, Babesia PCR
 - Neg

Goldie

- → 1° IMHA



Goldie: Treatment

- Steroide
 - 2 mg/kg BID
- Cyclosporin
 - 5 mg/kg BID
- Gerinnungshemmer
 - LMWH (Dalteparin) – 150 ug/kg TID sc
 - Aspirin ca. 1 mg/kg SID
- Omeprazol
 - 1 mg/kg SID

Follow-up

- 5d

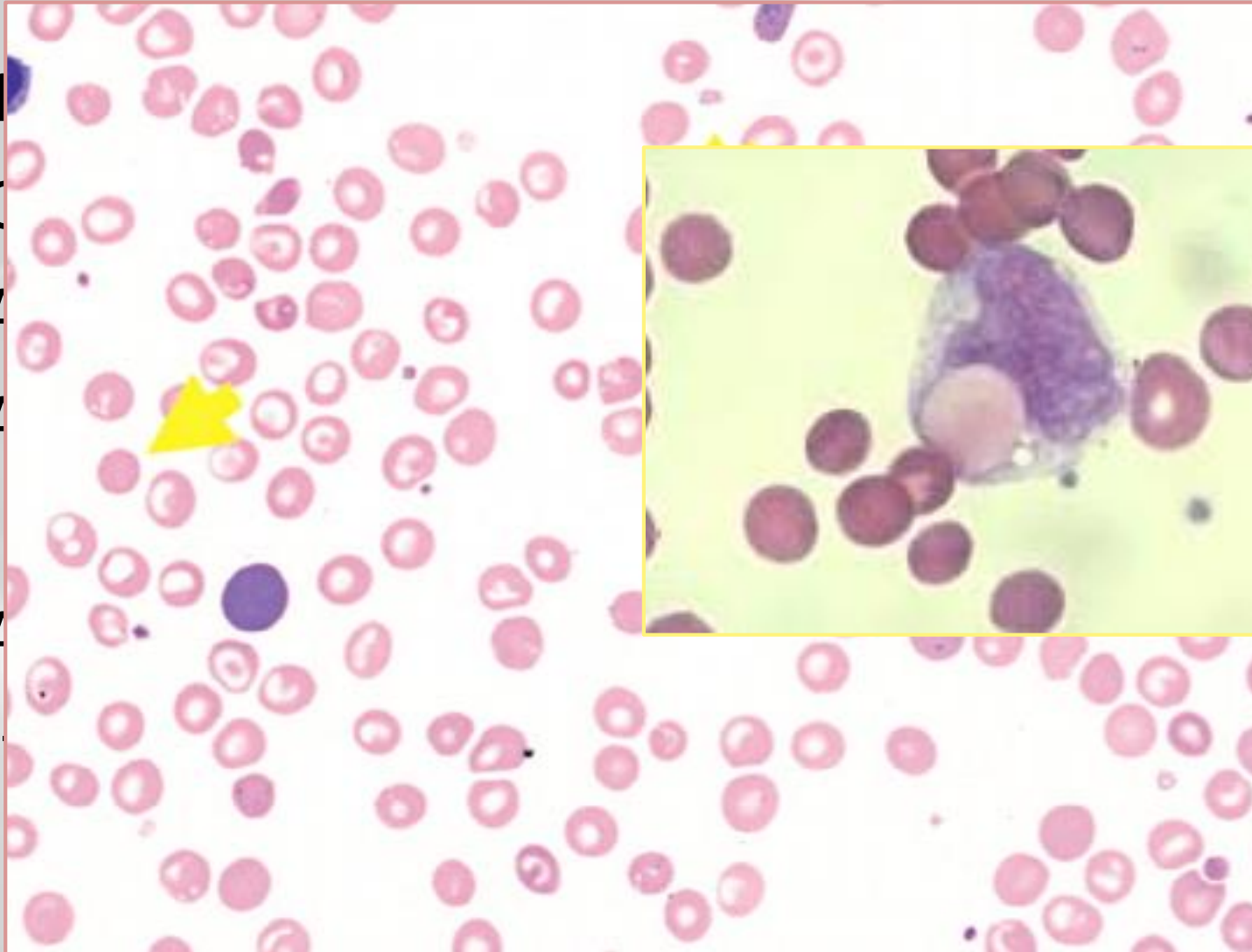
| Haematology | | | |
|------------------------------------|--------------|---------------------------|------------------------------------|
| | Alert | | Reference Interval |
| Sample condition | | Slightly icteric | |
| Haemoglobin | L | 7.7 g/dL | (12.0 - 18.0 g/L) |
| Red Blood Cells | L | 3.11 x10 ¹² /L | (5.50 - 8.50 x10 ¹² /L) |
| Haematocrit | L | 0.237 L/L | (0.370 - 0.550 L/L) |
| Nucleated RBCs % | | 22.80 % | |
| % Reticulocyte Count | | 8.60 % | |
| Absolute Reticulocyte Count | | 267.5 x10 ⁹ /L | |

- 14d

| Haematology | | | |
|------------------------------------|--------------|---------------------------|------------------------------------|
| | Alert | | Reference Interval |
| Sample condition | | Slightly lipaemic | |
| Haemoglobin | L | 10.8 g/dL | (12.0 - 18.0 g/L) |
| Red Blood Cells | L | 4.35 x10 ¹² /L | (5.50 - 8.50 x10 ¹² /L) |
| Haematocrit | L | 0.327 L/L | (0.370 - 0.550 L/L) |
| % Reticulocyte Count | | 2.20 % | |
| Absolute Reticulocyte Count | | 95.7 x10 ⁹ /L | |

IMHA

- 1
- C
- A
- A
- A



IMHA: Immunosuppressive Therapie

- Steroide
 - 2 mg/kg BID
- Azathioprin
 - 2 mg/kg SID, dann EOD
- Cyclosporin
 - 5-10 mg/kg SID
- Mycophenolat Mofetil 10-20 mg/kg BID
- Leflunomid 2-4 mg/kg SID

IMHA: Andere Therapien

- Gerinnungshemmer
- IV Immunglobulins
- Splenektomie

IMHA: Prognose

- Verschiedene Studien mit versch. “risk factors”
- Blutwerte: nicht wirklich aussagekräftig
- Antwort auf Therapie...

Fall 2

Liberty, 7j, SBT, WK

- Leistungsschwäche 2 Mo
- Anorexie in der letzten Woche.

Klinische Untersuchung

- Blasse Shht
- Tachykardie – HF 160

Haematology

| | | |
|------------------|--------------------|----------------------------------|
| Haemoglobin | 5.1 | 12.0 - 18.0 g/dL |
| RBC | 3.80 | 5.50 - 8.50 x10 ¹² /L |
| Hct | <u>0.17</u> | 0.37 - 0.55 L/L |
| MCH | 13.4 | 19.5 - 24.5 pg |
| MCV | <u>46.6</u> | 62.0 - 77.0 fL |
| MCHC | <u>28.8</u> | 32.0 - 36.0 g/dL |
| WBC | 20.5 | 6.0 - 18.0 x10 ⁹ /L |
| Band Neutrophils | 0.00 | 0.00 - 0.50 x10 ⁹ /L |
| Seg Neutrophils | 16.61 | 4.00 - 12.00 x10 ⁹ /L |
| Lymphocytes | 3.90 | 1.00 - 4.80 x10 ⁹ /L |
| Monocytes | 0.00 | 0.10 - 1.80 x10 ⁹ /L |
| Eosinophil | 0.00 | 0.20 - 1.20 x10 ⁹ /L |
| Basophils | 0.00 | 0.00 - 0.10 x10 ⁹ /L |
| PLT | 550 | 200 - 500 x10 ⁹ /L |

Red cell morphology: Anisocytosis with microcytosis and hypochromia.

White cell morphology: Within normal limits.

Platelet morphology: Platelet count appears correct on the blood film with a moderate number of large platelet seen.

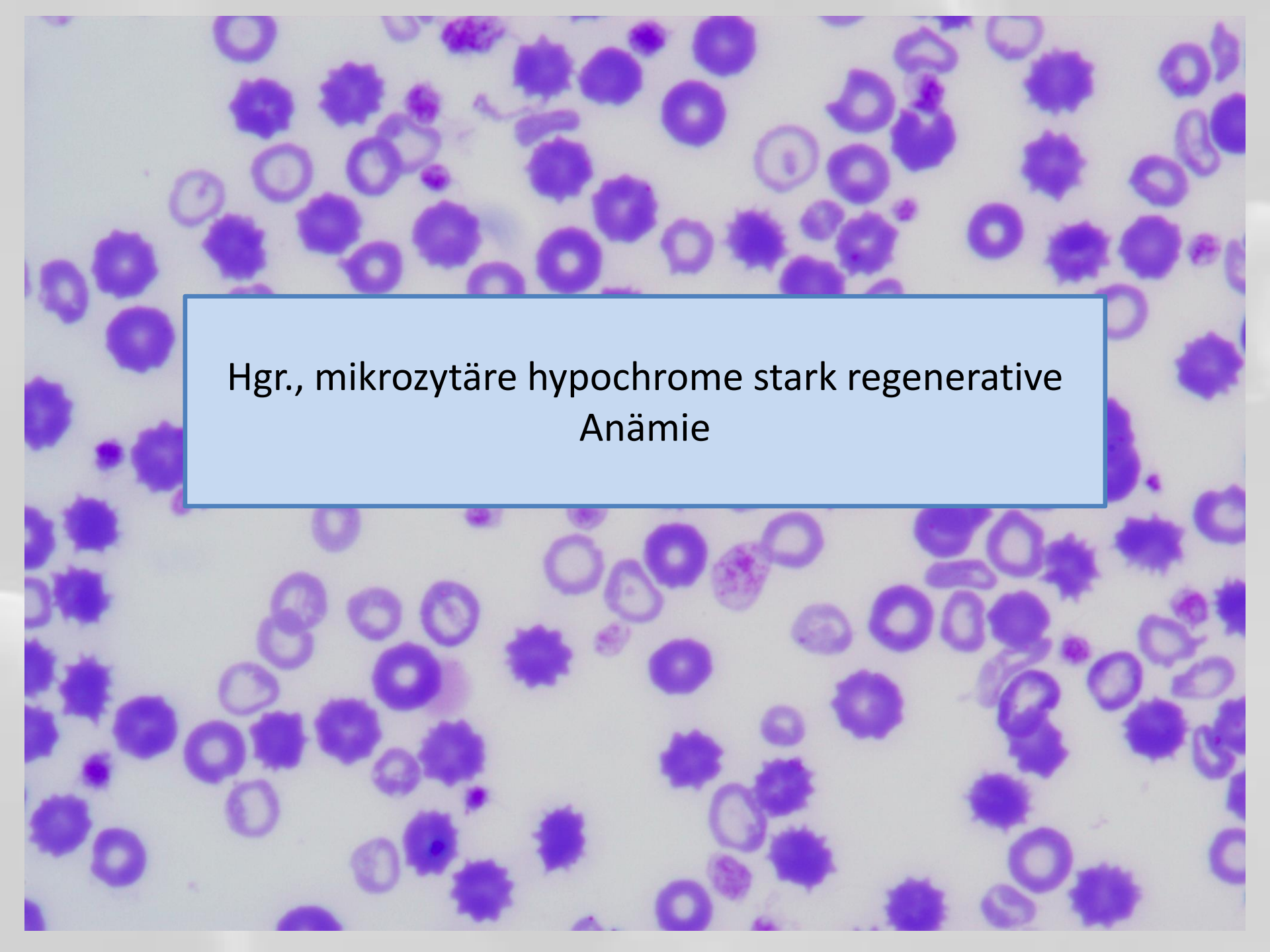
Haematology

| | | |
|-------------|--|----------------------------------|
| Haemoglobin | 5.1 | 12.0 - 18.0 g/dL |
| RBC | 3.80 | 5.50 - 8.50 x10 ¹² /L |
| Hct | 0.17 | 0.37 - 0.55 L/L |
| MCH | 13.4 | 19.5 - 24.5 pg |
| MCV | 46.6 | 62.0 - 77.0 fL |
| MCHC | 28.8 | 32.0 - 36.0 g/dL |
| WBC | Absolute reticulocyte count 1071.6 x10 ⁹ /L | |
| Band Ne | | |
| Seg Neu | | |
| Lymphoc | | |
| Monocytes | 0.00 | 0.10 - 1.80 x10 ⁹ /L |
| Eosinophil | 0.00 | 0.20 - 1.20 x10 ⁹ /L |
| Basophils | 0.00 | 0.00 - 0.10 x10 ⁹ /L |
| PLT | 550 | 200 - 500 x10 ⁹ /L |

Red cell morphology: Anisocytosis with microcytosis and hypochromia..

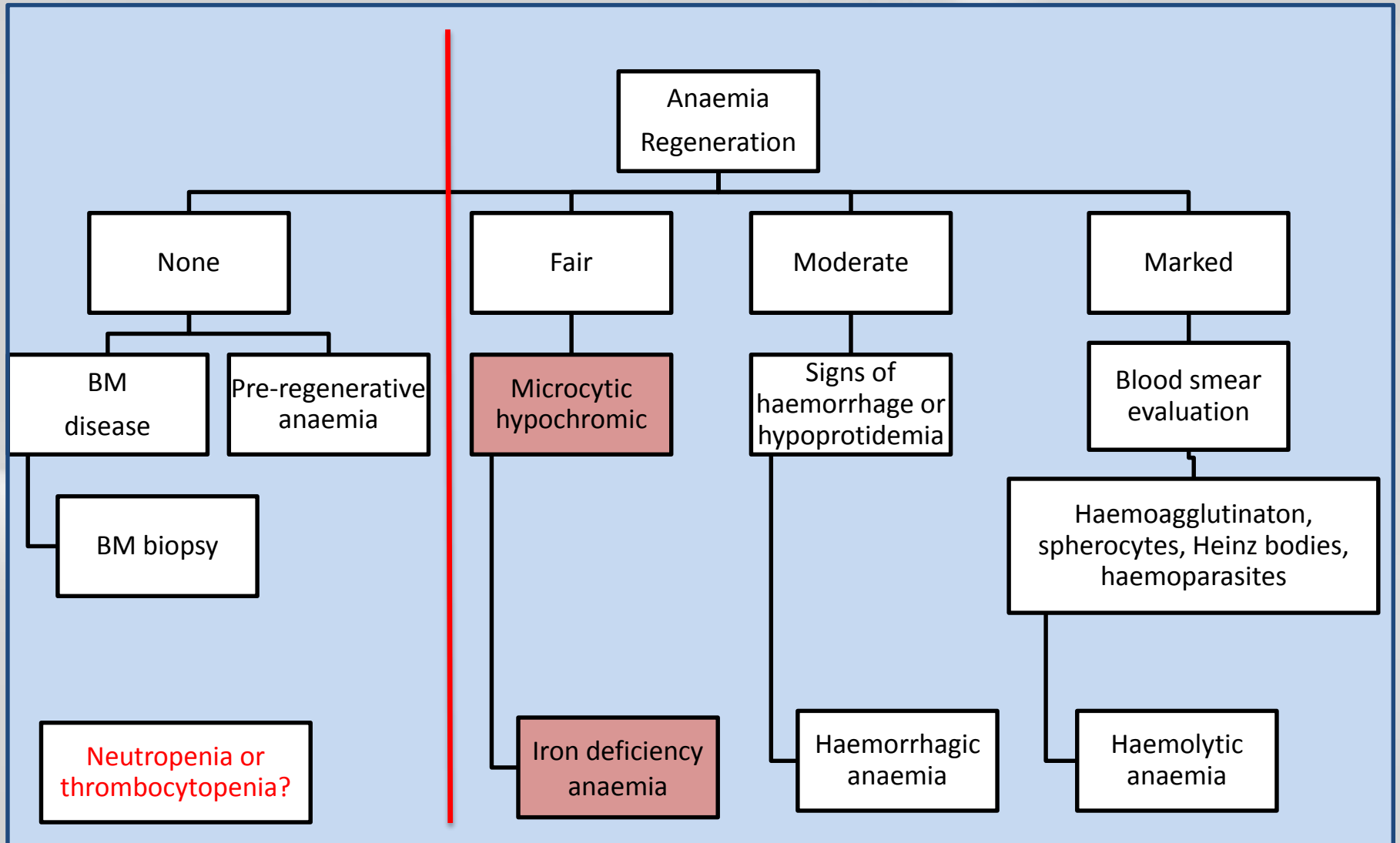
White cell morphology: Within normal limits..

Platelet morphology: Platelet count appears correct on the blood film with a moderate number of large platelets seen.

A microscopic view of a blood smear stained with a purple dye. The field is filled with numerous red blood cells. Many of these cells are small (microcytic) and have a pale, central area (hypochromic). Some cells exhibit a characteristic 'target' or 'bull's-eye' appearance, which is a sign of regenerative response. The overall appearance is consistent with a regenerative anemia.

Hgr., mikrozytäre hypochrome stark regenerative
Anämie

Algorithm



Problem List

- Leistungsschwäche, Anorexie
- Hgr., mikrozytäre hypochrome stark regenerative Anämie
- Milde Thrombozytose

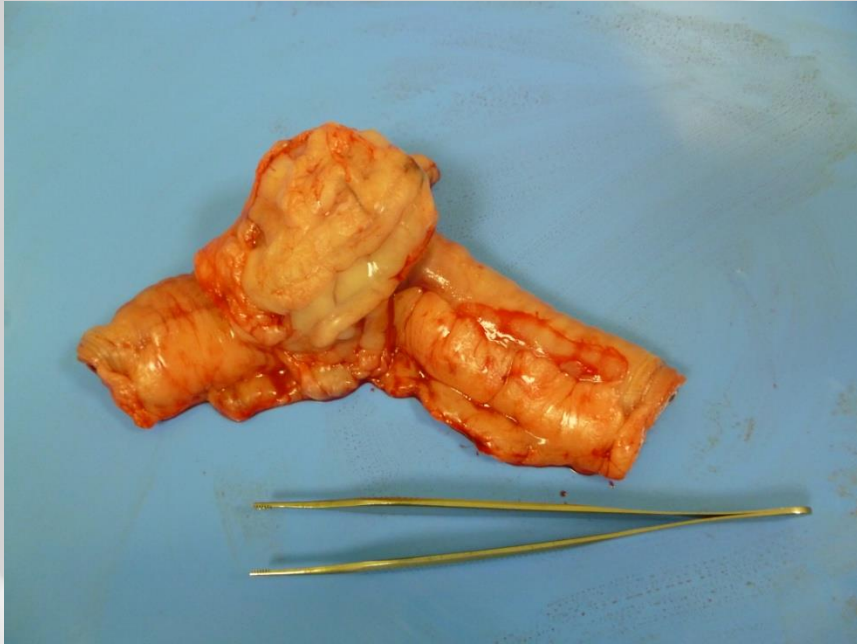
Eisenmangel-Anämie

Chronische Blutung

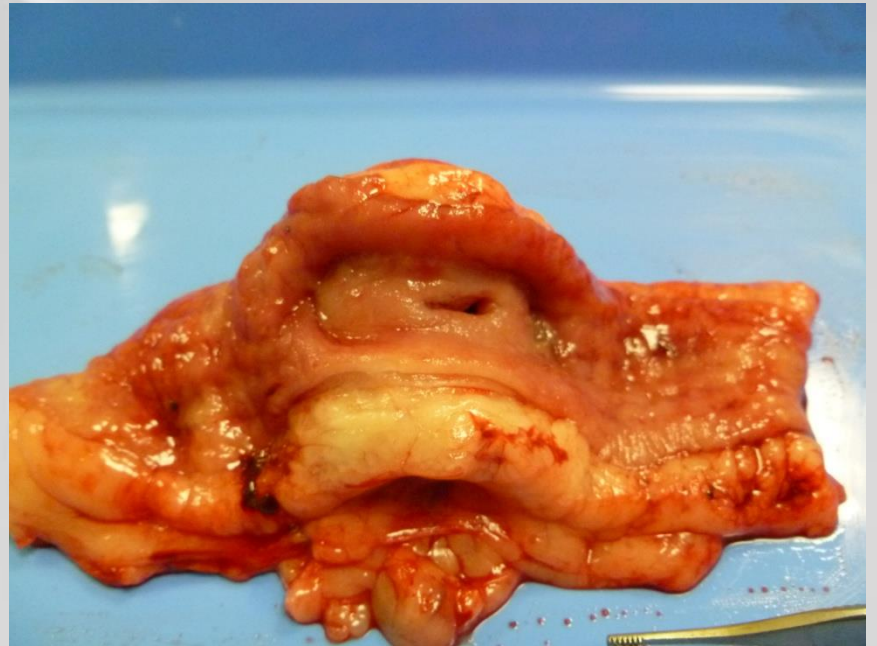
- Gastrointestinale Geschwüre / Neoplasie
- Haemorrhagische Kolitis
- Neoplasie Harnblase
- Thrombozytopenie
- Gerinnungsstörungen

- US: Masse Dünndarm
- Thorax-Rö: Keine Hinweise auf Metastasen





Diagnosis: Gastrointestinal stromal tumour (GIST)



DANKE



Anämie-Profil



Anämieabklärung

E+A

Blutbild (inkl. Diff.), Rc, Tc,



Blutparasiten



Coombs

Erregerprofile

| PROFILE | |
|--|---|
| <input type="checkbox"/> Reiseinfektion akut 1) S+E+A Blutparasiten, Leishmania-AK, Ehrlichia-PCR <input type="checkbox"/> zusätzl. Babesien-PCR, Dirofilaria-AG | <input type="checkbox"/> FIP-Profil S+E+A Blutbild inkl. Diff., ALB/GLOB-Quot., Titer <input type="checkbox"/> zusätzl. FIV <input type="checkbox"/> zusätzl. FeLV |
| <input type="checkbox"/> Import-Check 1) S+E+A Blutparasiten, Leishmania-AK, Ehrlichia canis-AK <input type="checkbox"/> zusätzlich Babesien-AK, Mikrofilarien (KNOTT) | <input type="checkbox"/> Profil Viren Katze S/HP/EP FeLV(AG), FIV(AK), FCoV(AK) |
| <input type="checkbox"/> Leishmaniose S+E+A ALB, TP, UREA, CREA, Blutbild inkl. Diff., Leish-AK | <input type="checkbox"/> Profil Augenabstrich Katze Tu FHV-PCR, Chlamydia-PCR <input type="checkbox"/> zusätzlich Mycoplasma-PCR |
| <input type="checkbox"/> Einheimische Zeckeninfektion S+E+A Blutparasiten, Borrelien-WB, Anaplasma-PCR | <input type="checkbox"/> Profil Rachenabstrich Tu FHV-PCR, Chlamydia-PCR <input type="checkbox"/> zusätzlich Mycoplasma-PCR <input type="checkbox"/> zusätzlich Calizi-PCR |
| <input type="checkbox"/> Feline hämotrophe Mycoplasmen E M. haemofelis, Candidatus m. haemominutum, Candidatus m. turicensis (PCR) | |
| <input type="checkbox"/> Canine hämotrophe Mycoplasmen E M. haemocanis, Candidatus m. haemoparvum (PCR) | |



PARASITOLOGIE

Gastrointestinal

- Allg. Parasitologie (Sed./Flot.) **K** Mikrofilarien PCR **E**
- Protozoennachweis (SAF) **Kf** Hepatozoon PCR **E**
- Giardia ELISA **K** Leishmania (AK) IFT **S/HP/EP**
- Giardia PCR **K** Leishmania PCR **E,Km,Pu,Va**
- Kryptosporidien (AG) **K**
- Kryptosporidien (färberisch, nativ) **K** Hautgeschabsel **Hg**
- Kryptosporidien PCR **K** Ektoparasitenidentifizierung **Parasit**
- Sarkoptes (AK) ELISA **S/HP/EP**

Ektoparasiten

- Tritrichomonas PCR **K**
- Endoparasitenidentifizierung **Parasit**
- Kot-US Reptilien **K,Kf**
- Nach-US Reptilien **K,Kf**
- Lungenwürmer (Baermann) **K**

Blutparasiten

- mikroskopisch **E,A** Neospora canis (AK) **S**
- (Ehr, Bab, Diro, Hepatozoon, Mycoplasma)
- Babesia canis (AK) **S/HP/EP** E. cuniculi PCR **U,Va**
- Babesia spp. PCR inkl. Diff. **E** Toxoplasmose (AK) **2** **S/HP/EP**
- Dirofilaria (AG) **S/HP/EP** Toxoplasmose PCR **K,Li**
- Mikrofilarien-Nachweis (KNOTT) **E**
- zusätzlich Typisierung
- Dichte

BAKTERIOLOGIE

+

Spezielle Bakteriologie

- Anaplasma phagocytophilum (AK) **S/HP/EP**
- Bartonella henselae PCR **E**
- Borrelia burgdorferi C6 (AK) ELISA **S/HP/EP**
- Borrelia burgdorferi (AK) Westernblot **S/HP/EP**
- Borrelia burgdorferi PCR **U,Sy,Li,Va**
- Brucella canis (AK) **S/HP**
- Campylobacter **K**
- Chlamydomphila felis PCR **Tu**
- Chlamydomphila spp. PCR **Tu,Va,K (Vogel)**
- Clostridium perfringens Enterotoxin PCR **K**
- Clostridium perfringens **K**
- Ehrlichia canis (AK) IFT **S/HP/EP**
- Ehrlichia / Anaplasma PCR **E,Sy,Km**
- Leptospira spp. MAT **S/HP/EP**
- Leptospira spp. PCR **U,Bi**
- Mycoplasma haemocanis PCR **E**
- Mycoplasma haemofelis PCR **E**
- Mycoplasma spp. PCR **Tu**
- Salmonellen **K**
- Yersinia enterocolitica **K**
-

VIROLOGIE

- Virale Durchfallerreger (Parvo, Rota) **K**

Virologie Hund

- Adenovirus/HCC (AK) **S/HP,EP**
- FSME (AK) **S/HP,EP**
- Herpesvirus (PCR) **Tu,Bi,Va**
- Parvoviren (AG) **K**
- Parvoviren (AK) **S/HP,EP**
- Rotaviren (AG) **K**
- Staupevirus (AG) **Cy**
- Staupevirus (AK) **S/HP,EP**
- Staupevirus PCR **Tu,E,Li**

Virologie Heimtiere/Reptilien/Vögel

- Schildkrötenherpesvirus PCR **Va**

Virologie Katze

- Calicivirus PCR **Tu**
- Coronaviren (FIP-AK) IFT **S/HP/EP**
- Coronavirus PCR (FIP) **E,K,Va**
- FHV-PCR (Felines Herpesvirus) **Tu**
- FeLV (AG) ELISA **S/HP/EP**
- FeLV PCR **E,Km**
- FIV (AK) ELISA **S/HP/EP**
- FIV PCR **E**
- Parvovirus (AG) **K**
- Parvovirus (AK) HAH **S**