# CBC edu‘CAT’ion: Feline hematology Secrets

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Laboratory Retrievers

Animals can’t hide their objective data


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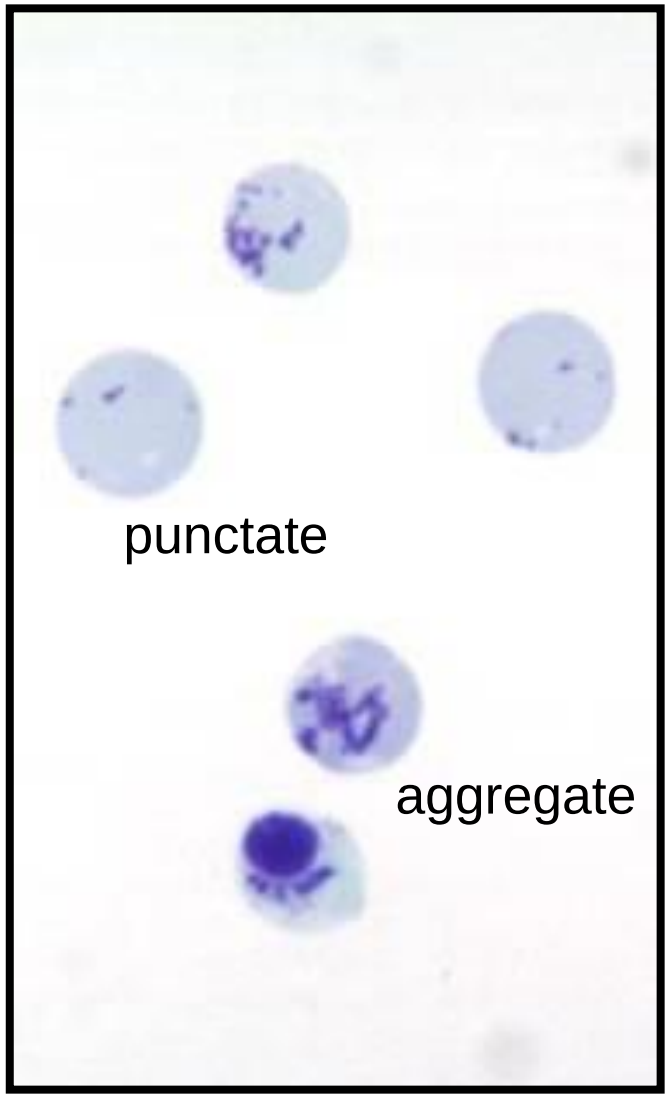
# Old dogs, old tricks

- Feline Reticulocytes
- Feline Heinz Bodies
- Identification of band/immature neutrophils-blood film
- Cytograms/dot plots

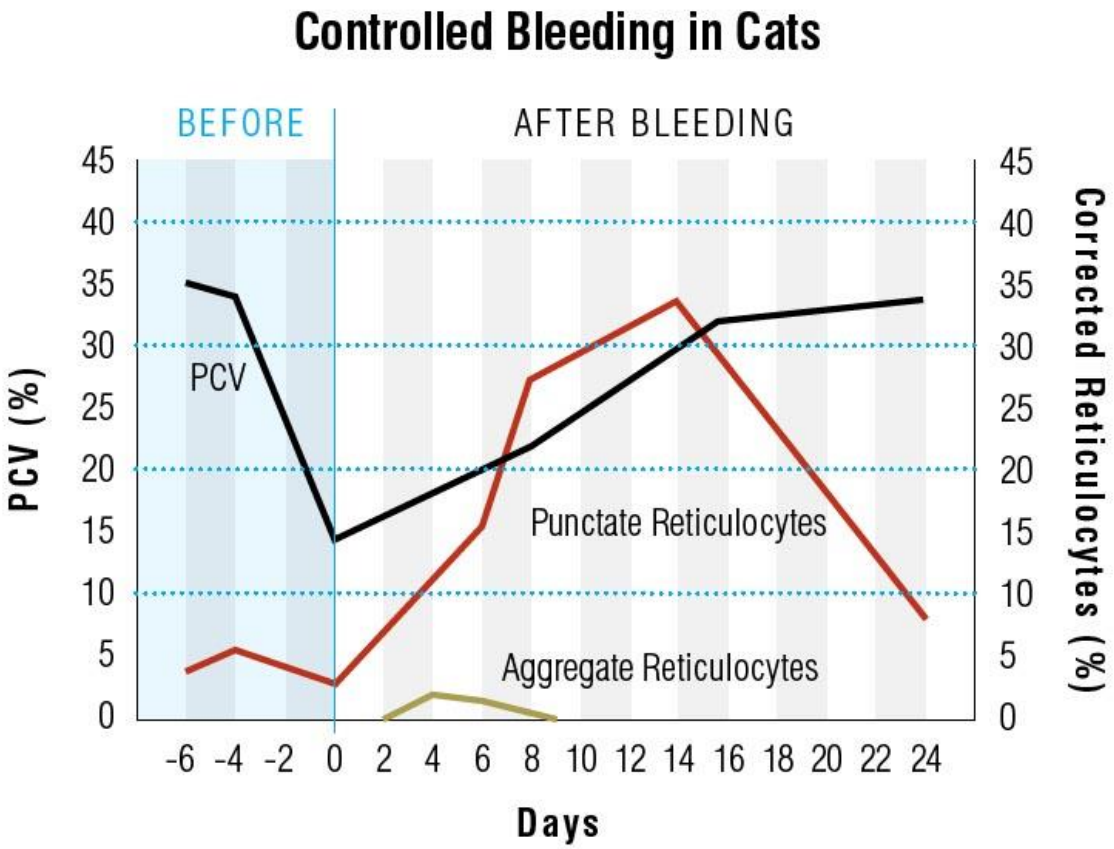
# Feline reticulocytes

- 0.4% present in normal health (aggregate)
- Two types of reticulocytes:
  - Aggregate:
    - ↓ ~12–24 hours
  - Punctate:
    - ↓ ~ 10–14 days
  - Mature RBC



# Definition of regeneration in cats

- How many reticulocytes?
- Only aggregate reticulocytes?
- Aggregate and punctate reticulocytes?

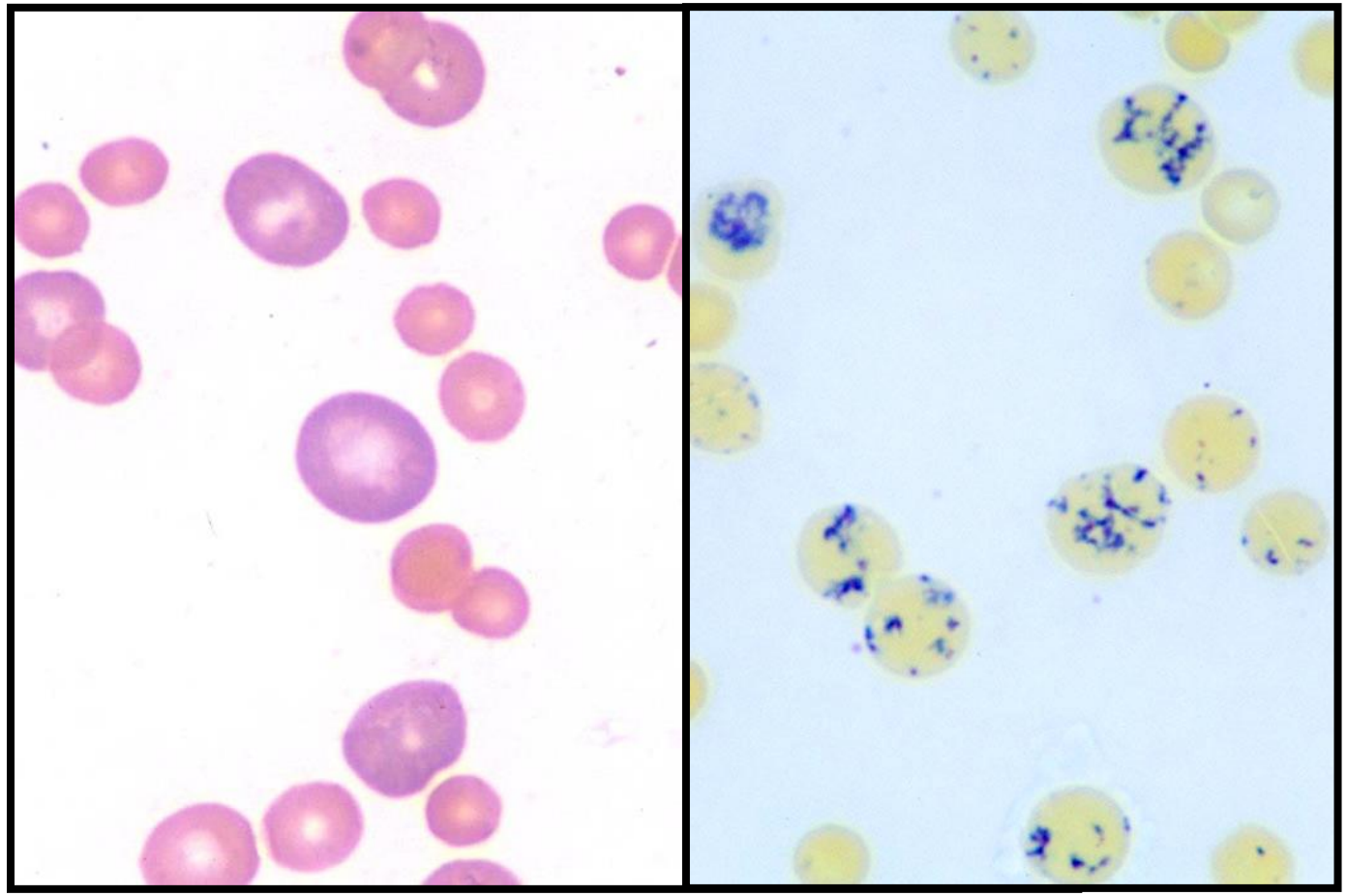




**Sources:**

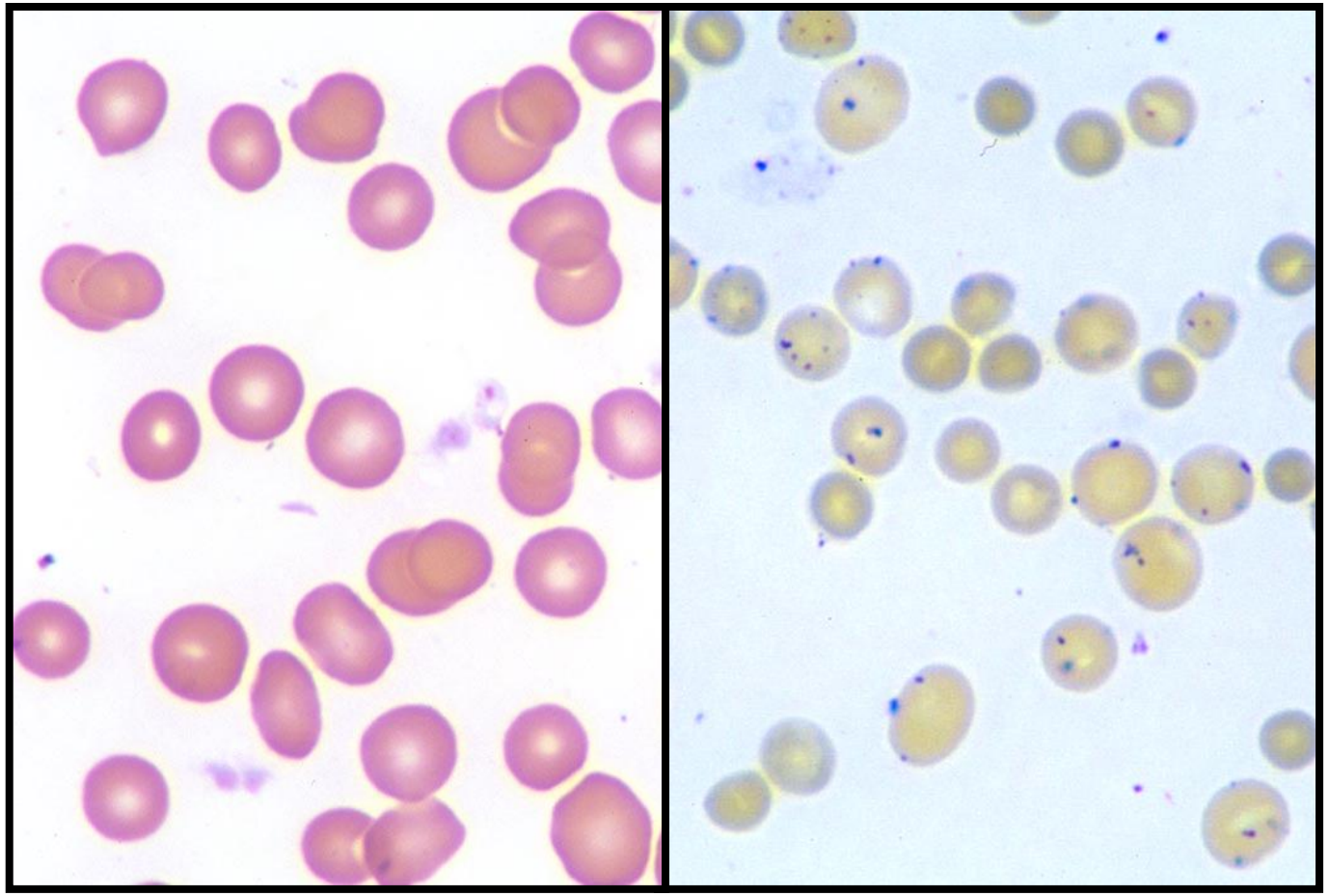
1. Cramer DV, Lewis RM. Reticulocyte response in the cat. *JAVMA*, 1972;160(1):61–67.
2. Alsaker RD, Laber J, Stevens JB, Perman V. A comparison of polychromasia and reticulocyte counts in assessing erythrocytic regenerative response in the cat. *JAVMA*. 1977;170(1):39–41.
3. Fan LC, Dorner JL, Hoffman WE. Reticulocyte response and maturation in experimental acute blood loss anemia in the cat. *J Am Anim Hosp Assoc.* 1978;14:219–224.

# Feline *Mycoplasma haemofelis* anemia



Hospital day 2 PCV = 8%

# Feline *Mycoplasma haemofelis* anemia



Hospital day 10  PCV = 22%

# Heinz Bodies

- **In cats, Heinz bodies are particularly significant for a few reasons:**
- **Cats are more prone to Heinz body formation** than many other species. This is because feline hemoglobin has more sulfhydryl groups, making it more susceptible to oxidative damage.
- **Small numbers of Heinz bodies (up to 5%) can be normal** in healthy cats and may not indicate disease.
- **Increased numbers of Heinz bodies** can be seen with exposure to oxidative agents, such as certain drugs (e.g., acetaminophen), foods (e.g., onions, garlic), or diseases (e.g., diabetes mellitus, lymphoma, hyperthyroidism).
- **Heinz bodies can cause hemolytic anemia** if present in large numbers, as affected red blood cells are more likely to be removed by the spleen.

# Poikilocytes in cats

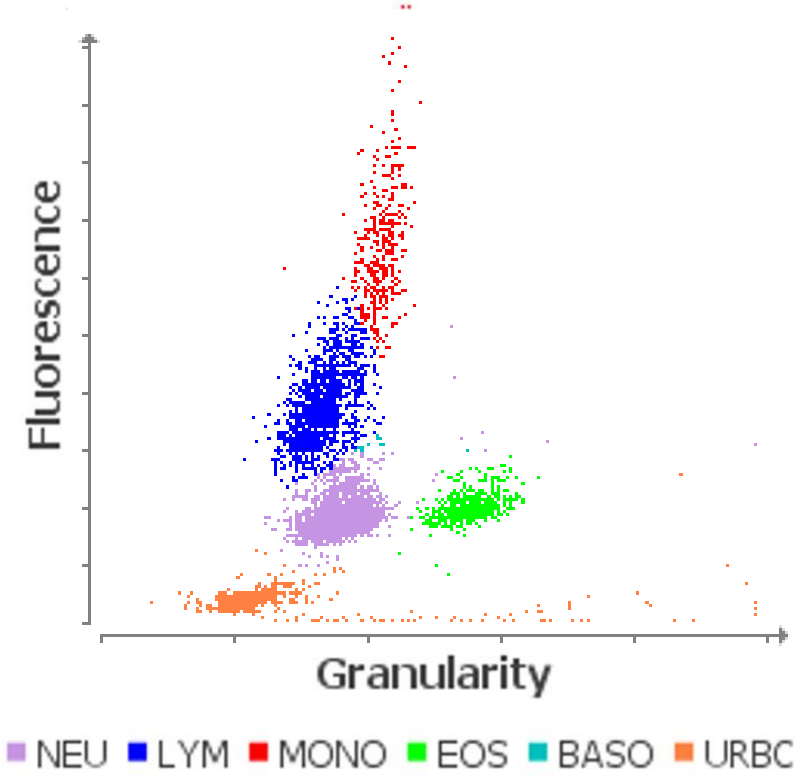
- Spherocytes
- Acanthocytes

# Inflammation

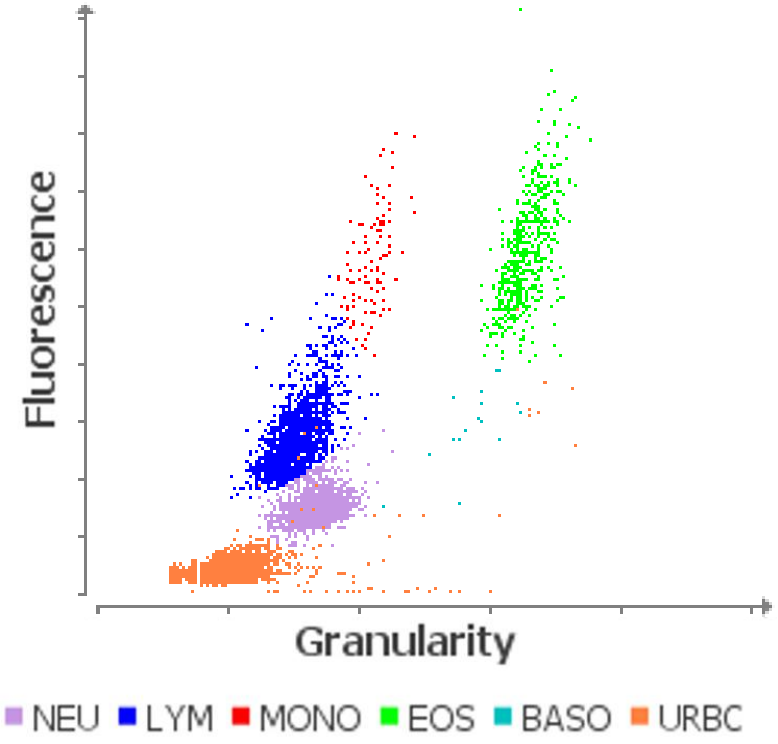
- Dohle bodies
  - Döhle bodies in cats as in other species are cytoplasmic inclusions found in neutrophils, appearing as pale blue, angular structures
  - Often associated with toxic change during inflammation in most species
  - In cats – often identified in neutrophils from healthy cats
    - May be seen during inflammation but difficult to differentiate
    - Need to look for other indicators of toxicity (cytoplasmic basophilia, foamy to vacuolated cytoplasm, etc.

# Normal Canine and Feline WBC Dot Plots

Normal WBC Dot Plot (Canine)




Normal WBC Dot Plot (Feline)



# New Tricks from Old Dogs

- Reticulocytosis without anemia
- Reticulocyte Hemoglobin
- Feline SAA- Serum Amyloid A
- Red Cell and Platelet Indices
- AI Morphology
- Feline Pancreatic Lipase

# Feline acute phase proteins

- Major APP in the cat
  - Serum amyloid A (SAA)
- SAA sample
  - Serum
  - Heparinized and EDTA plasma
  - Body cavity fluids (synovial, peritoneal)
- SAA stability
  - Room temp preferred over refrigerated
    - >24-hour storage freeze sample
  - Frozen 3 months

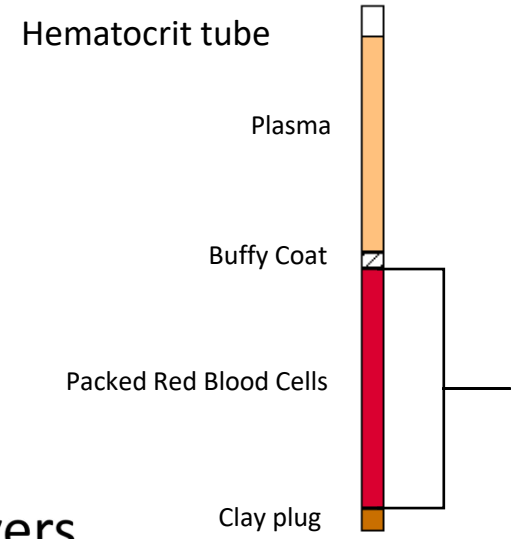
| Species | Major APP | Moderate APP | Minor APP |
|---|---|---|---|
| Feline | SAA | AGP | Hp |
| | | CRP | Cp |

SAA= Serum Amyloid A; AGP= alpha-1 acid glycoprotein; Hp= Haptoglobin; CRP= C Reactive Protein; Cp= ceruloplasmin

# Platelets by the numbers

- Thrombogram
  - PLT / PCT – count / mass

| Test | Results | Reference Interval | LOW | NORMAL | HIGH |
|---|---|---|---|---|---|
| PLT | 225 K/µL | 148 - 484 | | | |
| MPV | 12.6 fL | 8.7 - 13.2 | | | |
| PDW | 12.3 fL | 9.1 - 19.4 | | | |
| PCT | 0.28 % | 0.14 - 0.46 | | | |




Analogous to HCT

HCT (%) = (RBC x MCV) / 10

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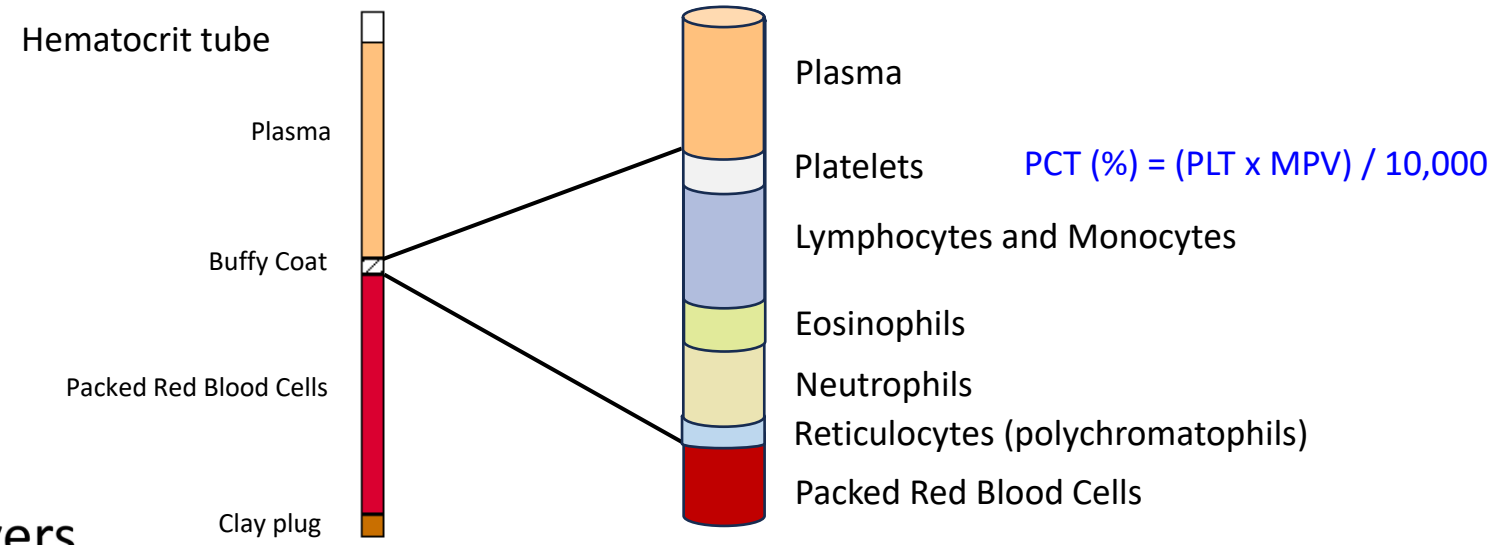
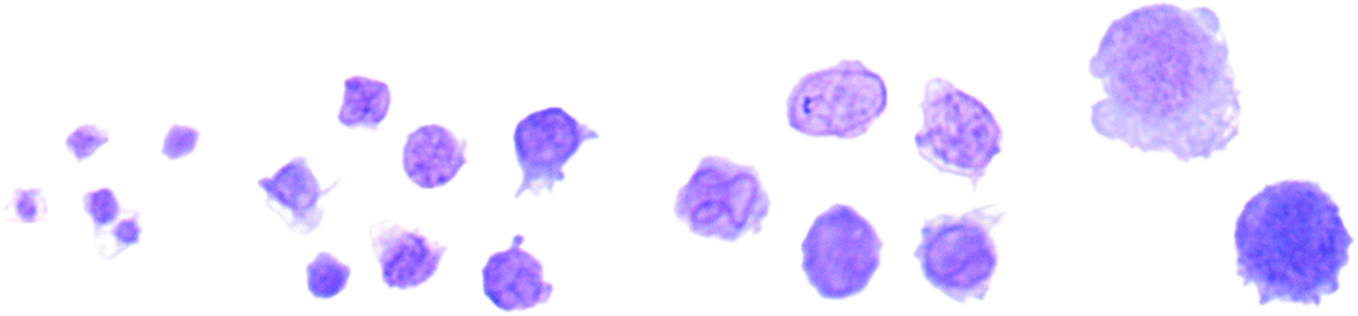



PCT (%) = (PLT x MPV) / 10,000

# Platelets by the numbers

- Thrombogram
  - PLT / PCT – count / mass
  - MPV – platelet volume

Normal sized RBC



Normal size | Mildly enlarged | Moderately enlarged | Markedly enlarged

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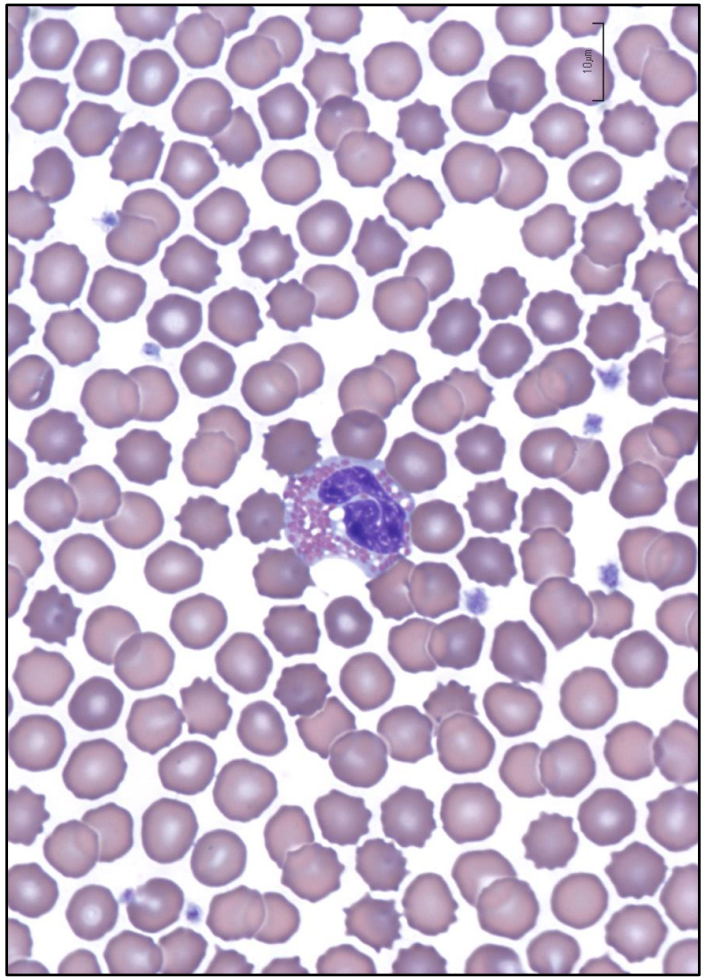
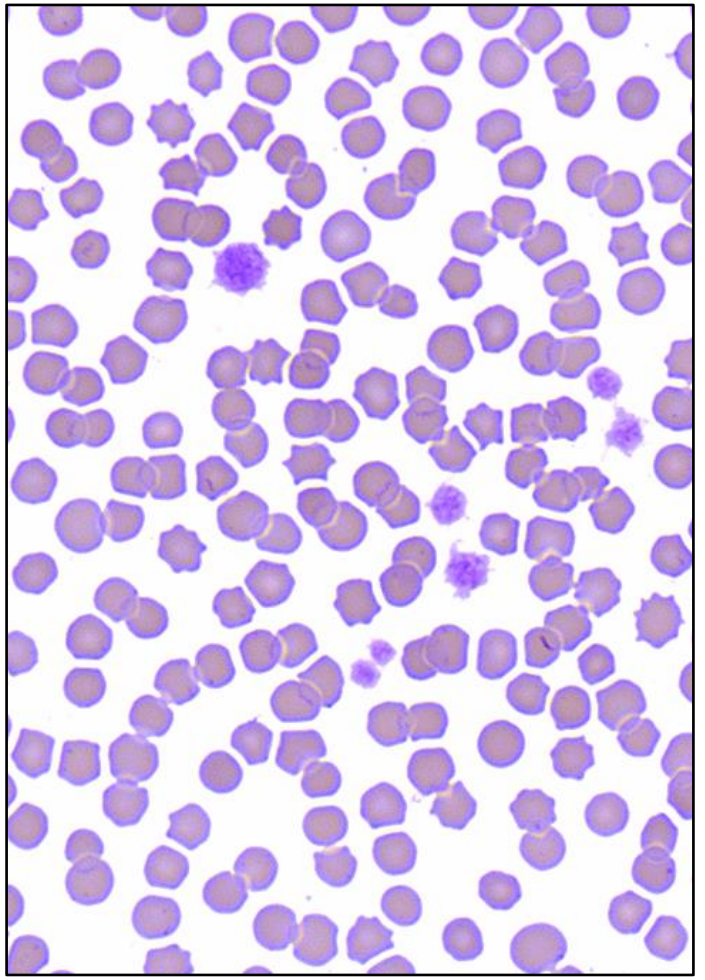
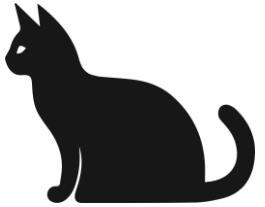
# Species variation in platelet size

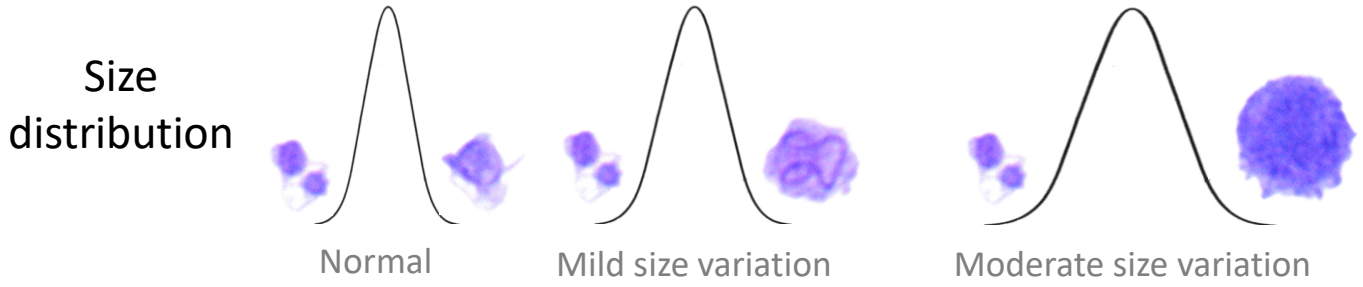






# Platelets by the numbers

- Thrombogram
  - PLT / PCT – count / mass
  - MPV – platelet volume
  - PDW – variation in platelet size

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# Clinical Case Study

- History/Presentation
  - Adopted 5 months earlier, soon to receive final vaccinations
  - In-door cat since adoption
  - Presented with sudden onset lethargy, anorexia and ataxia
- Physical examination
  - Temp: 102.1$^{o}$ F, Pulse: 220 bpm, Resp: 80
  - Pale pink mucous membranes, CRT < 2 sec
  - Dull mentation / Depressed
  - Walking slowly with ataxia
  - Eventual blindness

**Boogeyman**

- 7 months old
- Neutered male
- Black and White DSH

Not Boogeyman: only a representation of a black and white Domestic Shorthair cat

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# Clinical Case Study

- Initial laboratory evaluation three weeks before present CBC
  - Mild decreased MCV – 33.3 fL (RI; 35.9 – 53.1)
  - Marked decreased PLT – 13 K/µL (RI; 151 – 600)
  - Mild ALP increase – 154 U/L (RI; 14 – 111)
  - Mild PHOS increase – 7.8 mg/dL (RI; 3.1 – 7.5)
  - Marked Ammonia increase – 217 µmol/L (RI; 0 – 95)
- Additional diagnostics
  - Ultrasound / CT scan of abdomen – possible extrahepatic shunt
- Patient management
  - Surgical correction of shunt

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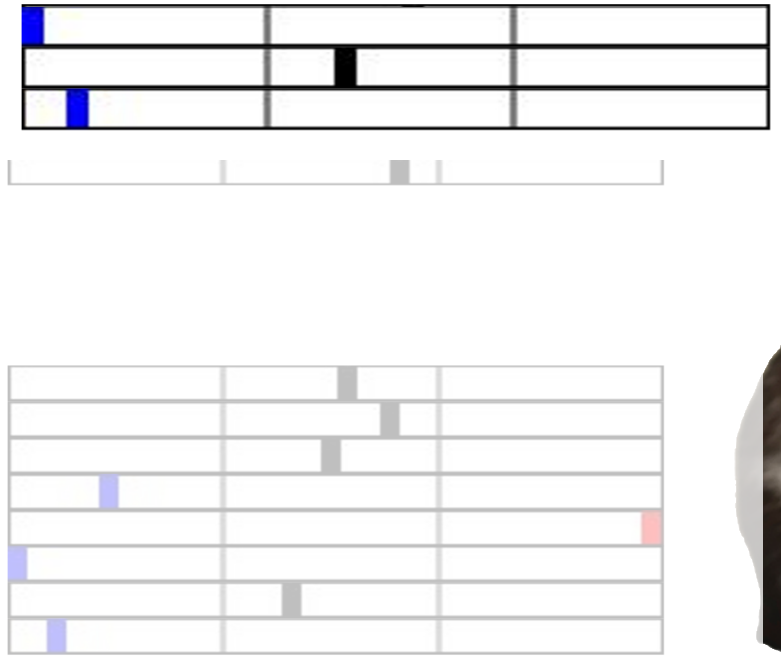
|---|---|---|---|---|---|
| ProCyte Dx (March 12, 2024 8:19 AM) | | | | | |
| RBC | 9.91 M/µL | 6.54 - 12.20 | | | |
| PLT | 29 K/µL | 151 - 600 | LOW | | |
| MPV | 14.7 fL | 11.4 - 21.6 | | | |
| PCT | 0.04 % | 0.17 - 0.86 | LOW | | |
| WBC | 14.45 K/µL | 2.87 - 17.02 | | | |
| %NEU | 48.5 % | | | | |
| %LYM | 38.6 % | | | | |
| %MONO | 2.5 % | | | | |
| %EOS | 0.6 % | | | | |
| %BASO | 9.8 % | | | | |
| NEU | 7.02 K/µL | 2.30 - 10.29 | | | |
| LYM | 5.58 K/µL | 0.92 - 6.88 | | | |
| MONO | 0.36 K/µL | 0.05 - 0.67 | | | |
| EOS | 0.08 K/µL | 0.17 - 1.57 | LOW | | |
| BASO | 1.41 K/µL | 0.01 - 0.26 | HIGH | | |
| PLT | 29 K/µL | 151 - 600 | LOW | | |
| MPV | 14.7 fL | 11.4 - 21.6 | | | |
| PCT | 0.04 % | 0.17 - 0.86 | LOW | | |





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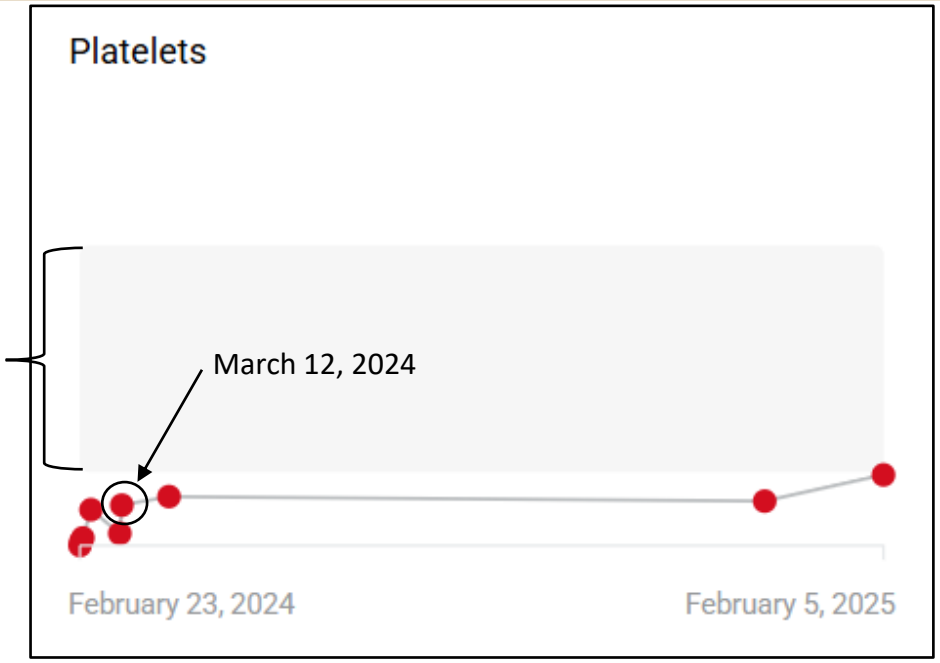


Decreased PLT
Decreased PCT

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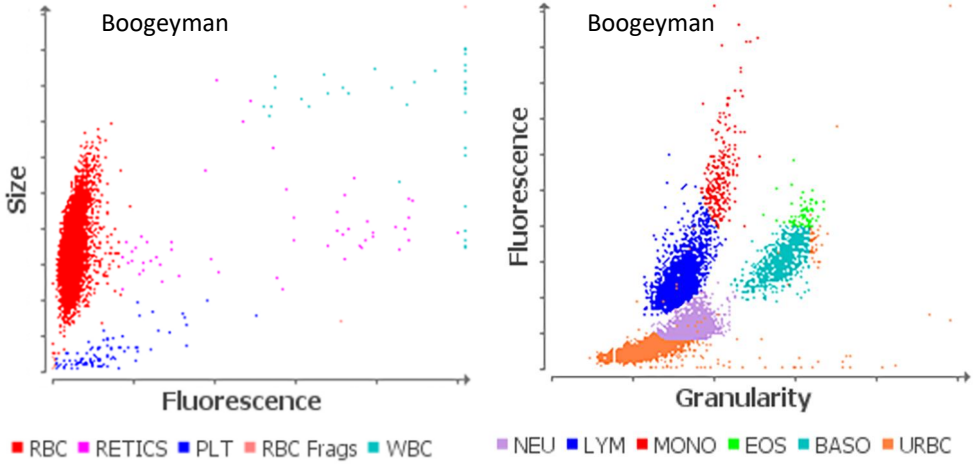
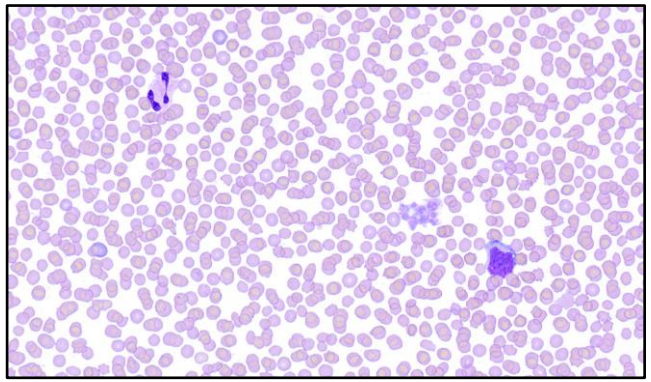
How can we confirm the thrombocytopenia?









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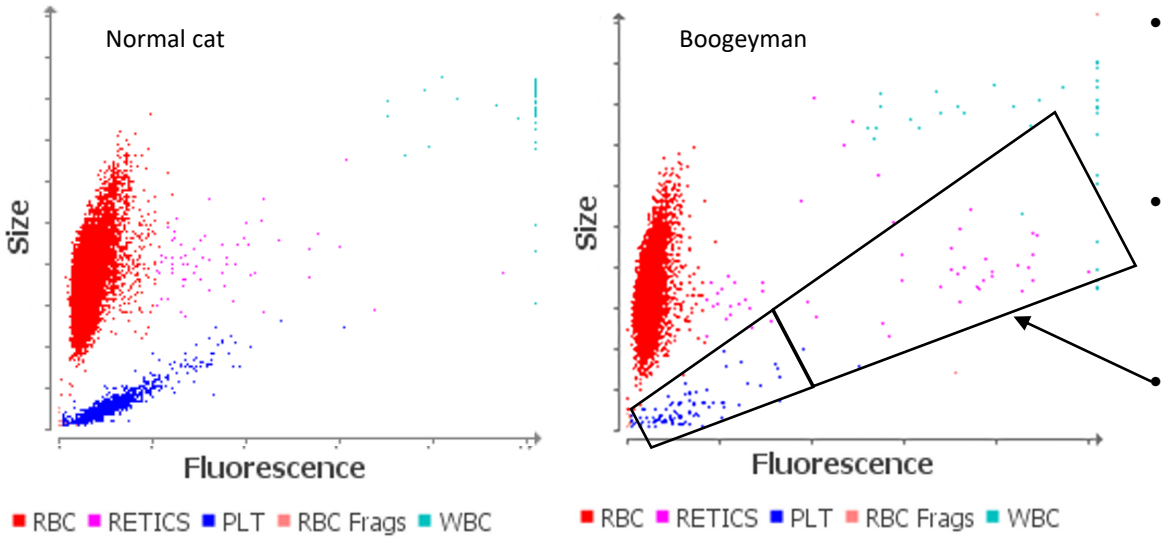


- Overall identification of different cell populations appears good – you can trust the data
- Platelet digitized events are low compared to normal – supports thrombocytopenia
- Continuum of digitized events suggests very large or clumps of platelets

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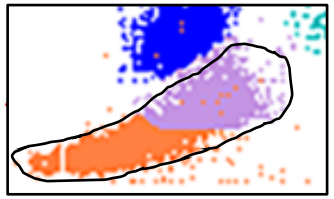
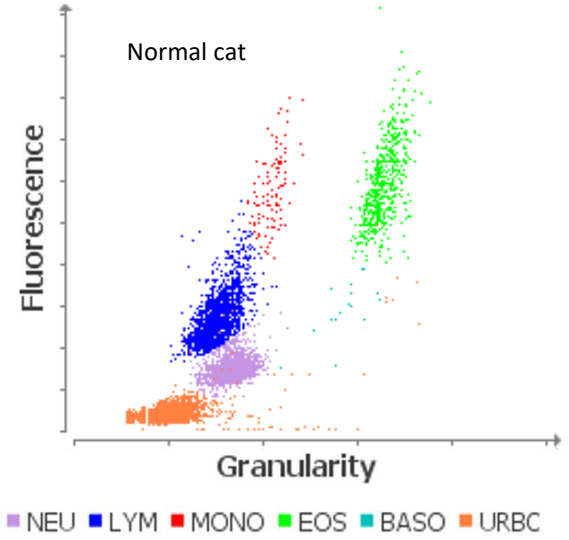
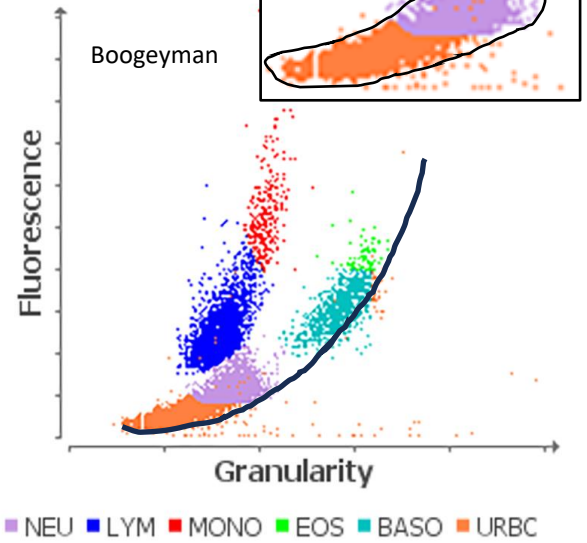
Strongly supports platelet clumping






- Some significant variation from normal pattern – needs blood film review
  - Extremely low numbers of eosinophils
  - Unlysed RBCs and NEUs melding together
- Platelet clumping oftentimes presents as a curvilinear array of digitized events extending from the lower left corner upward to the right

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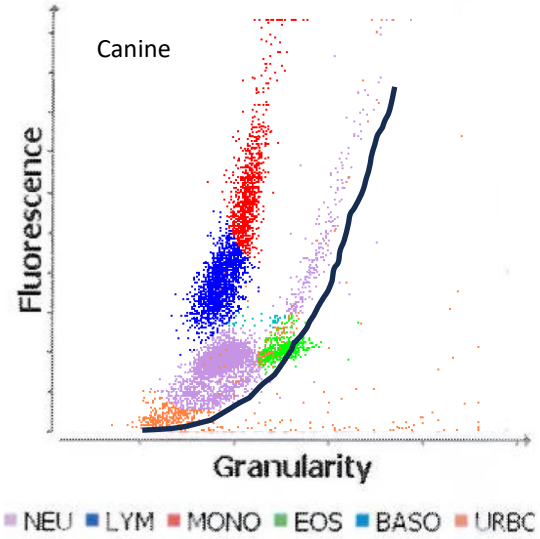
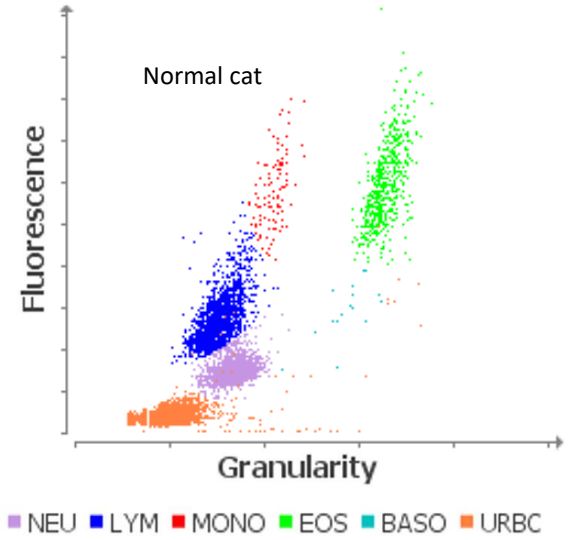
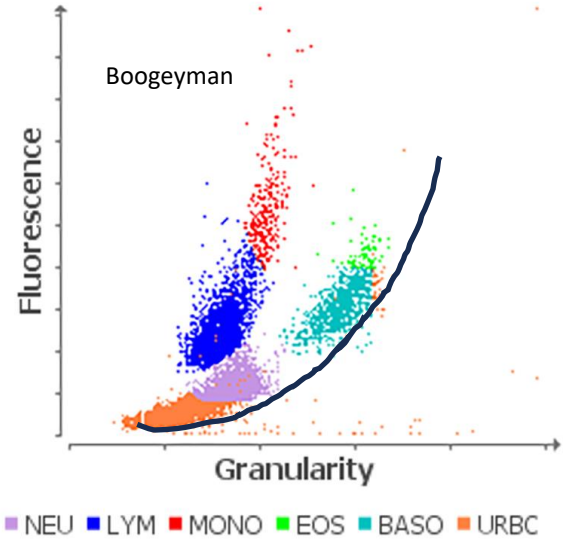
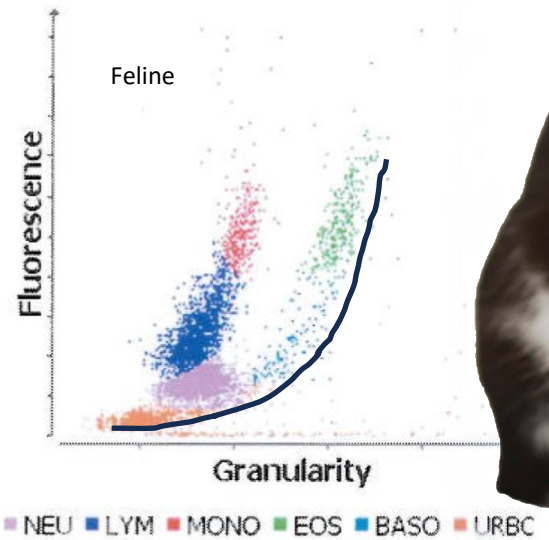
# Clinical Case Study

Examples of PLT clumping with the ProCyte Dx

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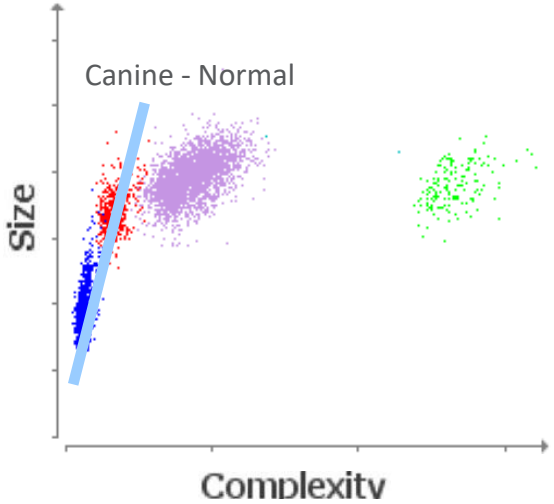


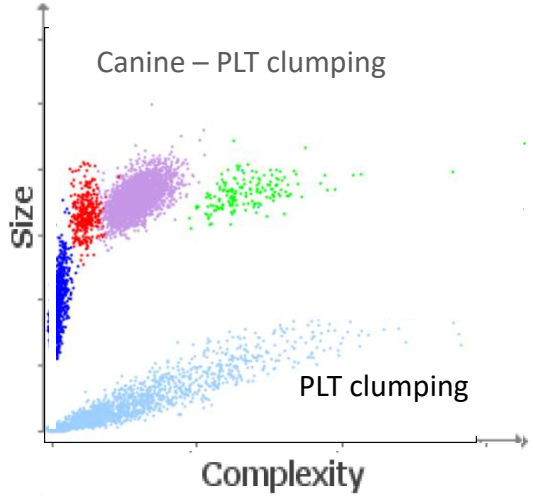


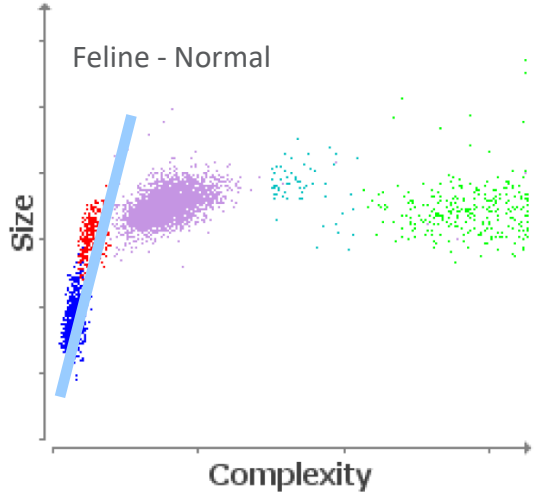


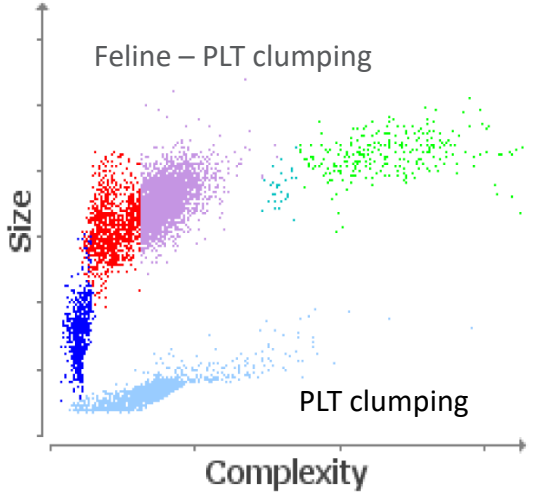


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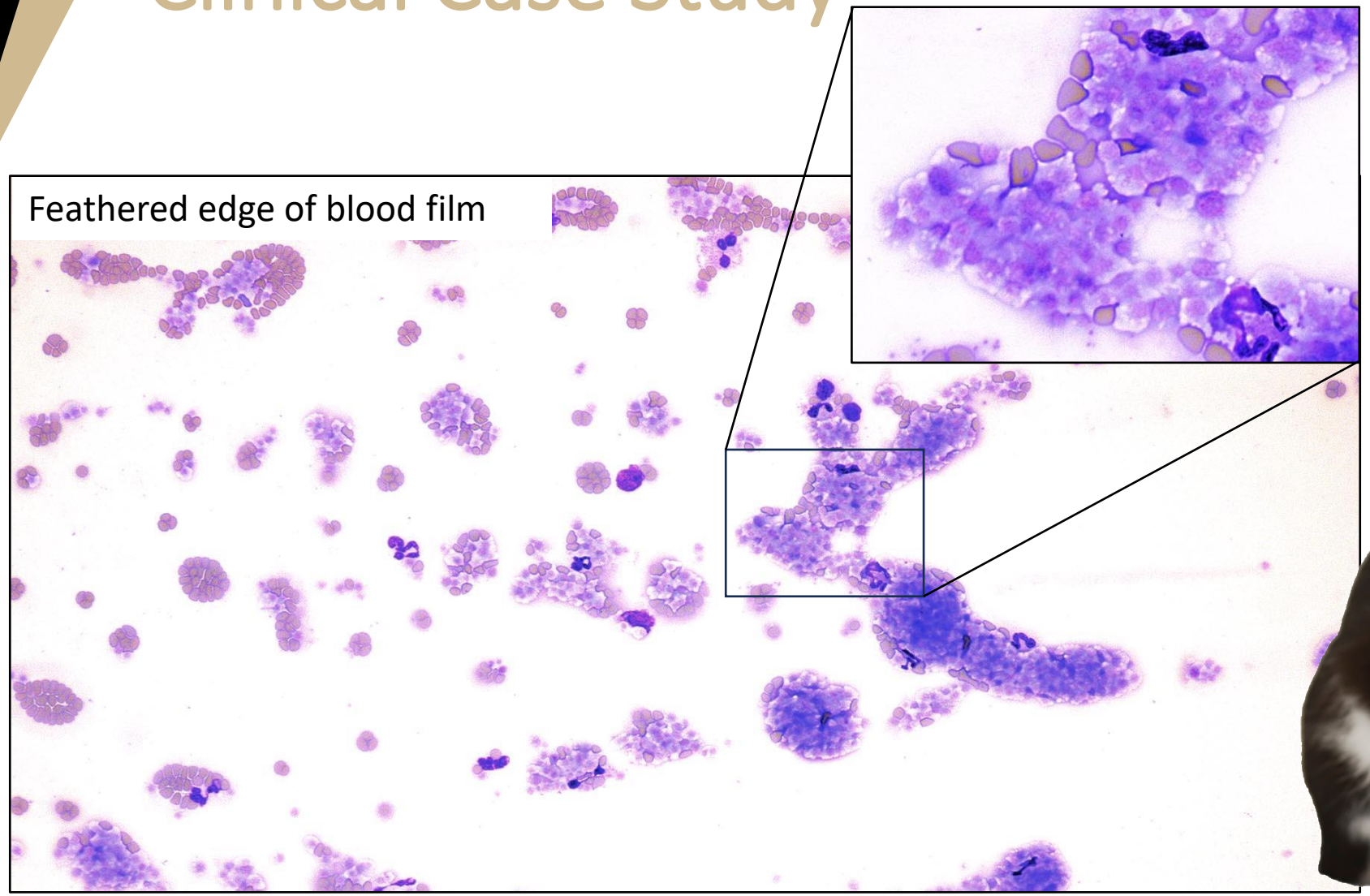


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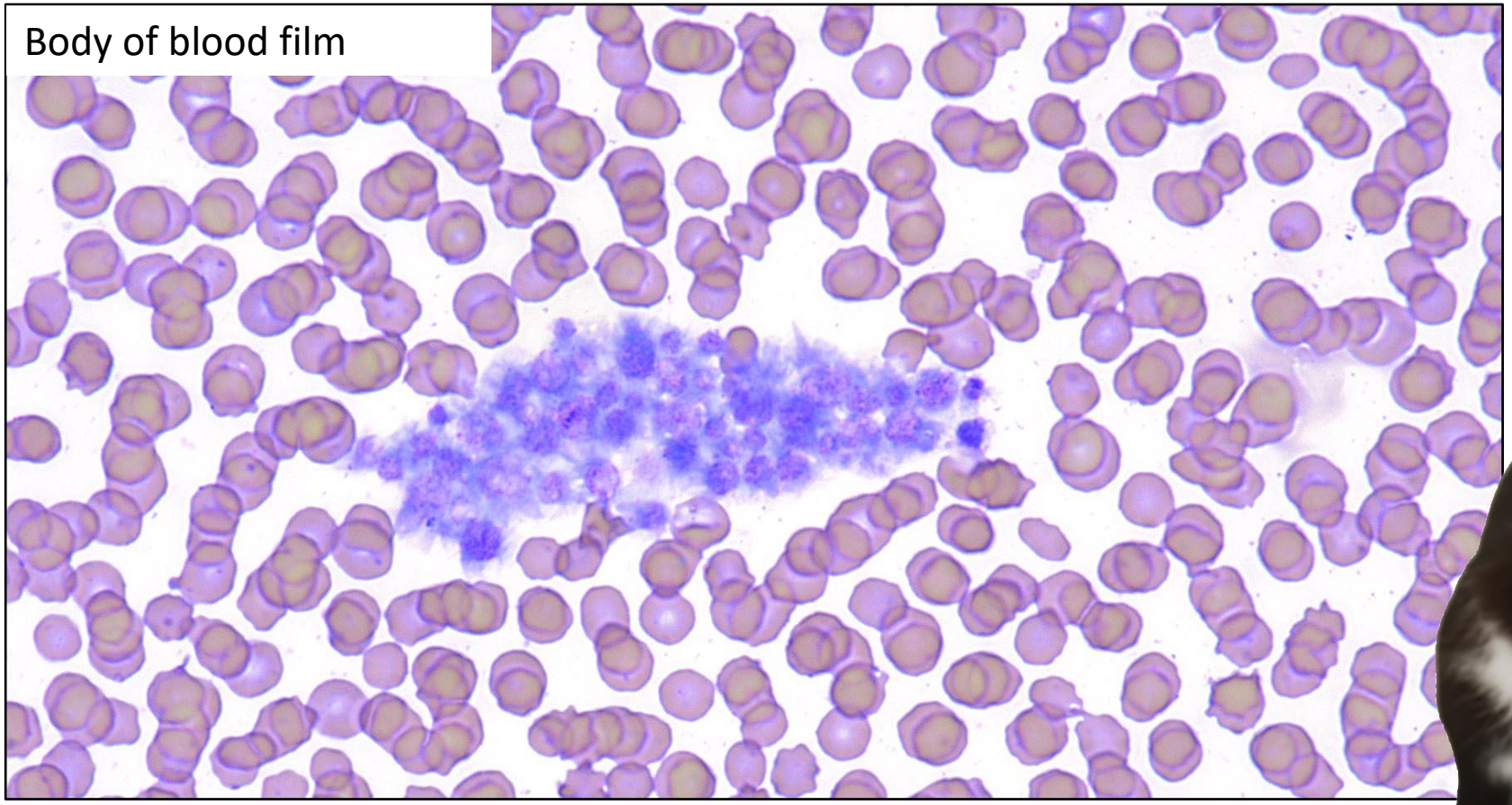


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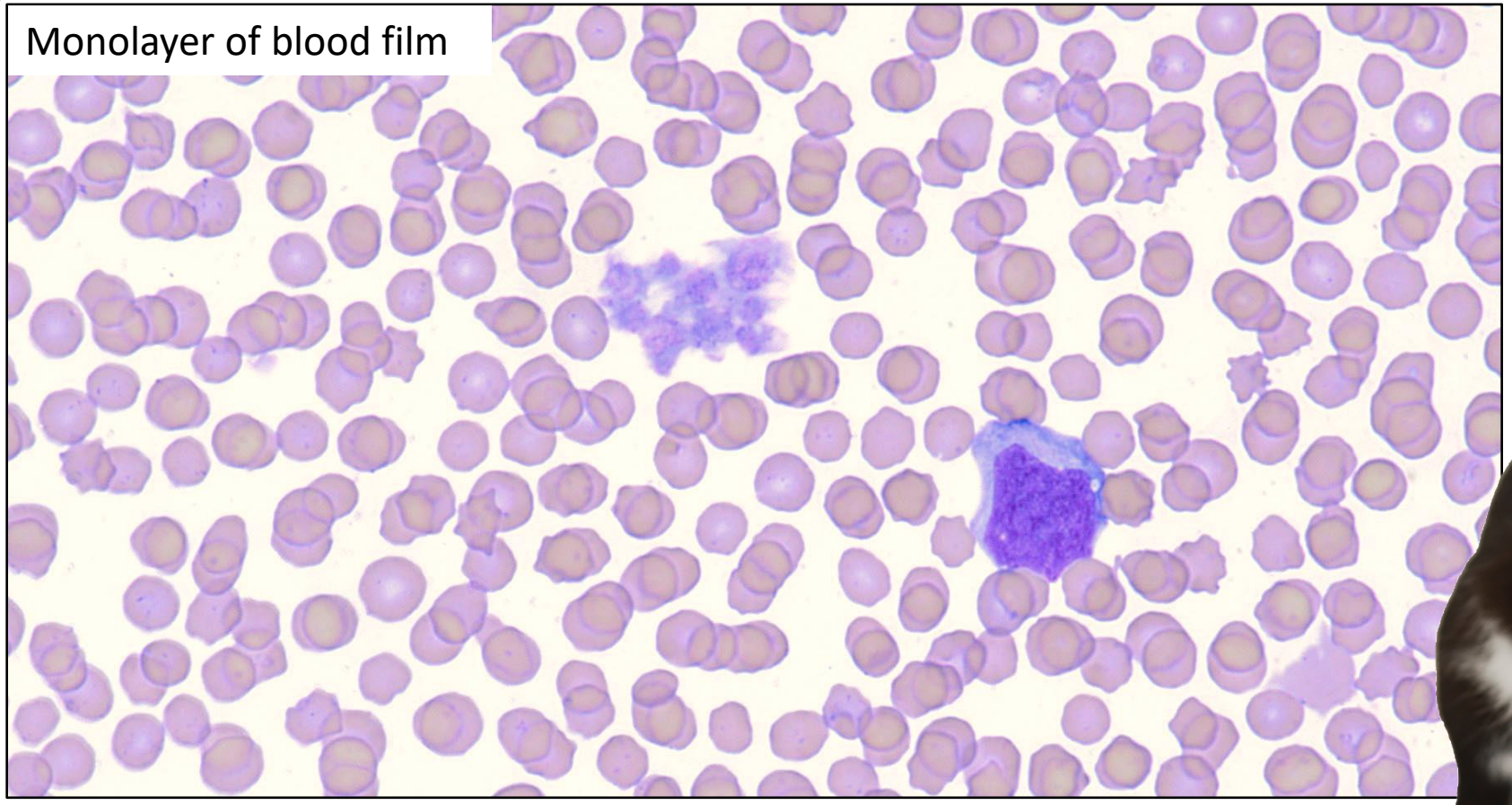


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- Neutered male
- Black and White DSH

Not Boogeyman: only a representation of a black and white Domestic Shorthair cat

Laboratory Retrievers
Animals can't hide their objective data

# IDEXX inVue Dx™ Cellular Analyzer

## Revolutionary workflow

Slide-free, load-and-go, results in 10 minutes

Plug-and-play integration with VetConnect® PLUS and IDEXX VetLab® Station

Give valuable time back for patient care

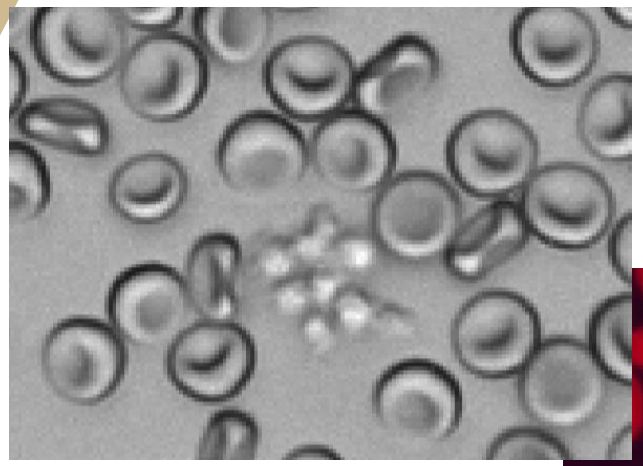
## Deeper insights

Multidimensional interrogation of cells in natural state

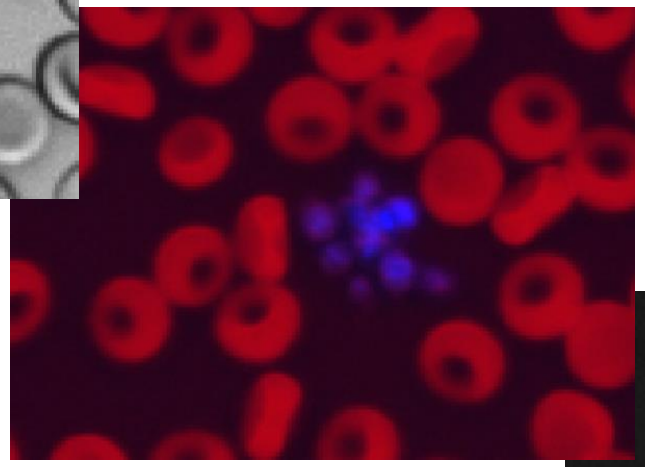
Multiple wavelengths of light and fluorescence

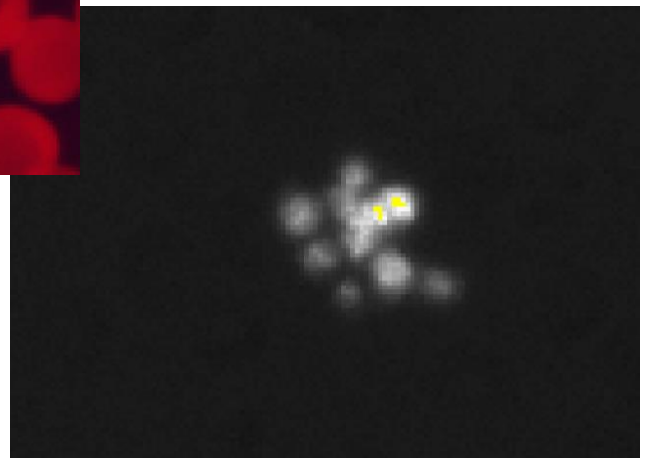
Board-certified pathologist trained

# IDEXX inVue Dx™ Cellular Analyzer



Platelet Clumping






PCT (%) = (PLT x MPV) / 10,000

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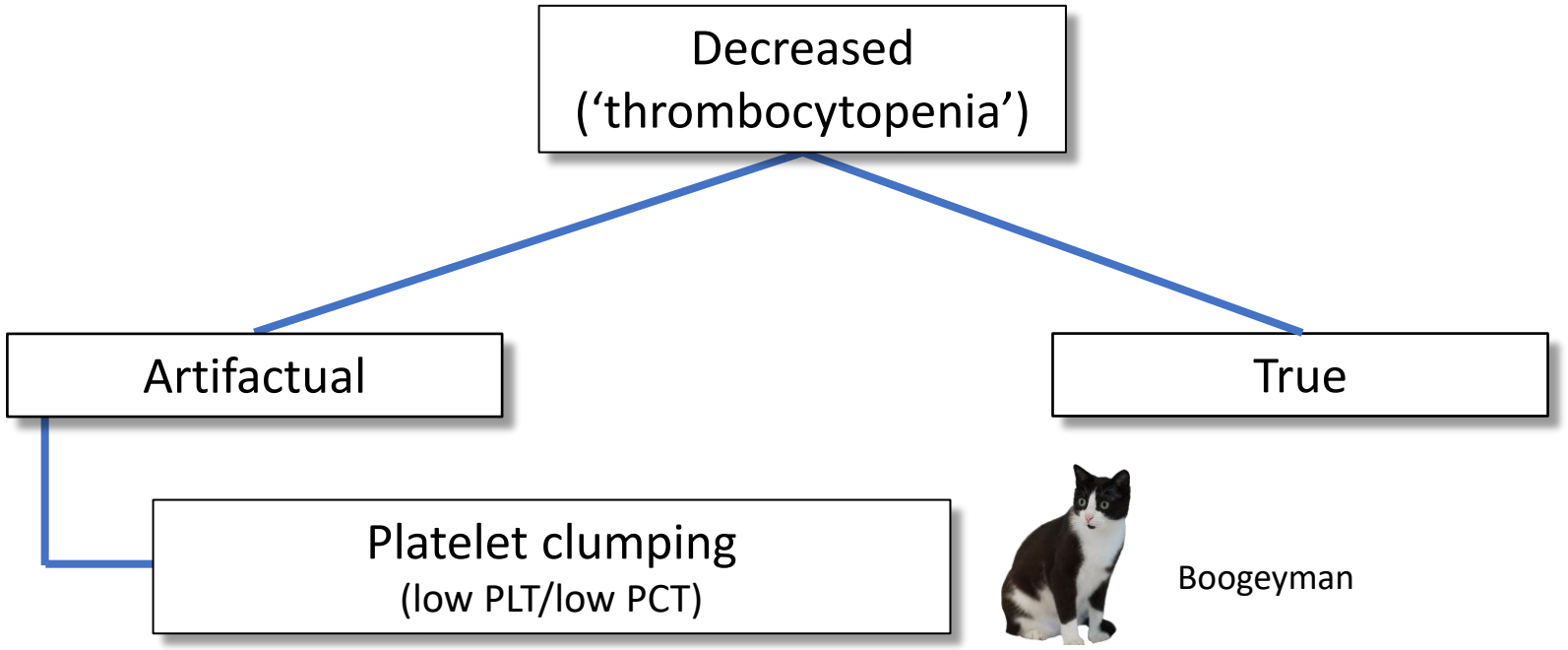
# Approach to the evaluation of platelets



# The Laboratory Retriever Team

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# Catalyst New Menu Consistently Drives Adoption at Scale

% of **U.S. Catalyst** customers **adopted in the first year of launch***

| >65% | >55% | >50% | >50% |
|---|---|---|---|
|  |  |  |  |
| Catalyst® **Lyte 4 CLIP** | Catalyst® **Total T4 Test** | Catalyst® **SDMA** | Catalyst® **Pancreatic Lipase** |
| *Launched December 2008* | *Launched February 2015* | *Launched January 2018* | *Launched September 2024* |

*Customers who adopted in first year of launch had run at least one consumable slide on Catalyst Dx® Chemistry Analyzer or Catalyst One® Chemistry Analyzer in the last 30 days of 12 months post-launch for Lyte 4 CLIP, Total T4 and SDMA, and at least one

consumable slide on Catalyst Dx® Chemistry Analyzer or Catalyst One® Chemistry Analyzer in the last 30 days as of 7/30/25 for Pancreatic Lipase.



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