Old dogs, new tricks: Canine hematology secrets

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Laboratory Retrievers

Animals can't hide their objective data

Conflict of Interest Disclosure:

We have financial interest, arrangement or affiliation with:

Speaker	Name of Organization	Relationship
Fred Metzger	IDEXX	Speaker
Dennis B. DeNicola	IDEXX	Speaker

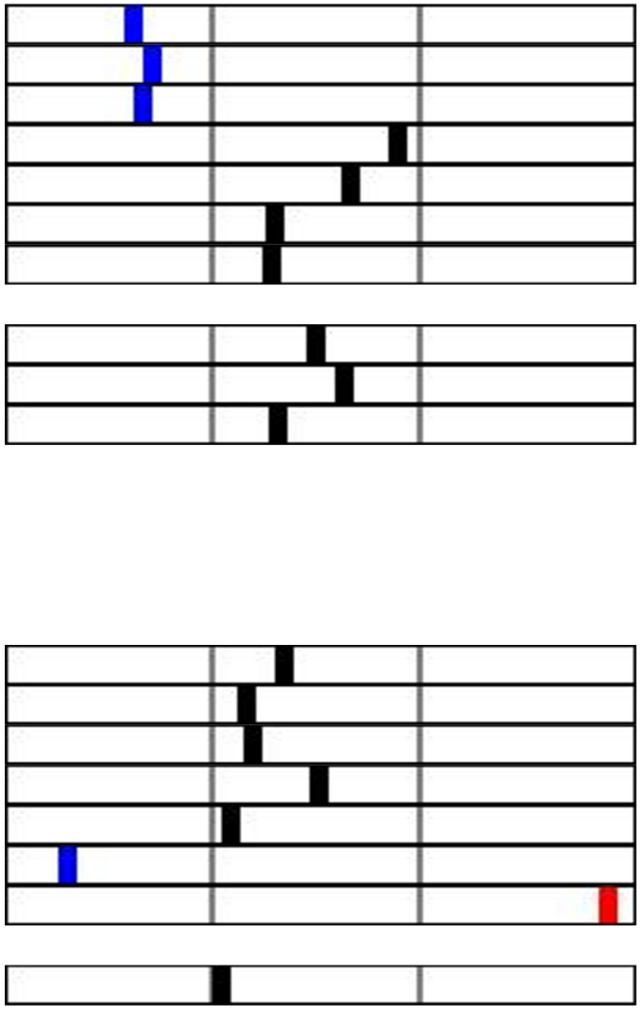
Complete Blood Count

Erythrogram
- RBC mass
- RBC morphology
- Objective measure of BM response Fe availability

Leukogram
- WBC mass
- WBC relative distribution
- WBC absolute distribution

Thrombogram
- PLT mass
- PLT morphology
- PLT mass

RBC	4.30 M/µL	5.65 - 8.87	LOW
HCT	31.1 %	37.3 - 61.7	LOW
HGB	10.5 g/dL	13.1 - 20.5	LOW
MCV	72.3 fL	61.6 - 73.5	
MCH	24.4 pg	21.2 - 25.9	
MCHC	33.8 g/dL	32.0 - 37.9	
RDW	16.0 %	13.6 - 21.7	
%RETIC	1.4 %		
RETIC	61.5 K/µL	10.0 - 110.0	
RETIC-HGB	27.0 pg	22.3 - 29.6	
WBC	8.81 K/µL	5.05 - 16.76	
%NEU	68.0 %		
%LYM	20.2 %		
%MONO	4.1 %		
%EOS	7.6 %		
%BASO	0.1 %		
NEU	5.99 K/µL	2.95 - 11.64	
LYM	1.78 K/µL	1.05 - 5.10	
MONO	0.36 K/µL	0.16 - 1.12	
EOS	0.67 K/µL	0.06 - 1.23	
BASO	0.01 K/µL	0.00 - 0.10	
PLT	* 63 K/µL	148 - 484	LOW
MPV	23.7 fL	8.7 - 13.2	HIGH
PDW	--.-- fL	9.1 - 19.4	
PCT	0.15 %	0.14 - 0.46	



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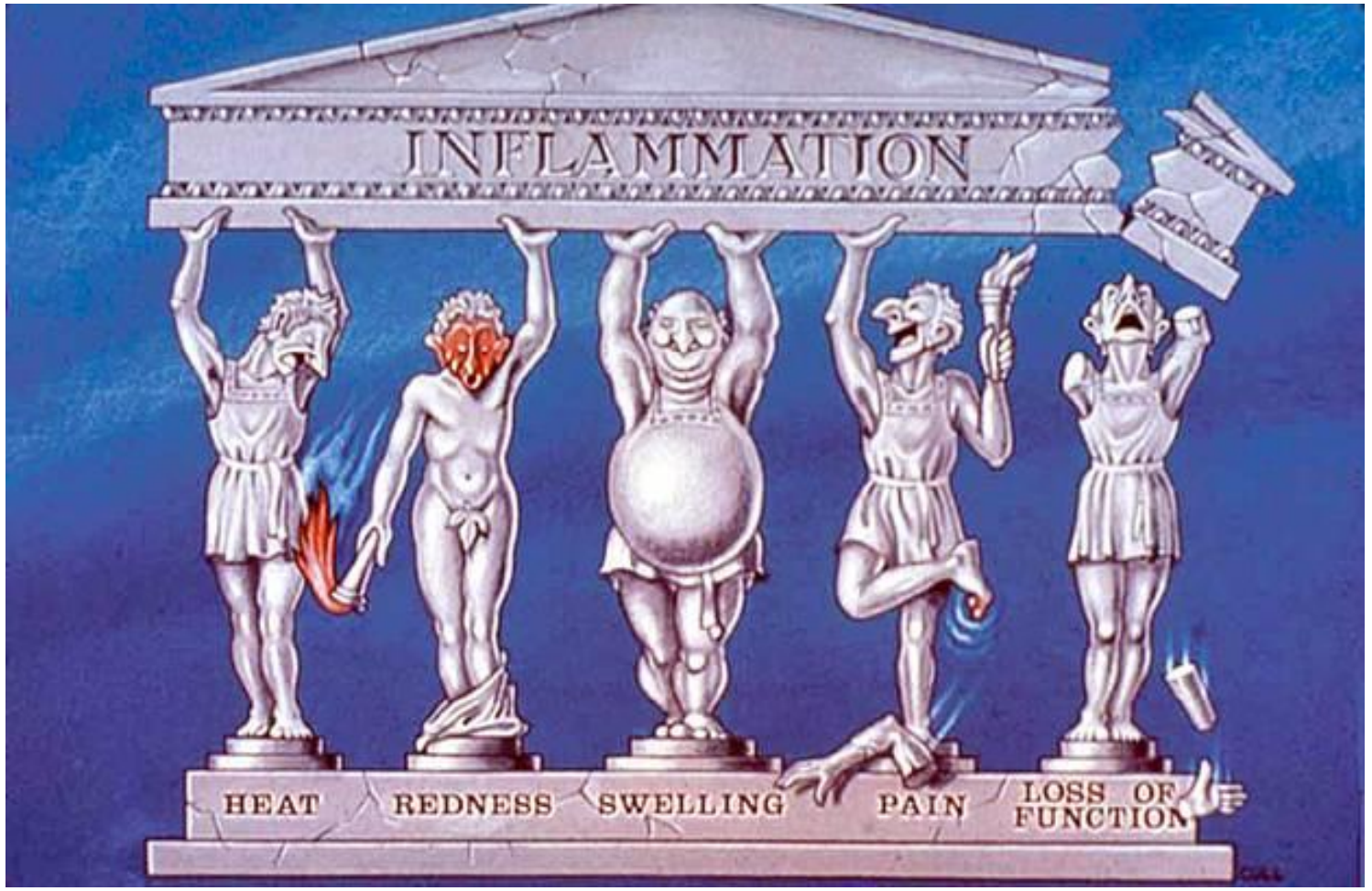
Complete Blood Count

WBC	8.81 K/µL	5.05 - 16.76	
NEU	5.99 K/µL	2.95 - 11.64	

More than 50% of cases with neutrophilic inflammation have total WBC counts within refererence interval limits

Clinical signs of inflammation



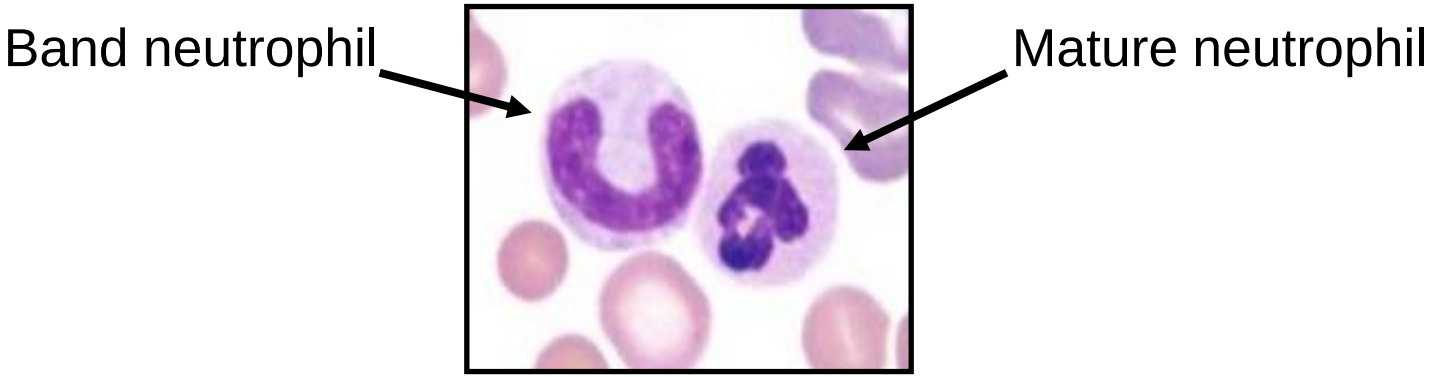
Calore Rubor Tumor Dalore

Old dogs, old tricks

- Identification of band/immature neutrophils - blood cell morphology
- Cytograms/dot plots

Old dogs, old tricks

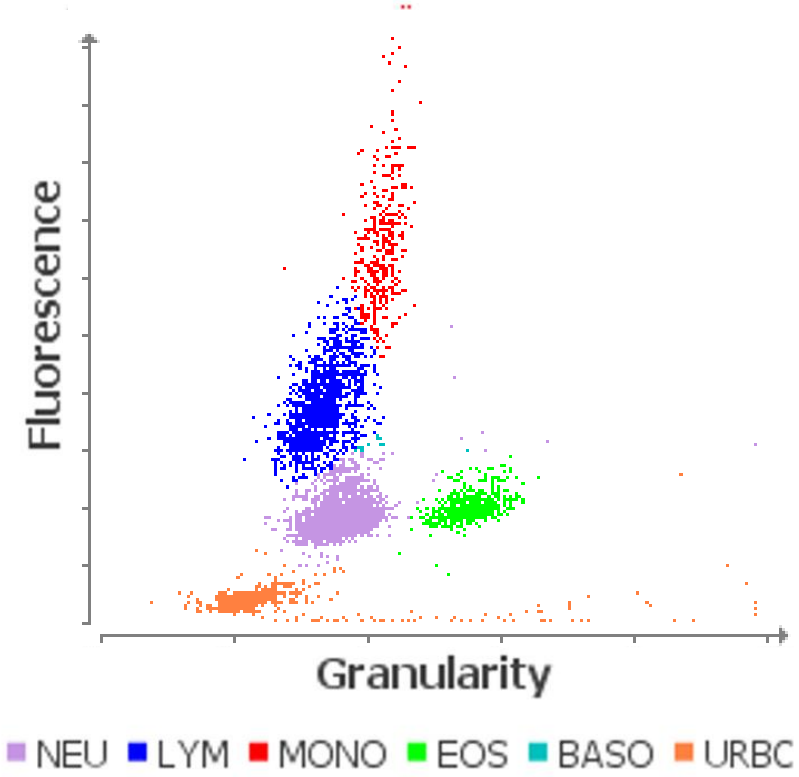
- Definitions
  - A neutrophil with a “horseshoe-shaped” nucleus with parallel-sided nuclear membranes
    - “Slight” nuclear indentations are acceptable



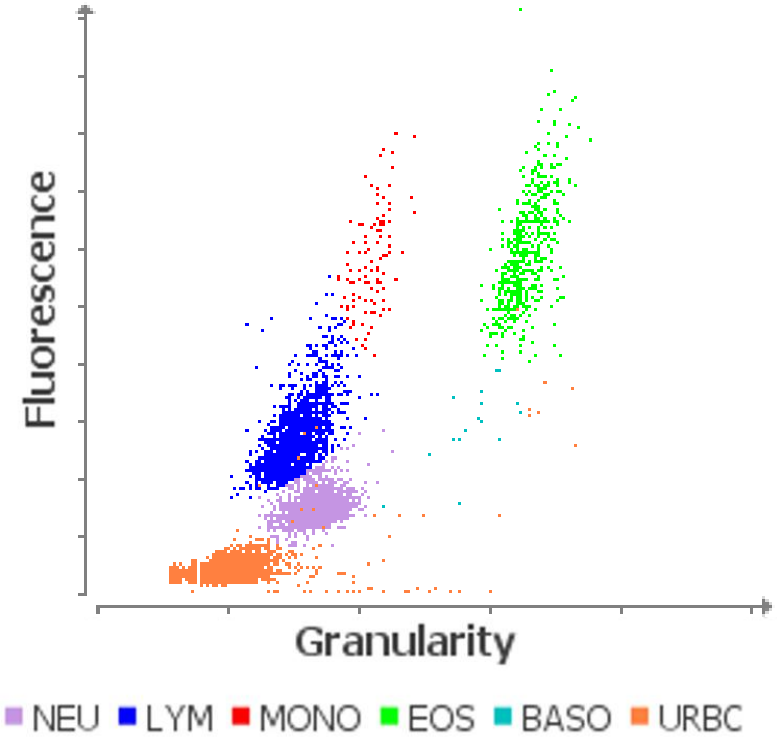
The immature neutrophil is the “hallmark” of inflammation

Normal Canine and Feline WBC Dot Plots

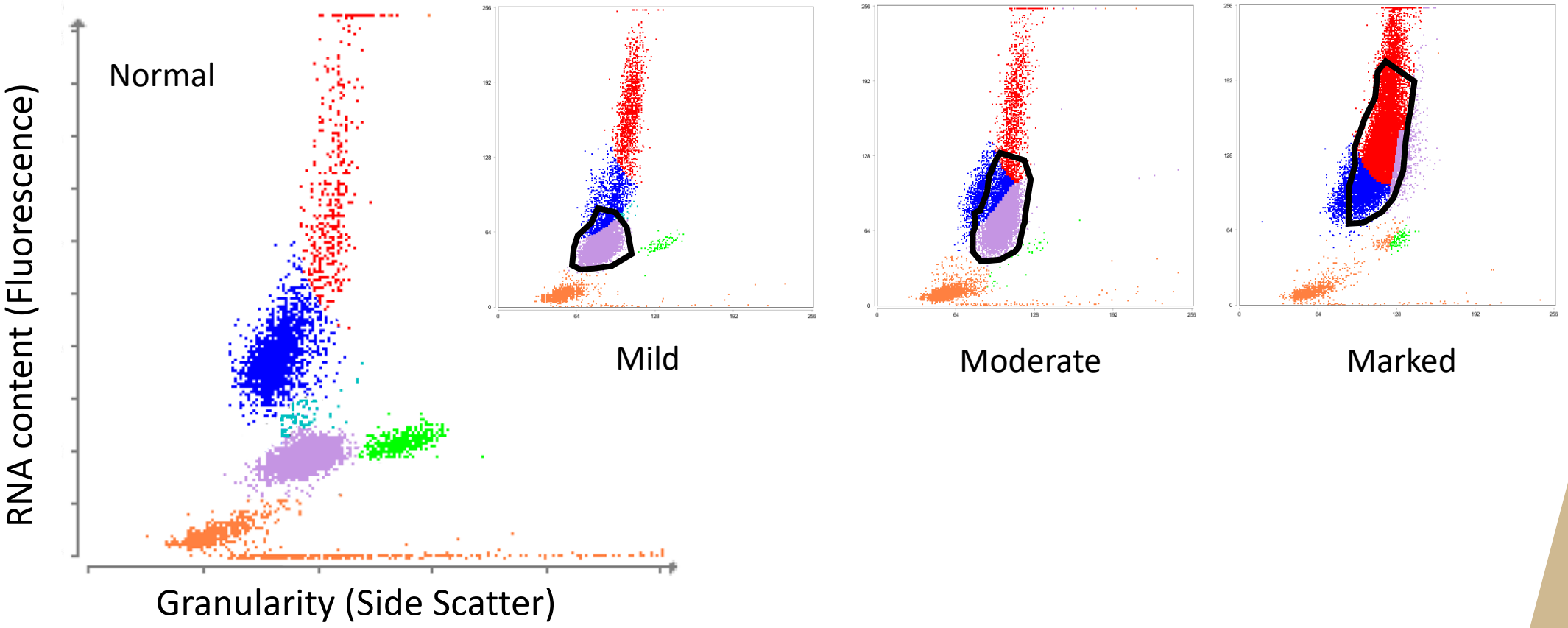
Normal WBC Dot Plot (Canine)



Normal WBC Dot Plot (Feline)



Immature and/or toxic neutrophils



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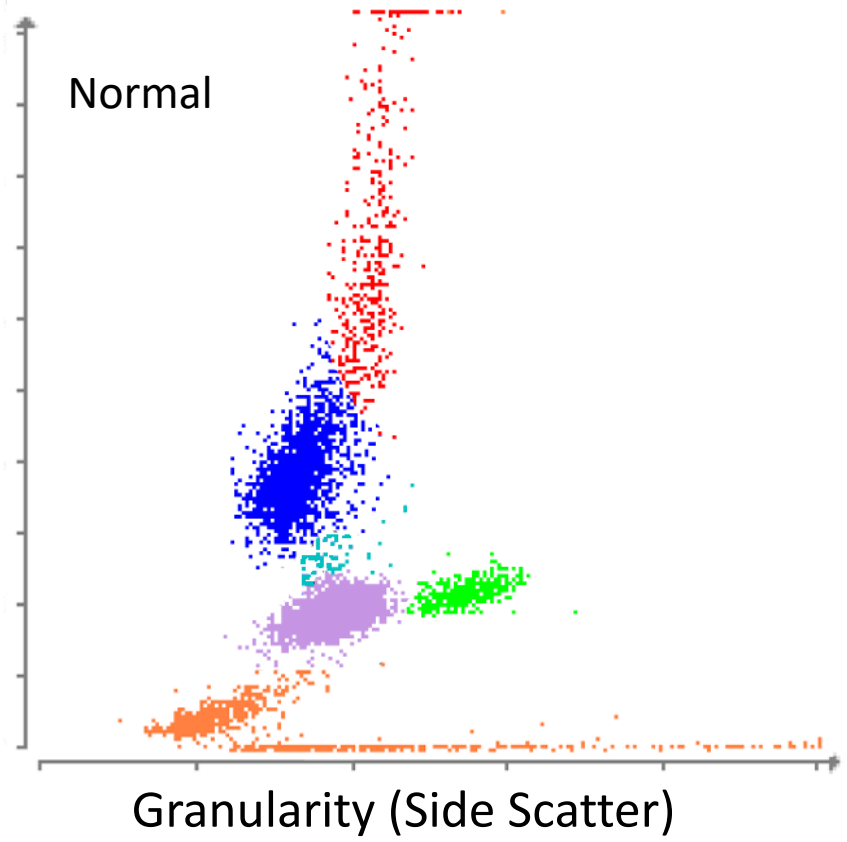
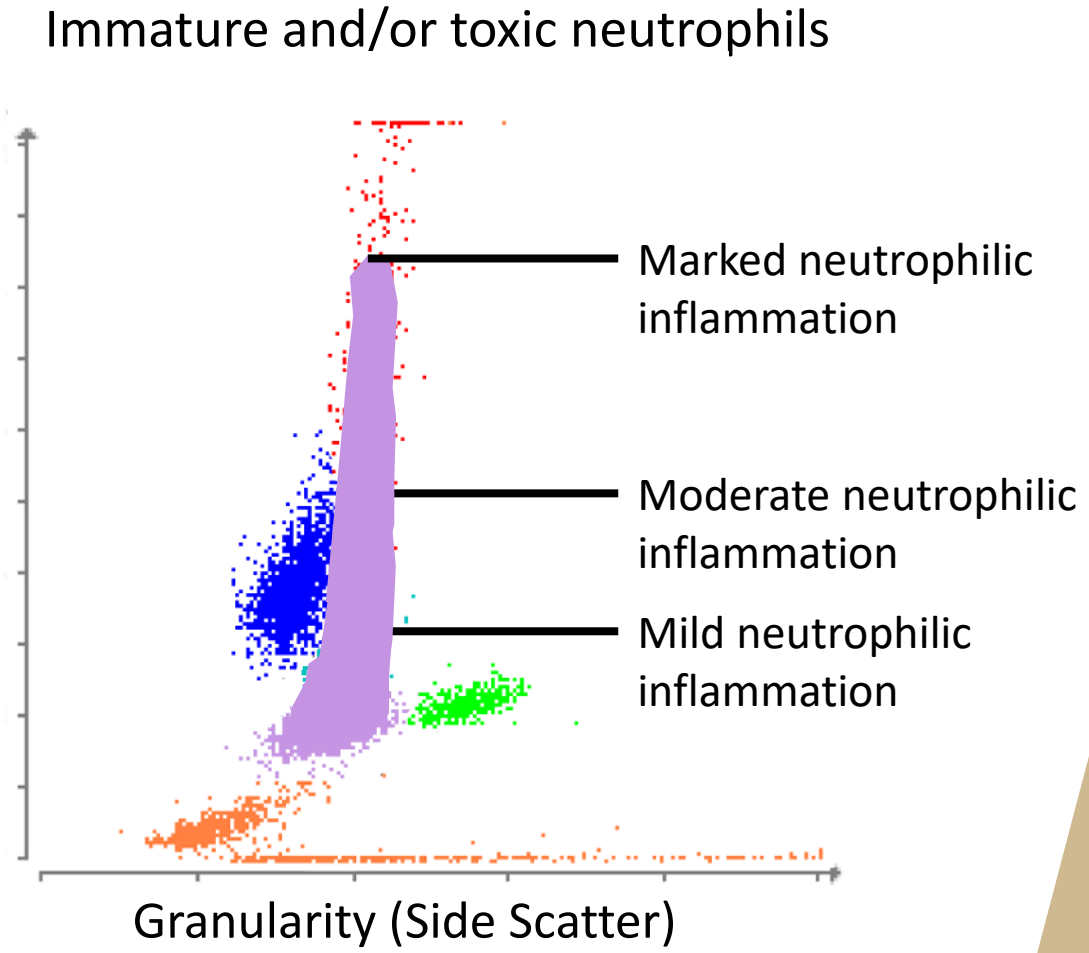
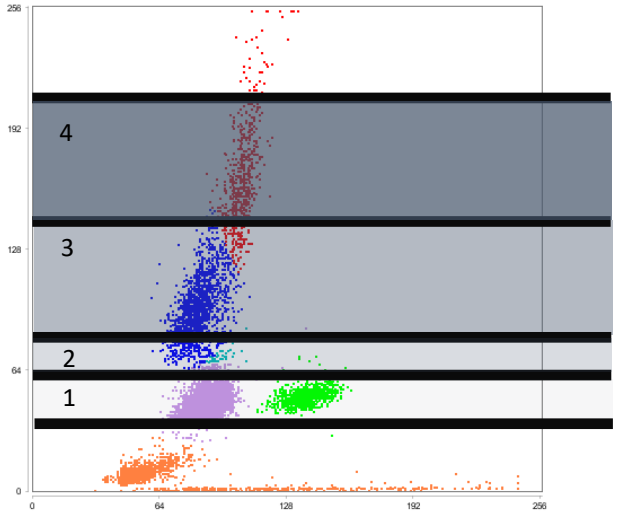
Immature and/or toxic neutrophils



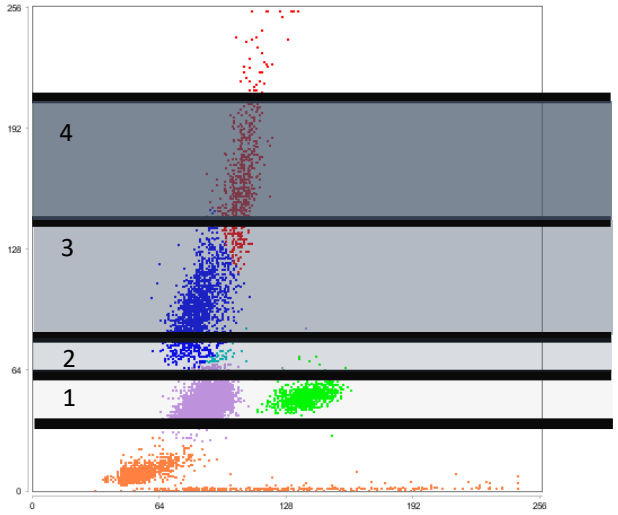


Degree of immature / toxic neutrophils



4 - Marked inflammation
3 - Moderate inflammation
2 - Minimal to mild inflammation
1 - Normal

Degree of immature / toxic neutrophils



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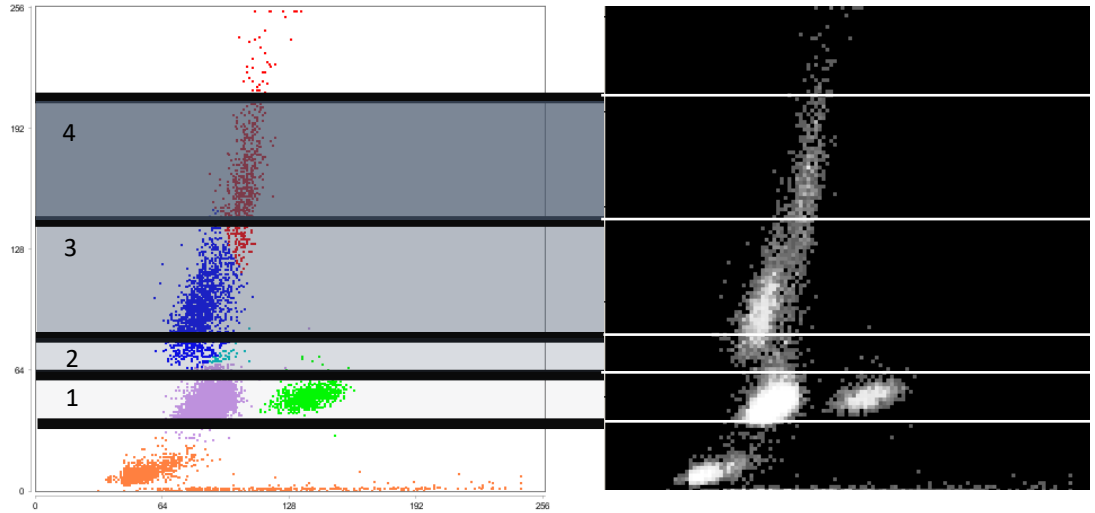
Degree of immature / toxic neutrophils



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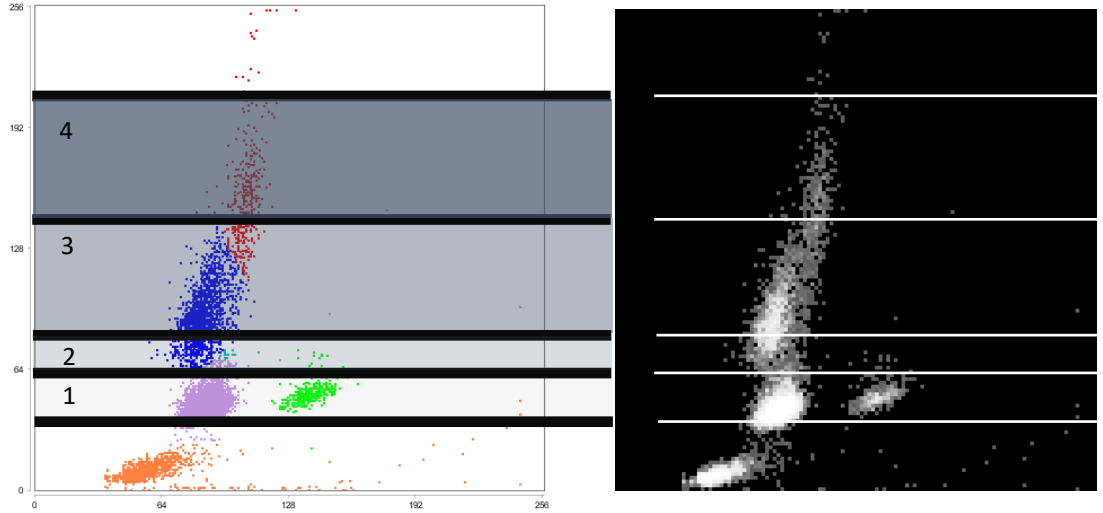
Canine – Ziggy



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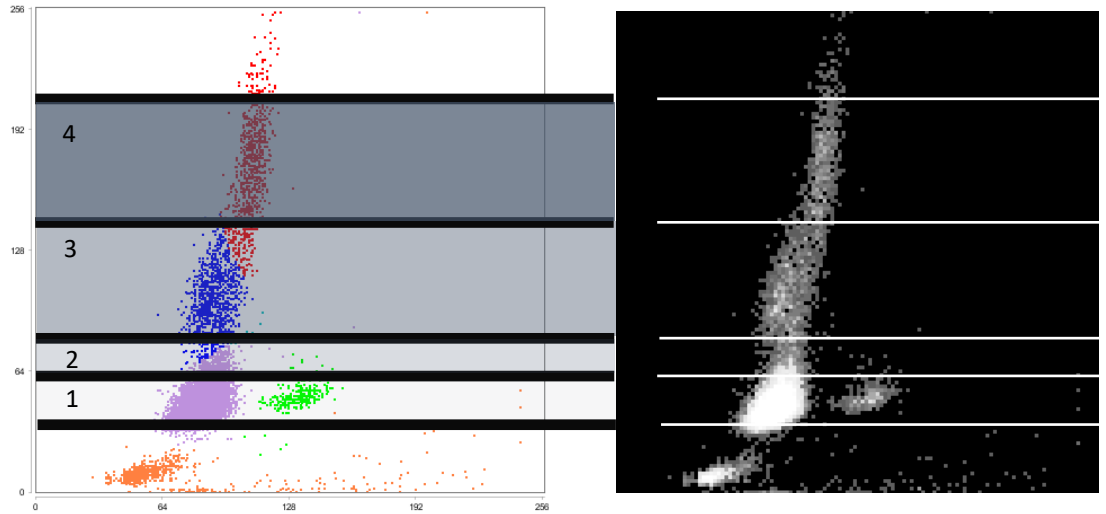
Canine – Sampson – Mild



4 - Marked inflammation
3 - Moderate inflammation
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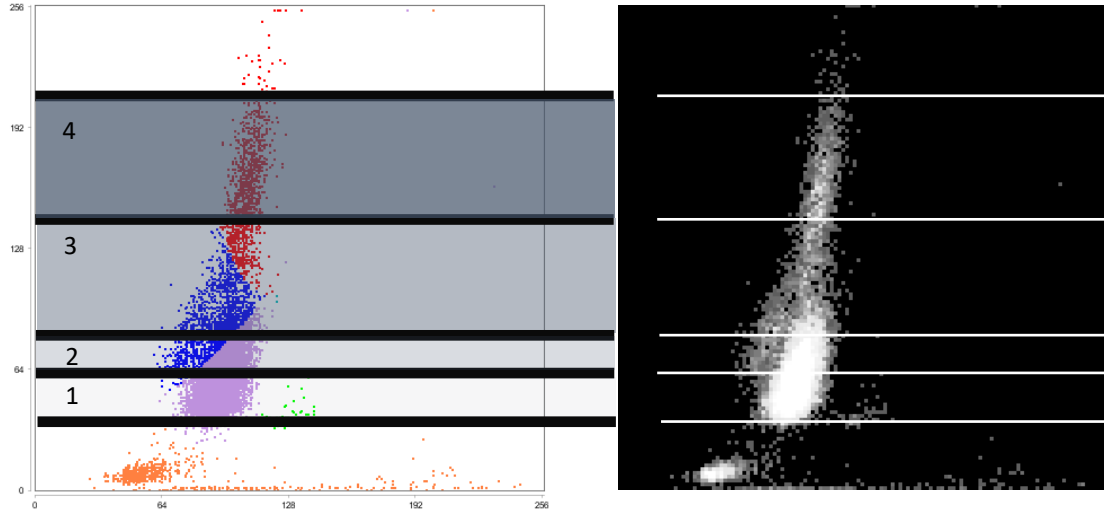
Canine – Lily – Moderate



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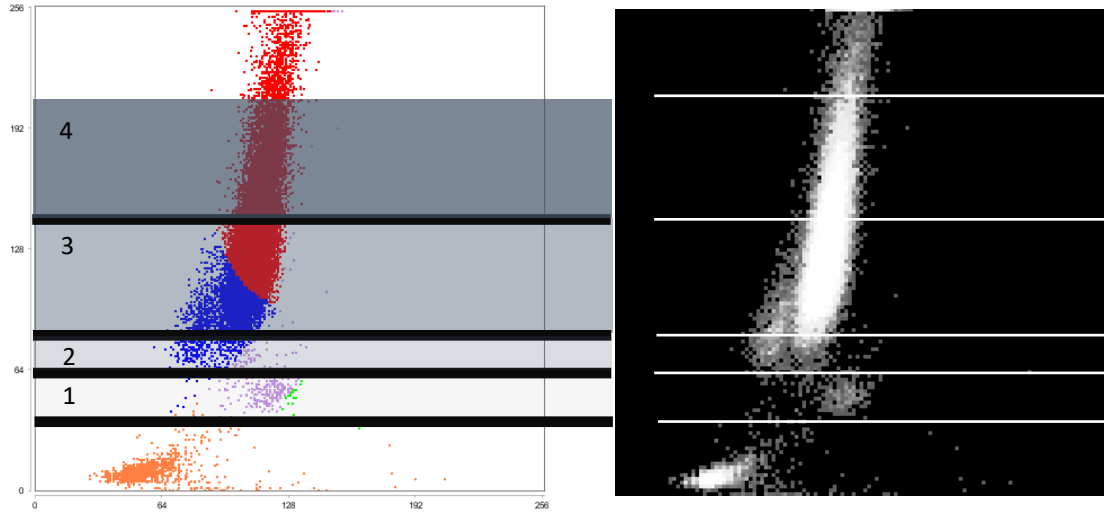
Canine – Penny -Marked



4 - Marked inflammation
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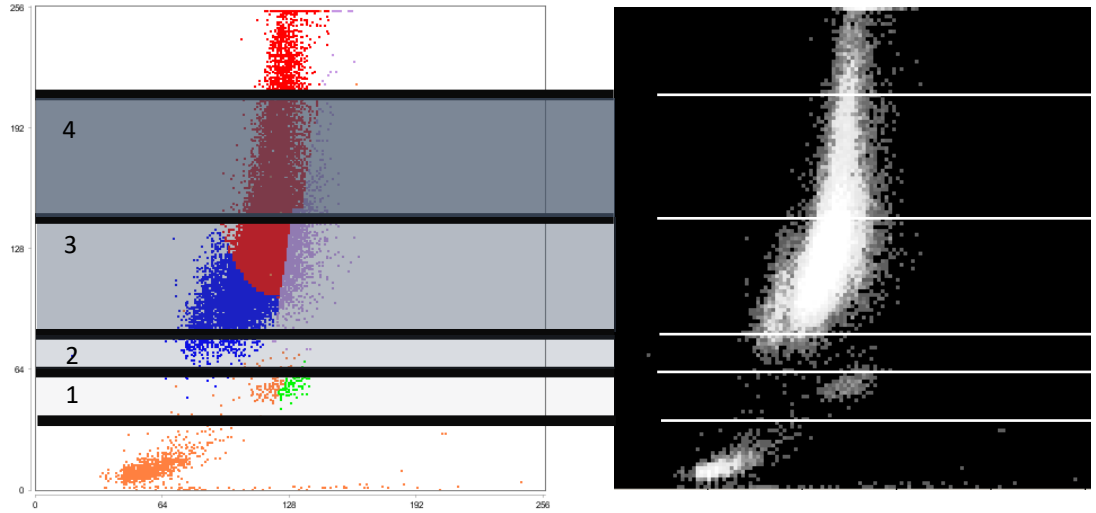
Canine – Duke 2-Marked



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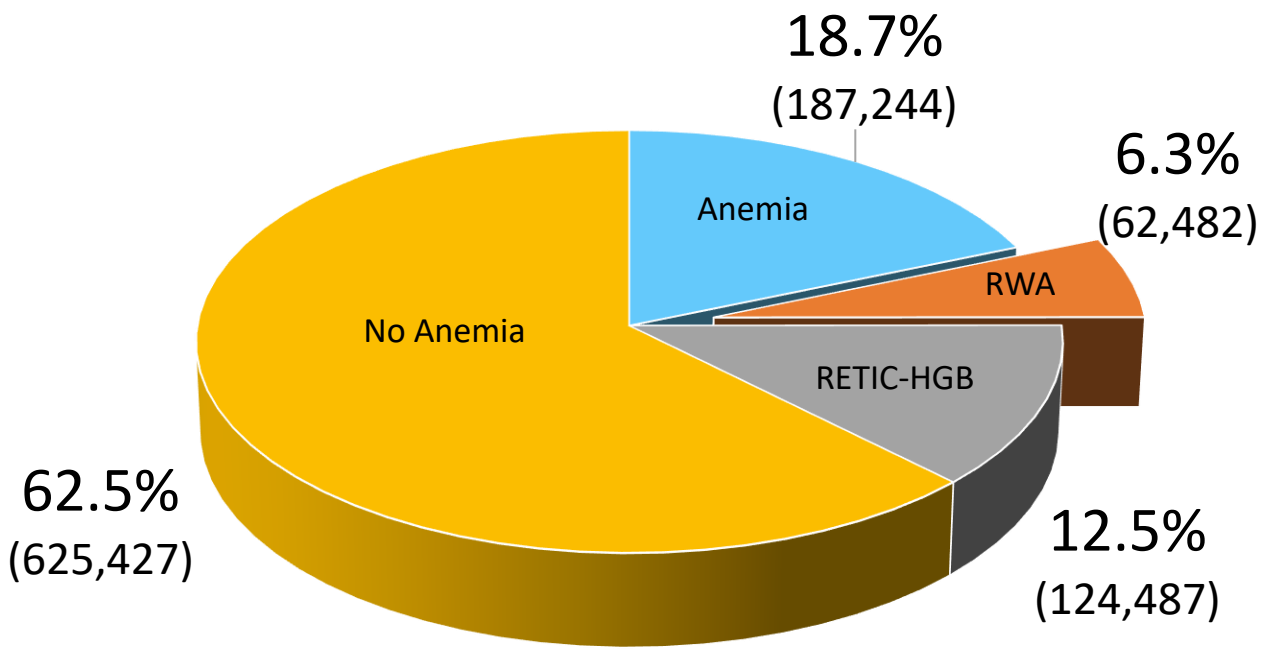
New Tricks from Old Dogs

- Absolute Reticulocyte Count

The value of reticulocytes



- Reticulocytosis without anemia (RWA):
  - Potential for identifying underlying and possibly occult serious disease
  - “Compensated” hemolytic or blood loss disease

Data analysis based on 1,000,000 CBCs randomly collected from the global field of ProCyte Dx® Hematology Analyzers in 2017.

New Tricks from Old Dogs

- Absolute Reticulocyte Count
- Reticulocytes without anemia (RWA)
- Reticulocyte Hemoglobin

Iron Deficient vs Iron Limited RBC Production

Normal Iron Delivery

Normocytic
Normochromic

Inflammation

Limited Iron Delivery

Small RETICs with less hemoglobin

Potential microcytosis and hypochromasia with longstanding inflammation

Chronic blood loss

Deficient Iron Delivery

Small RETICs with less hemoglobin

Eventual microcytic and hypochromic RBCs

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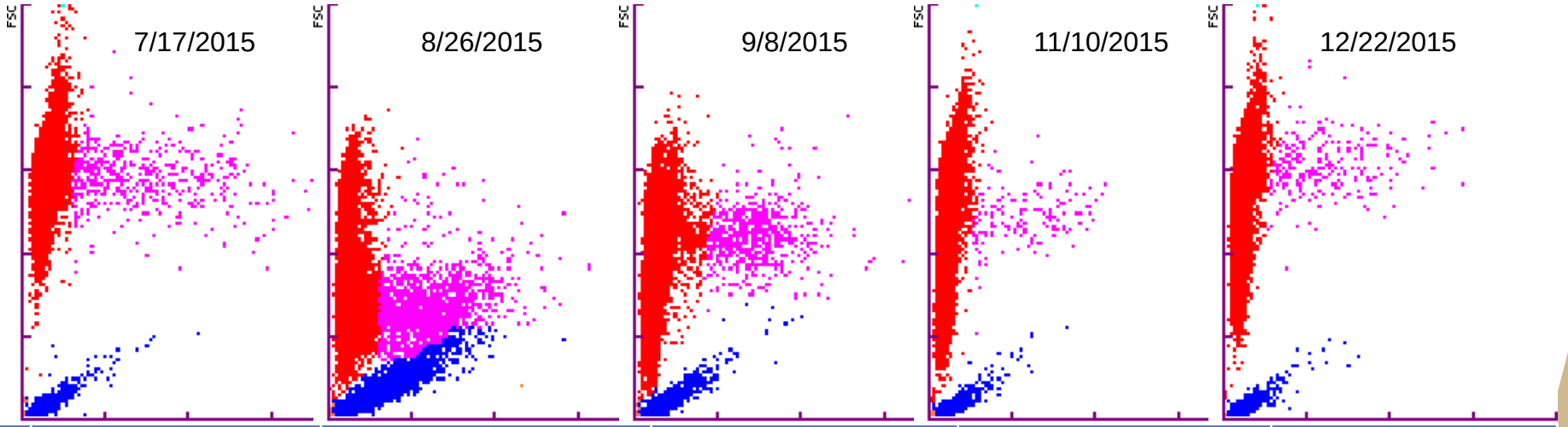
Maxi: Serial dot plots and RETIC-HGB



Date	07/17/15	08/26/15	09/08/15	11/10/15	12/22/15
HCT (%) (37.3 0 61.7)	41.1	11.2	25.4	25.4	41.6
MCV (fL) (61.6 – 73.5)	65.9	40.7	44.7	52.2	60.3
RETIC (K/µL) (10 – 110)	141.6	239.5	171.0	51.11	72.5
RETIC-HGB (pg) (22.3 – 29.6)	25.1	13.0	17.5	19.6	26.7

New Tricks from Old Dogs

- Absolute Reticulocyte Count
- Reticulocytes without anemia (RWA)
- Reticulocyte Hemoglobin
- CRP-C Reactive Protein

Cool new tests!

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- Reticulocyte Hemoglobin
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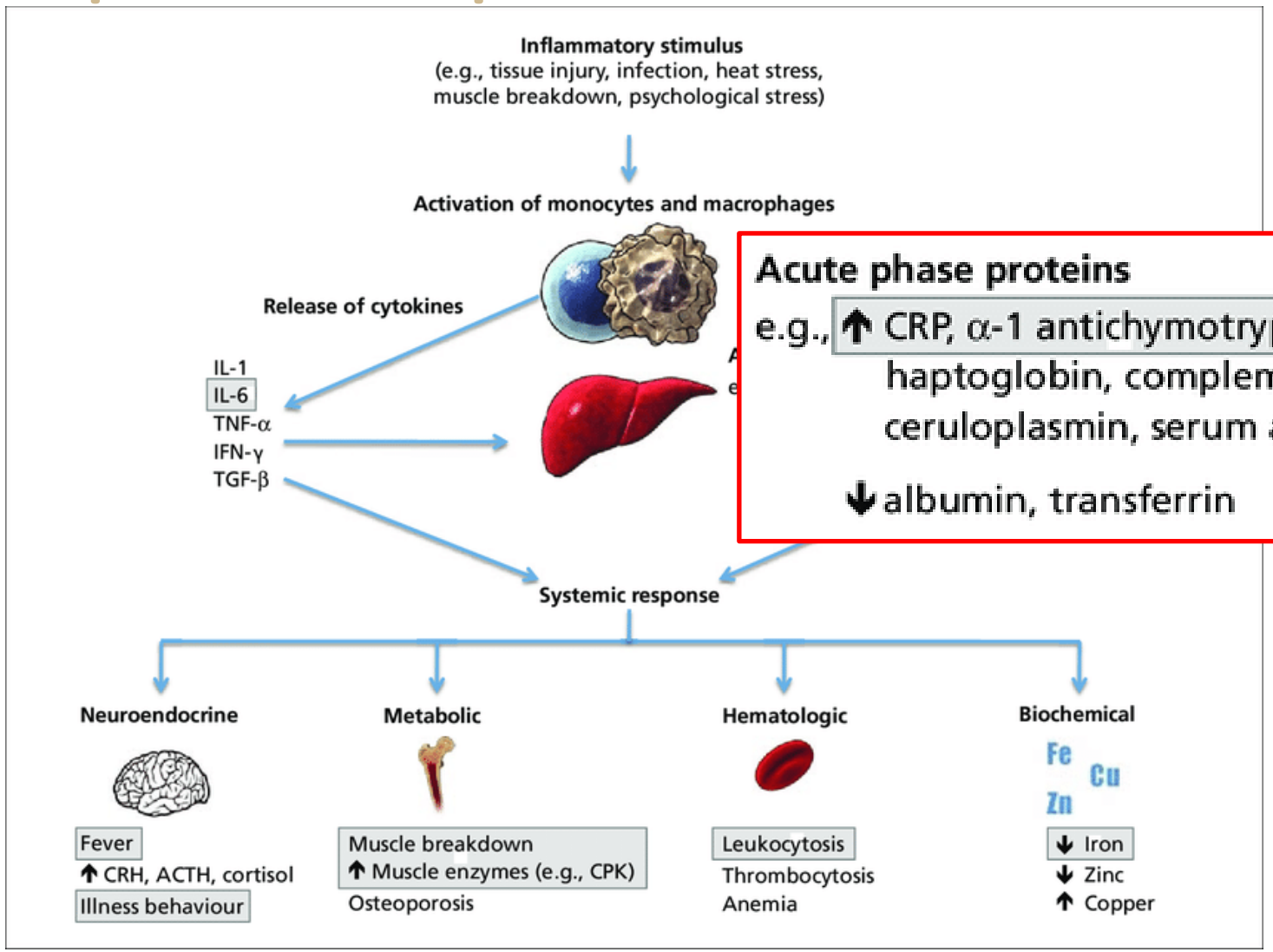
Acute phase response



In-clinic testing options

- Various in-house testing options
  - Latex agglutination immunoassay
    - Antibodies bind lo latex beads which bind to SAA and precipitate
- Species validated assays
  - Often anti-human antibodies
  - Cross-reactivity across species
- Rapid
  - Can lack accuracy
- Discriminate inflammatory vs non-inflammatory

CRP in diagnosing and managing inflammatory conditions

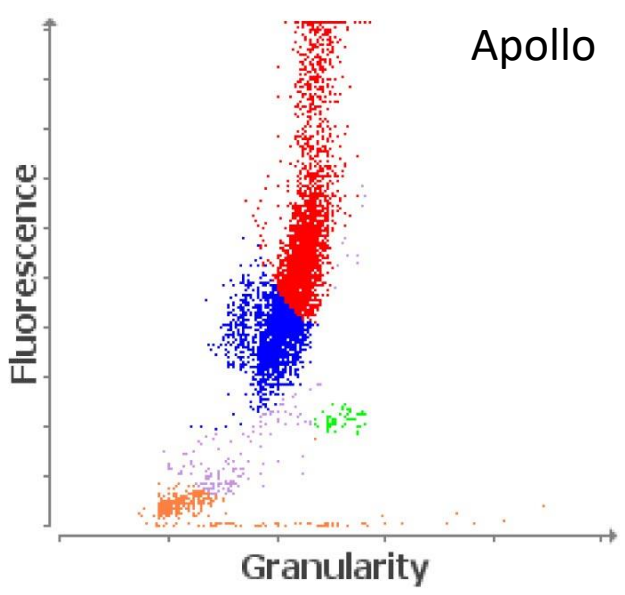
- Increases within 6 hours of onset systemic inflammation

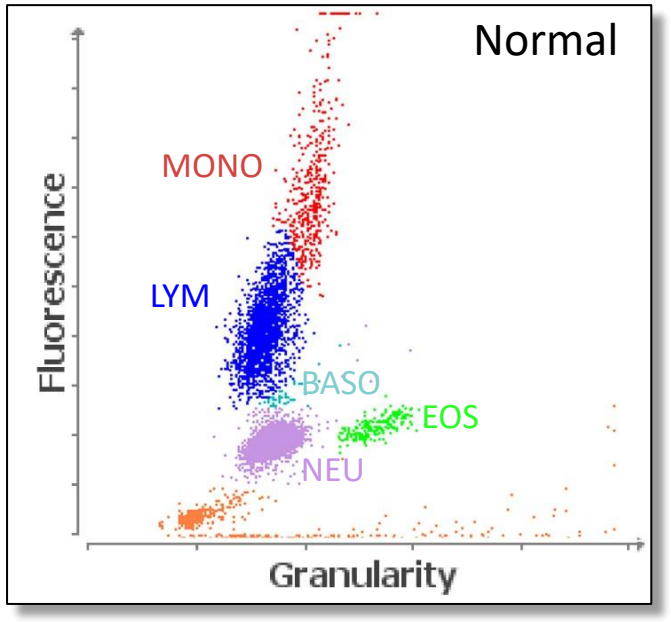
- CRP increased
  - Supports systemic inflammation – treat, investigate further, monitor frequently

- CRP normal
  - Does not support systemic inflammation - investigate further

- CRP during therapeutic trial
  - Decreases rapidly (short t ½) with successful treatment → supports diagnosis

Apollo – 6y M/N Great Dane





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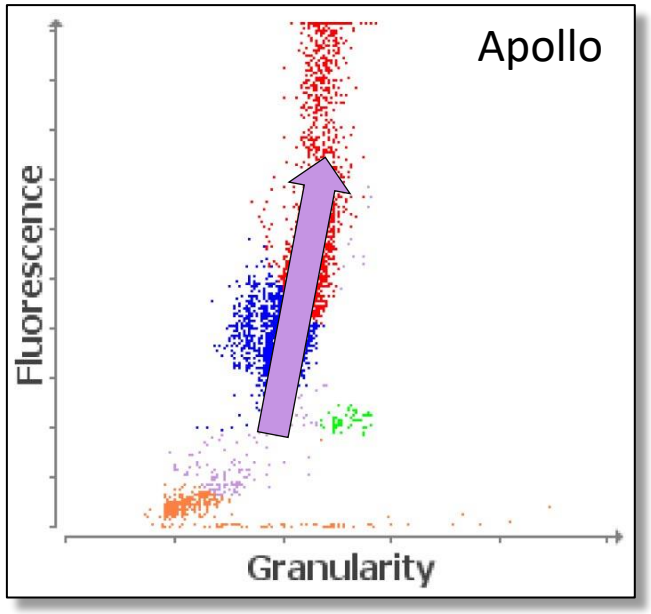
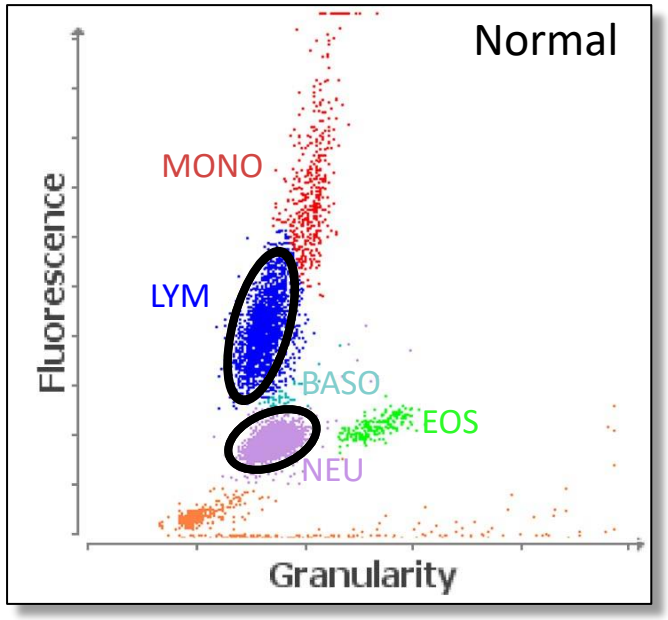
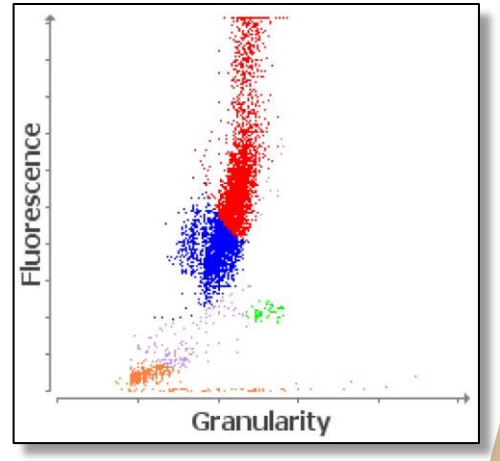




Apollo – 6y M/N Great Dane

Test	Results	Reference Interval	LOW / NORMAL / HIGH
ProCyte Dx (August 10, 2017 10:27 AM)			
WBC	7.16 K/µL	5.05 - 16.76	
NEU	* 0.16 K/µL	2.95 - 11.64	LOW
BAND	* Suspected		
LYM	* 2.87 K/µL	1.05 - 5.10	
MONO	* 4.07 K/µL	0.16 - 1.12	HIGH
EOS	0.06 K/µL	0.06 - 1.23	
BASO	0.00 K/µL	0.00 - 0.10	
Band neutrophils suspected			
WBC Abnormal Distribution			



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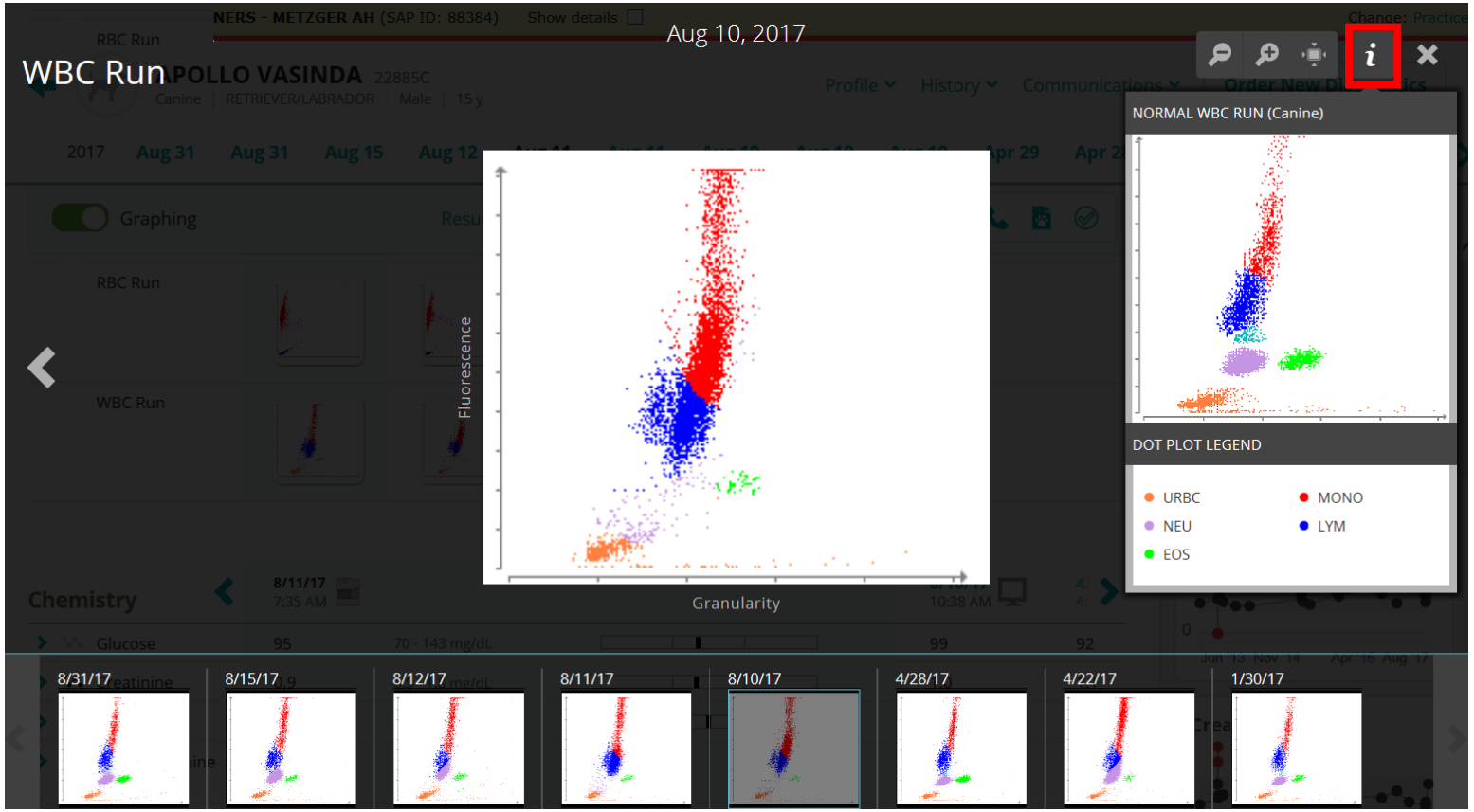
Apollo

IDEXX VetConnect PLUS



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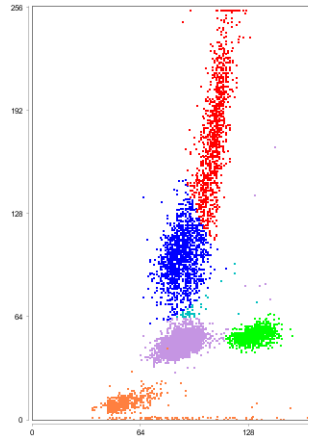

Date	4/28/17
Band	-
WBC (K/µL) (5.05–16.76)	10.58

RED = Abnormal high Blue = Abnormal low

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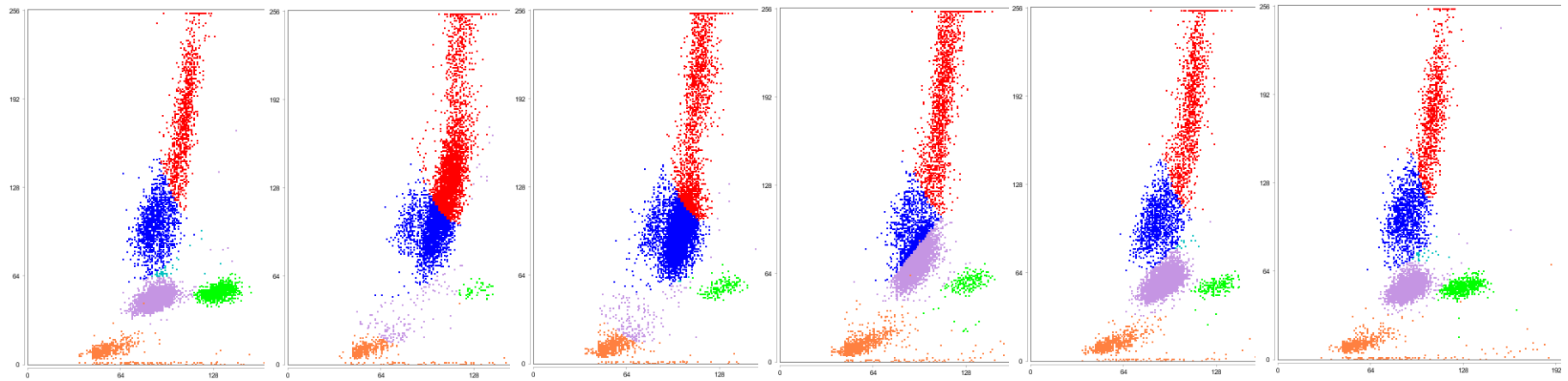

Date	4/28/17	8/10/17	8/11/17	8/12/17	8/15/17	8/31/17
Band	-	+	+	+	+	-
WBC (K/µL) (5.05–16.76)	10.58	7.16	8.72	8.84	11.08	10.23

RED = Abnormal high Blue = Abnormal low

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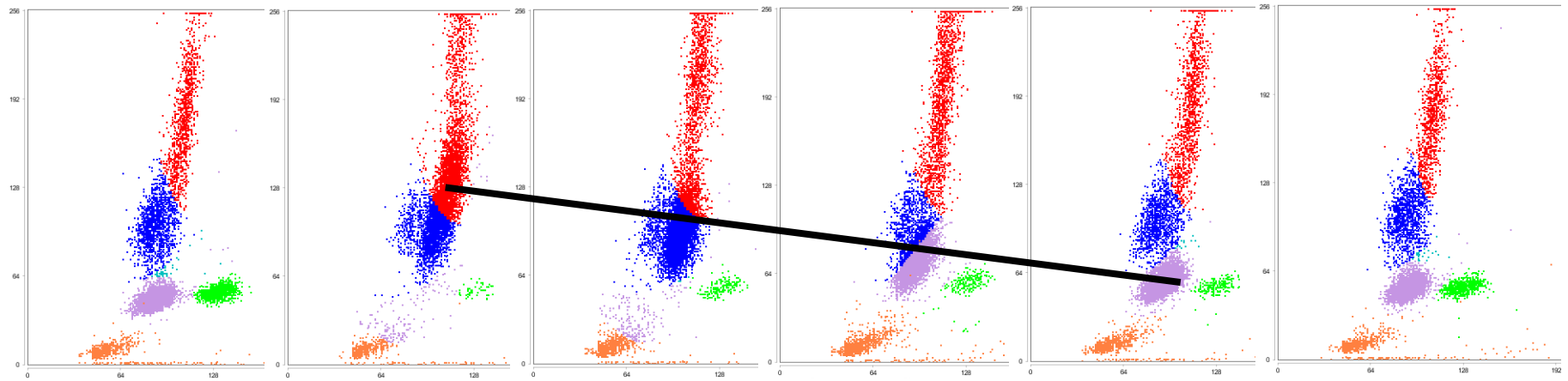

Date	4/28/17	8/10/17	8/11/17	8/12/17	8/15/17	8/31/17
Band	-	+	+	+	+	-
WBC (K/µL) (5.05–16.76)	10.58	7.16	8.72	8.84	11.08	10.23

RED = Abnormal high Blue = Abnormal low

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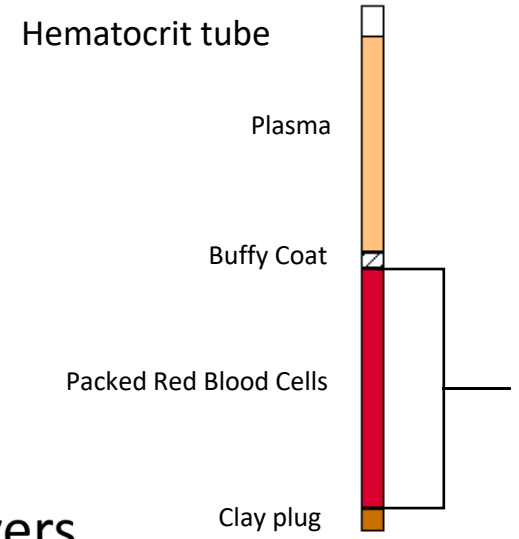
New Tricks

- Reticulocyte Hemoglobin
- Reticuloytes-with and without anemia
- CRP-C Reactive Protein
- Red Cell and Platelet Indices

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

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			
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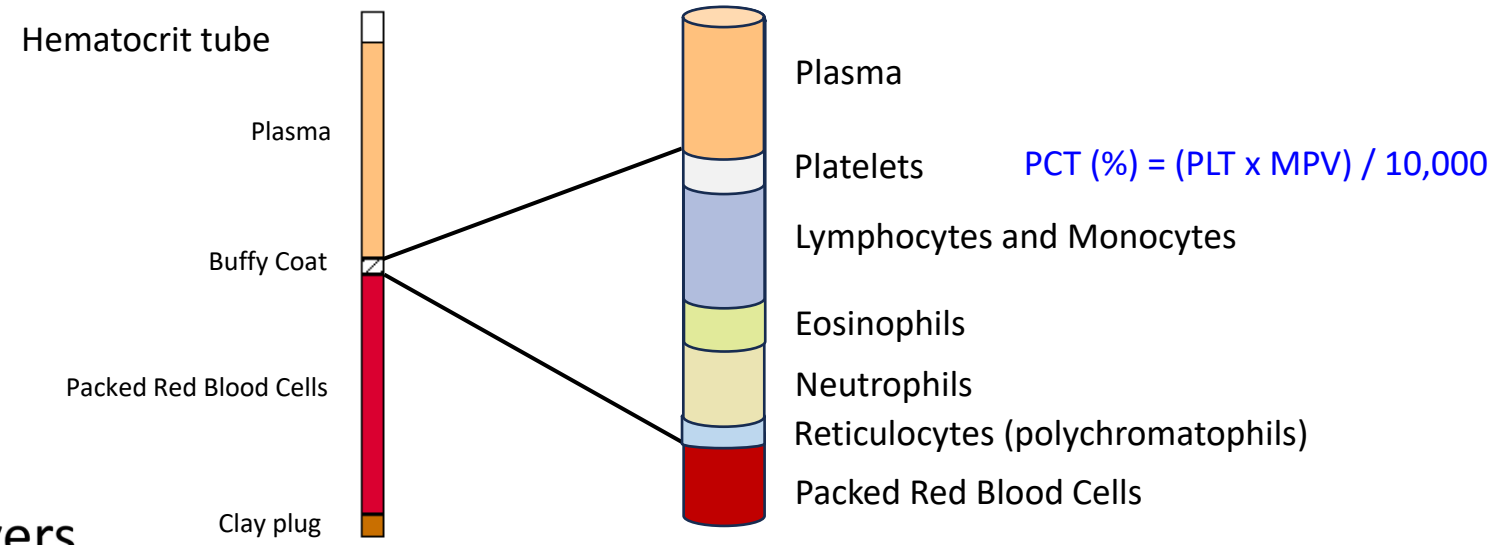
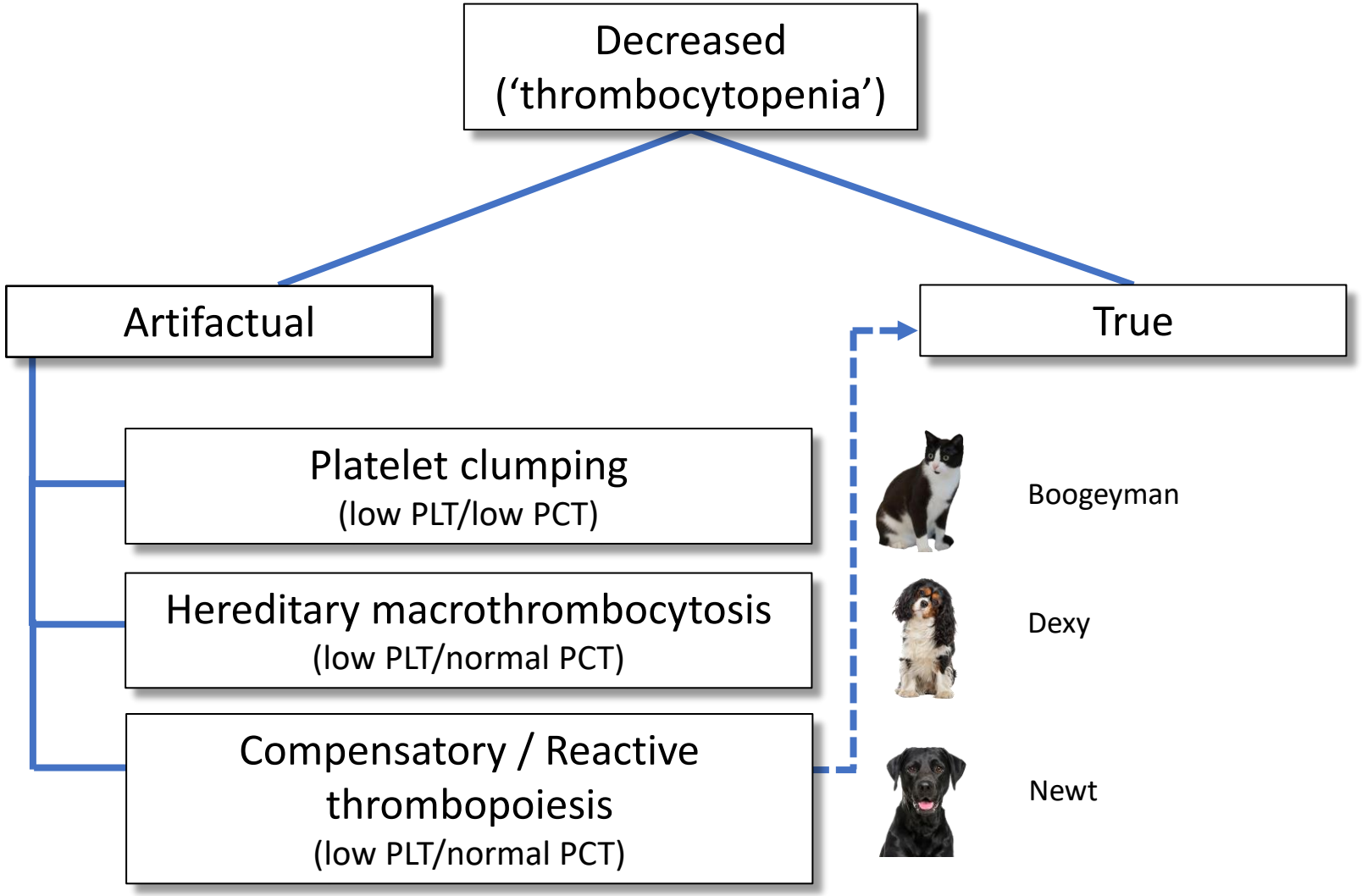


PCT (%) = (PLT x MPV) / 10,000

Approach to the evaluation of platelets



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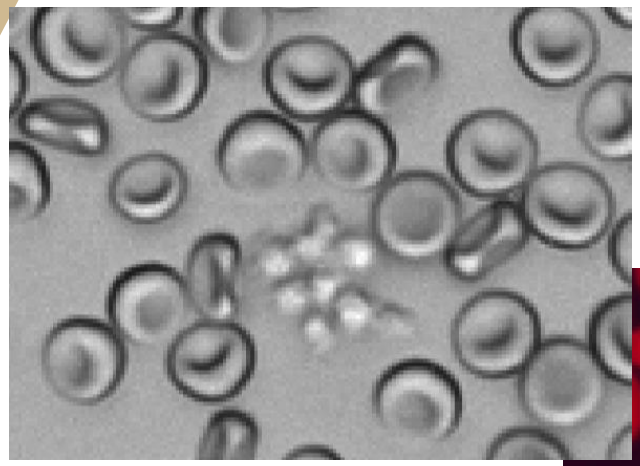
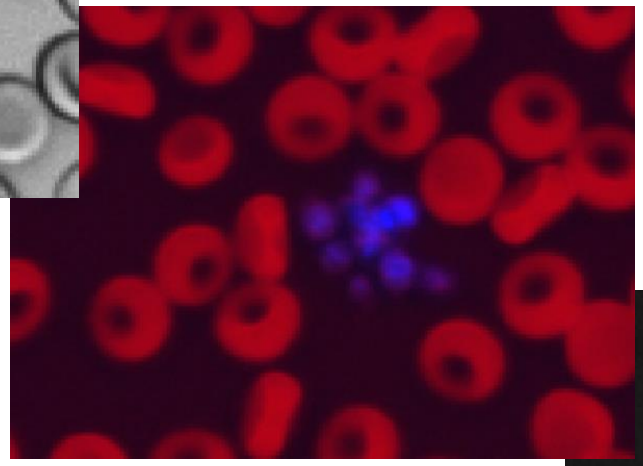
New Tricks from Old Dogs

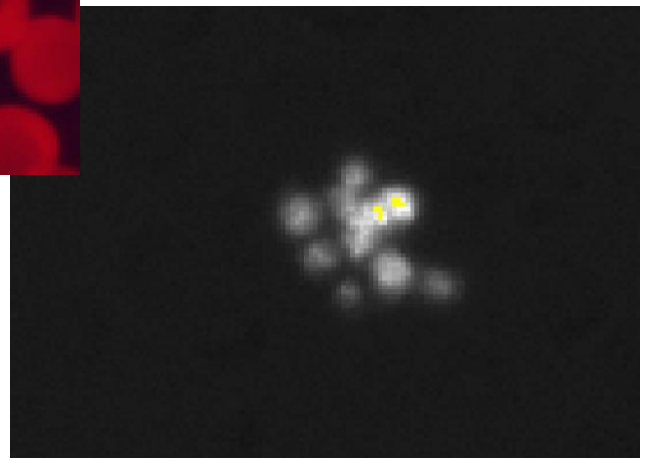
- Absolute Reticulocyte Count
- Reticulocytes without anemia (RWA)
- Reticulocyte Hemoglobin
- CRP-C Reactive Protein
- Red Cell and Platelet Indices
- AI blood morphology

IDEXX InVue Dx Cellular Analyzer



Platelet Clumping





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

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- Reticulocytes without anemia (RWA)
- Absolute Reticulocyte Count
- Reticulocyte Hemoglobin
- CRP-C Reactive Protein
- Red Cell and Platelet Indices
- AI blood morphology
- Canine Pancreatic Lipsae
- Cortisol
- Canine Cancer Test

Catalyst New Menu Consistently Drives Adoption at Scale

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

>65%	>55%	>50%	>50%
			
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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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The Laboratory Retriever Team

Alan H. Rebar, DVM, PhD, DACVP

Dennis B. DeNicola, DVM, PhD, DACVP

Dr. Fred Metzger, DVM, MRCVS, DABVP

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