AVCPT FORMULA GUIDE

HEMATOLOGY		
Test	**Formula**	**Example**
Mean Corpuscular Volume (MCV)	$\frac{\text{PCV x 10}}{\text{RBC}}$ = MCV (fL)	**Patient Information:** **PCV = 45%** **RBC = 7.50 x 10^6/µL** $\frac{45 \times 10}{7.50}$ = 60.0 fL MCV = 60.0 fL
Mean Corpuscular Hemoglobin Concentration (MCHC)	$\frac{\text{Hb (g/dL) x 100}}{\text{PCV}}$ = MCHC (g/dL)	**PCV = 45%** **Hb = 15 g/dL** $\frac{15 \times 100}{45}$ = 33.3 g/dL MCHC = 33.3 g/dL
Mean Corpuscular Hemoglobin (MCH)	$\frac{\text{Hb (g/dL) x 10}}{\text{RBC}}$ = MCH (pg)	**Hb = 15 g/dL** **RBC = 7.50 x 10^6/µL** $\frac{15 \times 10}{7.5}$ = 20.0 pg MCH = 20.0 pg
Red Blood Cell Estimate	$\frac{\text{PCV}}{6}$ = ~ # RBC x 10^6/µL	**PCV = 45%** $\frac{45}{6}$ = 7.5 x 10^6/µL RBC Estimate = 7.50 x 10^6/µL

Hemoglobin Estimate	$\frac{\text{PCV}}{3}$ = ~ Hb g/L	**PCV = 45%** $\frac{45}{3}$ = 15 g/dL Hb Estimate = 15 g/dL
PCV Estimate	Hb x 3 = ~ PCV (%)	**Hb = 15 g/dL** 15 x 3 = 45% PCV Estimate = 45%
Hemacytometer (Neubauer) Formula	$\frac{\text{Number of Cells Counted}}{\text{Number Large Squares Counted}}$ x depth of hemacytometer (10) x dilution = cells/µL or mm^3	
Reticulocyte Percentage	$\frac{\text{Number Reticulocytes Counted}}{\text{1000 RBCs Counted}}$ x 100 = % Reticulocytes	**Number of Retics / 1000 RBCs = 25** $\frac{25}{1000}$ x 100 = 2.5% Reticulocyte Percentage = 2.5%
Absolute Reticulocyte Count	% Retics x Total RBC count/µL = Retics/µL	**% Reticulocytes = 2.5%** **Total RBC Count = 7,500,000/µL** $\frac{2.5}{100}$ x 7,500,000/µL = 187,000 Retic/µL
Corrected Reticulocyte Percentage (CRP)	% Retics x $\frac{\text{Patient's PCV}}{\text{Avg. PCV for species}}$ = % Reticulocytes Common “Normal” Avg. PCV: Canine = 45%	**Patient Canine:** **2.5% Retics** **HCT: 25%** 2.5 x $\frac{25}{45}$ = 1.39% CRP = 1.4%

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<tr>
<td>Red Cell Production Index (RPI)

Canine only</td>
<td>$\frac{\text{CRP \%}}{\text{Maturation Factor}} = \text{RPI \%}$

<table>
<tr><th>Patient PCV %</th><th>Maturation Time (days)</th></tr>
<tr><td>45</td><td>1</td></tr>
<tr><td>35</td><td>1.5</td></tr>
<tr><td>25</td><td>2.0</td></tr>
<tr><td>15</td><td>2.5</td></tr>
</table>
</td>
<td>CRP = 1.4%
HCT = 25%

$\frac{1.4\%}{2.0} = 0.7\%$

RPI = 0.7%</td>
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<tr>
<td>Absolute WBC Counts</td>
<td>Total CWBC count/µL x (% of each WBC type/100) = absolute count of each cell type/µL or mm^3</td>
<td>WBC count = 9000/µL
Neutrophils = 60%
Lymphocytes = 35%
Eosinophils = 5%

$9{,}000 \times \frac{60}{100} = 5{,}400/\mu L$
OR
9,000 x 0.60 = 5,400 neutrophils/µL

$9{,}000 \times \frac{35}{100} = 3{,}150/\mu L$
OR
9,000 x 0.35 = 3,150 lymphocytes/µL

$9{,}000 \times \frac{5}{100} = 450/\mu L$
OR
9,000 x 0.05 = 450 eosinophils/µL</td>
</tr>
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White Blood Cell Estimate (from peripheral blood film) (High Dry Fields [10x ocular x 40 x obj. = 400x mag.])	$\frac{\text{number of WBC in 10 fields}}{10}$ x 2,000 = ~ number of WBC/µL	**50 WBCs in 10 HPFs (in the monolayer on 40x)** $\frac{50}{10}$ x 2,000 x = 10,000/µL
Corrected White Blood Cell Count (for the presence of Nucleated Red Blood Cells)	$\frac{\text{WBC count/µL x 100}}{\text{100 + number of NRBC per 100 WBC}}$ = corrected WBC count/µL	**WBC Count = 45,000/µL** **20 NRBC per 100 WBC (from manual differential)** $\frac{45{,}000 \times 100}{100 + 20}$ = 37,500/µL
Platelet Estimate (from peripheral blood film) (oil immersion fields [10x ocular x 100x obj. = 1000x mag.])	$\frac{\text{number of platelets in 10 fields}}{10}$ x 20,000 = ~ number of platelets/µL	**Platelets = 120/10 fields (in the monolayer on 100x)** $\frac{120}{10}$ x 20,000 = $\frac{2{,}400{,}000}{10}$ = 240,000/µL
Fibrinogen (Heat Precipitation Method)	(Non-incubated Plasma Protein g/dL minus incubated Plasma Protein g/dL) x 1000 = Fibrinogen mg/dL	**Non-incubated Plasma Protein = 6.0 g/dL** **Incubated Plasma Protein = 5.4 g/dL** (6.0 – 5.4) x 1,000 = 600 mg/dL

URINALYSIS

Test	Formula	Example
Dilution of USG when initial USG reading exceeds upper limits of the refractometer scale	Prepare a 1:2 dilution by mixing equal parts of urine and deionized / distilled water. Read USG using a clinical refractometer. Multiply the digits to the right of the decimal by 2 to compensate for the 1:2 dilution.	**Initial reading exceeds the upper limits of the refractometer scale.** USG on 1:2 diluted sample = 1.036 0.036 x 2 = 0.072 = USG 1.072

PARASITOLOGY		
Test	**Formula**	**Example**
Fecal Egg Count Reduction Test (FECRT)	$\frac{\text{EPG (pre-treatment) - EPG (14 day post-treatment)}}{\text{EPG (pre-treatment)}} \times 100 = \%$	Pre-treatment on an equine = 1,050 epg Post-treatment (14 days) = 150 epg $\frac{1{,}050 - 150}{1{,}050} = 86\%$
Modified McMasters Quantitative Fecal Exam (Eggs/g of feces [e/g])	Common Method of Ruminants with Large Volumes of Feces (example: cattle) using 4 g feces, 56 mL flotation Total number of eggs for each parasite counted x 50 = epg OR 4 g feces, 26 mL flotation solution Total number of eggs for each parasite counted x 25 = epg	Patient cow: 4 g feces, 56 mL flotation Solution, total of 10 eggs counted in both chambers 10 x 50 = 500 epg
	Common Method for Ruminants with Small Fecal Volumes (example: sheep, goats) using 2 g feces, 28 mL flotation Total number of eggs for each parasite counted x 50 = epg	Patient sheep: 2 g feces, 28 mL flotation Solution, total of 5 eggs counted in both chambers 5 x 50 = 250 epg
	Common Method for Horses using 4 g feces, 26 mL flotation Total number of eggs for each parasite counted x 25 = epg	Patient horse: 4 g feces, 26 mL flotation Solution, total of 15 eggs counted in both chambers 15 x 25 = 375 epg

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