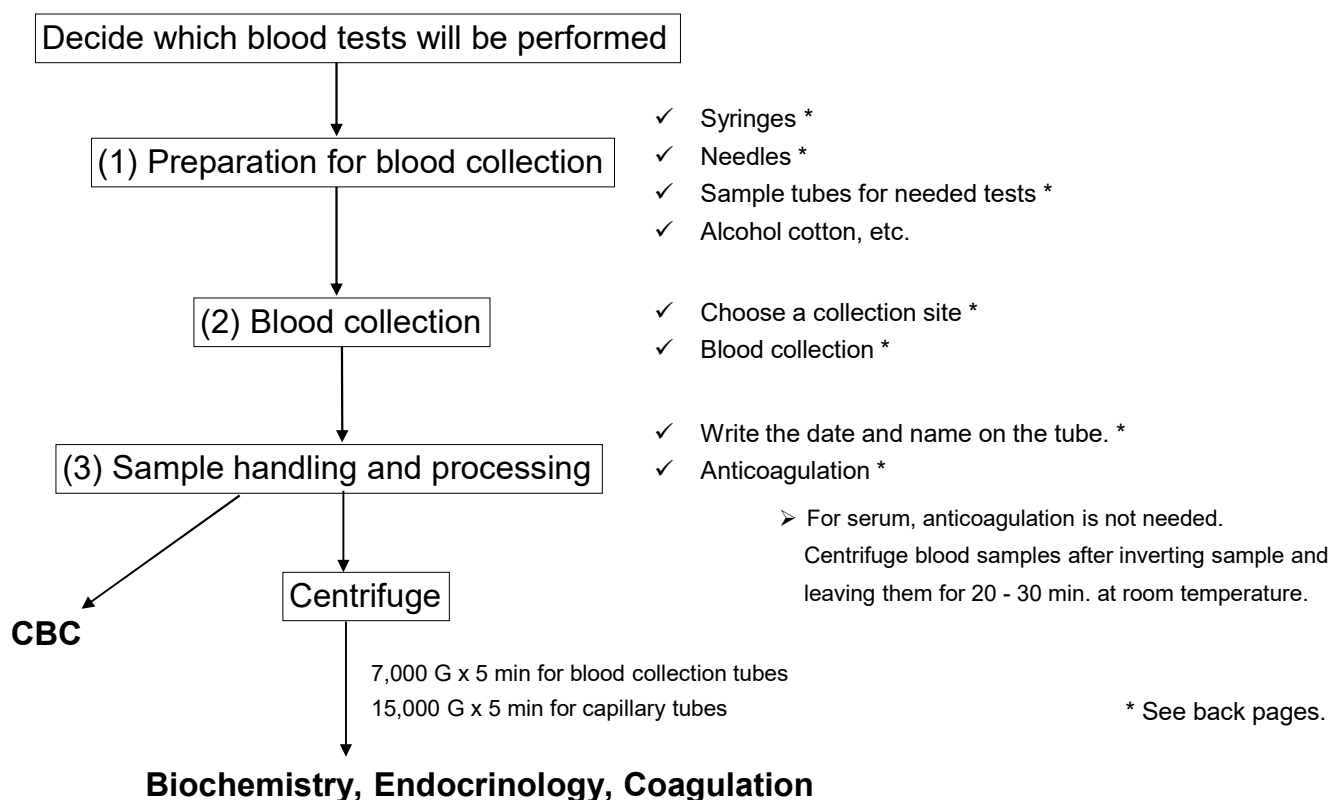


# Blood Tests in cats & dogs

## Blood tests

Blood Tests	Sample types	Approx. required volume
Complete Blood Count (CBC)	Whole blood	0.5 – 1.0 mL
Biochemistry and/or Endocrinology	Serum or Plasma	1.0 – 2.0 mL
Coagulation	Plasma	1.0 mL

## Blood collection and sample processing







### (1) Preparation for blood collection

- Syringes**
- A little larger than the volume of blood collection
  - 2.5 mL is widely applicable
- Needles**
- 23 G...Large to middle sized dogs
  - 25 G...Small sized dogs and cats (widely applicable)
- Tubes**



Align needle hole and scale direction.

Cap color	Additive	Sample	Tests
	EDTA (Ethylenediaminetetraacetic acid )	Whole blood	CBC
	Heparin	Plasma	Biochemistry test, Endocrinology
	None	Serum	Biochemistry test, Endocrinology
	Sodium citrate	Plasma	Coagulation test

## (2) Blood collection

### Collection sites

- Cephalic vein...widely applicable
- External saphenous vein...dogs
- Femoral vein...cats
- Jugular vein...very small animals, large blood collection



Cephalic vein



External saphenous vein



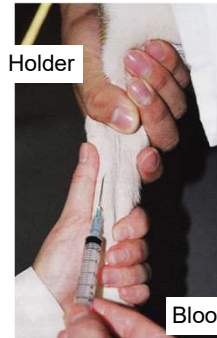
Femoral vein



Jugular vein

### Blood collection

- Apply pressure to the proximal portion (by holder).
- Disinfection with alcohol cotton.
- Find the vein distended.
- Insert the needle into a vein.
- Check the flashback.
- Pull the inner tube and collect blood.
- Inform the holder "finished".
- Release the pressure (by holder).
- Hold the site with a finger.
- Pull out the needle.



## (3) Sample handling and processing

- Write the date and name on the tube.
- Anticoagulation should be performed immediately after collection when it is necessary.
  - When it stood for a while, samples should be mixed by inverting.

**To prevent hemolysis, DO NOT mix sample too strongly and let foam rise.**

- Blood cells precipitates in minutes.

### Effects of interferences (hyperlipidemia, hemolysis, icterus)

Check the color of plasma.



Clear  
↓  
Normal



Amber  
↓  
Bilirubin (Icterus)



Red  
↓  
Hemoglobin (Hemolysis)



Cloudy  
↓  
Chyle (Hyperlipidemia)

Hyperlipidemia, hemolysis, and icterus can affect the results of biochemical tests shown in the table below.

Veterinary Laboratory Medicine Interpretation & Diagnosis 2nd Edition (Japanese version)

Interference	BUN	CRE	ALT	AST	ALP	GGT	T-Bil	TBA	GLU	T-Chol	TG	Ca	IP	TP	ALB	Na	Cl	K	Mg	AMY	LIP	CPK
Hyperlipidemia	*1	↑	↑	↑	↑	*1	↑	↑	↑	*1		↑	↑	↑ *2	↓	↓ *3	↓ *3	↓ *3		↓		
Hemolysis		↓	↑	↑	↓		↑	↓ *4	↑			↑	↑	↑ *2	↑		*1	↑ *5,6	↑	↑	↑	↑
Icterus		↓			↑				*1	*1	↓		↑	↑			↑		↓		*1	

The results can be...

↑ : INCREASED

↓ : DECREASED

\*1 The effects vary depending on the assays.

\*2 Only refractometer is affected.

\*3 Ion Selective Electrode (ISE) is not affected, only flame photometry is affected.

\*4 Radioimmunoassay is not affected.

\*5 Dry chemistry is affected.

\*6 The Akita-inu samples are affected.

## (4) CBC and Blood smear

### CBC

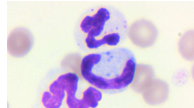
#### What is CBC?

Count all blood cells

- RBC...Find anemia, and evaluate regenerative property
- WBC...Find inflammation, and tumors (leukemia etc.)
- Platelets...Evaluate hemostatic capacity

#### Samples

- Whole blood
- anti-coagulated with EDTA



#### Microhematocrit with capillaries

##### Methods

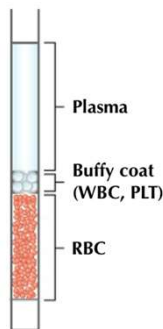
- Aspirate EDTA blood into the capillaries
- Centrifuge at 15,000 G x 5 min

##### Plasma color

- Clear...normal
- Amber...bilirubin (icterus)
- Clouded...chyle (hyperlipidemia)
- Red...hemoglobin (hemolysis)

##### Buffy coat

- Contains WBCs and platelets
- Thickness indicates WBC counts



##### Packed cell volume (PCV), hematocrit (Hct)

- RBC volume / whole blood volume
- Increase...dehydration, polycythemia
- Decrease...anemia

##### Total protein (TP)

- Measure with a refractometer
- Increase...dehydration, inflammation
- Decrease...hypoalbuminemia



### Blood smear

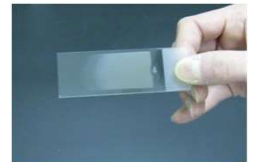
#### Purpose

- Calculate the ratio of WBCs
- Evaluate blood cell morphology
- Find tumor cells (leukemia etc.)

#### Methods

##### Wedged method

- Smear on a slide glass
- Wide area can be observed



##### Coverslip method

- Smear on a cover glass
- Low cost



#### Staining

##### Methods

- Romanowski stain...Wright, Wright Giemsa
- Simplified Romanowski stain...Diff-Quick™, Hemacolor®

##### Procedure of simplified Romanowski stain

- Fix with methanol
- Stain with eosinophilic dye (red)
- Stain with basophilic dye (blue)
- Wash with buffer



##### Mounting

- Prevents scratches and debris
- For observation at 10,000 x (with oil)

#### Microscopic observation

From low power, to high power

##### Systemic observation

- RBC, WBC, Platelets...

**Dr. Katsumi Ishioka**

Nippon Veterinary and Life Science University

