Understanding CBC, SAP, UA/Laura J. Steadman, DVM

I. CBC - Complete Blood Count

A. Three major types of cells are counted

1. Red Blood Cells

2. White Blood Cells

3. Platelets

B. Cells are counted at the lab by an automatic cell counter that distinguishes cells by size.

C. Ensuring accuracy

1. EDTA tubes - prevent clotting by binding calcium. The best anticoagulant for preserving cell size and morphology.

2. Why not heparin?

a. Heparin distorts cell size.

b. Effects of heparin diminish after several hours so blood will clot.

D. D-Lab vs. Antech

1. Included with the CBC at the D-Lab is a manual differential (lab technician determining the percentage of different cell types) and manual assessment of cell morphology. For this reason, with some patients the doctor may prefer to send samples to the D-Lab.

2. Examples -

a. Cancer patients

b. If a blood parasite is suspected.

II. SAP - Small Animal Profile

A. SAP is the D-Lab's name for a specific set of serum biochemical tests.

B. Antech often refers to the same set of tests as a "Superchem"

C. Some compounds of interest -

1. Liver enzymes

2. Electrolytes (Na, K, etc.)

3. Protein levels

4. BUN (Blood Urea Nitrogen) and Creatinine - two compounds excreted by the kidneys

5. Glucose

D. At the lab, many of these tests work by analyzing a color change (similar to the urine strips used in the clinic for urinalysis). Therefore, anything that effects the color of serum could interfere with the tests results.

E. Ensuring accuracy

1. Prevent hemolysys - lysing (destruction) of red blood cells

a. Hemolysis leads to the release of hemoglobin in serum which turns serum red and may effect tests

b. Hemolysis can also affect results directly as cell contents (like Potassium, Phosphorous, etc.) leak into the serum

c. How to prevent hemolysis?

i. Atraumatic drawing of blood from patient

ii. Remove needle from syringe before putting blood into tube

iii. Do not centrifuge too long

2. Prevent lipemia

a. Lipemia = fat in the blood

b. Lipemia causes opaque or white serum

c. Lipemia is prevented by obtaining a fasting blood sample (usually 10 to 12 hours)

3. Jaundice can effect lab results as well

a. Jaundice = bilirubin in blood

b. Jaundice causes yellow serum

c. Jaundice is a consequence of certain illnesses (examples - certain liver ailments, blood parasites)

4. Do not leave serum on blood clot

a. This will lead to falsely lowered glucose as red blood cells will continue to metabolize glucose for energy

b. In addition, can cause elevated Phosphorus because as red blood cells metabolize ATP for energy, the phosphorus will leak into the serum

c. Finally, leaving serum on the clot can falsely elevate potassium. This electrolyte, normally found in much higher levels inside the cells that in serum will begin to leak from the cells with time.

5. Do not use serum separator tubes for certain tests as these can cause a false decrease in the values of certain drugs like Phenobarbital and Digoxin.

6. Using serum vs. plasma

a. Serum differs from plasma in that serum does not contain some proteins that are used to form a clot.

b. The reason why serum is generally used for tests is that the anticoagulants used to prevent clotting can cause erroneous values. Examples - EDTA binds with Calcium; Na Heparin will raise Sodium values.

III. UA - Urinalysis

A. A urinalysis is very important in conjunction with blood work. For example, a low urine specific gravity (urine concentration) with elevated kidney values is diagnostic for kidney failure. Another example is the presence of glucose in the urine in diabetic patients.

B. Three parts of Urinalysis

1. Chemical analysis - utilizes reagent strips to look for certain chemicals or values - glucose, bilirubin, protein, pH

2. Specific gravity - measures urine concentration

3. Microscopic evaluation - assessment of a centrifuged sample for cells, crystals, bacteria, etc.

C. Three methods of collecting urine

1. Voided

a. Advantage

i. Technically easy

ii. Owner can do at home

iii. Atraumatic

b. Disadvantag - bacteria normally present therefore not a good sample for determining if a patient has a true urinary tract infection even when doing a culture and sensitivity.

2. Catheter

a. Advantage

i. Can be therapeutic (unblocking an obstructed urethra)

ii. Can be the easiest way to collect sample in male dogs with small amount of urine present

iii. Acceptable sample for culture and sensitivity, although not the best

b. Disadvantage

i. Unable to perform in an unsedated cat

ii. Difficult to perform in female dogs

iii. Some risk of introducing bacteria into urinary tract

3. Cystocentesis

a. Advantage

i. Method of choice for culture and sensitivity

ii. "Sterile"sample therefore any bacteria grown on culture and sensitivity are from a true urinary tract infection

iii. Can often be used on patients when collecting a voided sample is unsuccessful

b. Disadvantage

i. Risk of bleeding (Most often this causes confusion of whether blood is from inflammation or from method of collection. However, there is some small risk of serious hemorrhage.)

ii. Risk of introducing infection

iii. Risk of urine leaking into abdomen