BOX 3-2. APPROACH TO ANEMIA DIAGNOSIS

I. **Determine Severity of the Anemia** (see text)
- A. Mild anemia (PCV > 30% dog, > 20% cat)
  1. Consider age, breed, and statistical chance of normality
  2. Check for laboratory or sample error; repeat venipuncture
  3. Often secondary anemia, go to IV
- B. Moderate to severe anemia, go to II

II. **Determine Bone Marrow Responsiveness**
- A. No reticulocytosis or polychromasia expected during first 2-3 days or in mild anemia (PCV > 30% dog, > 20% cat)
- B. Reticulocytosis and polychromasia peaks 4-5 days if bone marrow function is normal
  1. Marked canine reticulocytosis (>500,000/µl)
  2. Marked feline aggregate reticulocytosis (>200,000/µl)
- C. Later-stage responsiveness at 7-14 days, use:
  1. Feline punctate reticulocytosis, marked (>1,500,000/µl)
  2. Dogs: use increase in macrocytic hypochromic RBCs
     a. RBC cytograms and histograms illustrate amount
- D. Classification by RBC indices and hematology instrument graphics
  1. Macrocytic hypochromic: regenerative anemia
  2. Normocytic normochromic: nonregenerative or pre-regenerative anemia
  3. Microcytic hypochromic: usually iron deficiency anemia
  4. Macrocytic normochromic (see text)
- E. If adequately regenerative, go to III; if inadequately regenerative, go to IV

III. **Regenerative Anemia Diagnosis**
- A. Blood smear analysis critical in hemolytic anemia diagnosis
  1. Spherocytes, autoagglutination, Heinz bodies, polychromasia, blood parasites, eccentrocytes, RBC fragmentation (for interpretation, see text)
- B. Hemoglobinuria is best proof of intravascular hemolytic anemia. Icterus and splenomegaly suggest extravascular hemolysis.
- C. Internal blood loss resembles hemolytic anemia
  1. Document hemorrhage with cytology, etc.
- D. External blood loss
  1. Often in history
  2. Tendency toward hypoproteinemia, hypoalbuminemia, or both
  3. Check for thrombocytopenia or bleeding tendency (see Chapter 5)

IV. **Nonregenerative Anemia Diagnosis**
- A. Way to a diagnosis varies with case presentation
- B. Use history and severity of anemia to re-evaluate reticulocyte numbers to see if anemia is truly nonregenerative; duration exceeding 3-4 days excludes pre-regenerative anemia; reticulocyte response is weak or absent 2 weeks after the cause of an anemia ceases; mild anemia will not stimulate significant reticulocytosis
- C. CBC Evaluation
  1. Microcytic hypochromic RBCs; usually indicates iron deficiency anemia
     a. RBC cytograms and histograms more sensitive than MCV and MCHC
     b. Half of iron deficiency anemia cases regenerative
  2. Normocytic normochromic anemia most common but nonspecific
  3. Macrocytic normochromic feline RBCs without reticulocytosis; suggests FeLV-induced myelodysplasia (see text)
  4. Evidence of inflammation (see Chapter 4); anemia of inflammatory diseases is very common (i.e., mild, normocytic normochromic anemia)
  5. Evidence of leukemia or dysplastic hematopoiesis (see Chapter 4) usually indicates bone marrow evaluation; go to H
  6. Thrombocytopenia (see Chapter 5); consider *Ehrlichia* or other infections (see Chapter 15)
  7. Pancytopenia or bicytopenia; indicates bone marrow disease and bone marrow evaluation; go to H
- D. Clinical chemistry profile
  1. Evidence of renal or hepatic failure; causes secondary anemia (see Chapters 7 and 9)
  2. Evidence of systemic diseases; variable causes of anemia
- E. Virology, serology if infection is likely (e.g., fever, lymphadenopathy)
- F. Endocrinologic examination; hypothyroidism or other dysfunction (see Chapter 8) (e.g., mild, normocytic normochromic anemia)
- G. Toxicity
  1. Check for testicular neoplasm or access to estrogen
  2. Withhold any current drug therapy and monitor for recovery
  3. Check for toxicants in environment
- H. Bone marrow examination reveals many diagnoses (see text and Chapter 2)
  1. Myelofibrosis, aplastic anemia, bone marrow necrosis/inflammation, dyserythropoiesis, leukemia, metastatic neoplasia, myelodysplastic syndromes, etc.

CBC, Complete blood count; *FeLV,* feline leukemia virus; *MCHC,* mean corpuscular hemoglobin concentration; *MCV,* mean corpuscular volume; *PCV,* packed cell volume; *RBC,* red blood cell.