Reptile Hematology

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KEYWORDS

• Reptile • Hematology • Leukogram • Phlebotomy • Snake • Chelonian • Lizard • Crocodilian

KEY POINTS

- Sample collection and processing: Most reptile species have accessible sites for blood sample collection. The anticoagulant of choice is heparin, although slides made from fresh nonanticoagulated blood are best if possible. Syringes and needles can be coated with heparin before collection to prevent clotting in small patients. A Romanowsky-type stain is preferred for cytology (eg, Giemsa). Rapid stains can be used to produce acceptable hemogram results but may understain some cell types.
- Lymph contamination: In most reptiles, the lymphatic drainage system is closely paired with the venous system such that lymph contamination of blood samples is a common occurrence. Grossly contaminated samples should not be used for hematology. In addition, samples with low packed cell volume, no evidence of regeneration (polychromasia), and a high percentage of small lymphocytes are likely to be significantly lymph contaminated, and the hemogram results should be interpreted with caution.
- Variation: The normal hemogram of reptiles varies by many factors including species, age, gender, season, environmental parameters, geographic location, and sample collection method. Because of this variation, values should be compared with reference intervals most closely matching the species and situation for each individual reptile. As these values are often not available, interpretation of the hemogram may rely heavily on cell morphology and on changes over the progression of a disease rather than on absolute values at a single point in time.

INTRODUCTION

The basic principles of hematology used in mammalian medicine can be applied to reptiles. This article outlines techniques for sample collection, processing, and analysis that are unique to reptiles, and provides a review of factors influencing interpretation of the results.

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RESTRAINT AND BLOOD COLLECTION TECHNIQUES

General Comments

Before collecting a blood sample, the maximum safe volume that can be collected should be determined. Reptiles have a lower total blood volume than a similarly sized mammal, 5% to 8% of their body weight,[1,2] and 10% of this volume may be safely collected from healthy reptiles (eg, 0.5–0.8 mL in a 100-g animal). Smaller samples should be collected from compromised individuals.

Lithium heparin is generally the anticoagulant of choice in reptiles, as ethylenediaminetetraacetic acid (EDTA) has been reported to cause hemolysis, particularly in chelonians.[3,4] However, other studies of multiple reptilian species that suggest EDTA produces blood smears of comparable or better quality to those using heparin.[5–8] Ideally, hematology slides should be prepared from samples immediately after collection to avoid complications related to the anticoagulant. However, when drawing a sample from small individuals, it can be helpful to heparinize the needle and syringe before collection to prevent clot formation in the syringe. A study of slide preparation using blood obtained from green iguanas (*Iguana iguana*)[9] found that both the coverslip-slide method and bevel-edge slide techniques produced adequate quality smears, whereas the slide-slide method produced lower quality smears (higher numbers of ruptured cells). Slides are stained with a Romanowsky-type stain for morphologic analysis (eg, Giemsa, Wright, or Wright-Giemsa).[10,11] Rapid stains, such as Diff-Quik, may result in understaining or damage to some cell types, but can be used to produce adequate hemogram results.[11] For all venipuncture attempts, cleaning the skin with a dilute chlorhexidine solution before phlebotomy is prudent.

Snakes

There are 2 common venipuncture sites in snakes: the caudal tail vein (**Fig. 1**) and the heart (**Fig. 2**).[12,13] For either site, proper restraint of the snake's head is critical for handler safety. The caudal tail vein is accessed by holding the snake in dorsal recumbency and stabilizing the tail caudal to the cloaca. Holding the tail ventral to the body, such as over the end of a table, aids in successful collection. The needle is inserted on the midline between one-third and one-half the distance from the cloaca to the tip of the tail (usually 6–12 scutes caudal to the cloaca) at a 45° angle directed cranially. Avoid puncture of the hemipenes and scent glands that lie on either side of the midline. The needle is advanced with slight negative pressure. If vertebrae are encountered,

Fig. 1. Blood collection from the tail vein of a snake (*Naja kaouthia*).

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