

**AVOID
OVERSUPPLEMENTING**
The key to preventing hypervitaminosis A is to ensure reptiles are fed a well-balanced diet.



MANAGEMENT STRATEGIES

Hypervitaminosis A in Reptiles

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Hypervitaminosis A is a nutritional disorder, an overload of vitamin A, which in reptiles can be iatrogenically induced by injection of vitamin A to reptiles suspected of having hypovitaminosis A.¹⁻³ Vitamin A is a fat-soluble vitamin, meaning that it dissolves in fats and oils, and is a major part of commercially prepared diets. Vitamin A supplements are often given presumptively to reptiles because hypovitaminosis A is a known nutritional problem that often results from unbalanced diets.^{2,4}

The safe dose for vitamin A administration is 5000-10,000 IU/kg, and a toxic dose is roughly 100 times higher (50,000 to 100,000 IU/kg).^{1,2} The risk for overdosing can be decreased by administering vitamin A in an oral, rather than injectable, formulation.³ However, hypervitaminosis A can still be induced, even when a “safe dose” of supplement is given as an injection and an increased amount of vitamin A is consumed as part of the diet for a prolonged period.²

Vitamin A plays an important role in maintaining normal epithelial tissues and is vital for vision, growth, reproduction, and immune function; it is stored in the liver.² Excess levels of vitamin A (i.e., toxicity) overwhelm the hepatic function and storage capabilities and lead to tissue damage, which then is clinically seen initially as dry, flaky skin.^{1,4}

Herbivorous reptiles typically do not experience vitamin A deficiency because of their plant-based diet and their ability to synthesize vitamin A.^{1,2} Plants, which contain vitamin A precursors called carotenoids (beta-carotene, lutein, and canthaxanthin are the most essential), include leafy greens, orange and yellow vegetables, and fruits.² However, some reptiles, such as carnivorous turtles and other carnivorous reptiles (e.g., box turtles), are not able to synthesize beta-carotene well. In reptiles, conversion occurs in the intestines or liver, where it is later stored.⁴ Vitamin A toxicity from dietary intake is unlikely to occur in herbivorous reptiles. For omnivorous or carnivorous reptiles, a diet including liver can cause dietary hypervitaminosis.

SIGNALMENT

Reptiles typically affected by this disease are carnivorous or omnivorous tortoises, such as box turtles and aquatic turtles.¹ There is no age or sex predisposition.

PRESENTATION

In reptiles, the clinical signs of hypervitaminosis A are typically manifested in the skin.² The signs are dry, scaly skin; skin ulceration and/or sloughing to various degrees; depression; lethargy; anorexia; weight loss; and/or dehydration (**FIGURES 1 AND 2**).¹⁻³



The areas of skin that tend to be the most affected are the areas of loose skin near the front legs and neck; those tissues eventually become swollen because of cell damage (when water-soluble vitamin A has been administered).^{1,4} In reptiles with severe hypervitaminosis, the dermis and muscle can become exposed and they can die of secondary dehydration.¹ Commonly associated with skin lesions is secondary infection (bacteria or fungal), which can lead to sepsis.^{1,2} In chameleons specifically, excess vitamin A can potentially lead to nutritional metabolic bone disease because of vitamin D interference.⁵

DIAGNOSIS

History and clinical findings are extremely important for diagnosing hypervitaminosis A, especially if vitamin A was administered weeks or months before you examine the animal.¹⁻³ The history should provide information about the patient's dietary intake of vitamin A (such as raw liver).² Information from liver biopsy results and serum vitamin A levels is also helpful;³ however, although liver biopsy results can be considered more accurate, biopsy sample collection is obviously more invasive than blood collection. Skin biopsy results can help you determine primary or secondary causes, and culture and sensitivity should be considered for determining medical treatment.¹ Ideally, you can collect biopsy samples endoscopically or grossly (e.g., wedge biopsy) because fine-needle aspiration may not be diagnostic. Several laboratories can test for vitamin A; you can send serum samples to IDEXX Laboratories, Inc., the Animal Health Diagnostic Center at Cornell University, and the veterinary diagnostic laboratories at Michigan State University or Iowa State

University. Before transport, the serum needs to be separated from the clot, kept refrigerated, and kept away from light. Turnaround times range from 3 to 7 business days after sample receipt (varying according to laboratory). Serum levels can vary significantly compared with hepatic vitamin A levels, and serum levels might therefore not be practical for a diagnosis because of these normal fluctuations.⁴ Vitamin A levels in the blood can also be assessed through plasma retinol values. In captive aquatic turtles, plasma retinol levels are 0.03 to 0.364 mg/mL and in tortoises, 0.034 to 0.415 mg/mL. Plasma retinol levels in lizards and snakes have been reported between 0.049 to 0.372 mg/mL and 0.012 to 0.049 mg/mL.² Differential diagnoses for skin lesions in reptiles are infection (bacterial, fungal, viral, parasitic) and/or trauma.¹

TREATMENT

Unfortunately, prior administration of vitamin A cannot be reversed.² Therefore, the treatment of hypervitaminosis A is typically supportive and includes prevention of secondary skin infections (**FIGURES 3 AND 4**). Decreasing and potentially discontinuing vitamin A intake/usage are important.^{2,3,6,7}

Reptiles with acute hypervitaminosis A require supportive care and fluid therapy (10 to 30 mL/kg/day).¹ Skin lesions can be treated with hydrotherapy, antiseptic solution soaks, systemic antimicrobials, and pain medication as needed.^{1,2} Skin lesions should be treated like burn wounds; prevent secondary infections and relieve pain. Therapeutic laser therapy (photobiomodulation) is a newer form of wound management that has shown some promising results



FIGURE 1. A turtle that had received an overdose of vitamin A by injection a few days earlier. Note the severe swelling and partial sloughing of the dermis.



FIGURE 2. The dermal cast of the entire limb of the patient from Figure 1; the skin completely sloughed during the physical examination, revealing the raw dermis.

In reptiles with severe hypervitaminosis, the dermis and muscle can become exposed and they can die of secondary dehydration.¹

in iguanas when used at 10 Joules/cm².⁸ Morphine can be used in chelonians (1.5 mg/kg IM or SC) and lizards (10 mg/kg IM or SC) or meloxicam can be used at 0.2 to 0.3 mg/kg PO or IM q24h, but the patient must be carefully monitored for respiratory depression.¹ Nutritional support, with or without a feeding tube, may also be indicated.^{1,2} Treatment should continue until wounds have healed, which can take 4 to 6 months.^{1,2,4}

Reptiles with chronic hypervitaminosis A require long-term support and wound management as well as routine check-ups.¹

If vitamin A supplementation is warranted, it is better to give a fat-soluble than a water-soluble formulation because water-soluble vitamin A can be absorbed more quickly and thus potentially be more toxic.⁴

PROGNOSIS

The prognosis for patients with hypervitaminosis A



FIGURE 3. Aural abscess in a box turtle. These abscesses have been linked to hypovitaminosis A, and treatment often leads to overdose. For these small patients, a single oral dose of vitamin A might be more suitable.

depends on the extent of skin lesions, amount and form of vitamin A given, clinical signs, prior health of the animal, chronicity of the disease, and aggressiveness of treatment.¹⁻⁴ The prognosis for lesions is fairly good, unless there are large areas of sloughing.¹

CONCLUSION

It is easy to oversupplement reptiles with vitamin A. Before administering vitamin A, you should perform a physical examination, review the diet, and analyze blood test results.^{1,4} If the patient is showing signs of hypovitaminosis, rather than directly administering an injectable formulation, consider providing oral medication and changing the diet to include more vegetables with vitamin A.^{1,6} Typically, this regimen will help treat hypovitaminosis A and is unlikely to cause hypervitaminosis A, which, again, is often iatrogenically induced.⁶ Vitamin A from natural foods rarely leads to an overdose.¹ The best ways to avoid and under- and oversupplementation of vitamin A are to provide oral supplementation such as gut-loading insects (feeding insects nutritious diets prior to feeding the reptile), dietary supplementation, and/or vitamin A-rich vegetables.

CLIENT KEY POINTS

- Hypervitaminosis A typically affects carnivorous or omnivorous reptiles; herbivorous reptiles are less affected because of their diet.
- Treatment is mainly supportive, so resolution may several weeks to months.
- Any skin lesions should be treated with antimicrobials and pain medications.



FIGURE 4. Computed tomography image of the eustachian tubes of a reptile. The direct connection to the oral cavity is clearly visible and might be the cause of the aural abscessation found in turtles when the epithelial lining is compromised by a lack of vitamin A.

- The key to treating and preventing hypervitaminosis A is to ensure the reptiles are fed a well-balanced diet. **TVP**

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