



# ARAV Cancer and Case Reports

**Jeff Baier, MS, DVM;  
Erica Giles, DVM  
*Moderators***



# Fibropapillomatosis in Chameleons

---

Kim Oliver Heckers, Dr med vet,  
Janosch Dietz, med vet,  
Rachel E Marschang, PD, Dr med vet, Dipl ECZM (Herpetology), FTÄ Mikrobiologie,  
ZB Reptilien

## Session #346

*Affiliation:* Laboklin GmbH & Co KG, Steubenstr 4, 97688 Bad Kissingen, Germany.

Fibropapillomas have been observed with increasing frequency in recent years and occur mostly in panther chameleons (*Furcifer pardalis*). These include a complex of different neoplastic lesions (papillomas, keratoacanthomas and intracutaneous cornifying epitheliomas) with similar macroscopic appearance and clinical behavior characterized by nodular changes, starting with single spots, which spread over the body in a period of 1-2 years. At the beginning, the overall general condition is good while at progressive stages of spread, the general condition declines. In a retrospective study, 22 tumors from chameleons with several types of fibropapillomas were examined. Panther chameleons (*Furcifer pardalis*) were the most affected species (64%), followed by veiled chameleons (*Chamaeleo calyptratus*) (14%) and 22% of chameleons of unknown species. All of the affected chameleons were adults. The age of 9 animals was known and had a range of 2-5 years with an average of 3.4 years. Thirteen males, one female and eight chameleons of unknown sex were examined. Papillomas were the most frequent tumors (55%), followed by keratoacanthomas (36%) and intracutaneous cornifying epitheliomas (9%). In this study no trend towards malignant transformation of the tumors was found. The etiology of fibropapillomatosis is still unknown but a viral genesis is suspected. An invertebrate iridovirus was detected in the lesions of one veiled chameleon by PCR.



# Skin Tumors in Chameleons

Kim Oliver Heckers, Dr med vet, Janosch Dietz, med vet,  
Rachel E Marschang, PD, Dr med vet, Dipl ECZM (Herpetology), FTÄ Mikrobiologie,  
ZB Reptilien

## Session #348

*Affiliation:* Laboklin GmbH & Co KG, Steubenstr 4, 97688 Bad Kissingen, Germany.

Skin tumors in chameleons are being diagnosed with increasing frequency. Chameleon skin tumor reports in the literature are limited and systematic studies have not yet been performed. This study is the first, to our knowledge, focusing on chameleon skin tumors and providing an overview on the tumors and their possible etiology. In this study, tumors of 62 chameleons were examined including 26 veiled chameleons (*Chamaeleo calyptrotatus*), 25 panther chameleons (*Furcifer pardalis*), one flap necked chameleon (*Chamaeleo dilepis*) and 10 individuals of unknown species. Sixty-four tumors were collected over a period of 13 years. In 2 cases, chameleons were exhibiting 2 different kinds of neoplasia. In 62.5% of the cases, the neoplasia was malignant. Thirteen different kinds of neoplasia were identified. Chromatophoromas occurred most often (25%) followed by squamous cell carcinomas (19%), papillomas (19%), sarcomas (13%) and keratoacanthomas (13%). Metastases were found in 2 cases. Two veiled chameleons exhibited wide spread metastasis to all parenchymatous organs and the gastrointestinal tract. The tumors were identified as a melanophoroma and an iridophoroma. The majority of the samples (66%) came from males, 11% from females and in the other cases, the gender was not known. The age of the animal was known in 40 cases, the average age was 3.5 years. The youngest animal was 1 year of age and the oldest animal was 8 years old.



# Squamous Cell Carcinomas, Cholangiosarcoma and Multiple Fibriscesses in a Veiled Chameleon (*Chamaeleo calypttratus*)

---

K. Mathes, DVM, Dr med vet, Cert Spec in Reptiles and Amphibians,  
Dipl ECZM (Herpetology),  
M. Fehr, DVM, Dr med vet, PhD,  
P. Günther, DVM, Dr med vet,  
P. Zwart, DVM, Dr med vet, Dipl ECVP, Dipl ECZM (Herpetology)

## Session #127

*Affiliation:* From the Clinic for Pets, Reptiles, Pet and Feral Birds, University of Veterinary Medicine Hannover, Buenteweg 9, D-30559 Hannover, Germany (Mathes, Fehr, Günther) and Departement of Veterinary Pathology University Utrecht, Yalelaan 1, NL-3584CL Utrecht, The Netherlands (Zwart).

This case report describes the clinical findings and progression, treatment and necropsy results of a captive-raised male veiled chameleon (*Chamaeleo calypttratus*) with multiple squamous cell carcinomas. The animal's progress was followed over a two year period. The chameleon presented with subcutaneous masses in the eye region which were repeatedly surgically excised and recurred in neighbouring locations each time. Digital radiographs and computed tomography showed changes in the lungs, soft tissues and ribs. Histopathologic examination of the excised recurrent subcutaneous masses in the eye region revealed multiple squamous cell carcinomas (SCC) with invasive growth. Two and a half years after first presentation, the chameleon, which had always been active, hungry and alert showed massive loss of appetite and movement within three days. Euthanasia was performed in agreement with the owner. Whole body necropsy and histopathology revealed multiple squamous cell carcinomas, multiple fibriscesses in the liver and lung and a cholangiosarcoma. To the authors' knowledge this is the first scientific description of a cholangiosarcoma in a veiled chameleon.





# Hyperglycemia Associated with Renal Adenocarcinoma in a Chinese Water Dragon

David Hannon, DVM, DABVP (Avian), and Mike Garner, DVM, Dipl ACVP

## Session #021

*Affiliation:* From Avian and Exotic Animal Veterinary Services, Memphis Veterinary Specialists, 555 Trinity Creek Cove, Cordova, TN 38018, USA.

A female adult Chinese water dragon (*Physignathus cocincinus*) of unknown age was presented for anorexia and weight loss. Initial bloodwork showed profound hyperglycemia. Radiographs and ultrasound demonstrated marked renomegaly. The patient was managed medically, but continued to decline. The hyperglycemia persisted, as well as the glucosuria. Persistent abnormal laboratory findings included hypophosphatemia, hypoalbuminemia, hyponatremia, hypercalcemia, hyperglobulinemia, elevated uric acid levels, elevated creatine kinase levels, monocytosis, heterophilia, lymphocytosis, and hematuria. The lizard was euthanized 9 weeks after initial presentation. Postmortem exam showed renal tubular adenocarcinoma with metastasis to the liver. Metastatic mineralization of the heart was also identified. The pancreas was histologically normal. Hyperglycemia can be a common sequel to systemic disorders, including neoplasia in lizards without the presence of a pancreatic disorder.<sup>1</sup> Lizards and alligators have been shown to be much less sensitive to insulin than snakes or turtles.<sup>2</sup> Renal adenocarcinoma should be considered as a differential diagnosis in Chinese water dragons with persistent hyperglycemia.

## References

1. Stahl SJ. Diseases of the reptile pancreas. *Vet Clin Exot Anim*. 2003;6(1):191-212.
2. Stahl SJ. Hyperglycemia in reptiles. In: Mader D, ed. *Reptile Medicine and Surgery*, 2nd ed. St. Louis, MO: Elsevier;2006:822-830.



# Two Cases of Congestive Heart Failure in Lizards

---

Elisabeth Simone-Freilicher, DVM, DABVP (Avian),  
Patrick Sullivan, DVM,  
Rebecca Quinn, DVM, Dipl ACVIM (Cardiology), Dipl ACVIM (Internal Medicine),  
Katie Hogan DVM,  
Niora Fabian, DVM,  
Brendan Noonan, DVM, DABVP (Avian),  
Anne Wayne, DVM

## Session #344

*Affiliation:* From the Avian and Exotic Animal Medicine Department (Simone-Freilicher, Fabian, Noonan), Cardiology Department (Quinn, Hogan), and Emergency Department (Wayne), Angell Animal Medical Center, 350 South Huntington Ave, Boston, MA 02130, USA and the Avian and Zoological Medicine Service, Department of Small Animal Clinical Sciences, College of Veterinary Medicine, University of Tennessee, Knoxville, TN 37996, USA (Sullivan).

*Abstract:* Two cases of congestive heart failure in lizards and their treatment are presented: a 6-year-old male bearded dragon and a 13-year-old male green iguana. Both cases presented with inappetence, lethargy, and marked blepharedema. CBC and serum chemistry for both patients were unremarkable. Congestive heart failure and atrial enlargement were diagnosed by echocardiography. Treatment including oxygen, supportive care, and furosemide was initiated. The lizards both showed significant clinical improvement, and no renal side effects were seen. Survival was modest at 2-5 months. Congestive heart failure should be considered as a differential diagnosis for lethargic reptiles, particularly when blepharedema is seen. Treatment with furosemide is considered to improve quality of life.

## Introduction

---

Heart disease has not been well described in reptiles, and reptile cardiology may be considered to be in its infancy.<sup>1</sup> It is possible that heart disease in reptiles is under-represented, due to the non-specificity of signs (lethargy, weakness).<sup>2</sup> Congestive heart failure (CHF) has been infrequently reported in this class, notably in a Burmese python described with congestive heart failure secondary to caseous bacterial endocarditis.<sup>3</sup> To our knowledge, congestive heart failure has not been previously reported in lizards.

Ascites and peripheral edema have been reported as signs of heart disease in reptiles.<sup>2</sup> Blepharedema as a sign of heart failure has not been previously described, but may be explained by the large retrobulbar venous sinus many of these species possess. The mechanism of obstructed venous return may result in similar signs to the exophthalmos sometimes seen in rabbits with thoracic disease such as thymoma or cardiac disease.

The loop diuretic furosemide is a mainstay of treatment of CHF in mammals. Because reptile kidneys do not have loops of Henle, furosemide has long been thought to be of little use in these species.<sup>2</sup> However, in mammals, furosemide is thought to have some effect on the renal proximal tubules,<sup>4</sup> and anecdotally may result in diuresis in reptiles.

Pimobendan is an inodilator: a medication with both inotropic and vasodilator effects. Its use has not been previously reported in lizards, and due to the adverse response seen in one of our cases to a single dose, it requires further investigation before it can be recommended for routine use.

## Clinical Report

---

### Case 1

A 6-year-old male bearded dragon was presented to the Angell Animal Medical Center Critical Care Unit for inappetence and dysphagia. On physical examination, the lizard was quiet with a large, smooth, and mildly compressible round structure palpable in the right caudal coelom. Severe blepharospasm, exophthalmos, and blepharedema were present, and improved when the patient was held in an upright vertical position. The lizard had an increased respiratory rate following handling, and a quiet grade 1 heart murmur was intermittently present during auscultation.

The lizard was admitted for support and diagnostic testing. CBC and chemistry were within normal limits. A coelomic ultrasound was performed, and revealed a large amount of coelomic effusion, as well as minimal cardiac contractility. A large fluid-filled structure was partly surrounded by hepatic parenchyma, consistent with either an enlarged gall-bladder or a hepatic cyst. Foreign material was present in the colon, and an obstruction could not be ruled out.

An echocardiogram was performed and revealed a subjectively enlarged right atrium, possible ventricular thickening and decreased motion suggestive of ventricular hypertrophy, along with pericardial and cranial coelomic effusion. A tentative diagnosis of congestive heart failure was made. Furosemide (Salix, Intervet International, Summit, NJ) was recommended to be given at 2mg/kg SQ q12h for 3 doses prior to repeating the echocardiogram.<sup>5</sup>

Following the third dose of furosemide, a repeat echocardiogram was performed. The patient was more alert and active, and the echocardiogram revealed an improvement in coelomic and pericardial effusion. The pleural effusion was resolved. Serum chemistry remained unchanged. Pimobendan (Vetmedin, Boehringer Ingelheim, St. Joseph, MO) was compounded to a 1.25 mg/mL suspension, and prescribed at 0.2 mg/kg PO q24h.

Within 12 hours of the first dose of pimobendan, the bearded dragon was again lethargic and would barely lift its head. Pimobendan was discontinued, and the furosemide continued. The patient became more active by the following day, and was discharged to his owner on furosemide and syringe-feeding (Critical Care Herbivore, Oxbow Animal Health, Murdock, NE).

On recheck examination one week later, the bearded dragon was reported to be eating on its own. The patient was bright and alert, with mild blepharedema, and normal hydration. The right atrial enlargement appeared unchanged on echocardiogram with no apparent fluid in the thorax or coelom. No change in treatment was recommended at this time.

Two days later, the patient was presented to the Critical Care Unit for open mouth breathing, lethargy, and decreased water intake. The patient was quiet and depressed, with increased blepharedema. The patient was admitted to the hospital for supportive care, including oxygen support and continued furosemide therapy. Blood work was unremarkable aside from a moderate lymphocytic leukocytosis of  $18.4 \times 10^3/\mu\text{l}$  and a CK of 2,753 U/L. Ceftazidime was initiated at 20 mg/kg IM q72h. Upon discontinuation of oxygen support five days later, the bearded dragon remained very active and passed normal feces. The lizard was discharged on furosemide at 1 mg/kg PO q6h.

On recheck 3 weeks into treatment (10 days after discharge), the lizard seemed improved. However, the owner reported that the blepharedema was near-resolved in the mornings, but would progressively worsen throughout the day. A recheck chemistry panel at this time was unremarkable. Three weeks after initiating ceftazidime, a CBC was performed and revealed a severe leukocytosis of 53,700, characterized by a severe lymphocytosis

( $46.2 \times 10^3/\mu\text{l}$ ). The majority of the lymphocytes were granular lymphocytes. Possible causes of granular lymphocytosis include viral infection, other causes of immune stimulation (of cell mediated immunity), and chronic lymphocytic leukemia (CLL, Patty Ewing, DVM, MS, DACVP, personal communication). If the lymphocyte count were to continue to increase in magnitude over time, CLL would be more likely. Evaluation for causes of immune stimulation was recommended as a more likely cause of granular lymphocytosis, but declined by the owner. Two weeks later, the patient died at home, and no necropsy was able to be performed.

## Case 2

An approximately 13-year-old male green iguana presented to the Critical Care Unit for abdominal distension, hyporexia, decreased feces and urate production, lethargy, and abnormal posturing (described by the owners as arching his body but differently from the typical defecation posture). The owners also reported that the iguana had slowed down over the last few years. Previous medical history included impacted femoral pores, a suspected back injury, and degenerative joint disease.

On initial examination, the iguana was quiet but alert and mildly dehydrated. It was thin with a body condition score of 2/5, moderate generalized muscle wasting, and weighed 3.83 kg. Mucous membranes were slightly pale and tacky, and the heart rate was between 40-50 beats per minute. The respiratory rate was 8 breaths per minute with normal lung sounds, and an occasional mild coughing noise was noted. There was significant bilateral blepharidema. The caudal pole of the left kidney was palpable percloacally, and the caudal pole of the right kidney was possibly palpable. The femoral pores were dilated, slightly inflamed, and impacted with large amounts of keratinaceous exudate. The lizard was ambulatory in all four limbs, but had left forelimb weakness. The impacted femoral pores were debrided and the pores were flushed with dilute chlorhexidine solution.

A complete blood count revealed a mild leukocytosis of  $13.9 \times 10^3/\mu\text{l}$  and a significant anemia (hematocrit of 8.5%) with a total protein of 5.8 g/dl. The AST and CK were elevated at 172 U/L and 3,643 U/L, respectively. The uric acid was slightly elevated at 7.3 mg/dl. Whole body cross-table lateral and dorsoventral radiographs revealed coelomic fluid with a fluid level visible on the lateral view, consistent with coelomic effusion. Degenerative changes were seen in the right elbow; the left elbow was only partially imaged. A small, mineralized foreign body was noted in the cranial gastrointestinal tract.

An echocardiogram revealed mild pleural effusion and trace pericardial effusion. The atria appeared dilated bilaterally, while the ventricle appeared possibly thickened with adequate wall motion. The walls of the pulmonary trunk were hyperechoic, suggestive of mineralization. Differential diagnoses for the biatrial enlargement included ventricular cardiomyopathy and chronic valve disease. Differential diagnoses for the pleural and pericardial effusions included cardiogenic/congestive heart failure, neoplasia, infection, vasculitis, or other systemic disease. Differential diagnoses for great vessel mineralization included normal variant in geriatric iguana, nutritional abnormality, or other systemic cause.

Furosemide therapy at 2 mg/kg PO q8h was initiated. A chemistry panel repeated 24 hours following the first dose revealed an elevated uric acid level of 15.4 mg/dl; the furosemide was subsequently decreased to 1 mg/kg PO q48h. The iguana was evaluated by our Pain Management service and treated with vitamin B12 aquapuncture for joint pain. Chlorhexidine solution and silver sulfadiazine cream were prescribed topically for the femoral pores, and Critical Care-Herbivores was sent home for assisted feedings.

On recheck examination 3 days later, the lizard was reported to be improved in appetite, mobility, and blepharidema. On examination it was bright and alert, adequately hydrated, and the blepharidema was significantly reduced. Some femoral pores were still impacted, and keratinaceous material was removed from both sides.

An echocardiogram revealed no pericardial effusion and significantly decreased pleural effusion. The AST, CK and uric acid levels were improved at 59 U/L, 817 U/L, and 2.3 mg/dl respectively. CBC revealed a persistent anemia (HCT 6.4%) and the iguana was given a single dose of iron dextran at 12 mg/kg IM. There was a severe leukocytosis of  $39.6 \times 10^3/\mu\text{l}$  characterized by a lymphocytosis ( $28.5 \times 10^3/\mu\text{l}$ ), and a blood culture was performed and yielded anaerobic growth of *Bacteroides caccae* and aerobic growth of *Proteus vulgaris*. Metronidazole at 20 mg/kg PO q24h and enrofloxacin at 5 mg/kg PO q24h were prescribed.

On recheck examination 2.5 weeks after initiated treatment, the owner reported that the patient was significantly improved, with an improved appetite and normal eliminations. The iguana was bright and alert, with very mild blepharedema. A repeat echocardiogram was much improved, with scant pleural effusion and no pericardial effusion. A chemistry panel was submitted and yielded a hyperglycemia (193 mg/dl) of uncertain significance. Remaining values were normal, including the uric acid (3.7 mg/dl). Metronidazole, enrofloxacin, and furosemide were recommended to be continued. A follow-up with pain management was recommended.

One month after the initiation of treatment, the owner reported that the patient was significantly improved, with an improved appetite and normal eliminations. At this time he was still receiving the metronidazole, enrofloxacin, and furosemide as prescribed. The iguana was thin but bright and alert, adequately hydrated, with a single femoral pore impacted. No blepharedema was appreciated. Antibiotics were recommended to be continued for 2 more weeks and furosemide continued q48h.

Two months into treatment, the patient was doing well at home, still receiving furosemide, with both antibiotics discontinued. There were no new findings on physical exam at this time aside from continued weight loss (3.62 kg). Trace pericardial effusion and mild pleural effusion were noted on echocardiogram. Anemia was still present but improved (19%), and the blood glucose continued to increase to 530 mg/dl, respectively. The owner was aware that this was concerning although of unknown significance, but elected not to pursue additional diagnostics at that time. It was recommended to increase the furosemide by 10% to 1.1 mg/kg PO q48h.

Four months into treatment, the iguana was presented to the Critical Care Service for open mouth breathing of less than 24 hours duration, recent sneezing and clear nasal discharge, and decreased energy level and appetite of approximately 2 weeks duration. On examination, the patient was dull, dehydrated, keeping its eyes closed, with possible crackles auscultated on the left thoracic cavity, and severely muscle wasted (3.45 kg). Furosemide was administered at 4 mg/kg IM, and admitted for oxygen, supportive care and further evaluation. The lizard's anemia was worse (15%) and bile acid was elevated at 54 U/L. Radiographs were unchanged in coelomic effusion and degenerative changes of the elbows. The caudal trachea appears narrowed, possibly secondary to dorsal cardiac displacement. Echocardiogram showed trace coelomic effusion and no pericardial effusion. Both atria appeared severely dilated, more so than on the previous study. Differentials included progression of heart disease, or secondary to the effects of chronic anemia. The ventricle appeared normal with adequate wall motion, and the aorta and pulmonary trunk appeared to be of normal diameter.

No further episodes of dyspnea were noted, but the patient remained quiet and inappetent. The owners were aware his prognosis was guarded, and elected to defer additional testing. The iguana was discharged on furosemide and syringe-feeding. Darbepoetin alfa (Aranesp, Amgen, Thousand Oaks, CA) was prescribed at 0.5  $\mu\text{g/kg}$  SQ q7d.

On recheck examination two weeks later, the hematocrit had decreased to 11.0%; the remainder of the CBC and chemistry were unremarkable. On echocardiogram both atria appeared slightly smaller compared to the previous study, with a trace of coelomic effusion and no pericardial effusion. Furosemide was recommended to be continued. Due to the chronic severe anemia, sucralfate (Carafate, Aptalis Pharmaceutical, Bridgewater, NJ) was prescribed and a fecal exam was recommended to rule out intestinal parasites. Additional diagnostics including a CT to rule out neoplasia was recommended but declined by the owners. The iguana presented to our Critical Care Unit dead on arrival 4 days later. A necropsy was not permitted.

## References

---

1. Kik MJL, Mitchell MA. Reptile cardiology: A review of anatomy and physiology, diagnostic approaches, and clinical disease. *Semin Avian Exot Pet Med*. 2005;14(1):52-60.
2. Mitchell MA. Reptile Cardiology. *Vet Clin N Am Exot Anim Pract*. 2009;12(1):65-80.
3. Jacobson ER, Homer B, Adams W. Endocarditis and congestive heart failure in a Burmese python (*Python molurus bivittatus*). *J Zoo Wildl Med*. 1991;22(2):245-248.
4. Knox FG, Wright FS, Howards SS, Berliner RW. Effect of furosemide on sodium reabsorption by proximal tubule of the dog. *Am J Physiol*. 1969;217:192-198.
5. Gibbons PM, Klaphake E, Carpenter JW. Reptiles. In: Carpenter JW, ed. *Exotic Animal Formulary*. Philadelphia, PA: Elsevier Saunders. 2013;83-182.





# Management of Quadrate Bone Trauma in a Green Tree Python (*Morelia viridis*)

---

Bradley J Waffa, MSPH, DVM

## Session #101

*Affiliation:* From the Churchland Animal Clinic, 6030 High Street W, Portsmouth, VA 23703, USA.

A 9-year-old captive-bred male green tree python (*Morelia viridis*) presented with unilateral mandibular paresis, facial asymmetry and mild stomatitis one week after attempting to swallow an oversized rat. The owner reported that the snake wrestled the food item for over an hour. When the snake finally abandoned its meal, the right side of the mouth did not occlude properly. The snake was observed to “yawn” excessively and the malocclusion worsened until the right crus of the mandible dangled freely. Differentials included trigeminal neuropathy (primary or secondary), muscle/ligament trauma, and/or luxation/subluxation/fracture of one of the mobile bones of the skull. Skull radiographs obtained under sedation revealed irregularities in the region of the right quadrate believed to represent a transverse fracture or luxation. The paretic half of the mouth was sutured into an anatomically normal position using 4-0 Vicryl® in an attempt to minimize mandible/quadrates movement during healing. The snake was hospitalized and maintained on an empiric antibiotic and NSAID for two weeks. Weight was measured every 48-72 hours as a proxy for hydration. Sutures were removed after 11 days when signs of inflammation had resolved and the snake was preparing for ecdysis. The snake was monitored for 24 hours post-suture removal with apparent resolution of signs. Ecdysis was initiated manually to prevent the normal associated head rubbing and then discharged to the owner with instructions not to offer a meal for 8 weeks. Four weeks post-discharge the snake has thrived with no recurrence of signs. Post-radiographs have not yet been obtained.