The Aplio i800 Takes Exotic Animals Imaging to the Next Level

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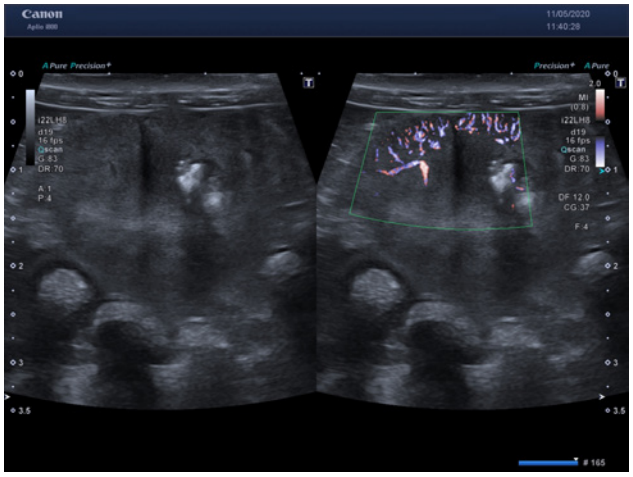
The Aplio i800 is a considerable advance in ultrasound technology, offering high-resolution images and high frequency transducers that are valuable in any clinical setting. The system's wide range of transducers and Superb Micro-vascular Imaging (SMI) modality have convinced a leading Spanish veterinarian to chose Canon Medical to carry out her ultrasound examinations. Dr. Maria Ardiaca, director of a veterinary centre specialising in exotic pets in Madrid, told VISIONS how she uses the Aplio i800 to diagnose and perform biopsies in her surprising patients.

Pythons, bearded dragons and cockatiels are not the traditional fauna in Spain, but they are typical patients at Los Sauces Veterinary Centre, a leading pet clinic located in the heart of Madrid. The facility has been caring for exotic pets since 1995, when it was launched by Dr. Andrés Montesinos, a pioneer in exotic animals medicine. The centre's nine veterinarians and seven nurses attend around 3,500 patients per year, from small mammals, birds, reptiles, amphibians, fish and even invertebrates.

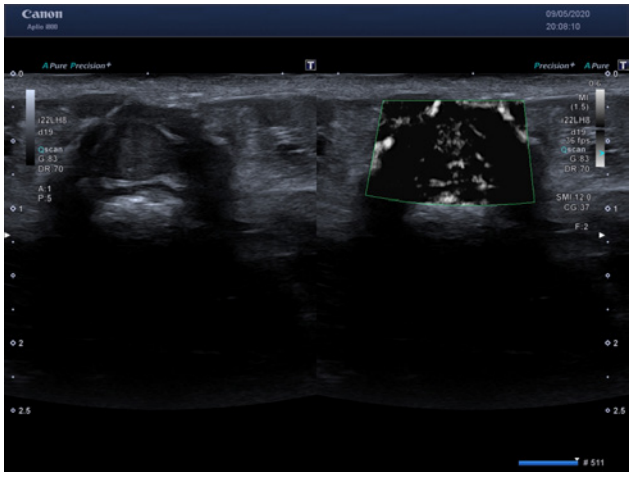
Exotic animals medicine: a growing and challenging field

Exotic veterinary medicine is experiencing a vertiginous development and this requires a considerable effort from the professionals to keep up to date with the latest medical advances, according to Dr. Maria Ardiaca, who has been working at the centre since November 2003. "All of us actively participate in national and international conferences to improve our training and present our scientific contributions. Our goal is to actively contribute to the development of the field and promote information, and thereby contribute to animal welfare and the reduction of illegal trade and capture of exotic and wild animals. Throughout the year, we receive dozens of Spanish and foreign veterinarians and students who want to improve their knowledge and skills in exotic animal medicine," she explained.

Specialising in exotic pets creates various challenges, starting with the vast diversity in the anatomic and physiologic particularities of patients. Dr. Ardiaca and her team attend a wide variety of species. Her avian patients include African grey parrots, budgerigars, cockatiels, lovebirds and other parrots, as well as canary finches and pigeons. Other regular patients comprise of rabbits, guinea pigs, chinchillas, degus, rats, hamsters, ferrets and minipigs, "the stars of mammalian visitors". In the reptile group, the team most commonly attends turtles and tortoises, bearded dragons, geckos, boas, pythons, milk and corn snakes.



Nephrocalcinosis in a domestic rabbit.



Inflammatory colitis with nodular mucosal hyperplasia in a rat.

Axolotls, goldfish, betta fish, frogs and toads are also frequent patients in the fish and amphibians hospital. The centre provides a comprehensive service of exotic animal medicine 24/7, offering consultation, diagnosis, hospitalisation, surgery and anaesthesia. The centre also has an internal laboratory where blood work, cytological or coprological analyses are performed.

As for diagnostic imaging, most examinations are performed in-house, but the team also works with specialists and advisors in different fields to offer the best option for patients.

Pushing ultrasound's capacities in diagnostic imaging and image-guided biopsies

Los Sauces veterinarians perform direct digital radiology, endoscopy and ultrasound examinations. For CT and MR studies, the team collaborates with a specialised veterinary imaging centre - Diez Bru Diagnostico por Imagen Veterinario - and with the Nuclear Magnetic Resonance Unit of the Multidisciplinary Institute (UCM) in Madrid.

To complete their diagnostic imaging capacities, Dr. Ardiaca and her team recently incorporated the new Aplio i800. The system will help perform abdominal and thoracic examinations, ultrasound-guided biopsies and nerve blocks, as well as echocardiography scans.

Biography

Dr. Maria Ardiaca is Director of the Los Sauces Veterinary Centre in Madrid. She received her veterinary degree at Madrid Universidad Complutense in 2002 and completed her university degree at wildlife recovery centres and at the Los Sauces Veterinary Centre in Madrid. She volunteered at the GREFA Wild Fauna Hospital and was an active member and president of the Veterinary Students' Association for Exotic and Wild Animals Medicine in Madrid. She worked as a veterinarian in wild fauna rehabilitation at the O Campiño Animal Rescue Centre during the Prestige oil spill in Galicia, Spain in 2002.

Dr. Ardiaca is an accredited veterinary specialist in exotic pets (New Companion Animals) at the Association of Small Animals Veterinarians of Spain (AVEPA). She is also president and scientific committee member of the Exotic Vets Association of Spain (GMCAE-AVEPA).

She regularly speaks in Continuing education courses and masters for veterinarians who are interested in exotic animal medicine. She has presented at several national and international conferences and published scientific papers on exotic animals medicine.

Besides high resolution images, one of Canon Medical's iconic trademarks, the wide range of transducers available with the Aplio i800 has been a determining factor in the decision to buy the equipment.

"The wide choice of transducers is suitable for all patients, from the largest to smallest companion animals, and this makes the Aplio i800 well suited for a veterinarian clinic or hospital," she said.

Dr. Ardiaca uses three configurations of probes: a 'Sector Probe' 3.5-12 MHz., a 'Linear Array Transducer' 4.0-18.3 MHz (intelligent Dynamic Micro-Slice - iDMS) and a 'Linear Probe for small superficial parts', ranging from 8.8-22 MHz, which offer high quality images. The 22 MHz hockey stick transducer is particularly useful with small pets, which constitute the vast majority of her patients. "Most of them weight less than one kilogram and many are thinner than 2-3 cm. I really appreciate resolution over penetration and need to work with high frequency linear transducers with good near field detail. This equipment offers outstanding resolution," she said.

Echocardiography is difficult to perform in small animals but the sector probe 12 MHz transducer of the Aplio i800 is up to the task and better suited than other equipment. "It is a significant improvement over my old 7 MHz transducer in obtaining images of my patients' small hearts at high frame rate," she said.

Aplio i800's ultra-wideband i-series transducers cover the same bandwidth as two conventional transducers, offering superior sensitivity and resolution for both near and far field. This groundbreaking transducer design helps provide better imaging regardless of the patient condition and helps to reduce costs.

"The Aplio i800's SMI expands the range of visible blood flow to visualise low-velocity microvascular flow in an unprecedented way."

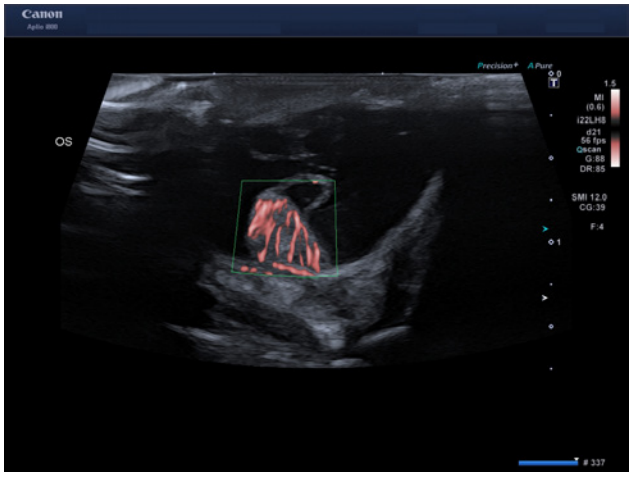
Dr. Maria Ardiaca, Director of the Los Sauces Veterinary Centre in Madrid

The system's Superb Micro-vascular Imaging (SMI), an unique technology on the market, helps expand the range of visible blood flow to visualise low-velocity microvascular flow in an unprecedented way. The SMI software can be used in a wide range of settings, from liver and kidney tumours to ophthalmology, enabling detailed view of the pecten in both reptiles and birds' eyes. This technology is gaining momentum in many other areas of pet imaging.

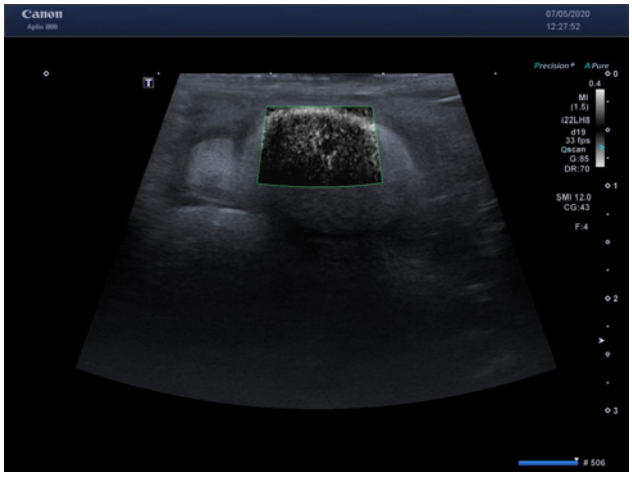
"SMI enables to evaluate perfusion in smallest body parts such as intestines of small rodents, adrenal gland or lymph nodes of ferrets, among others, with really subtle low blood flow," Dr. Ardiaca said.

Last but not least, the Aplio i800 is robust and long lasting, two qualities that are essential in the context of pet imaging, as patients are not always cooperative.

Dr. Ardiaca expects to perform around 600 ultrasound examinations per year with the new equipment, and this activity is set to grow, as more and more people chose to adopt exotic pets. She is also planning on future collaboration with Canon Medical for projects in research and continuing education.



Pecten oculi of an orange winged amazon (Amazona amazonica).



Normally perfused mature ovarian follicle in a mississippi map turtle. A small immature follicle is visible as a blood flow pattern disruption.

Clinical Case: Metastatic Osteosarcoma in a Blue-Fronted Amazon Parrot *(Amazona aestiva)*

Dr. Maria Ardiaca, Los Sauces Veterinary Centre in Madrid, Spain

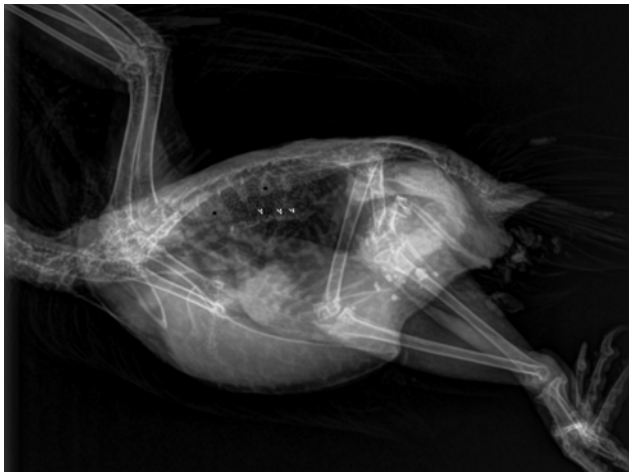
A blue-fronted Amazon parrot of unknown age (at least 36 years) was presented due to apathy, anorexia and lameness. The clinical history of this patient included bilateral chronic stifle arthritis and a diaphyseal fracture of the right femur 3 months ago that was treated surgically.

The clinical examination showed mild dehydration, poor body condition (body score 2/5), weakness, alert mental status and bilateral paraparesis. *(Figure 1)* The bird exhibited signs of pain during the palpation of the rear extremities and it was not possible to elicit a complete extension of the legs, especially the right leg.

Complete blood analysis revealed mild anemia (PCV 36%; reference range 42-53%), severely elevated alkaline phosphatase (2249 U/l, reference range 20-108 U/l) and mildly elevated bile acids (59 umol/l).[1]

Radiographs in laterolateral and ventrodorsal projections showed proliferative alterations in the right femur compatible with exuberant callus and misalignment in the diaphysis of the right femur and osteolysis in the distal epiphyseal region; cortical irregularities on the distal diaphysis and epiphysis of the left femur; irregular radiodense lesions on the vertebral column; calcification of the aorta and pulmonary arteries and moderate hepatomegaly. *(Figures 2 and 3)*

Figure 1: The patient, an Blue-fronted amazon parrot (Amazona aestiva) showing bilateral paraparesis.



Figures 2 and 3: Radiograph in ventrodorsal and laterolateral projections showing proliferative alterations in the right femur compatible with exuberant callus (arrow); osteolysis in the distal epiphyseal region (arrowhead) and irregular hyperdense lesions on the vertebral column (*) and calcification of the aorta and pulmonary arteries (notched arrowhead) among other findings. Positioning was suboptimal due to patient inability to extend the legs.

Ultrasonographic examination with the aid of a 22 MHz hockey stick transducer and Aplio i800 equipment (Canon Medical Systems) evidentiated several space occupying lesions of mixed echogenicity that varied from 2.6 to 3.7 mm in diameter within the hepatic parenchyma. These lesions presented an uncommon coffee-bean appearance as they were roundish predominantly hypoechoic with a slightly hyperechoic periphery and central area. The perfusion evaluation with the SMI (Superb Micro-vascular Imaging) consistently revealed mild signal in the central area of the lesion. *(Figures 4, 5 and 6)*

Based on clinical and diagnostic findings, particularly the coffee-bean-shaped lesions in the hepatic parenchyma, a presumed diagnosis of metastatic neoplasia was made. The differential diagnosis included multifocal osteomyelitis and abscesses in the liver. Bilateral paraparesis was attributed to medullar lesion, probably related to the vertebral lesions. Supportive and analgesic therapy was initiated in order to stabilize the patient and evaluate further diagnostic plan, but the bird died approximately 24 hours after presentation.

The necropsy revealed hard whitish masses in the cranial area of both lungs; ateromatosis, arteriosclerosis and calcification of aorta and pulmonary arteries; several whitish firm nodular lesions in the liver and kidneys, right adrenal gland; large proliferative cortical lesion in the right femur and several smaller proliferative lesions on the ribs and dorsal thoracic wall. *(Figure 7)*

The histopathological study of the tissue samples concluded that pulmonary atelectasis and acute shock associated with severe atheromatosis, a metastatic osteosarcoma involving several organs, particularly the liver, and hemorrhagic lesions in the spinal cord contributed to the clinical picture and death of this parrot.

It was not possible to determine the location of the primary neoplasm or to rule out a primary poliostic involvement. Osteosarcoma may have contributed to pulmonary atelectasis from local compression and the metastatic malignancy was complicated by a catabolic process and dehydration that contributed to the shock in this patient.

Fractures in elderly parrots must always include the differentials for pathological fractures, such as neoplastic disease and a thorough diagnostic approach is advisable.[2] In this case, the recent femoral fracture was most probably due to the osteosarcoma that was not detected.

Figure 4: Sonographic image of coffee-bean shaped SOL in the liver with mild signal in the central area on the SMI perfusion evaluation.

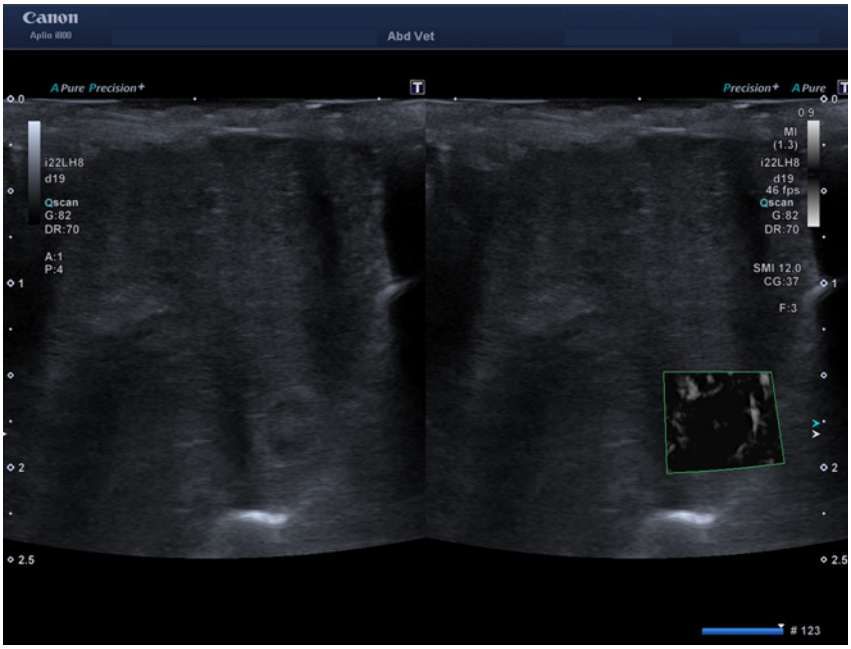


Figure 5: Sonographic image of coffee-bean shaped SOL in the liver with mild signal in the central area on the SMI perfusion evaluation.

Osteosarcomas are sporadically described in the scientific literature in different avian species, most often appendicular osteosarcomas.[1–5] Particularly in the blue-fronted Amazon parrot (Amazona aestiva) osteosarcoma, osteoma and chondrosarcoma are described.[2,6,7]

Osteosarcomas are locally aggressive tumors that cause osteolysis and local invasion and they metastasize frequently, while chondrosarcoma tends to be only locally invasive with low metastatic potential in birds.[1–4,7] Several attempts of chemotherapy for osteosarcoma in birds were made without success.[5]

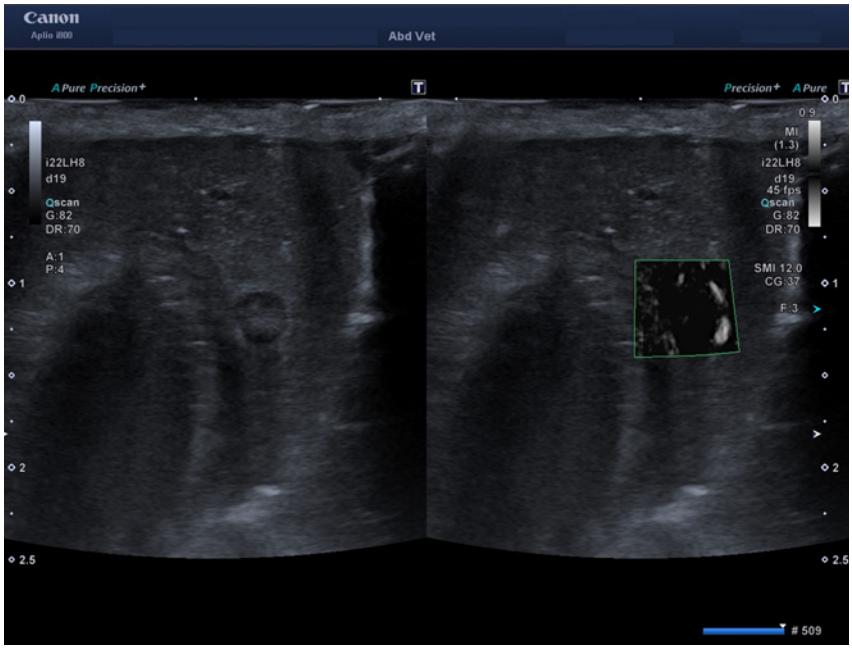


Figure 6: Sonographic image of coffee-bean shaped SOL in the liver with mild signal in the central area on the SMI perfusion evaluation.

Figure 7: Macroscopic appearance of the metastatic osteosarcoma lesions in the liver.

The differential diagnosis for the coffee-bean shaped lesions (sometimes also called bull`s eye or target-shaped) in the human liver ultrasonography includes abscess (particularly due to Candida sp. or Acinetobacter sp. Infection) and metastatic disease, considered the latest most probable.[8–11]

There are no scientific descriptions of this lesion in avian liver. In this case, the use of the novel SMI technique was particularly relevant as it allowed detection of very low flow perfusion that suggested neoplastic origin of the lesion, rather than an abscess. //

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