## Tech Tip

## **OPTIMAL CONVENTIONAL AND DIGITAL RADIOGRAPHY**

While conventional radiography is declining in veterinary medicine, it remains alive in many small animal practices. Digital radiography, on the other hand, is rapidly growing in popularity. Special techniques, such as those utilizing iodinated contrast media, are also changing due to the increasing availability of alternate imaging tools that include ultrasonography, CT and MR imaging. Ten key features for optimal radiography in small animal practice.

1. Patient positioning when you're by yourself. Flexible and rigid sandbags are useful for positioning and restraining dogs, particularly when sedation is not possible. With heavy sandbags encircling limbs or placed over the neck or back, and particularly with the use of a pet-positioner, dogs can be positioned in many different ways. Technicians can work more efficiently and help reduce patient motion during exposure.

2. Doing basic projections the right way. Inadequate patient positioning can lead to false interpretation. This is particularly crucial for head, spine and joints. The identification and assessment of a few anatomical landmarks can validate the quality of your images.

3. Special projections to consider. Stress views are useful when joint instability needs to be confirmed. Skyline projections can help detecting small bone fragments or help localizing soft tissue calcification. Other special views can help better highlighting tympanic bullae or the dens.



4. Fixing exposure issues in conventional radiography step by step. Film darkening relies on adequate mAs and kVp settings and proper development. In most instances, a chart is required and must be used adequately (patient measurements, etc.). Patient conformation and disease processes also influence film darkening. Fixing issues requires a systematic approach.

5. Adjusting DR images before saving and backuping. Image brightness and contrast must be evaluated on a proper monitor in low ambient lighting. Additional filtering can help highlight fine details such as bone margins. Unnecessary areas - particularly white areas - must be cropped. Patient ID and positioning (right-left) must be double-checked.

6. Treating grainy DR images. Grainy, or noisy, images result from insufficient signal, which can be due to insufficient x-rays reaching the digital detector (CR, DR plate or CCD), poor detector sensitivity, or inefficient transformation of x-rays into photons producing electric pulses. Signal-to-noise ratio (SNR) varies among systems, and can be optimized in some cases.

7. Referring patient or sending images for review. DICOM images represent raw information, and associated with larger image files (20-50MB). Ideally, this format is used for burning a CD/DVD or sending images by the web to consulting





radiologists. Images can then be reviewed with native format (megapixel resolution) and greyscale. When burning a CD/DVD, make sure to include proper DICOM reading software in case the consultant does not have one. JPEG compression reduces image file but results in image degradation - giving a pixelated look - which can significantly hamper interpretation. JEPG2000 and lossless JPEG formats are offered by some vendors and can be used for interpretation.



8. Talking care of DR systems. A few simple steps can increase the longevity of a digital system. Among those, turning off the computer and monitor at night, and keeping it free from dust and hair, can be crucial. Making sure patient data - including body markers - is accurate can save a lot of time when reviewing images, and can prevent redos. Limiting unnecessary exposures to the digital plate, and particularly with CR, can increase longevity.

9. Using contrast media. Now that ultrasound (US), CT and MRI have become widely available, the need for radiographic contrast procedures in veterinary medicine has declined. Yet, several can be useful in practice. Esophagography remain the only way to provide both functional and structural assessment of the thoracic esophagus. Urethrocystography is particularly useful for detecting tears and to assess the intrapelvic ureter. Barium studies can complement US in the detection of foreign bodies, masses, and strictures, particularly when the GI system if gas distended. With US guidance, renal pyelography can help confirm ureretal obstruction or rupture on radiographs. Myelography remains useful in some instances and particularly when MRI is not available.

## 10. Proper utilization and maintenance of contrast media.

Light, temperature, and air can alter contrast media in different ways and limit their longevity. If seldom used contrast material is used check expiration dates. Limiting contamination through proper contrast medium manipulations is also crucial. Spillage or leakage of contrast media on or around the patient will make interpretation more difficult.