Radiographs are an essential non-invasive diagnostic tool frequently used to investigate clinical complaints in veterinary patients. However, understanding and implementing safe use of X-ray emitting medical devices is paramount for every veterinary clinical practice team. Occupational exposure to radiation through veterinary diagnostics is generated primarily through scatter (or secondary) radiation that originates from the animal patient. Appropriate collimation of the primary X-ray beam results in both improved image resolution and decreases scatter radiation, as well as creating an unexposed periphery outside the area of interest. Human exposure to radiation should always be As Low As Reasonably Achievable (ALARA) and is required by both Federal and State regulations. Best safety practices avoid unnecessary radiation exposure for both human operators and animal patients alike.

The ALARA standard is best obtained through practical attention to TIME, DISTANCE and SHIELDING parameters. Conscious efforts should be made to decrease the number of radiation exposures made and the time that personnel spend around any radiation source. Routine use of radiation exposure technique charts will aid in decreasing the number of repeat studies. Increasing the distance from a radiation source markedly decreases exposure factors. Specifically, mathematics of the Inverse Square Law demonstrate that doubling the distance from a radiation source reduces the exposure rate by a factor of four. Personal protective devices should include shielding through use of appropriate lead aprons, lead gloves, thyroid shields and protective eyewear for all personnel present within the diagnostic X-ray imaging suite.

Veterinary medical personnel directly involved with ionizing radiation procedures should wear body dosimetry badges to monitor radiation exposure, with badge measurements evaluated regularly. Dosimetry badges should be stored in a dry, climate controlled area, away from any radiation source, but remember: dosimetry badges left in a drawer, unworn, provide no value. If an individual dose is reported to be high, measures should be implemented to identify and mitigate potential ALARA errors. Reducing further exposure to the individual, such as minimizing exposure time (which may include rotating personnel to spread the amount of time spent producing radiographs is more uniformly distributed), maximizing distance (do not hand hold a sensor or film cassette, even with a gloved hand; do not hold a portable X-ray machine during exposure) and wearing appropriate shielding should also be initiated. Remember: lead gloves provide good protection from SCATTER radiation, but do NOT attenuate the primary X-ray beam. Laying lead gloves over the top of fingers and hands does not protect from scatter radiation.

A human body part within a primary x-ray beam is a failure in safety protocol and should be prevented through proper personnel training and chemical restraint of the animal patient. In addition to chemical restraint, use of positioning aides is key to obtaining
highly diagnostic hands-free radiographic images in veterinary patients. Radiolucent sponge pads, bandaging tape and ties, as well as body V-trays (foam, metal, Pawsitioner) should be applied to eliminate human restrainers. Sandbags should not be placed directly against the animal within the collimated field-of-view, but may be used with a radiolucent foam sponge buffer.

A posted short list of the veterinary practice radiation safety plan should be included in the prominently displayed radiation posting requirements for each room/suite where X-ray emitting medical devices are in use.

References


