



### D16 Tracking Bullet Trajectories: A Comparison of Multi-Detector Computed Tomography and Magnetic Resonance Imaging

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After attending this presentation, attendees will understand that although radiography, either using film or a digital recording format, is currently the primary means for the examination of gunshot wound victims, interest has increased in employing advanced imaging modalities such as Multi-Detector Computed Tomography (MDCT) and Magnetic Resonance Imaging (MRI). Although vendors suggest the equipment is easily operated, a skilled technologist is required to manipulate the unit in order to obtain the optimal images. This presentation will consider optimizing protocols which will maximize image quality and, in addition, compare the advantages and disadvantages of MDCT and MR.

This presentation will impact the forensic science community by demonstrating how when operated by a skilled technologist, MR and

MDCT can be employed to produce complementary images of gunshot wounds. MR will demonstrate the soft tissue response to the forces created by the projectile. MDCT will more clearly visualize lead fragments from the projectile and resulting damage to bony structures.

**Hypothesis:** Both MDCT and MR provide excellent sectional images of anatomic structures. However, with each of the advanced imaging modalities, skilled equipment operators are necessary in order to manipulate the protocols necessary to generate the best obtainable images.

**Synopsis of Content (Materials & Results):** As part of a study to determine the effects of gunshot wounds on soft tissue and bone, three pigs were shot with two different caliber handguns and subsequently imaged using various imaging modalities including computed radiography (CR) and plane (conventional) radiography, Multi-Detector Computed Tomography (MDCT), and Magnetic Resonance Imaging (MRI). Prior to being shot, the animals were stunned using a "capture bolt" and then exsanguinated by via a throat slash. Because of the length of time necessary to acquire the MRI images, only one pig was imaged with all four imaging modalities including MRI and MDCT.

**Conclusion:** Compared to MDCT, MRI produces superior sectional images of soft tissue structures; however, specific parameters regarding slice orientation must be programmed prior to the initiation of the examination. Conversely, MDCT best visualizes bone and more dense materials that are not clearly demonstrated with MR. In addition, MDCT initially collects a volume of tissue that can later be reconstructed in virtually any plane and can also generate three- dimensional images with varying degrees of transparency.

**Magnetic Resonance Imaging (MRI), Multi-Detector Computed Tomography (MDCT), Gunshot Wound Imaging**