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Radiological Society of North America

820 Jorie Blvd
Oak Brook, IL 60523
TEL 1-630-571-2670
FAX 1-630-571-7837
RSNA.org

NEWS

RSNA Press Release

CT Helps Identify Bullet Trajectories

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Media Contacts:

RSNA Media Relations: 1-630-590-7762

Linda Brooks
1-630-590-7738
lbrooks@rsna.org

Maureen Morley
1-630-590-7754
mmorley@rsna.org

At A Glance

- Researchers are using multidetector CT to analyze ballistic trajectories and wound paths.
- Analyzing entrance and exit sites, angles and trajectories provides clues to the origin of an explosion or the location of a sniper.
- MDCT has the potential to improve patient care and aid in military and civilian forensic investigations.

OAK BROOK, Ill. — Multidetector computed tomography (MDCT) provides an efficient, effective way to analyze wounds from bullets and explosive devices, according to a study published online and in the March issue of *Radiology*.

"The information provided by MDCT has the potential to improve patient care and aid in both military and civilian forensic investigations," said the study's lead author, Les R. Folio, D.O., M.P.H., from the Uniformed Services University in Bethesda, Md.

U.S. troops stationed in Iraq and Afghanistan face threats from increased sniper activity and the use of improvised explosive devices. Current clinical reports of wounds from bullets and bomb fragments do not include the progression of the trajectory or the direction of the wound path, despite the fact that ballistic injuries are not necessarily confined to a single anatomic structure.

While research has shown the value of CT in the analysis of ballistic wound paths, there is no widely accepted method for consistently and accurately pinpointing wound paths and determining the trajectory angles.

For the study, researchers evaluated the accuracy of MDCT-based ballistic wound path identification. They had a marksman shoot six shots from a rifle into two simulated legs made from various synthetic materials to optimally represent real tissue. The legs were tilted at six different angles based on common sniper heights and distances.

After the leg phantoms were scanned with 64-channel MDCT, several radiologists independently reviewed the CT images and recorded entrance and exit sites for the bullet trajectories. The angles measured on MDCT corresponded closely with those calculated from coordinates with actual shooting angles. Dr. Folio and his team concluded that radiologists could estimate the location of a sniper or an explosive device by extrapolating trajectories identified on MDCT when other factors, such as sniper distance and the victim's position, are known.

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"Investigators want to know where the sniper was and where the bomb blast originated," Dr. Folio said. "MDCT allows us to see the path and help determine these answers."

MDCT-based calculations of wound paths and angles of trajectory have other potential benefits, according to Dr. Folio, including assistance in crime scene analysis and the triage and treatment of patients. The work can also be applied to records from the Joint Theater Trauma Registry, a U.S. Department of Defense database of penetrating injuries in fatally and catastrophically wounded soldiers.

"This technology allows us to analyze thousands of penetrating injuries, correlate them with external ballistics and use that data to help develop protective gear and prevent future injuries," Dr. Folio said.

Additional research into MDCT's potential to analyze trajectories and wound paths in other areas of the body, including the head, chest and abdomen, is ongoing. Dr. Folio is currently leading a study on automated trajectory analysis in Vietnam veterans with traumatic brain injuries.

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"CT-based Ballistic Wound Path Identification and Trajectory Analysis in Anatomic Ballistic Phantoms." Collaborating with Dr. Folio was Tatjana V. Fischer, Paul J. Shogan, D.O., Michael I. Frew, M.D., Pil S. Kang, M.D., Rolf Bunger, M.D., Ph.D., and James M. Provenzale, M.D.

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