



## Young Forensic Scientists Forum—2020

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### **Y8 The Possibility of Personal Identification By Measurement of Scapular Volume and Bone Conformation: A Preliminary Assessment With Postmortem Full-Body Computed Tomography (CT)**

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**Learning Overview:** After attending this presentation, attendees will learn the value of postmortem imaging for personal identification using scapula morphometric values from postmortem CT.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by showing that with scapular morphometrics, CT data can be used to obtain objective indicators for personal identification.

The value of postmortem imaging for personal identification has clearly emerged in recent years, and applications of postmortem bone imaging to the determinations of sex, height, weight, and other characteristics have been investigated. This study reports on a preliminary investigation into the relationship of scapula morphometric values from postmortem CT to sex, age, height, weight, and other physical properties.

An analysis was performed for 570 adult autopsies (359 men, 211 women; mean age 60 years; range 18–98 years) with no observable injury, damage, or other effects on anatomical structure. CT was performed using a Hitachi Medical Multislice ECLOS-16 system and scapular 3D structure reproduction images were analyzed on a Fujifilm SYNAPSE VINCENT volume analyzer.

Among the various scapular measurement points, this study measured straight-line distance from the most superior point (D) on the superior angle to the most inferior point (C) on the inferior angle and from the most posterior point (I) on the crest of the glenoid fossa border to the spine base center point on the medial border (B), and left-right scapular volume and mean CT values. Sex determination by Receiver Operating Characteristic (ROC) curves of inter-D-C distances in the left and right scapulae showed sensitivity of 0.88–0.91 and specificity of 0.88–0.92, and that by scapular inter-IB distance showed sensitivity of 0.89–0.91 and specificity of 0.89–0.91, indicating high determination capability. Sex determination capability by volume was even higher, at 0.97–0.98 sensitivity and 0.95–0.96 specificity. No strong correlations (no correlation  $\sim r=0.56$ ,  $p<0.001$ ) of scapular measurement values to height or weight were observed. Taken together, the results indicate that with scapular morphometrics, CT data can be used to obtain objective indicators for personal identification.

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#### **Computed Tomography, Personal Identification, Scapular Volume**