



## Physical Anthropology Section - 2012

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### H11 An Evaluation of the Use of Modern Medical Imaging Techniques for the Determination of Biological Sex From Craniometric Measurements

*Aisling M. Smyth, MSc\*, Cranfield University, 59 Barrington Road, Watchfield, Swindon, Wilts SN6 8TN, UNITED KINGDOM; Mark D. Viner, MSc, Inforce Foundation, Cranfield Forensic Institute Defence Academy of the United Kingdom, Shrivenham, SN6 8LA, UNITED KINGDOM; Gerald J. Conlogue, MHS, Quinnipiac University, Diagnostic Imaging Program, 275 Mount Carmel Avenue, Hamden, CT 06518; and Tania Blyth, MHS, Quinnipiac University, 275 Mount Carmel Avenue, NI-HSC, Hamden, CT 06518*

After attending this presentation, attendees will be aware of the range of imaging techniques that may be used as alternatives to direct physical craniometric measurements. They will understand the relative advantages and disadvantages and levels of accuracy of Computed Tomography (CT) Scanning and Computed Radiography (CR) and their suitability for deployment.

This presentation will impact the forensic science community by increasing awareness of alternative non-invasive methods of taking measurements from the cranium for the determination of biological sex in human subjects.

The acquisition of direct anthropological measurements from human remains can sometimes involve the removal of flesh. This practice raises many ethical, cultural, and religious issues, and, in the United Kingdom, is in conflict with the recommendations of the Clarke enquiry. The process is also time-consuming and involves the manual handling of biological material. Radiography has long been an alternative, non-invasive method for obtaining measurements from fleshed remains, but has traditionally been a very time-consuming process requiring correction for magnification. However, the advent of modern digital imaging techniques appears to offer more efficient methods of gathering anthropological data non-invasively. This paper will present the findings of a study that aimed to evaluate the viability of two modern imaging methods; Multi-Detector Computed Tomography (MDCT) Scanning and Computed Radiography (CR) for determining cranial measurements to aid human sex identification.

Twenty skulls from a museum collection were examined using both MDCT and CR and five standard measurements were taken from each skull using the image data from both techniques. These measurements were compared with direct physical measurements taken using callipers, mandibulometer, and osteometric board.

The results showed that measurements taken from CT scan images were as accurate as direct osteometric measurements, and measurements taken from CR images were affected by magnification proportional to the distance of the body part from the image receptor. The results from this study suggest that the effect of magnification on measurement data from digital radiography is significant enough to alter any resulting assessment of biological sex and should be corrected for. However, the process of examination and measurement from Computed Radiography is rapid and the technology is far more widely available to investigators than CT scanning and can be deployed easily in field situations. It is recommended that an accurate and reproducible magnification correction method for use at various object-to-film distances should be developed for CR technologies.

It is recommended that CT should be used as the method of choice for taking craniometric measurements from fleshed remains. However, where this is not possible digital radiography is an acceptable alternative, provided that the magnification can be accurately corrected for.

**Craniometrics, Radiography, CT Scanning**