H128 Osteon Area Measurements - A Validation Study

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After attending this presentation, attendees will become familiar with this method for osteon area measurements. This presentation will also identify the need for the validation of this measurement technique as the purpose of this study is to analyze the error rate produced within and between observers for the measurement of osteon area.

This presentation will impact the forensic science community in vali- dating the use of osteon area measurements in forensic work as a reliable method of osteon size estimation as well as a method that is able to be repli- cated with a high degree of consistency. This research also identifies the need for experience and practice with this measurement technique, as with any other type of scientific measurement technique.

This research determines the inter-observer and intra-observer error rate of researchers with varying levels of experience measuring the area, circum- ference and diameter of human osteons. The independent variables are individual level of experience, while the dependent variables include consistency among and between individuals with novice, intermediate and advanced experience in this technique.

Four researchers, with varying levels of experience with the technique (termed novice, intermediate and advanced) were asked to measure the area, circumference and diameter for the same 361 osteons(contained in multiple captured images), using Image Pro Plus 4.5 microscopy software. The two novice researchers each had only a 20 minute instruction to the method. The intermediate researcher had more than 10 hours of experience measuring the osteon area using this Image Pro Plus 4.5 software. The advanced researcher had over two years experience measuring osteon area using the Image Pro software and image capture system. Each researcher was asked to measure the area and greatest diameter of the same group of osteons in each image. Some of the groups of osteons were measured by each researcher various times throughout each measurement session to test the inter-observer error rate of each researcher. This allowed the researchers to measure the same osteons several different times within the same day to determine their consis- tency in measurement. Histomorphometric data was collected using a Leica DM 2500 transmitted light microscope equipped with 10x wide field oculars, 5x, 10x, 20x UPLanFL objectives, and a Leica DFC480 R2 color firewire digital camera. Each of the images was captured at 10x ocular lens and 10x objective lens. The area data was exported to an Excel spreadsheet, where all area and diameter measurements were compared within and between researchers. The data was compared using the SAS statistical package. The data suggests that the level of experience the researchers have with the technique and the equipment plays an important role in the accuracy of their measurements. It seems that the more familiar the novice researchers got with measuring the osteons the more consistent their measurements were when measuring the same osteons over again.

Osteon Area, Intra-Oberver Error, Inter-Observer Error

 ** Presenting Author*