



## Physical Anthropology Section - 2013

### H20 The Use of Joint Surface Pathology to Reassociate Commingled Human Remains in Forensic Anthropology

Colleen Cheverko, BS\*, 635 West 6th Ave, Apt 9, Chico, CA 95926

After attending this presentation, attendees will have a better understanding of how joint surface pathology can be used to reassociate commingled human skeletal remains.

This presentation will impact the forensic science community by providing forensic anthropologists who are often confronted with the challenges of reassociating commingled skeletal remains an additional sorting tool.

Osteometric sorting, articulation, pair matching, taphonomic similarities, and DNA sequencing are among the established techniques used to reassociate commingled skeletal remains. The technique of articulation is based on the principle that two bones in articulation form a congruent joint; however, the effects of joint surface pathologies such as osteoarthritis on articulation are unknown. These pathologies often exclude the use of traditional methods, warranting the development of new techniques to reassociate affected commingled remains.

The goal of the study was to evaluate the expression of osteoarthritis as a possible tool for sorting commingled remains. Medical literature indicates that the expression of osteoarthritis is consistent within an individual across joint surfaces in autopsy and surgical patients; however, bioarchaeological literature shows the variation in expression of the pathology is dependent on the method used to identify it.<sup>1</sup> To insure consistency in scoring osteoarthritis, the authors used the criteria published by Buikstra and Ubelaker to determine presence of osteoarthritis and the criteria established by Jurmain to determine the severity of the joint disorder.<sup>2,3</sup>

For this study, 258 discrete individuals from the Phoebe A. Hearst Museum of Anthropology were examined. The individuals included in the study were aged 30 years or older and had 50 percent of two or more surfaces from the same joint. The degree of lipping, eburnation, and porosity was examined in each synovial joint of the skeleton and a severity score was assigned that described the joint degeneration.

Overall, the majority of the osteoarthritis was expressed as marginal lipping and porosity; therefore, many of the joint surfaces were scored with a severity score of one. Chi-square tests were used to analyze the frequency of osteoarthritis in the hip, knee, elbow, and shoulder. The results showed that presence of osteoarthritis was consistent across surfaces of a joint. For example, the radial head was not marked with osteoarthritic changes if the capitulum of the humerus was not. Similarly, the medial condyle of the tibia was likely scored as one if the medial condyle of the femur was scored as one.

The study showed that osteoarthritis is a useful tool to reassociate commingled skeletal remains; although, it is most useful when used in conjunction with other techniques. While pathology of the joint surface may preclude the use of other methods such as the measurement of joint surfaces, joint pathology is a valid criterion to reassociate discrete individuals. This study only examined osteoarthritis; future studies should evaluate other pathological conditions.

Despite a great deal of past research, there is a need to develop additional tools to facilitate reassociation of discrete individuals. Future studies should investigate joint surface pathologies from modern and archaeological collections to increase our understanding of these pathologies and their value for reassociating commingled remains.

#### References:

1. Lagier R. Bone eburnation in rheumatic diseases: a guiding trace in today's radiological diagnosis and paleopathology. *Clin Rheumatol* 2005;25:127-31.
2. Buikstra JE, Ubelaker, DH. Standards for data collection from human skeletal remains. Proceedings of a Seminar at the Field Museum of Natural History. Fayetteville (AR): Archaeological Survey Press, 1994.
3. Jurmain R. Paleoepidemiology of a central California prehistoric population from CA-ALA-329: II: degenerative disease. *Am J Phys Anthropol* 1990;83:83-94.

#### Commingling, Mass Burials, Joint Pathology