



## Physical Anthropology Section - 2012

### H4 Validation of Two Age Estimation Methods Based on the First and Fourth Ribs in the Colombian Population

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The goal of this presentation is to show the application of two aging methods, one with the first rib and one with the fourth rib in the Colombian population.

This presentation will impact the forensic science community by showing how the aging process of the first rib on the costal facet and the face of the tubercle, as well as the morphological changes of the costal facet of the fourth rib and the general aspects of each method and their application to Colombian populations.

This study was carried out with the skeletal collection curated by the National Institute of Legal Medicine and Forensic Sciences in Bogotá, Colombia. The collection consists of 135 adult individuals, both male and female, with ages ranging from 19 to 93 years at the time of death.

The method used for the first rib was developed by DiGangi et al.<sup>1</sup> In this method, the geometric features of the costal facet are observed together with the texture of the surface of the tubercle. Each one is assigned a score according to the tables developed for this method. Changes were observed and recorded, excluding structures that showed diseases, where the area of interest was concealed by remnants of dry soft tissue, were incomplete or deteriorated.

The Loth & Iscan method was used for the fourth rib.<sup>2</sup> This method observes the changes produced by the aging of the costal face; morphological changes of this area were recorded, taking into account the features present on the articular surface, the borders, the walls, the depth and shape of the pit, and the porosity and quality of the bone in general. Both studies took into account both the right and left ribs, regardless of sex.

Results indicate that current methodologies utilizing both the first rib and fourth rib capture age-related change more accurately in young and middle-aged adults. For the first rib, the correlation coefficient between the best point estimate and real age was 0.623 ( $p$ -value < 0.001). Not surprisingly, adults aged 60 years and older had the most amount of error associated with their age estimates. In the case of the first rib method, these individuals were most likely to fall outside of both the 50% and 95% posterior density regions and in the case of the fourth rib method, these individuals often fell outside of the mean and standard deviation. Overall, the first and fourth rib methods do appear to contribute to age estimates and should continue to be tested.

These efforts to validate the methods according to the characteristics of the Colombian population provide more scientific rigor to the forensic work in the country. This contributes to the standardization process in the research of the biological profile of modern populations. Additionally, estimates will be more precise and they will strengthen the practice of forensic anthropology in Colombia and its role in the resolution of criminal cases.

The most important aspect of these projects is that they provide support to the families of the victims of the Colombian armed conflict. They are part of the resolution of forensic cases and facilitate identification. Consequently, they contribute to the return of individuals to their families.

#### References:

1. DiGangi EA, Bethard JD, Kimmerle EH, Konigsberg LW. A new method for estimating age-at-death from the first rib. *Am J Phys Anthropol* 2009;138(2):164-76.
2. Loth SR, Iscan MY. Morphological assessment of age in the adult: the thoracic region. In: Iscan MY, editor. *Age markers in the human skeleton*. Springfield: C.C. Thomas, 1989;105-35.

#### Age Estimation, First Rib, Fourth Rib