



### H103 Evaluation of the Oettlé and Steyn Sternal Rib End Aging Method on an American Sample

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After attending this presentation, attendees will have an understanding of the overall accuracy of the Oettlé and Steyn sternal rib end aging technique on an American sample, as well as possible ancestral differences for the method.

This presentation will impact the forensic science community by evaluating if the Oettlé and Steyn technique is applicable to an American Black sample.<sup>1</sup>

Sternal rib end aging was originally developed by İşcan, Loth, and Wright.<sup>2,3</sup> Although their method was developed specifically on White individuals, it was later tested on American Blacks (İşcan *et al.*), in which differences in morphological age-related changes between Blacks and Whites were found, with a general tendency to overage older Black individuals.<sup>4</sup> Additional key features associated with Black individuals were also identified, such as a difference in the scalloping pattern, an earlier development of bony projections, and overall good bone quality, even through old age.

Due to these known ancestral differences, Oettlé and Steyn tested and applied the İşcan *et al.* methods on a South African Black sample.<sup>1-3</sup> Low accuracy rates of the method and a tendency for delayed maturation of South African Blacks were found; therefore, the method was revised to reflect the population. Similar morphological differences observed in the İşcan *et al.* study, as well as plaque-like deposits that formed on the interior pit, were also seen in the South African Black sample.<sup>4</sup>

Ancestral and population-based differences have previously required the use of separate standards in other aging techniques, such as with cranial suture closure; therefore, other aging methods also need to be examined for these possible variations. Due to the presence of known ancestral differences in the aging process of the sternal rib end, the purpose of this research was to determine the accuracy of the Oettlé and Steyn sternal rib end aging method on an American sample, consisting of both White and Black individuals.<sup>1</sup>

In order to evaluate this method, data was collected from the Hamann-Todd collection. The sample consisted of 333 individuals and included male and female right fourth sternal rib ends from both White and Black individuals, ranging in age from 14 to 80 years. The method was tested on all individuals using both photographs and phase descriptions from the original article.

Accuracy was evaluated through the use of cross tabulation tables, with 34% of the sample correctly assigned to the actual age phase. Additionally, 79% were correctly assigned within one phase, and 94% were within two phases. Spearman's coefficient of rank correlation was also used to examine the relationship between the estimated and actual ages, as well as any differences in accuracy based on ancestry or sex. The overall correlation coefficient for the sample was 0.690, with the highest coefficient of 0.714 for Black males.

Results indicate the Oettlé and Steyn method performs somewhat poorly overall on an American sample, although it is slightly more accurate for American Blacks compared to Whites.<sup>1</sup> Even though accuracy rates were relatively low, results do reflect the need for ancestral and population-based standards. Further research is needed to determine if this method is more accurate than that of other sternal rib end aging techniques, and additional data will be collected from the WM Bass collection to include a more modern sample, as well as to test for possible secular differences.

#### References:

1. Oettlé AC, Steyn M. Age estimation from sternal ends of ribs by phase analysis in South African blacks. *J Forensic Sci* 2000;45(5):1071-79.
2. İşcan MY, Loth SR, Wright RK. Age estimation from the rib by phase analysis: white males. *J Forensic Sci* 1984;29(4):1094-104.
3. İşcan MY, Loth SR, Wright RK. Age estimation from the rib by phase analysis: white females. *J Forensic Sci* 1985;30(3):853-63.
4. İşcan MY, Loth SR, Wright RK. Racial variation in the sternal extremity of the rib and its effect on age determination. *J Forensic Sci* 1987;32(2):452-66.

#### Age Estimation, Sternal Rib Ends, Ancestry