



A157 The Detection of Cancerous Lesions in Skeletal Remains Using Visual Methods and Radiographs

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Learning Overview: After attending this presentation, attendees will have gained insight into the potential benefits of incorporating medical imaging equipment into standard practice for the detection of potentially individuating lesions.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating the need for the use of medical imaging equipment in a modern, forensic context to detect the presence of cancer in unknown skeletal remains, contributing to the biological profile and leading to possible identification.

Forensic anthropological literature describes the detection of cancerous lesions on dry bone that originated in soft tissue, later metastasizing to the bone. However, the use of medical imaging equipment to detect these lesions is rarely considered standard practice. Given the mechanisms of cancer metastasis, it is expected that more cancerous lesions would begin inside the bone, thus visible only with the aid of medical imaging equipment. Potentially individuating cancerous lesions may not be detected when employing macroscopic analysis of dry bone. These lesions may be excluded from the biological profile and impede the identification of unknown remains. Rothschild and Rothschild's study analyzed the presence of cancer both macroscopically and radiologically, finding that two-thirds of all cancer cases would be missed with visual inspection alone.¹ However, their study sample may not apply to contemporary, forensic contexts. The objective of this study is to determine if the presence of cancerous lesions in a sample of contemporary skeletons is greater when assessed using radiographs compared to macroscopic examination of dry bone, allowing for more accurate accounts of potentially individuating lesions in unknown remains.

The study sample consisted of 30 individuals with reported cancer from the Bass Donated Skeletal Collection. Elements selected for analysis included: skull, vertebrae, sacrum, clavicles, scapulae, sternum, ribs, humeri, os coxae, and femora. All elements were examined in isolation for the presence of visible lesions following the criteria for differential diagnosis established in the paleopathology literature.²⁻⁴ Each element was also radiographed at the University of Tennessee Student Health Center by a trained radiology technician. Radiographic images were analyzed blindly to ensure no bias in knowing if these individuals exhibited visible lesions. Lesion nature, location, size, and margins were recorded. Following analysis in isolation for each method, the sample was reanalyzed with simultaneous macroscopic and radiographic analysis, with the frequency of lesion presence between the two methods being compared.

Preliminary results indicate that 23% of the sample exhibited lesions only visible on the radiographs; 33% of the sample exhibited lesions macroscopically, but also exhibited additional lesions that were only visible on radiographs. These lesions were primarily lytic in nature, though there were also instances of blastic lesions only visible on radiographs. Of the elements selected, lesions appeared most frequently on the skull, followed by the os coxae. Preliminary results indicate that more than half of lesions in these cases could have been missed if traditional macroscopic analysis alone was employed. This presentation can validate the use of medical imaging equipment in a modern, forensic context to detect the presence of cancer in unknown skeletal remains, contributing to the biological profile and leading to possible identification.

Reference(s):

1. Rothschild B.M., Rothschild C. Comparison of Radiologic and Gross Examination for Detection of Cancer in Defleshed Skeletons. *Am J Phys Anthropol.* 1995; 96: 357-363.
2. Aufderheide A.C., Rodríguez-Martin C. *The Cambridge Encyclopedia of Human Paleopathology.* Cambridge: Cambridge University Press, 2006.
3. Ortner D.J. *Identification of Pathological Conditions in Human Skeletal Remains.* San Diego: Academic Press, 2003.
4. Roberts C., Manchester K. *The Archaeology of Disease: Third Edition.* Gloucestershire: Sutton Publishing, 2005.

Anthropology, Cancer, Radiographs