

How Can Non-Invasive Tech Assist With Studying Disease and Trauma In Ancient Skeletal Remains?

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Introduction

Non-invasive imaging systems, such as computed tomography and radiography have been used to examine ancient skeletal remains for years now. These techniques provide a way to view inside and outside of bone in a non-invasive way, allowing researchers to view damage and scarring that may not be able to be seen with macroscopy. The use of non-invasive imaging helps keep the rare skeletal remains from being destroyed; sometimes all we have is a tooth or the tip of a phalange⁴ of a skeleton and it may be one of the few examples of a species of culture group. Sometimes we find a burial or grave site and we have no idea what killed the people buried in the site; all we have is their bones. It could have been disease, war, murder, or a natural death which killed the people in a site.

Research Question

How can non-invasive tech assist with studying disease and trauma in ancient skeletal remains?

Studying ancient skeletal remains using non-invasive tech such as CT and X-ray can help not only preserve the rare samples of ancient skeletal remains, but it can also help us to possibly understand how a population lived and died. Disease and trauma leave distinct marks on bone, such as large callouses over a badly set and healed fracture to certain wounds on the skull being from human aggression.

Studying ancient skeletal remains for disease and trauma can also possibly help us understand how healing in the human body happens and if anything has changed between ancient or archaic populations and modern ones. Societal and cultural practices may also be determined in some way through the study of ancient skeletal remains through non-invasive tech, such as looking for possible plague victims or victims of a massacre and how the remains were disposed of.

Methods

Participants

Since my research question involves the use of ancient skeletal remains, no living participants will be involved in this study.

Materials

Materials used will be journal articles, books and studies found in peer reviewed journal databases as well as the library.

Procedure

I will be using a comparative approach to the case studies. This approach will involve comparing case studies based on their non-invasive imaging techniques and comparing them to others to see how useful they are in application.

Design

The design will be a qualitative study, focusing on the use of case studies to gather data. The use of case study in the form of peer reviewed journal articles is the best design path currently based on costs and availability of remains to study.

Expected Conclusions

This project will be done using case studies of research via peer reviewed journals and books. Due to the high cost of the tech and the ability to access ancient skeletal remains is not easy, I will be using a qualitative method where I use comparative analysis to see how the studies use non-invasive tech and how useful it was or how it could possibly be expanded on in the future.

Expected conclusions are the positive use of non-invasive tech to find trauma and disease in ancient skeletal remains. Since scanning technology does not damage or destroy finite and rare remains as well as making it possible to visualize internal structures of bone, the use of tech such as CT and X-ray are powerful tools in the study of paleopathology and paleoarchaeology. The information from such scans can help us to understand disease progression, how people healed in the ancient past as well as how societies possibly formed as well as their cultural practices

Background and Literature Review

Wu, et al. 2011- CT scans were used to examine a lesion on the cranium of a late middle Pleistocene human, indicating healing as well as possible human aggression.

Licata, et al., 2015- Ancient human remains from several sites in North West Lombardy, Italy. The remains span several centuries and include mummies as well as bones. CT scans helped identify fractures, callouses, osteomas and trauma to a cranium.

Papagrigorakis, et al., 2011- Researchers compared 240 modern Greek skulls and 141 ancient dry Greek skulls using X-rays to determine disease and healing in both populations. Some comparison is done to determine if both populations healed in similar ways to diseases such as osteoporosis.

Significance

Advantages to this study will be rare remains will not be destroyed and will be available for future study. Other advantages will be understanding how bones react to trauma and how they healed prior to the advent of biomedicine.

Some disadvantages will be that in order to identify a disease fully, some bone may still need to be destroyed for DNA since scans do not pick up DNA.

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Figure 1. Right superolatgeral view of the Maba cranium showing lesion, (Wu, et al., 2011)

Figure 2. X-ray and CT of a small mummified lower limb. A fracture is visible on the fibula. (Licata, et al., 2015)