

FORENSIC RESEARCH PROJECT

RESEARCH PROJECT

Title : **Immunohistochemical analysis for determining the vitality of perimortem trauma in human skeletal remains.**

Keywords : Forensic anthropology, bone fracture timing, haemorrhaging, glycoporphin, bone histology, microscopy

Expertise Area : Forensic Anthropology

Department : Unit of Biological Anthropology, Bioscience Faculty

Institute/Company : Universitat Autònoma de Barcelona (UAB)

City : Cerdanyola del Vallès, Barcelona

Country : Spain

Supervisor : Xavier Jordana (UAB) and Ignasi Galtés (IMLCFC-UAB)

Email address : xavier.jordana@uab.cat

Telephone number : 00-34-935811503

UVA Examiner : Roelof-Jan Oostra

UVA Coordinator :

SHORT DESCRIPTION

Timing bone fractures is one of the main tasks of a forensic anthropologist, but still an uncertain diagnostic. A reliable distinction between perimortem trauma and postmortem damage is crucial, since the former may allow conclusions on the circumstances of death. Even more problematic is the determination of vitality. While perimortem trauma is sustained around the time of death, not all of that trauma may be related to the death event itself. Injuries sustained while the bone is still 'fresh' but after the death of the individual may be confused with injuries that precipitated the death itself, even if they are unrelated. Recent preliminary experimental research has explored the possibility of detecting microscopic markers of haemorrhage and early healing signs in bone fractures on skeletonized human remains. These methods would be highly useful to reach the diagnosis of vitality of injuries. The aim of this study is to analyze the presence of immunohistochemical biomarkers of vitality (RBC and hemorrhagic signs) in fractured bones from cases with diverse degree of taphonomy (body conservation status) and post-mortem interval.

Methodology:

1. Sample includes individuals of a mass grave from Spanish civil war with gunshot trauma, ancient archaeological bones, and real traumatic cases from medicolegal autopsies of the Institute of Legal Medicine and Forensic Science of Catalonia (IMLCFC)
2. Anti-human glycoporphin A (GPA) antibody and Haematoxylin and eosin staining (H&E). Histological samples are prepared at the Department of Surgical Pathology of Althaia Hospital, Manresa.
3. Qualitative and quantitative analysis of histological section on light microscopy at UAB.

REQUIRED/RECOMMENDED EXPERTISE

Human anatomy / biology / biomedicine / microscopy

REFERENCES

1. Baldari, B., Vittorio, S., Sessa, F., et al (2021). Forensic application of monoclonal anti-human glycophorin a antibody in samples from decomposed bodies to establish vitality of the injuries. A preliminary experimental study. *Healthcare*, 9(5), 514.
2. Cappella, A., Bertoglio, B., Castoldi, E., et al (2015). The taphonomy of blood components in decomposing bone and its relevance to physical anthropology. *American Journal of Physical Anthropology*, 158(4)
3. Ghiasi, M. S., Chen, J., Vaziri, A et al. (2017). Bone Fracture Healing in mechanobiological modeling: A review of principles and methods. *Bone Reports*, 6, 87–100.
4. Oryan A., Monazzah S., Bigham A. (2015): “Bone injury and fracture healing biology.” *Biomedical and environmental sciences: BES* vol. 28,1 57-71.
5. Wieberg, D. A. M., & Wescott, D. J. (2008). Estimating the timing of long bone fractures: Correlation between the postmortem interval, bone moisture content, and blunt force trauma fracture characteristics. *Journal of Forensic Sciences*.