

LETTER TO THE EDITOR

Open Access



Is it time for a guideline on the use of immunohistochemistry in forensic pathology?

Massimo Lancia^{1*} and Mauro Bacci¹

In the field of forensic trauma pathology, immunohistochemistry (IHC) and specialized staining techniques are crucial to estimate the age of the wound and to identify complications stemming from the trauma. In addition, they are essential to detect unique cases, including those of asphyxia and severe head trauma (Chen et al. 2021).

The use of IHC is also promising for tackling fundamental questions in forensic medicine, such as those related to the age-dating of skin injuries, surpassing the limitations of older techniques based on histochemical techniques (Tomassini et al. 2022; Tomassini et al. 2024).

Despite its promise, the rate of IHC staining undergoes significant variations over time after death, due to postmortem involutonal phenomena affecting tissues and altering their antigen-antibody affinity. This has been demonstrated by studies conducted on populations consisting of medico-legal autopsies (Lesnikova et al. 2018).

This is indeed critical, as the practical application of IHC is documented in the literature and proposed in a variety of very complex and sensitive procedural contexts. For example, in homicide cases, where a positive immunohistochemistry result can provide substantial evidence to establish trial truth (Tong et al 2017).

Hence, the use of IHC in forensic pathology is an extremely sensitive issue, as the literature in this field has

advocated the application of these techniques in a vast variety of cases related to both natural and violent deaths.

Often, these recommendations are based on studies conducted on relatively small cadaveric populations and not always through adequate standardization of the study population. This is surprising considering that, in courts of law, forensic pathologist consultants frequently invoke the negativity or positivity of a particular IHC staining; this raises the question—assuming the character of evidence before a court —: is that technique truly scientifically validated? Are there clear indications from guidelines and/or protocols regarding the use of one technique over another, or under what conditions the use of either technique should be excluded?

At this juncture, there is a compelling need for the issuance of clear guidance indicating when these techniques may be employed and under what conditions. Specifically addressing the time since death within which the technique is valid, its state of preservation, and the susceptibility of the IHC technique to post-mortem modifications. This is necessary to ensure the proper utilization of these techniques and to provide a fruitful incentive for their study and further exploration in various forensic-medical issues that remain largely unresolved.

Abbreviation

IHC Immunohistochemistry

Acknowledgements

Not applicable.

Authors' contributions

M.B. and M.L. contributed to the conceptualization of the work. M.L. and M.B. were involved in the original draft preparation. M.L. performed the review and editing of the manuscript. M.B. provided supervision. All authors have

*Correspondence:

Massimo Lancia
dr.massimolancia@gmail.com

¹ Forensic Medicine, Forensic Science and Sports Medicine Section, Department of Medicine and Surgery, University of Perugia, Piazza Lucio Severi, 06132 Perugia, Italy

thoroughly reviewed and approved the final version of the manuscript for publication.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Availability of data and materials

Not applicable.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

All authors declare no financial or non-financial competing interests.

Received: 1 April 2024 Accepted: 5 June 2024

Published online: 17 June 2024

References

- Chen XS, Chu J, Yang LJ, Wang T, Tao LY (2021) Application of immunohistochemistry and special staining technique in forensic traumatic pathology identification. *Fa Yi Xue Za Zhi* 37(5):666–72. <https://doi.org/10.12116/j.issn.1004-5619.2020.400817>
- Lesnikova I, Schreckenbach MN, Kristensen MP, Papanikolaou LL, Hamilton-Dutoit S (2018) Usability of immunohistochemistry in forensic samples with varying decomposition. *Am J Forensic Med Pathol* 39(3):185–91. <https://doi.org/10.1097/PAF.0000000000000408>
- Tomassini L, Manta AM, Naso I, Adelini V, Paolini D, Petrasso PEY et al (2022) Rust stains' response to environmental stresses: an experimental study on porcine skin. *J Forensic Leg Med* 91:102402. <https://doi.org/10.1016/j.jflm.2022.102402>
- Tomassini L, Lancia M, Scendon R, Manta AM, Fruttini D, Terribile E et al (2024) Dating skin lesions of forensic interest by immunohistochemistry and immunofluorescence techniques: a scoping literature review. *Diagnostics* 14(2):168. <https://doi.org/10.3390/diagnostics14020168>
- Tong F, Wu R, Huang W, Yang Y, Zhang L, Zhang B et al (2017) Forensic aspects of homicides by insulin overdose. *Forensic Sci Int* 278:9–15. <https://doi.org/10.1016/j.forsciint.2017.06.015>

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.