Molecular Spectroscopy in Time of Death Estimation

Emilia Gruszczyńska[1], Marta Starost[2], Martyna Czarnomska[1], Aneta Lewkowicz[1], Piotr Bojarski[1], Łukasz Balwicki[3]

[1]Faculty of Mathematics, Physics and Informatics, University of Gdansk
[2]Faculty of Law and Administration of the University of Gdansk
[3]Faculty of Health Sciences with the Institute of Maritime and Tropical Medicine, Medical University of Gdansk

The estimation of the time of death is a highly complex and challenging task in forensic medicine and science. The methodologies currently employed to determine the postmortem interval (PMI) are demonstrably inaccurate, primarily due to the significant influence of external environmental conditions [1]. Therefore, there is a pressing need among forensic experts for the improvement of current methods and the development of new, more accurate and non-invasive techniques. This includes the exploration of physicochemical methods and the identification of new markers that can enhance the precision of the determination of time of death and reduce the risk of error.

The present study introduces an innovative non-invasive approach to estimating time of death based on spectroscopic analysis of free tryptophan present on the skin surface. Using spectroscopic techniques, we confirmed that tryptophan is a promising marker for this purpose. The spectroscopic methods will permit the detection of changes in the concentration of free tryptophan over time, thereby offering a potential new approach for forensic investigations.

This research was supported by a grant National Science Centre, Poland 2021/41/B/HS5/03250 (E.G., M.Cz., A.L.)

[1] Sutton, L.; Byrd, J. An Introduction to Postmortem Interval Estimation in Medicolegal Death Investigations. WIREs Forensic Science 2020, 2 (5). https://doi.org/10.1002/wfs2.1373.

corresponding author: emilia.gruszczynska@phdstud.ug.edu.pl