

Editorial for the Special Issue “The Identification of Narcotic and Psychotropic Drugs”

Pascale Basilicata and Maria Pieri *

Department of Advanced Biomedical Science, University of Naples “Federico II”, Via S. Pansini 5,
80131 Naples, Italy; pbasilic@unina.it

* Correspondence: maria.pieri@unina.it

1. Introduction

Over the last few decades, there has been a constant increase in interest in the forensic toxicology field, which has become one of the reference sciences for the elucidation of events of judicial interest [1,2]. The need to reconcile analytical problems (mainly concerning the qualitative/quantitative analysis of substances of abuse [3], particularly new psychoactive compounds [4] in complex biological matrices and seized material) with judicial requirements [5] (i.e., providing data that can be used as documentary evidence in trials [6]) makes the discipline unique among “analytical” sciences.

The correct interpretation of analytical data [7], especially that aiming to elucidate the extent of the impairment induced by a certain substance [8,9], as well as the mechanisms regulating drugs’ toxicity [10], as well as “old” issues related to the correct interpretation of post-mortem data [11,12], represent critical aspects of research and debate among forensic toxicologists.

This Special Issue addresses several key aspects of forensic and clinical toxicology related to the analysis of substances of abuse and psychoactive drugs in different matrices (both biological and non-biological), as well as the importance of studies on animal models to extrapolate drugs’ toxicity toward humans.

2. An Overview of Published Articles

The manuscript by Tang and colleagues [13] presents the neurotoxic consequences of ketamine exposure in zebrafish. The study integrated metabolic profiling and behavioural analysis, highlighting a correlation between the extent of ketamine exposure and the degree of locomotor activity. Metabolic profiling allowed for the elucidation of similarities with humans, confirming that zebrafish could be a valid candidate as a model organism to predict ketamine toxicity.

The research of Stern and colleagues [14] is focused on a critical tool in forensic toxicology: the prompt identification of new psychoactive compounds in street drugs. In particular, the authors focused on the identification of xylazine, used as an adulterant in the production of fentanyl and its derivatives. The analytical approach involves the use of an electrochemical sensor designed for xylazine and suitable for on-site tests performed also by non-specialized technicians.

The contribution from Dunn and colleagues [15] reports a descriptive pharmacovigilance analysis on adverse events due to drug abuse based on the Food and Drug Administration’s Adverse Events Reporting System. The results highlight increasing misuse of

Received: 14 July 2025

Revised: 6 October 2025

Accepted: 7 October 2025

Published: 9 October 2025

Citation: Basilicata, P.; Pieri, M. Editorial for the Special Issue “The Identification of Narcotic and Psychotropic Drugs”. *Toxics* **2025**, *13*, 852. <https://doi.org/10.3390/toxics13100852>

Copyright: © 2025 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

veterinary medications (including active principles authorized exclusively in a veterinary context), frequently present as adulterants in the illicit drug market.

The influence of storage conditions on post-mortem stability is presented by Gariglio and colleagues [16], who focused on spontaneous post-mortem methemoglobin formation. The article focuses on a critical issue in post-mortem practice, especially when death is caused by nitrite and/or nitrate poisoning. The results of both a retrospective study related to judicial cases analyzed in the period 2018–2021 and of an experimental study confirm the need for an analysis of the accuracy of the obtained results.

Zellner and colleagues' [17] contribution focuses on the value of toxicological data in clinical practice. The authors present the results of a retrospective study on more than eight hundred patients that underwent urinary toxicological analysis after hospitalization at the Division of Clinical Toxicology of the Poison Centre of Munich in the period 2014–2022. The results propose as evidence the crucial role of performing toxicological analyses for a correct diagnosis, since anamnestic datum alone can be inaccurate due to patients frequently underreporting ingesting drugs.

Sosa's article [18] focuses on the use of ocular surface fluid as an alternative matrix in post-mortem analysis. A survey of scholarly sources available is presented with the aim of shedding light on the potential of such a matrix for external drug screening as well as systemic disease tests.

List of Contribution

1. Chung, H.; Choe, S. Overview of Forensic Toxicology, Yesterday, Today and in the Future. *Curr. Pharm. Des.* **2017**, *23*, 5429–5436. <https://doi.org/10.2174/1381612823666170622101633>.
2. Boscolo-Berto, R. Challenges and future trends of forensic toxicology to keep a cut above the rest. *Adv. Clin. Exp. Med.* **2024**, *33*, 423–425. <https://doi.org/10.17219/acem/185730>.
3. Borden, S.A.; Palaty, J.; Termopoli, V.; Famiglini, G.; Cappiello, A.; Gill, C.G.; Palma, P. Mass spectrometry analysis of drugs of abuse: challenges and emerging strategies. *Mass Spectrom. Rev.* **2020**, *39*, 703–744. <https://doi.org/10.1002/mas.21624>.
4. Krotulski, A.J.; Mata, D.C.; Smith, C.R.; Palmquist-Orlando, K.B.; Modell, C.; Vikingsson, S.; Truver, M.T. Advances in analytical methodologies for detecting novel psychoactive substances: A review. *J. Anal. Toxicol.* **2025**, *49*, 152–169. <https://doi.org/10.1093/jat/bkae098>.
5. Wille, S.M.R.; Elliott, S. The Future of Analytical and Interpretative Toxicology: Where are We Going and How Do We Get There? *J. Anal. Toxicol.* **2021**, *45*, 619–632. <https://doi.org/10.1093/jat/bkaa133>.
6. Celeste, M.A. A Judicial Perspective on Expert Testimony in Marijuana Driving Cases. *J. Med. Toxicol.* **2017**, *13*, 117–123. <https://doi.org/10.1007/s13181-016-0579-z>.
7. Maskell, P.D.; Elliott, S.; Desharnais, B.; Findell, M.; Jackson, G. A model of evaluative opinion to encourage greater transparency and justification of interpretation in post-mortem forensic toxicology. *J. Anal. Toxicol.* **2023**, *47*, 563–573. <https://doi.org/10.1093/jat/bkad055>.
8. Korpi, E.R.; den Hollander, B.; Farooq, U.; Vashchinkina, E.; Rajkumar, R.; Nutt, D.J.; Hyytiä, P.; Dawe, G.S. Mechanisms of Action and Persistent Neuroplasticity by Drugs of Abuse. *Pharmacol. Rev.* **2015**, *67*, 872–1004. <https://doi.org/10.1124/pr.115.010967>.
9. Kim, H.D.; Call, T.; Magazu, S.; Ferguson, D. Drug Addiction and Histone Code Alterations. *Adv. Exp. Med. Biol.* **2017**, *978*, 127–143. https://doi.org/10.1007/978-3-319-53889-1_7.

10. Porath, A.J.; Beirness, D.J. Predicting categories of drugs used by suspected drug-impaired drivers using the Drug Evaluation and Classification Program tests. *Traffic Inj. Prev.* **2019**, *20*, 255–263. <https://doi.org/10.1080/15389588.2018.1562178>.
11. Stephenson, L.; Van Den Heuvel, C.; Scott, T.; Byard, R.W. Difficulties associated with the interpretation of postmortem toxicology. *J. Anal. Toxicol.* **2024**, *48*, 405–412. <https://doi.org/10.1093/jat/bkae052>.
12. Mantinieks, D.; Gerostamoulos, D.; Glowacki, L.; Di Rago, M.; Schumann, J.; Woodford, N.W.; Drummer, O.H. Postmortem Drug Redistribution: A Compilation of Postmortem/Antemortem Drug Concentration Ratios. *J. Anal. Toxicol.* **2021**, *45*, 368–377. <https://doi.org/10.1093/jat/bkaa107>.
13. Tang, Y.; Yang, K.; Xu, J.; Qiu, Y.; Meng, L.; Zhao, S. Toxicological assessment of ketamine in Juvenile Zebrafish (*Danio rerio*). *Toxics* **2025**, *13*, 82. <https://doi.org/10.3390/toxics13020082>.
14. Stern, J.E.; Wemple, A.H.; Sheppard, C.W.; Vinnikov, A.; Leopold, M.C. Fouling-Resistant Voltammetric xylazine sensors for detection of the street drug “Tranq”. *Toxics* **2024**, *12*, 791. <https://doi.org/10.3390/toxics12110791>.
15. Dunn, J.; Schifano, F.; Dudley, E.; Guirguis, A. Exploring human misuse and abuse of veterinary drugs: A descriptive pharmacovigilance analysis utilising the Food and Drug Administration’s Adverse Events Reporting System (FAERS). *Toxics* **2024**, *12*, 777. <https://doi.org/10.3390/toxics12110777>.
16. Gariglio, S.; David, M.C.; Mattia, A.; Consalvo, F.; Scopetti, M.; Padovano, M.; D’Errico, S.; Morena, D.; Frati, P.; Santurro, A.; et al. Evaluation of spontaneous over-time methemoglobin formation in post-mortem blood samples from real cases in critical storage conditions. *Toxics* **2024**, *12*, 670. <https://doi.org/10.3390/toxics12090670>.
17. Zellner, T.; Eyer, F.; Rabe, C.; Geith, S.; Haberl, B.; Schmoll, S. Recreational drug overdose—Clinical value of toxicological analysis. *Toxics* **2024**, *12*, 662. <https://doi.org/10.3390/toxics12090662>.
18. Šoša, I. Ocular surface fluid: More than a matrix. *Toxics* **2024**, *12*, 513. <https://doi.org/10.3390/toxics12070513>.

Author Contributions: P.B. conceptualization, data curation, writing—original draft preparation; M.P. conceptualization, writing—original draft preparation, writing—review and editing. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding

Data Availability Statement: Not applicable

Conflicts of Interest: The authors declare no conflict of interest.

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.