BEYOND THE BLOTTER: FORENSIC IDENTIFICATION OF NOVEL LSD ANALOGS VIA GC–QqQ–MS AND UHPLC–QqQ–MS/MS

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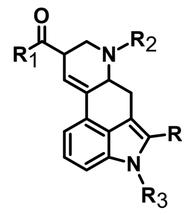
INTRODUCTION

LSD is a potent psychedelic with a long history of recreational use. In recent years, numerous structurally modified analogs, so-called designer psychedelics, have emerged on illicit markets. Their appearance raises concerns for public health and forensic toxicology, creating demand for reliable analytical methods

Key challenges:

- Synthesized to bypass existing drug regulations
- Rapidly increasing diversity on illicit markets
- Presence of isomeric forms with distinct activity
- Very low concentrations in biological samples hinder detection

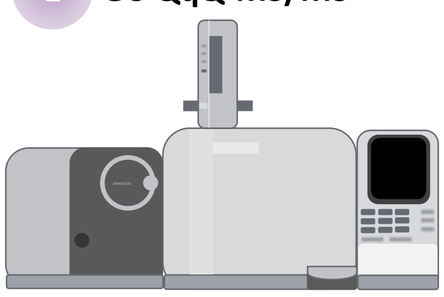
METHODS



analytical standards

MeOH, EtOH iso-PrOH
ACN, acetone, ethyl acetate
hexane, DCM, diethyl ether
MTBE, isooctane

1 GC-QqQ-MS/MS

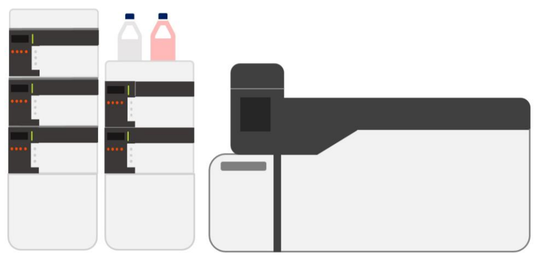


biological material

LLE pH9
ethyl acetate

LSD-d_3 as IS

2 UHPLC-QqQ-MS/MS



RESULTS

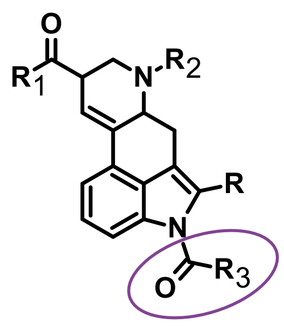
1 ISOMERS SEPARATION

Mean area intensity of LSD analogs

isooctane | hexane | iso-PrOH ACN | Ethyl acetate EtOH | TBME diethyl ether acetone | DCM

ALD-52
1P-LSD
1cP-LSD
1B-LSD
1V-LSD

MeOH → **LSD**

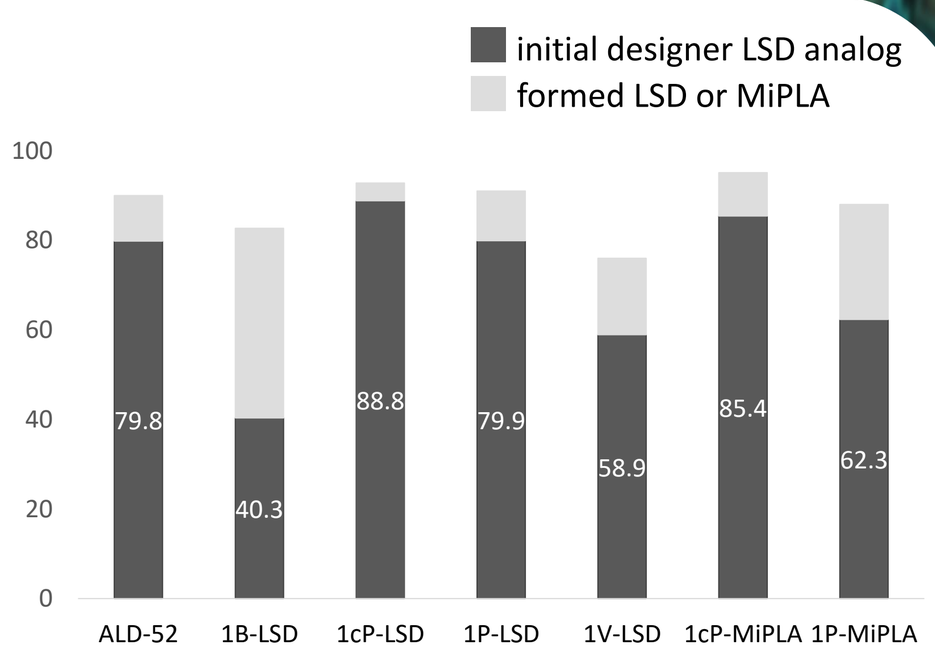


cleavage of the N-substituent

MiPLA ← *MeOH*

1P-MiPLA
1cP-MiPLA

2



Summarization of stability study results in blood collected to the tube with NaF after 30 days

CONCLUSIONS

1. Both approaches are complementary:
   - GC–MS is optimal for seized samples and isomer characterization
   - UHPLC–MS/MS is essential for trace quantification of designer LSD analogs
2. Solvent choice is critical: methanol induces degradation, while acetone, diethyl ether and TBME preserve stability.
3. NaF preservative stabilizes LSD analogs in biological samples and prevents conversion of N1-substituted analogs.

REFERENCES

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[2] Wachełko O. et al. A highly sensitive UHPLC-MS/MS method for determining 15 designer LSD analogs in biological samples with application to stability studies. Analyst 2025, 150(2), 290-308. doi: 10.1039/d4an01361a

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