



ABSTRACT BOOKLET

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The link to Cansford's paper can be found on page 367 inside the full-version TIAFT 2024 programme [here](#).

Below is the abstract and also the full poster.

Patterns of drugs of abuse and ethyl glucuronide levels in fingernail and toenail

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Background & Aims: While cut-offs have been established for some compounds in hair samples when testing for drugs and alcohol markers, the interpretation of levels detected is further benefited by comparing the levels detected with those previously obtained by the testing laboratory. In the context of nail results where no cut-off levels have yet been established, the statistical compilation of previously tested samples is just as important.

This paper aims to provide information from a large representative source of results from nail samples tested for drugs and alcohol in our laboratory.

Methods: 1685 of clipped nail samples (1296 cases of fingernail and 389 cases of toenail) from medico-legal and workplace sectors were collected between 2015 and 2023 and analysed for a panel of up to 100 compounds. The analytical procedure of extraction and detection by LC-MS/MS method were validated and accredited to ISO/IEC 17025 standards. Only values exceeding the recommended cut-off for drugs and ethyl glucuronide (EtG) in hair were included in the calculations.

Results & Discussion: 46 out of 100 compounds tested were detected in at least one nail type (fingernail or toenail). Cocaine, tetrahydrocannabinol (THC) and EtG produced the highest positive rate. Examples of median levels (n) obtained in fingernails were: benzoylecgonine 0.6 ng/mg (205), EtG 33 ng/mg (193), cocaine 5.5 ng/mg (170), THC 0.82 ng/mg (156) and likewise, median levels obtained in toenails were: benzoylecgonine 0.35 ng/mg (76), THC 0.31 ng/mg (56) EtG 25.5 ng/mg (52), and cocaine 2.3 ng/mg (46).

Other drugs found included median (n) for fingernails: cannabidiol 0.12 ng/mg (103), anhydroecgonine methyl ester (AEME) 1.2 ng/mg (38), amphetamine 1.1 ng/mg (33), cannabidiol 0.21 ng/mg (27), 6-acetylmorphine 4.2 ng/mg (22), morphine 1.5 ng/mg (21), codeine 0.8 ng/mg (20), heroin 2.7 ng/mg (17), ketamine 1.4 ng/mg (11) and dehydroepiandrosterone 48.5 ng/mg (6); and for toenails: cannabidiol 0.10 ng/mg (36), cannabidiol 0.10 ng/mg (11), dehydroepiandrosterone 16.0 ng/mg (9), amphetamine 1.6 ng/mg (8), codeine 1.5 ng/mg (4), tramadol 12.35 (4), AEME 4.7 ng/mg (2), 6-acetylmorphine 24.35 ng/mg (2), morphine 7.8 ng/mg (2) and nordiazepam 0.06 ng/mg (2).

The results for cocaine, benzoylecgonine, AEME, amphetamine, THC and MDMA in fingernail and toenails were in the same range reported by relevant publications.

The benefit of the results of our paper is to contribute to the scientific community with the levels tested in nail of our population and add to the levels contributed by other laboratories, and perhaps enable the establishment of a more realistic cut-off of for drugs and ETG in nail samples.

Conclusion: The intralaboratory compilation of previously tested nails samples in our laboratory provides guidance levels to aid interpretation of nail samples results. In addition, the publication of similar levels by different testing laboratories, may help the establishment of relevant cut-offs for drugs and EtG in nail samples.

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Introduction

Nail is a keratinised matrix, that has been increasingly used as an alternative to hair testing for drugs and alcohol markers. However, cut-off levels for the compounds usually tested in nail, unlike hair testing [1], have not yet been established [2]. The statistical compilation of laboratory results from previously tested samples is an important mechanism to provide information of levels commonly detected useful results.

Purpose

This study provides information from a representative source of results from nail samples tested for drugs and alcohol marker in our laboratory with the aim to collate the data and provide information useful for interpretation when reporting nail results.

Results

46 out of 100 compounds tested were detected in at least one nail type (fingernail or toenail). In 29 of the compounds, fingernail concentrations were higher than toenail.

Table 1 shows a representative pattern of results with median and the number of samples tested of the main compounds detected in fingernails and toenails.



Method

1296 cases of fingernail and 389 cases of toenail collected between 2015 and 2023 were analysed for a panel of up to 100 compounds using LCMS/MS.

This study shows that, while cut-off levels for nail testing have not yet been established, the compiled statistical analysis of past test results become important to provide information of levels when interpreting new results.

Table 1 - Results for some of the detected compounds in ng/mg

	Fingernail	Toenail		Fingernail	Toenail
Amphetamine	1.1 (33)	1.6 (8)	DHEA	49 (6)	16 (9)
Benzoylcegonine	0.6 (205)	0.4 (76)	EtG*	33 (193)	26 (52)
Cannabinol	0.1 (103)	0.1 (36)	Methamphetamine	3.6 (11)	5.7 (4)
Cocaethylene	0.18 (37)	0.14 (14)	Norcocaine	0.29 (68)	0.15 (15)
Cocaine	5.5 (170)	2.3 (46)	THC	0.815 (156)	0.305 (56)
Codeine	0.8 (20)	1.5 (4)	THC-COOH	0.0013 (93)	0.0015 (28)

*pg/mg



Conclusion

The results found are comparable with some previous papers [4,5,6,7]. For this study only values exceeding the recommended cut-off for drugs and ethyl glucuronide (EtG) in hair were included in the calculations.

Fingernail and toenail samples differ in growth rates and possible contamination pathways. This could lead to different concentrations in both samples and should be taken into account when choosing the type of nail sample to analyse [5].

Each type of nail has its advantages and disadvantages, and sampling should be evaluated on a case-by-case basis. We recommend a similar publication of levels detected of drugs and EtG in nail samples by different testing laboratories, to help the establishment of relevant cut-offs.

References

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