

## Results

Analysis is performed daily. We offer electronic return of results by PDF.

Results are reported as positive or negative based on the limit of detection and include the following text:

This ULPC-MS/MS method screens for the 6 most common synthetic cannabinoids (NOIDS) found in herbal materials in UK as determined from our in-house: This includes 5F-AKB48, MDMB-CHMICA, MDMB-CHMINICA, 5F-PB22 and the more recently appearing 5F-ADB and AMB-FUBINACA.

The detection window for NOIDS in blood is approximately 1-2 days.

This service will be added to our list of UKAS accredited tests in due course.

Please note this method cannot distinguish MDMB-CHMICA from the following synthetic cannabinoids BB22, 5F-NNEI, AB005. However, from our own analysis of synthetic cannabinoid materials the detection of MDMB-CHMICA is more likely.

## References

1. EMCDDA European drug report. Trends and developments 2017. Available online at: <http://www.emcdda.europa.eu/system/files/publications/4541/TDAT17001ENN.pdf>
2. Ford, LT and Berg, JD. Analysis of legal high materials by UPLC-MS/TOF as part of a toxicology vigilance system. What are the most popular novel psychoactive substances in the UK? *Annals of Clinical Biochemistry*. 2017 Mar;54(2):219-229.
3. Rook W, Ford LT, Vale A. Four analytically confirmed cases of use of third generation synthetic cannabinoid receptor agonists incorporating an adamantyl group *Clin Toxicol* 2016; 54: 14-19.
4. Meyyappan C, Ford L, Vale A. Poisoning due to MDMB-CHMICA, a synthetic cannabinoid receptor agonist. *Clin Toxicol (Phila)*. 2017 Feb;55(2):151-152.
5. Translating Knowledge of Synthetic Cannabinoids to Help Treat Poisonings SOT Communiqué Blog March 15, 2018

## Contact Points

### Dr Loretta Ford

Consultant Clinical Scientist

Tel: 0121 507 6026

Email: [Loretta.ford@nhs.net](mailto:Loretta.ford@nhs.net)

### Pervaz Mohammed

BCPS Specialist Services Clinical Lead

Tel: 0121 507 5353

Email: [pervaz.mohammed@nhs.net](mailto:pervaz.mohammed@nhs.net)

**Toxicology laboratory:** 0121 507 4138

Opening times: week days: 9.00am to 17:00pm

Weekends & Bank Holidays: closed

## Mailing Address

Department of Clinical Biochemistry

City Hospital

Dudley road

Birmingham

B18 7QH

[www.cityassays.org.uk](http://www.cityassays.org.uk)

UKAS Accredited

**A Teaching Trust of The University of Birmingham**  
Incorporating City, Sandwell and Rowley Regis Hospitals

© Sandwell and West Birmingham Hospitals NHS Trust

ML5730

Issue Date: May 2018

Review Date: May 2021

**NHS**

Black Country Pathology Services



# Screening for 6 synthetic cannabinoids (NOIDS) in blood

## Toxicology Laboratory City Hospital



**BCPS**

**NHS Pathology Serving the Black Country**

Provided by Sandwell and West Birmingham NHS Trust, The Dudley Group NHS Foundation Trust, The Royal Wolverhampton NHS Trust and Walsall Healthcare NHS Trust.



## Introduction

Synthetic cannabinoids (NOIDS) are new psychoactive substances (NPS) that mimic effects of the main psychoactive ingredient in cannabis tetrahydrocannabinol (THC). NOIDS act on the same CB1 receptors in the brain as THC, but are often much more potent and there are over 160 different compounds<sup>1</sup>. From our own analysis of NOID herbal materials sold in the UK we have found only a select few compounds are actually present. Our screening strategy is therefore to identify and target these common NOID compounds and offer a service to detect their use in blood and urine samples.

## Targeting common UK NOIDS

From 2014 to 2017 we received 59 clinical requests to test the herbal materials for NPS, including NOIDS and the results are summarised in Table 1.

Year	Synthetic cannabinoid detected									
	AKB-48	5F-AKB48	STS-135	5F-PB22	AB-CHMINICA	MDMB-CHMICA	MAB-CHMINACA	AMB-FUBINACA	5F-ADB	
2014	1	11	2	11	0	0	0	0	0	0
2015	0	12	1	13	3	10	0	0	0	0
2016	0	12	0	10	1	2	1	5	1	1
2017	0	0	1	0	0	0	1	3	8	8
Total	1	35	4	34	4	12	2	8	9	9

Table 1 Summary of NOID compounds detected in 59 herbal materials screened by UPLC-MS/TOF

Common Abbreviation	IPUAC Name	CAS No
MDMB-CHMICA	methyl 2-[[1-(cyclohexylmethyl)indole-3-carbonyl]amino]-3,3-dimethylbutanoate	1971007-95-0
MDMB-CHMINICA	methyl 2-[[1-(cyclohexylmethyl)-1H-indazol-3-yl]formamido]-3,3-dimethylbutanoate	1185888-32-7
5F-AKB48	1-(5-fluoropentyl)-N-(tricyclo[3.3.1.1.1.3,7.]dec-1-yl)-1H-indazole-3-carboxamide	1400742-13-3
5F-PB22	Quinolin-8-yl 1-pentyfluoro-1H-indole-3-8-carboxylate	1400742-41-7
5F-ADB	methyl-5-2-[1-(5-fluoropentyl)-1H-indazole-3-carboxamido]-3,3-dimethylbutanoate	1715016-75-3
AMB-FUBINACA	methyl (1-(4-fluorobenzyl)-1H-indazole-3-carbonyl)-L-valinate	1715016-76-4

This identified 6 common NOID compounds currently in use in the UK that we now target using our screening method as follows:

## Clinical rationale for NOID screening

- I. To diagnose the cause of patients presenting with the following features: intoxication, psychosis, hallucinations, reduced level consciousness, seizures, cardiac events, respiratory depression.
- II. Analytical identification/confirmation of NOID use may prevent patients undergoing invasive/expensive tests including:
  - CT brain scan
  - lumbar puncture.
  - electroencephalography for investigation of seizures
  - antiviral treatment for suspected viral encephalitis.

## Specimen Requirements

This method uses 0.5 mL of EDTA plasma.

- Transport at ambient temperature
- Stored samples should be separated and kept frozen prior to dispatch

## Method

This method is intended for clinical use only. Synthetic cannabinoids are extracted from EDTA plasma using liquid-liquid extraction and analysed using a Waters ACQUITY<sup>®</sup>I Class UPLC system (binary solvent manager, sample organiser, sample manager and column manager) and Xevo TQD mass tandem spectrum detector with positive electrospray ionization.

## Essential in-house validation data

Validation Evidence	Performance
Intra assay variation	<10% at 0.25, 0.5 and 10ng/mL for all 6 NOIDS
Inter assay variation	<20% at 0.25, 0.5 and 10ng/mL for all 6 NOIDS
Limit of Detection	0.005ng/mL 5F-ADB, AMB-FUBINACA, MDMB-CHMICA & 0.010ng/mL 5F-PB22, 5F-AKB48, MDMB-CHMINICA (>10 data points, SN>3, ion ratio within target range)
Absolute Matrix effects	Within ±10% target for all 6 NOIDS at 0.25, 0.5 and 1.0ng/mL
True Recovery	Within ±20% for all 6 NOIDS at 0.25, 0.5 and 1.0ng/mL
%Uncertainty (ruggedness)	Range from 23 to 44% for all 6 NOIDS at 0.25, 0.5 and 1.0ng/mL
EQA scheme(s)	UK (LGC) Quartz Forensic blood toxicology proficiency testing scheme: <ul style="list-style-type: none"><li>• New Psychoactive Substance (NPS) Blood Quantification Samples</li><li>• Synthetic Cannabinoid Blood Sample: Qualitative</li></ul>