**Specialist Laboratory Medicine Toxicology service**

**Information for :** Users of the Leeds Teaching Hospitals Toxicology service

**Purpose of information**: To provide a service overview on

# TESTING FOR SUBSTANCE ABUSE IN URINE

**Contacts:**

**Carys Lippiatt** **Tel. 0113 2067174**
**Consultant Clinical Scientist** **email. Carys.lippiatt@nhs.net**

**Elizabeth Fox PhD FRCPath** **Tel. 0113 2064860**
**Principal Clinical Scientist** **email. Elizabeth.fox4@nhs.net**

**James Booth MSc, FIBMS** **Tel. 0113 2066063**
**Advanced Biomedical Scientist** **email. jamesbooth@nhs.net**

**Address for specimens:**

**Specialist Laboratory Medicine**
**Toxicology Section**
**Block 46**
**St James's University Hospital**
**Beckett Street**
**Leeds LS9 7TF**

# Contents

# 1.0 Quick reference guide

## 1.1 Service Overview

This laboratory provides a routine clinical service for the measurement of a specified range of illicit and therapeutic drugs in patients attending substance abuse clinics. We do not carry out medico-legal work which would require samples collected under chain-of-custody procedures.

## 1.2 Tests available

**Urine screen (performed 2-3 times a week):**

6-Monoacetylmorphine
Morphine
Codeine
Dihydrocodeine
Cannabis
Amphetamine
Benzoylecgonine (Cocaine metabolite)
Nordiazepam
Oxazepam
Methadone + EDDP
Buprenorphine + Norbuprenorphine

**Urine Ethanol (performed daily).**

This test can be performed on the same sample as the urine drug screen but please request clearly on the request form (or ensure test is selected for requests using ICE)

**Urine additional tests (performed when required) – please add handwritten request on the request form**

Ketamine and Norketamine
MDMA and MDA
Oxycodone
Pholcodine
Pregabalin and Gabapentin
Tramadol and O-desmethyl tramadol

**Referred tests**

The availability of other tests varies over time according to the changing patterns of substance misuse. Please contact the laboratory with enquiries.

### 1.3 Specimen requirements

Random urine collected into a plain universal container (no preservative). Urine collected into preservative cannot be tested.

### 1.4 Request forms

Request forms must be completed in full and the details match those on the specimen container. Incomplete request forms and inadequately labelled samples will be rejected. A minimum of three unique patient identifiers are required on both form and sample e.g. full surname plus full forename, date of birth, NHS number, hospital unit number.

## 2.0 URINE TESTING

### 2.1 Sample Requirements

Urine collected into a plain universal which must be tightly secured. Urine collected into boric acid cannot be tested. Leaking samples cannot be analysed for health & safety reasons. **Please ensure that all Universal Containers are properly sealed before sending to the laboratory**.

### 2.2 Drug tests available

Urine samples are analysed exclusively* by liquid chromatography - tandem mass spectrometry (LC-MS/MS). A screen for a panel of 13 drugs is carried out on all samples and quantitative results are reported.
(*With the exception of urine alcohol.)

- 6-monoacetyl morphine (6MAM, heroin metabolite)
- Morphine
- Codeine
- Dihydrocodeine (DHC, DF118)
- Amphetamine
- Cannab
- Benzoylecgonine (Cocaine metabolite)
- Nordiazepam
- Oxazepam
- Methadone
- EDDP (Methadone metabolite)
- Buprenorphine
- Norbuprenorphine (Buprenorphine metabolite)

The following drug tests are available in addition to the screen. Results of these tests are reported as “positive” or “not detected”:

- Ketamine (Plus metabolite)
- Oxycodone
- Pholcodine
- Pregabalin
- Gabapentin
- Tramadol
- Alcohol (Ethanol; Reported quantitatively; lower reporting limit = 10 mg/dL)

Drugs, cut-offs and approximate detection times are shown in table 2.

**Table 1. Drugs in screen**

| **Drug** | **Detection Time (approx, where known)** | **Leeds Cut-off (µg/L)** | **EWDTS* recommended Cut-off (µg/L)** |
|---|---|---|---|
| 6-monoacetylmorphine (6MAM) | Up to 24 hours | 10 | 10 |
| Morphine | 2-3 days | 50 | 300 |
| Codeine | 2-3 days | 50 | 300 |
| Dihydrocodeine (DHC, DF118) | | 50 | 300 |
| Methadone | 2 days (occasional exposure)<br>7-9 days (maintenance dosing) | 50 | 250 |
| EDDP (Methadone metabolite) | | 50 | 250 |
| Benzoylecgonine (Cocaine metabolite) | Up to 3 days (single use)<br>Up to 3 weeks (heavy use) | 50 | 150 |
| Cannabis metabolite | 3 days (single use)<br>4 days (moderate use)<br>10 days (heavy use)<br>Up to 36 days (chronic heavy use) | 15 | 15 |
| Nordiazepam, Oxazepam (Diazepam metabolites) | 7 days or more | 40 | 100 |
| Amphetamine, MDMA | Up to 9 days | 50 | 200 |
| Buprenorphine | 1-4 days | 5 | 5 |

*European Workplace Drug Testing Society

## 2.3 Interpretation of Drugs in Urine

### General advice

*Cut-offs*

Interpretation of drugs is related to clinical cut-off values. This is the concentration at which a drug can confidently be reported as being present in the sample. Cut-offs are selected to maximise drug detection rate but minimise the reporting of false positive results which may occur due to assay interferences. The cut-offs used in this laboratory are based upon those recommended by the European Workplace Drug Testing Society (EWDTS). However as providers of a clinical service we felt it was important to report the presence of drugs at concentrations below the traditional workplace testing thresholds. Both Leeds and EWDTS cut-offs are shown in Table 2.

*Detection times*

The detection times shown in Table 2 are a guide. Detection time will depend upon the following factors: dose, urine concentration, chronicity of use, urine pH, concurrent medications, individual differences in metabolism, renal and liver function and assay cut-off.

### Opiates

### Heroin

***Only the presence of 6-MAM is conclusive evidence of heroin use.***

**Morphine** may be detected either as a product of heroin metabolism, codeine metabolism, administration of morphine or from poppy seed containing foods. If the codeine concentration is higher than that of morphine and no 6-MAM is present then it is more likely that the morphine was derived from codeine metabolism.

**Dihydrocodeine (DHC)** is not metabolised to or from morphine or codeine. It will only appear in a sample following DHC use.

### Methadone and EDDP

Methadone is metabolised to EDDP and both drugs should be detected to confirm adherence with treatment. Any detectable methadone and EDDP can be taken as evidence of adherence and no importance should be placed on the exact concentration. The most likely explanation for absence of EDDP is direct addition of methadone to the urine sample. Other possible explanations are extremely slow methadone metabolism or recent ingestion in a naive subject. Each result should be interpreted in light of the clinical situation.

There is intra-individual variation in the metabolism of methadone. Metabolism is influenced by genotype, liver function, and concurrent medications. Methadone metabolism is increased during pregnancy and EDDP concentration may exceed methadone concentration.

### Buprenorphine and norbuprenorphine

Buprenorphine and its major metabolite, norbuprenorphine are measured. The concentration of norbuprenorphine usually exceeds the concentration of buprenorphine and presence of norbuprenorphine can be taken as evidence of adherence. If the

concentration of buprenorphine is in vast excess of norbuprenorphine this may indicate that subutex/suboxone has been directly added to the urine sample.

**Amphetamines**
At present we only look for amphetamine and MDMA. If differentiation of amphetamine isomers for street/prescribed amphetamine is required, samples are referred to an external laboratory. If any amphetamine-type drug (e.g. ephedrine, phentermine) other than those listed needs to be looked for then the laboratory must be informed.

**Cannabis**
The assay detects the major metabolite of cannabis; **11-nor-9 –carboxy-delta9-tetrahydrocannabinol**. The detection window for cannabis is strongly influenced by the amount and frequency of use. See table for details.

**Cocaine**
Cocaine use is detected using its main metabolite **benzoylecgonine**. The detection window for benzoylecgonine is influenced by amount and frequency of use. During prolonged use, the metabolite accumulates and can be excreted for up to 3 weeks after the last dose.

**Benzodiazepines**
Benzodiazepine use is detected using **nordiazepam** and **oxazepam**. These are long-acting metabolites of both diazepam and chlordiazepoxide. Other benzodiazepines such as nitrazepam and midazolam will not be detected. Following **diazepam** use, nordiazepam and/or oxazepam can be detected for up to 7 days in occasional users and up to 4 weeks in long term users.

## 3.0 TURNAROUND TIMES

### 3.1 Routine testing

We aim to report results within 5 working days of receipt in the lab.

### 3.2 Urgent analysis

The laboratory does not offer a weekend or out-of-hours service. Under certain circumstances a same-day result may be available. Prior discussion with the laboratory is essential.

## 4.0 CONTACTS

Any problems relating to interpretation of results or problems regarding the service should be reported to the Clinical Lead in charge of this service or the Advanced Biomedical Scientist by phone or by e-mail (see front cover). Please inform us immediately of any problems so that we can investigate and rectify the situation.

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