

TOXICOLOGY LABORATORY TEST REPERTOIRE 2022/2023

**Cardiff Toxicology Laboratory
4th Floor, Routledge Academic Centre,
University Hospital Llandough,
Penlan Road
Llandough
CF64 2XX**

Laboratory Open Monday – Friday 08:30 to 17:00

General enquiries	Emma Taylor (Office Manager) Tel – 02921 826894 Email emma.taylor6@wales.nhs.uk
Technical advice	Sandra Morgan (Laboratory- Senior Biomedical Scientist) sandra.morgan3@wales.nhs.uk Nichola Norman (Laboratory- Senior Biomedical Scientist) nichola.norman@wales.nhs.uk
Clinical advice	Joanne Rogers (Consultant Clinical Scientist) 029 218 26892 or Joanne.Rogers@wales.nhs.uk

For urgent requests please contact the laboratory. Samples will be processed as soon as it is feasible to do so.

Gel tubes are not acceptable for most assays due to the potential for chromatographic interference. Samples from gel samples are accepted for cholinesterase phenotyping / pseudocholinesterase activity only.

It is possible for other medications to interfere with analysis. Please state current medications.

For therapeutic drug monitoring it is usual to collect trough samples once steady state is achieved. Some exceptions do apply (notably anti-TB drugs and olanzapine).

Samples should be separated and stored at 2-8°C prior to sending (with the exception of thiopental – please see below)

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Amiodarone	EDTA Plasma 0.5 mL (minimum vol 200µL) Sample timing less important due to long half-life.	First Class Post	LC-MS/MS	0.5 – 2.0mg/L	7	LGC Standards	Therapeutic drug monitoring (limited utility in toxicity due to long tissue half life)	£35.31
Amitriptyline and nortriptyline	EDTA Plasma 2 mL (minimum vol 1 mL) Trough sample	First Class Post	HPLC	Sum of amitriptyline plus nortriptyline 80 – 200 µg/L	7	LGC Standards	Therapeutic drug monitoring	£35.31
Carboxy-haemoglobin	EDTA Whole Blood 0.5mL (minimum vol 100uL)	First Class Post	Spectrophotometry	< 3 % Smokers may be higher	7	LGC Standards	Suspected exposure / sample not suitable for blood gas analysis	£35.64
Cholinesterase Phenotype	EDTA Plasma 0.5 mL (minimum vol 150uL) If collecting samples after an episode of prolonged apnoea please wait at least 48 hours after surgery.	First Class Post	Spectrophotometry	Total activity: 650 - 1450 U/L	7	UK NEQAS sample exchange	Suxamethonium apnoea – assessment of risk	£22.21
Clobazam	EDTA Plasma 1 mL (minimum vol 0.5mL)	First Class Post	HPLC	50 – 300 ug/L	7	LGC Standards	Therapeutic drug monitoring (limited utility)	£35.31
Clozapine	EDTA Plasma 0.5mL (minimum vol 100uL) Trough sample	First Class Post	LC-MS/MS	350 – 600 µg/L	7	LGC Standards	Therapeutic drug monitoring / toxicity	£26.13

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Drugs of abuse comprising: Opioids: Morphine, Codeine, 6MAM, Dihydrocodeine, Oxycodone, Tramadol Cocaine metabolite Amphetamines: Amphetamine, Methamphetamine, MDMA Benzodiazepines: Alprazolam, Diazepam, Nordiazepam, Oxazepam, Temazepam Fentanyl Cannabis metabolite EDDP Buprenorphine Ketamine Gabapentin Pregabalin	Urine, plain 1mL	First Class Post	UPLC-Accurate mass spectrometry LC-MS/MS	Cut offs applied Amphetamines 200ng/mL, Benzodiazepines, Ketamine and Benzoylcegonine 100 ng/mL, Opioids (except 6MAM and Fentanyl) 300 ng/mL, 6MAM and Fentanyl 10 ng/mL, Cannabis 15 ng/mL, EDDP 75 g/mL, Norbuprenorphine and Buprenorphine 5 ng/mL	7	LGC Standards	Drugs of abuse	£26.67

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Ethambutol	EDTA Plasma 0.5 mL (minimum vol 250uL) 2 h post dose. If suspect delayed absorption collect samples at 2 and 6 h post dose. If concern over toxicity collect pre-dose. Please state sample timing on the request.	First Class Post	GC-MS	2-6 mg/L For peak drug levels for a daily dose regimen. Pre-dose ethambutol concentrations should be less than 1 mg/L	7	SKML Anti TB Drugs	Therapeutic drug monitoring / toxicity	£41.82
Flecainide	EDTA Plasma 0.5 mL (minimum vol 200uL) Trough sample	First Class Post	LC-MS/MS	0.15 – 0.9 mg/L	7	LGC Standards	Therapeutic drug monitoring	£53.17
Hydroxycarbazepine	EDTA Plasma 0.5 mL (minimum vol 100uL) Sample timing less important due to long half-life.	First Class Post	LC-MS/MS	3 – 35 mg/L	7	LGC Standards	Therapeutic drug monitoring	£35.31
Isoniazid	EDTA Plasma 2 mL (minimum vol 1 mL) 2 h post dose. If suspect delayed absorption collect samples at 2 and 6 h post dose.	First Class Post	HPLC	3 – 5 mg/L For peak drug levels for a daily dose regimen.	7	SKML Anti TB Drugs	Therapeutic drug monitoring	£41.82
Isopropanol	see <i>Volatile Alcohols</i>							

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Itraconazole	EDTA Plasma 0.5 mL (minimum vol 250uL) Trough sample	First Class Post	HPLC	➤ 0.5mg/L	7	UK NEQAS	Therapeutic drug monitoring	£35.31
L Amphetamine Fraction	Urine 2mL	First Class Post	GC-NPD	< 20% prescribed (d) amph 20-50% Mixture. > 50% "street" amph	7	Reference Material	Drugs of Abuse Prescribed / 'street' amphetamine	£41.82
Lamotrigine	EDTA Plasma 0.5 mL (minimum vol 100uL) Trough sample	First Class Post	LC-MS/MS	3 – 15 mg/L	7	LGC Standards	Therapeutic drug monitoring	£22.21
Levetiracetam	EDTA Plasma 0.5 mL (minimum vol 100uL) Trough sample	Levetiracetam is not stable in whole blood and plasma should be separated on the day of receipt and then stored in the fridge prior to sending. An 11% loss after 2 days has been reported in whole blood samples kept at room temperature. First Class Post	LC-MS/MS	12 – 46 mg/L	7	LGC Standards	Therapeutic drug monitoring	£22.21
Methanol	<i>see Volatile Alcohols</i>							
Mexiletine	EDTA Plasma 0.5 mL (minimum vol 200uL)	First Class Post	LC-MS/MS	0.6 – 1.7 mg/L	7	Reference Material	Therapeutic drug monitoring	£35.31

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Mitotane	EDTA Plasma 0.5 mL (minimum vol 150uL) Trough sample / >12h post dose	First Class Post	GC-MS	14 – 20 mg/L	7	Reference Material	Therapeutic drug monitoring	£35.31
Olanzapine	EDTA Plasma 0.5 mL (minimum vol 100uL) 12 hours post dose	Samples must be separated within 7 hours. Protect from light First Class Post	LC-MS/MS	20 – 40 µg/L 12h post dose	7	LGC Standards	Therapeutic drug monitoring	£41.82
Oxcarbazepine	See <i>hydroxycarbazepine</i>							
Perhexiline	EDTA Plasma 0.5 mL (minimum vol 250uL)	First Class Post	GC-MS	0.15 – 0.60	7	Perhexiline QA Programme QEH Australia	Therapeutic drug monitoring	£26.13
Pseudocholinesterase (activity only)	EDTA Plasma 0.5 mL (minimum vol 150uL)	First Class Post	Spectrophotometry	650 – 1450 U/L	7	UK NEQAS sample exchange	Acute organo-phosphate exposure (limitations apply) For assessment of risk for suxamethonium apnoea cholinesterase phenotyping is usually advised	£19.60
Pyrazinamide	EDTA Plasma 0.5 mL (minimum vol 150uL) 2 h post dose. If suspect delayed absorption collect samples at 2 and 6 h post dose.	First Class Post	HPLC	20-40 mg/L For peak drug levels for a daily dose regimen	7	SKML Anti TB Drugs	Therapeutic drug monitoring	£35.31

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Quetiapine	EDTA Plasma 0.5 mL (minimum vol 100 uL)	First Class Post	LC-MS/MS	50-500 µg/L	7	LGC Standards	Therapeutic drug monitoring (limited utility)	£35.31
Risperidone and 9-hydroxy risperidone	EDTA Plasma 0.5 mL (minimum vol 100uL) Sample timing less important due to long half-life.	First Class Post	LC-MS/MS	Total risperidone (sum of risperidone and 9-hydroxy risperidone) 20-60 µg/L	7	LGC Standards	Therapeutic drug monitoring	£35.31
Sertraline	EDTA Plasma 2 mL (minimum vol 1 mL) Trough sample	First Class Post	HPLC	20-150 µg/L	7	LGC Standards	Therapeutic drug monitoring	£35.31
Thiopental	EDTA Plasma 1 mL (minimum vol 250uL)	Discuss with laboratory prior to sending samples. Due to stability concerns samples MUST arrive within 12 hours of venepuncture . Alternatively plasma may be frozen for transportation.	GC-NPD	None	24 Hours.	Reference Material	Brain stem death testing.	£47.25
Topiramate	EDTA Plasma 0.5 mL (minimum vol 100uL) Sample timing less important due to long half-life.	First Class Post	LC-MS/MS	5 – 20 mg/L	7	LGC Standards	Therapeutic drug monitoring	£22.21

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Volatile Alcohols (methanol, ethanol, isopropanol and acetone)	Fluoride Oxalate Plasma Fluoride Oxalate Blood Urine, plain	Courier if urgent.	GC-FID	N/A	24 Hours	LGC Standards	Suspected toxicity	£47.25

*Minimum volumes do not allow for repeat analysis in case of assay failure.

¹An additional sample handling charge of £5.67 per sample from NHS Wales and £6.14 per sample for non-Welsh locations applies.

There is a surcharge for non-NHS patients as follows:

An additional charge of £5 for tests less than £20

An additional charge of 25% for those tests greater than £20

TOXICOLOGY LABORATORY TEST REPERTOIRE 2022/2023

**Cardiff Toxicology Laboratory
4th Floor, Routledge Academic Centre,
University Hospital Llandough,
Penlan Road
Llandough
CF64 2XX**

Laboratory Open Monday – Friday 08:30 to 17:00

General enquiries	Emma Taylor (Office Manager) Tel – 02921 826894 Email emma.taylor6@wales.nhs.uk
Technical advice	Sandra Morgan (Laboratory- Senior Biomedical Scientist) sandra.morgan3@wales.nhs.uk Nichola Norman (Laboratory- Senior Biomedical Scientist) nichola.norman@wales.nhs.uk
Clinical advice	Joanne Rogers (Consultant Clinical Scientist) 029 218 26892 or Joanne.Rogers@wales.nhs.uk

For urgent requests please contact the laboratory. Samples will be processed as soon as it is feasible to do so.

Gel tubes are not acceptable for most assays due to the potential for chromatographic interference. Samples from gel samples are accepted for cholinesterase phenotyping / pseudocholinesterase activity only.

It is possible for other medications to interfere with analysis. Please state current medications.

For therapeutic drug monitoring it is usual to collect trough samples once steady state is achieved. Some exceptions do apply (notably anti-TB drugs and olanzapine).

Samples should be separated and stored at 2-8°C prior to sending (with the exception of thiopental – please see below)

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Amiodarone	EDTA Plasma 0.5 mL (minimum vol 200µL) Sample timing less important due to long half-life.	First Class Post	LC-MS/MS	0.5 – 2.0mg/L	7	LGC Standards	Therapeutic drug monitoring (limited utility in toxicity due to long tissue half life)	£35.31
Amitriptyline and nortriptyline	EDTA Plasma 2 mL (minimum vol 1 mL) Trough sample	First Class Post	HPLC	Sum of amitriptyline plus nortriptyline 80 – 200 µg/L	7	LGC Standards	Therapeutic drug monitoring	£35.31
Carboxy-haemoglobin	EDTA Whole Blood 0.5mL (minimum vol 100uL)	First Class Post	Spectrophotometry	< 3 % Smokers may be higher	7	LGC Standards	Suspected exposure / sample not suitable for blood gas analysis	£35.64
Cholinesterase Phenotype	EDTA Plasma 0.5 mL (minimum vol 150uL) If collecting samples after an episode of prolonged apnoea please wait at least 48 hours after surgery.	First Class Post	Spectrophotometry	Total activity: 650 - 1450 U/L	7	UK NEQAS sample exchange	Suxamethonium apnoea – assessment of risk	£22.21
Clobazam	EDTA Plasma 1 mL (minimum vol 0.5mL)	First Class Post	HPLC	50 – 300 ug/L	7	LGC Standards	Therapeutic drug monitoring (limited utility)	£35.31
Clozapine	EDTA Plasma 0.5mL (minimum vol 100uL) Trough sample	First Class Post	LC-MS/MS	350 – 600 µg/L	7	LGC Standards	Therapeutic drug monitoring / toxicity	£26.13

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Drugs of abuse comprising: Opioids: Morphine, Codeine, 6MAM, Dihydrocodeine, Oxycodone, Tramadol Cocaine metabolite Amphetamines: Amphetamine, Methamphetamine, MDMA Benzodiazepines: Alprazolam, Diazepam, Nordiazepam, Oxazepam, Temazepam Fentanyl Cannabis metabolite EDDP Buprenorphine Ketamine Gabapentin Pregabalin	Urine, plain 1mL	First Class Post	UPLC-Accurate mass spectrometry LC-MS/MS	Cut offs applied Amphetamines 200ng/mL, Benzodiazepines, Ketamine and Benzoylcegonine 100 ng/mL, Opioids (except 6MAM and Fentanyl) 300 ng/mL, 6MAM and Fentanyl 10 ng/mL, Cannabis 15 ng/mL, EDDP 75 g/mL, Norbuprenorphine and Buprenorphine 5 ng/mL	7	LGC Standards	Drugs of abuse	£26.67

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Ethambutol	EDTA Plasma 0.5 mL (minimum vol 250uL) 2 h post dose. If suspect delayed absorption collect samples at 2 and 6 h post dose. If concern over toxicity collect pre-dose. Please state sample timing on the request.	First Class Post	GC-MS	2-6 mg/L For peak drug levels for a daily dose regimen. Pre-dose ethambutol concentrations should be less than 1 mg/L	7	SKML Anti TB Drugs	Therapeutic drug monitoring / toxicity	£41.82
Flecainide	EDTA Plasma 0.5 mL (minimum vol 200µL) Trough sample	First Class Post	LC-MS/MS	0.15 – 0.9 mg/L	7	LGC Standards	Therapeutic drug monitoring	£53.17
Hydroxycarbazepine	EDTA Plasma 0.5 mL (minimum vol 100uL) Sample timing less important due to long half-life.	First Class Post	LC-MS/MS	3 – 35 mg/L	7	LGC Standards	Therapeutic drug monitoring	£35.31
Isoniazid	EDTA Plasma 2 mL (minimum vol 1 mL) 2 h post dose. If suspect delayed absorption collect samples at 2 and 6 h post dose.	First Class Post	HPLC	3 – 5 mg/L For peak drug levels for a daily dose regimen.	7	SKML Anti TB Drugs	Therapeutic drug monitoring	£41.82
Isopropanol	see <i>Volatile Alcohols</i>							

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Itraconazole	EDTA Plasma 0.5 mL (minimum vol 250uL) Trough sample	First Class Post	HPLC	➤ 0.5mg/L	7	UK NEQAS	Therapeutic drug monitoring	£35.31
L Amphetamine Fraction	Urine 2mL	First Class Post	GC-NPD	< 20% prescribed (d) amph 20-50% Mixture. > 50% "street" amph	7	Reference Material	Drugs of Abuse Prescribed / 'street' amphetamine	£41.82
Lamotrigine	EDTA Plasma 0.5 mL (minimum vol 100uL) Trough sample	First Class Post	LC-MS/MS	3 – 15 mg/L	7	LGC Standards	Therapeutic drug monitoring	£22.21
Levetiracetam	EDTA Plasma 0.5 mL (minimum vol 100uL) Trough sample	Levetiracetam is not stable in whole blood and plasma should be separated on the day of receipt and then stored in the fridge prior to sending. An 11% loss after 2 days has been reported in whole blood samples kept at room temperature. First Class Post	LC-MS/MS	12 – 46 mg/L	7	LGC Standards	Therapeutic drug monitoring	£22.21
Methanol	<i>see Volatile Alcohols</i>							
Mexiletine	EDTA Plasma 0.5 mL (minimum vol 200uL)	First Class Post	LC-MS/MS	0.6 – 1.7 mg/L	7	Reference Material	Therapeutic drug monitoring	£35.31

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Mitotane	EDTA Plasma 0.5 mL (minimum vol 150uL) Trough sample / >12h post dose	First Class Post	GC-MS	14 – 20 mg/L	7	Reference Material	Therapeutic drug monitoring	£35.31
Olanzapine	EDTA Plasma 0.5 mL (minimum vol 100uL) 12 hours post dose	Samples must be separated within 7 hours. Protect from light First Class Post	LC-MS/MS	20 – 40 µg/L 12h post dose	7	LGC Standards	Therapeutic drug monitoring	£41.82
Oxcarbazepine	See <i>hydroxycarbazepine</i>							
Perhexiline	EDTA Plasma 0.5 mL (minimum vol 250uL)	First Class Post	GC-MS	0.15 – 0.60	7	Perhexiline QA Programme QEH Australia	Therapeutic drug monitoring	£26.13
Pseudocholinesterase (activity only)	EDTA Plasma 0.5 mL (minimum vol 150uL)	First Class Post	Spectrophotometry	650 – 1450 U/L	7	UK NEQAS sample exchange	Acute organo-phosphate exposure (limitations apply) For assessment of risk for suxamethonium apnoea cholinesterase phenotyping is usually advised	£19.60
Pyrazinamide	EDTA Plasma 0.5 mL (minimum vol 150uL) 2 h post dose. If suspect delayed absorption collect samples at 2 and 6 h post dose.	First Class Post	HPLC	20-40 mg/L For peak drug levels for a daily dose regimen	7	SKML Anti TB Drugs	Therapeutic drug monitoring	£35.31

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Quetiapine	EDTA Plasma 0.5 mL (minimum vol 100 uL)	First Class Post	LC-MS/MS	50-500 µg/L	7	LGC Standards	Therapeutic drug monitoring (limited utility)	£35.31
Risperidone and 9-hydroxy risperidone	EDTA Plasma 0.5 mL (minimum vol 100uL) Sample timing less important due to long half-life.	First Class Post	LC-MS/MS	Total risperidone (sum of risperidone and 9-hydroxy risperidone) 20-60 µg/L	7	LGC Standards	Therapeutic drug monitoring	£35.31
Sertraline	EDTA Plasma 2 mL (minimum vol 1 mL) Trough sample	First Class Post	HPLC	20-150 µg/L	7	LGC Standards	Therapeutic drug monitoring	£35.31
Thiopental	EDTA Plasma 1 mL (minimum vol 250uL)	Discuss with laboratory prior to sending samples. Due to stability concerns samples MUST arrive within 12 hours of venepuncture . Alternatively plasma may be frozen for transportation.	GC-NPD	None	24 Hours.	Reference Material	Brain stem death testing.	£47.25
Topiramate	EDTA Plasma 0.5 mL (minimum vol 100uL) Sample timing less important due to long half-life.	First Class Post	LC-MS/MS	5 – 20 mg/L	7	LGC Standards	Therapeutic drug monitoring	£22.21

Assay	Sample Requirement (ml)*	Sample Handling / Transport	Methodology	Reference Range	Turnaround Time (working days)	EQA	Clinical Utility	NHS Charge ¹ 2022/23 (£)
Volatile Alcohols (methanol, ethanol, isopropanol and acetone)	Fluoride Oxalate Plasma Fluoride Oxalate Blood Urine, plain	Courier if urgent.	GC-FID	N/A	24 Hours	LGC Standards	Suspected toxicity	£47.25

*Minimum volumes do not allow for repeat analysis in case of assay failure.

¹An additional sample handling charge of £5.67 per sample from NHS Wales and £6.14 per sample for non-Welsh locations applies.

There is a surcharge for non-NHS patients as follows:

An additional charge of £5 for tests less than £20

An additional charge of 25% for those tests greater than £20