TOXICOLOGY

HAIR ANALYSIS

Technical Specification

This document is effective from 25th March 2026. If your results precede this date, please contact the laboratory for a corresponding version of this document.

This document is updated periodically (at least annually) and outlines the services provided by Abbott Toxicology Ltd (the 'Company') for legally defensible drug and alcohol testing analyses using hair samples. Further details of specific hair analysis services can be provided on request. When placing an order for hair analysis, customers will be provided with a quotation that must be signed by the customer and returned to the Company. That quotation, along with this technical specification and the Company's terms and conditions for the supply of services (which can be read or downloaded from toxicology.abbott/uk-documents) form a contract between the Company and the customer and should be read in conjunction with each other.

1. ACCREDITATION

The Company have ISO 17025:2017 accreditation that covers the laboratory analytical function for hair analysis and ISO 9001:2015 certification that covers the provision of administration services for drug and alcohol testing programmes. The accreditation status of the laboratory is available on the UKAS website ukas.com under laboratory reference number 2720.

2. SAMPLE ACCEPTANCE AND PROCESSING

Receipt of a sample at the laboratory is recorded and the sample is inspected to confirm that it has not been tampered with or damaged in transit.

Chain of Custody

The sample form provides the chain of custody record that accompanies the sample(s) from the place of collection to the laboratory. The sample form contains fields in which to record the identity and signature of the sample donor and the signature of the person who performed the collection. All donor demographics are supplied by the donor at the point of sample collection. Additional collection demographics may be provided by the customer. Acceptable means of transporting samples to the laboratory include hand-delivery, national postal service, or a private or government courier service. It is laboratory policy not to return test items after analysis. Where the laboratory has not been responsible for the sampling stage, results apply to the sample as received.

Sample Handling

The Company expects samples to arrive complete, intact and unadulterated. The Company has the right to refuse to analyse a sample with one or more of the following discrepancies:

- The donor's consent section is not signed by the donor.
- The sample collection kit seals are broken.
- There are discrepancies in the information provided on sample form and documentation.
- The sample is of low weight or insufficient length to be useful to the client's requirements.

Note: The customer will be contacted if any discrepancies occur, and under certain circumstances the customer may be given the opportunity to authorise analysis of a discrepant sample by signing a declaration to recognise that the legal defensibility of the results may be limited. If we do not receive written confirmation to test within 30 days, this sample will be destroyed.

Failure to complete paperwork appropriately may result in sample analysis being delayed, until discrepancies are rectified. In the event of a discrepancy the laboratory will store the sample(s) for a period of 30 days. If the discrepancy is not rectified within this period then the sample will be destroyed. Any non-critical information that is not provided by the client or is illegible may be shown as 'N/A' on the Certificate of Analysis.

If the site on the donor's body from which the sample was taken is not specified on the sample form, the hair sample will be assessed and a decision made regarding how to proceed based on our experience. If the site of sampling cannot be determined, the sample may be treated as the site detailed on the final quotation. All demographic information is reported as received by the customer/donor on the sample request form.

Minimum Sample Requirements

Minimum weight of any hair section or sample to be analysed for drugs is 10 milligrams (mg).

In the event that a section or sample of hair that has been prepared for analysis is below 10mg in weight then the following options may be made available:

- We continue the analysis with the sample available. Please note that this may impact on our ability to test for all of the drugs requested and analytes present at low levels may not be detected.
- Dispatch of an additional sample collection kit enabling a new sample to be collected. Please note that this option may incur a charge and will delay the receipt of any results.

Alcohol Markers

- To allow the results to be compared with the Society of Hair Testing (SoHT) 2019 Consensus for the use of alcohol markers in hair for supporting the assessment of abstinence and chronic alcohol consumption, the analysis of the proximal 3 centimetres (cm) section is most suitable.
- Minimum weight of any hair section or sample to be analysed for EtG is 10mg.
- The results of the testing of hair lengths measuring 3cm can be compared with the SoHT 2019 Consensus on Alcohol Markers.
- Hair lengths less than 3cm down to a minimum of 1cm may be analysed with the customer's consent but in these cases it may not be possible to compare the results to the SoHT 2019 Consensus on Alcohol Markers.
- Hair lengths shorter than 1cm will not be analysed for alcohol markers to assist in determining chronic excessive alcohol use.
- The hair will be assessed at the laboratory; however, if the hair sample received at the laboratory does not satisfy the criteria for alcohol marker testing we may request that another sample is collected. Please note that this option may incur a charge and will delay the receipt of any results.

Insufficient Hair Length

In the instances when the requested time period to be covered by the test exceeds the length of hair sample collected (assuming 1.0cm of growth per month), the maximum length of hair available will be prepared and analysed.

Dreadlocks

Dreadlocked hair may contain much older strands of hair compared with those that would be present if the hair was not dreadlocked. Although it is possible to cut dreadlocked hair into sections, it is not possible to accurately determine the period of drug use or exposure. Interpretation of the results of a dreadlocked hair section differs from a section of head hair that has not been dreadlocked, mainly with regard to the approximate time period that each section represents. The use of dreadlocked hair in hair drug analysis can only provide evidence of the presence or absence of a drug in the hair sample and not when an individual may or may not have used or been exposed to a drug.

3. ANALYSIS

Samples are tested as received in the laboratory. The Company cannot guarantee the stability of compounds/drugs in hair samples stored in uncontrolled conditions prior to receipt and as such, quantitative results obtained from retained samples may differ from the original results if samples are stored in uncontrolled conditions prior to receipt. As detailed in the European/UK Workplace Drug Testing Guidelines for challenge analysis, a comparison of the concentration identified in the original sample and a retained sample should not be performed. Any comparison of the results should be performed according to whether a compound is detected and whether the result obtained on re-analysis is consistent with the original result.

Section 8 details the cut-offs for all methods. The quoted cut-off concentration is the analytical cut-off and represents the concentration in the hair sample as received at the laboratory, unless otherwise indicated. Section 8 also includes current ISO 17025:2017 accreditation status for each test type. The Company reserves the right to change the standard methodologies as new techniques are introduced.

Samples submitted for employment related testing will be subject to an initial screening test using Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS), which will look for the drugs requested and/or their metabolites. Any sample which screens presumptively positive for one or more of the drugs requested are further analysed by an alternate LC-MS/MS method.

All the analytical methods employed at the Company are fully validated in-house in accordance with our validation policy. All analytical methods meet the minimum requirements to accurately identify any target drug or metabolite at a concentration relevant to the requirements in the field of testing biological samples for the evidence of drug use.

Quality Control

The Company constantly monitors the performance of all methods by analysis of quality control samples, regular participation in international proficiency testing schemes and testing samples from the Company's internal proficiency testing programme.

Factors Affecting Results and their Interpretation

These factors may be pre-analytical and analytical. Pre-analytical factors occur before the sample arrives in the laboratory and analytical factors are associated with the variability of tests used by the laboratory.

Pre-analytical Factors

- When a hair sample is sub-divided or a different hair sample is taken from the same donor covering the same approximate time period, the Company cannot guarantee that the results obtained from the retested samples will be within our published uncertainty of measurement and bias when compared to the original hair sample result. The report on any retested samples should confirm the presence (or absence) of drug(s) detected and state whether this reflects what was found in the original report regardless of the amount of drug(s) detected.
- Although samples are stored in appropriate conditions at the laboratory the Company cannot guarantee the stability of compounds/drugs in stored hair samples and as such results obtained from retained hair samples may differ from the original result.

Analytical Factors

Factors contributing to the variability of the analytical tests include variables associated with reference standards (the identification and quantification of the drug or metabolites are extrapolated by comparing with known quantities of analyte, contained within reference standards) and laboratory measuring equipment (pipettes, balances, analysers). The detection of drugs in hair has an additional variable, which is the extraction efficiency of the drug from within the hair matrix. The uncertainty associated with the extraction efficiency is determined by incorporating data from incurred hair into the calculation of the uncertainty.

4. REPORTING

On request, the Company will undertake the role of toxicological review using the information provided, but not the medical review of results. Before results are reported, scientific personnel, who are experienced with the analytical protocols used in the laboratory, review each batch of analytical data.

Decision rules

Our decision point (acceptance limit) is described in this document as the cut-off. Results above the cut-off will be reported as positive and results below the cut-off will be reported as negative. No tolerance limit (estimated expanded uncertainty of measurement) is applied to this decision point. The ILAC G8 document describes this practice as “simple acceptance” stating that the probability to be above or below the cut-off may be as high as 50% in the case when the measurement result is equal to the cut-off . This probability reduces as the measurement result moves away from the cut-off. The actual estimated expanded Uncertainty of Measurement (UM) for the reported results is presented in section 8.

The Company monitor the UM associated with the variability of the analytical tests. UM is an estimate of the measurement, taking into account the analytical variables which characterise the range of values within which the true value is asserted to lie, with a specified level of confidence.

The Company’s mechanism for calculating uncertainty is defined within our internal procedures; details are available if required. The Company estimate the UM for all drugs at cut-off using a coverage factor of 2 (K=2) to ensure that at least 95% of measurements fall within the expected range. Please note that levels higher than the cut-off may have lower UM than that quoted.

As an example:

If a sample contains a concentration of 100ng/mL of drug and the laboratory reported concentration is 110ng/mL, then the Experimental Bias is +10%. If the reported concentration is 90ng/mL then the Experimental Bias is -10%.

The UM gives an estimate of the potential variation (or uncertainty) that a reported concentration has. So if 100 samples have a reported concentration of 100mg/mL and the UM is 10%, then for 95 out of the 100 samples (95% uncertainty level) the actual concentration present in those samples would be between 90 and 110ng/mL. The other 5 results would be outside of this range.

In order to enable the application of the Uncertainty of Measurement for a specific result where applicable the concentration will be provided on the report.

Certificate of Analysis

The Company provides simplified test reports unless otherwise specified by the customer. In cases where a simplified test report is issued, we will retain all information needed to generate a full report. Please note that opinions and interpretations held within the report are not covered by our UKAS ISO 17025:2017 schedule of accreditation.

For all analyses carried out by the Company we will only identify the presence or absence of the drug(s) or drug group(s) that have been requested by the client. See Section 6 for our disclosure policy. The Certificate of Analysis includes all of the following elements, in order to identify the sample and the client requesting the tests:

- Identification of donor (such as name, registration number and date of birth), or a unique confidential sample code if an alternative audit trail exists.
- Client code.
- Tests performed.
- Date of sample collection.
- Site of sample.
- Results.

A result will be reported using one of the following:

- ‘Positive’ — a drug or drug metabolite has been identified at a concentration equal to or greater than the designated cut-off for the drug or metabolite. Numeric results are reported as nanograms per milligram (ng/mg) or picograms per milligram (pg/mg) of hair. In addition a result may also be reported where a drug or metabolite has been identified as present at a concentration lower than cut-off if our acceptance criteria for detection have been met and the finding is deemed helpful in the overall interpretation of the case. UM is not applied to the result.
- ‘Negative’ — a drug or drug metabolite has not been detected above a designated cutoff.

Sub-contractors

Any result produced by another one of our laboratories, or other sub-contractor, will be identified as such, when reported by the Company.

Release of Results

Results will not be issued over the telephone unless pre-arranged with the client.

Results will be reported to the recipient specified at the time of requesting a quotation, by fax, email or hard copy, unless otherwise requested. It is the responsibility of the client to ensure that any fax number or email address specified is suitable for receiving confidential information.

For confidentiality purposes, the Company can only engage in communication regarding results with the client and are unable to engage directly with other parties e.g. the donor.

Any other method different from conventional delivery of a written report may be used to transmit the results, if pre-arranged with the client.

Turnaround Time

The Company's delivery time for results of routine analysis of workplace samples is 4 working days.

Note that the laboratory core working hours are from 08:00 to 17:30 Monday-Friday, and the quoted turnaround times assume sample receipt in the laboratory by 11:00. The dates of laboratory procedures performed on the sample are available on request.

Reproduction of Certificates of Analysis

Reproduction of an Certificates of Analysis (e.g. changing the format or reproducing on customer's own paper) must not be done without our written approval.

Changes to Certificates of Analysis requested by customers must be made in writing. Where the Company have issued a copy of the Certificate of Analysis, the certificate will include the following statement 'This certificate was issued on DATE and is a replacement for (or supplement to) the one issued on DATE' referring to the previously reported Certificate.

Medical Review Service

Where the Company provides access to a Medical Review Officer the following applies

- Positive analytical results from the laboratory are reported to the Medical Review Officer (MRO) service provider.
- The MRO may require the donor to make contact to discuss the result within an agreed time (normally two working days).
- The MRO will then communicate the final outcome back to the Company and a Certificate of Analysis will be issued and reported in the normal way to the customer.
- The Certificate of Analysis will clearly state the result has been medically reviewed. Please note that the turnaround time for Medical Review begins after the laboratory analysis is complete and so is additional to the laboratory turnaround time.
- The Medical Review Service is not an analytical test, so does not form part of our UKAS ISO17025:2017 schedule of accreditation. Although an analytical result may be positive the final outcome after Medical Review may be overturned to negative.

5. STORAGE OF SAMPLES

Intact non-negative workplace hair samples are stored for at least 6 years. Workplace negative hair samples are stored for at least 1 month. Hair extracts are stored for up to one year after receipt. Samples and hair extracts may then be disposed of following these time frames as per internal procedure.

Due to pre-analytical factors, the Company cannot guarantee the stability of compounds/drugs in stored hair samples, and as such results obtained from retained hair samples may differ from the original result.

Unless the donor has indicated otherwise on the analysis test form at the time of sample collection, the specimen may be retained for such purposes including retesting or scientific research. The donor details will be anonymised wherever possible in accordance with applicable Data Protection Laws.

6. DATA SUBJECT ACCESS REQUESTS/RETENTION OF DATA

Abbott Toxicology Ltd ("We/Us") conduct drug and alcohol testing on samples from an identified individual at the request of that individual's employer or potential employer who is an Abbott Toxicology Ltd Customer. The test results may include information capable of directly or indirectly identifying the individual who was tested ("Personal Data").

We will process personal data according to the instructions of the Data Controller, i.e. the organisation(s) requesting the testing. The donor details will be held in accordance with the principles of the applicable Data Protection Laws.

Examples of information retained may include: donor name, a unique ID, date of birth, gender, photo ID, UK National Insurance number, employment status (e.g. contractor etc), a list of current medications (some medications may affect the test result), the reason for the test and information related to the test and the test results, donor phone number and/or email address.

We may also collate demographic information such as age and gender to generate anonymised statistical information for research and statistical purposes.

All paper-based and positive electronic records containing information relating to the donor will be destroyed after seven years. Electronic information relating to negative samples will be erased after 18 months. Where we are under a legal obligation to retain information for longer, we will retain it in accordance with the applicable legal requirement.

Disclosure of Information to the Donor/ Data Subject Access Requests

A Donor/Candidate should submit a Data Subject Access Request to their employer or potential employer (as the Data Controller) for access to personal data they have identified. Contacting Abbott directly will unnecessarily delay the request because Abbott will contact the Data Controller to advise them of the request and ask them for their permission to release this information. Abbott cannot provide the data requested without permission from the Data Controller and cannot disclose personal data until their authorisation is received.

Disclosure of Information to the Court

Some testing is performed on instruments that will run multiple assays. In these instances other analytes may be indicated in the hair that we have not been specifically asked to test for by the client. In these instances we will notify the client in writing asking if they wish to proceed with any extra work that may be required. In all instances we will detail the identity of all compounds present if asked to do so in court.

7. CHALLENGED ANALYTICAL RESULTS

In the first instance any challenged results will be fully discussed with a senior member of the laboratory team. If analytical records are requested by a legal professional for review in a civil, family or criminal case they will contain sufficient material to allow independent review by a qualified toxicologist/scientist.

The requesting legal professional or court order may dictate what is included in the package. However, it will typically include: chain of custody documents, copies of analytical data which supports the identification of the drug(s), and if applicable the quantitation of the drug(s) and metabolites and/or the alcohol marker EtG.

8. RESULTS

Screening Assays

The table below details the assays for screening showing cut-offs for each analyte in hair. The Company reserve the right to amend reporting cut-offs when considered scientifically appropriate. Clients will be informed of any significant changes.

HAIR ANALYSIS				
DRUG/METABOLITE	UKAS ISO 17025:2017 ACCREDITATION (Y/N)	METHOD	ANALITICAL CUT-OFF (ng/mg)	ESTIMATED UNCERTAINTY OF MEASUREMENT (±%)
Amphetamine Group				
Amphetamine	N	LC-MS/MS	0.2	32%
Methamphetamine	N	LC-MS/MS	0.2	31%
MDMA	N	LC-MS/MS	0.2	11%
Benzodiazepine Group				
Diazepam	N	LC-MS/MS	0.2	22%
Desmethyldiazepam	N	LC-MS/MS	0.2	20%
Temazepam	N	LC-MS/MS	0.2	11%
Cannabis Group				
Delta-9-Tetrahydrocannabinol	N	LC-MS/MS	0.05	22%
Cocaine Group				
Cocaine	N	LC-MS/MS	0.5	14%
Methadone Group				
Methadone	N	LC-MS/MS	0.2	12%
Opiate Group				
6 Acetylmorphine (6-MAM)	N	LC-MS/MS	0.2	16%
Codeine	N	LC-MS/MS	0.2	24%
Dihydrocodeine	N	LC-MS/MS	0.2	15%
Morphine	N	LC-MS/MS	0.2	14%
Additional Tests				
Ketamine	N	LC-MS/MS	0.2	12%

Confirmation Assays

The table below details the assays available for confirmation showing cut-off limits, estimated uncertainty and experimental bias measured for each analyte in hair. The Company reserve the right to amend reporting cut-off levels when considered scientifically appropriate. Clients will be informed of any significant changes.

HAIR ANALYSIS						
DRUG/METABOLITE	**INCLUDED IN 4 DAY SERVICE**	**UKAS ISO 17025:2017 ACCREDITATION (Y/N)**	**METHOD**	**ANALYTICAL CUT-OFF (ng/mg)***	**ESTIMATED UNCERTAINTY OF MEASUREMENT (±%)**	**EXPERIMENTAL BIAS MEASUREMENT (%)**
Alcohol Markers						
Ethyl glucuronide (EtG)	Y	Y	LC-MS/MS	30pg/mg	27	-13
Amphetamine Group						
Amphetamine	Y	Y	LC-MS/MS	0.2	30	6
MDA	Y	Y	LC-MS/MS	0.2	29	3
MDEA	Y	Y	LC-MS/MS	0.2	30	3
MDMA	Y	Y	LC-MS/MS	0.2	30	5
MBDB	Y	Y	LC-MS/MS	0.2	33	11
Methamphetamine	Y	Y	LC-MS/MS	0.2	26	4
Benzodiazepine Group						
Chlordiazepoxide	Y	Y	LC-MS/MS	0.2	30	1
Desmethyldiazepam	Y	Y	LC-MS/MS	0.2	31	4
Diazepam	Y	Y	LC-MS/MS	0.2	26	7
Temazepam	Y	Y	LC-MS/MS	0.2	29	-1
Flurazepam	Y	Y	LC-MS/MS	0.2	27	14
Midazolam	Y	N	LC-MS/MS	0.2	29	16
Nitrazepam	Y	Y	LC-MS/MS	0.2	30	2
Buprenorphine Group						
Buprenorphine	N	N	LC-MS/MS	0.02	17	5
Norbuprenorphine	N	N	LC-MS/MS	0.02	21	11
Cannabis Group						
Delta-9-Tetrahydrocannabinol	Y	N	LC-MS/MS	0.05	19	-4
11 Nor-delta-9-THC Carboxylic acid	Y	N	LC-MS/MS	0.4pg/mg	11	8
Cocaine Group						
AEME	Y	Y	LC-MS/MS	0.5	21	2
Benzoylecgonine	Y	Y	LC-MS/MS	0.05	39	13
Cocaethylene	Y	Y	LC-MS/MS	0.05	39	-12
Cocaine	Y	Y	LC-MS/MS	0.5	34	0
Norcocaine	Y	Y	LC-MS/MS	0.05	39	-14
Methadone Group						
Methadone	Y	Y	LC-MS/MS	0.2	24	19
Methadone metabolite (EDDP)	Y	Y	LC-MS/MS	0.2	31	-12
Opiate Group						
6 Acetylmorphine (6-MAM)	Y	Y	LC-MS/MS	0.2	33	11
Acetylcodeine	Y	Y	LC-MS/MS	0.2	30	-3
Codeine	Y	Y	LC-MS/MS	0.2	24	0
Diacetylmorphine (Heroin)	Y	Y	LC-MS/MS	0.2	24	5
Dihydrocodeine	Y	Y	LC-MS/MS	0.2	31	4
Morphine	Y	Y	LC-MS/MS	0.2	30	8
Additional Tests						
Fentanyl	N	N	LC-MS/MS	0.02	20	11
Ketamine	Y	Y	LC-MS/MS	0.2	22	8
LSD	N	N	LC-MS/MS	0.02	23	-8
Mephedrone	Y	Y	LC-MS/MS	0.2	30	5
Tramadol	N	N	LC-MS/MS	0.2	28	-2
Zolpidem	N	N	LC-MS/MS	0.2	23	4

*For a sample weight of 10mg

9. SUB-CONTRACTING

On occasions the Company may have to sub-contract analysis to another laboratory. In this instance, the sample(s) will be sent to a Company approved laboratory, details of which will be provided upon request. Clients will be notified prior to work commencing if any part of the analysis will be conducted by a sub-contracted laboratory.

10. TECHNIQUES AND ABBREVIATIONS

ABBREVIATION	DEFINITION
LC-MS/MS	Liquid Chromatography Tandem Mass Spectrometry — A confirmation technique
MDA	3,4-Methylenedioxyamphetamine
MDEA	3,4-Methylenedioxyethylamphetamine
MDMA	3,4-Methylenedioxymethylamphetamine
MBDB	Methylbenzodioxylbutanamine
EDDP	2-Ethylidene-1,5-Dimethyl-3,3-Diphenylpyrrolidine
AEME	Anhydroecgoninemethylester
6-MAM	6-Monoacetylmorphine
EtG	Ethyl Glucuronide
MRO	Medical Review Officer
UM	Uncertainty of Measurement – an estimate of the potential variation (or uncertainty) that a reported concentration has

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