PRIMARY SAMPLE MANUAL
CLINICAL CHEMISTRY

INTRODUCTION

This is a list of the biochemistry, endocrinology, drugs of abuse and therapeutic drug monitoring tests performed at Eurofins Biomnis' Dublin Laboratory. For a searchable list of tests performed by Eurofins Biomnis in France, in our laboratories in Lyon and Paris, click here https://www.eurofins-biomnis.com/en/services/test-guide/

If you cannot find details of a test you require, please contact our Client Services department on Free Phone 1800-252-966, or e-mail clientservices@ctie.eurofinseu.com

All reference ranges listed are Adult Reference ranges. Paediatric reference ranges are available on request.

For sample collection, please contact our Logistics department on Free Phone 1800-252-967, or e-mail llogistics@ctie.eurofinseu.com

NOTES ON SAMPLE STABILITY

The majority of incorrect laboratory test results are due to improper sample collection and transport. For details regarding correct phlebotomy technique and our patient identification requirements, please click here.

In order for you to arrange and properly time phlebotomy and sample collection, we have indicated, for each test, its stability after collection. Stability is indicated for whole blood at various temperatures, and for plasma or serum separated from cells, also at various temperatures.

Note: RT = room temperature, i.e. 16 – 25 °C.

Stability data are taken from the manufacturers' instructions for use (IFUs), and from the World Health Organisation publication indicated below1.

Sample stability data is not available for all tests under all conditions, either in the manufacturers' IFUs or the published literature. If no information is available, in general, unless otherwise specified (such as when the required sample is whole blood), serum should be centrifuged and separated from cells after completion of clotting (20 – 30 minutes), and transported to the laboratory at 2 – 8 °C. Plasma may be centrifuged and separated from cells immediately after sampling and gently mixing the sample by inverting the tube 10 times. It should then be transported to the laboratory at 2 – 8 °C. Whole blood should be transported at 2 – 8 °C and reach the laboratory as soon as possible. However, please check each test for specific stability information.

If in doubt, please contact our Client Services department on Free Phone 1800-252-966, or e-mail client.services@eurofins-biomnis.ie.

References:

1. World Health Organisation: Use of anticoagulants in diagnostic laboratory investigations. WHO/DIL/LAB99.1 Rev.2, 2002.
2. Clinical Biochemistry 45 (2012) 464–469.

REASONS FOR REJECTION OF SAMPLES/NON-REPORTING OF TESTS

1. Samples received beyond the stability limits and/or not at the correct temperature indicated below for each test.

2. Samples received in the incorrect tube/with the incorrect anticoagulant or lack of the correct anticoagulant.

3. Samples received without the necessary patient identifiers. For more details, see here.

4. Samples which fail specific criteria for certain tests. See individual tests for details.

5. Leaking specimen received.

6. Samples with insufficient volume will be rejected.

DRUGS OF ABUSE: For workplace Chain of Custody specimens the following criteria also apply:

No seals on either specimen

Seal on A container broken or tampered with

Seal on B container broken or tampered with

Only one specimen received

Insufficient specimen for complete analysis (IA & GC-MS)

Analyte Name	Units	Suitable Specimen/ Container Types	Sample Stability	Turn Around Time	Instrument/ Platform/ Method	Reference Range		Source	Accreditation status	Note:
6MAM Heroin Metabolite	ng/mL	Urine Clean plastic or glass container	2-8°C: 5 days -20°C:longer	24 hours	Abbott Alinity c Cedia assay	Positivity Cut-off		Cedia 6MAM IFU	Accredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
Alanine Amino Transferase ALT	U/L	Serum Serum Separator Plasma: Dipotassium EDTA Lithium heparin Lithium heparin separator Sodium heparin	20-25°C: 3 days 2-8°C: 7 days -20°C: 60 days	24 hours	Abbott Alinity c Spectrophotometry NADH(without P-5'-P)	Adult Male	< 45	Abbott IFU	Accredited	
						Adult Female	< 34			
Albumin	g/L	Serum: Serum separator Plasma : Dipotassium EDTA Lithium heparin Lithium heparin separator Sodium heparin	20-25°C: 7 days 2-8°C: 7 days -20°C: 3 months	24 hours	Abbott Alinity c Spectrophotometry (Bromocresol Green)	Adults	35 - 50	Abbott IFU	Accredited	
						60 – 90 years	32 - 46			
						> 90 years	29 - 45			
Globulin	g/L	Serum: Serum separator Plasma : Dipotassium EDTA Lithium heparin Lithium heparin separator Sodium heparin	20-25°C: 7 days 2-8°C: 7 days -20°C: 3 months	24 hours	CALCULATION based on Abbott Alinity methodologies for Total Protein and Albumin.	Adult	21 - 36	Abbott IFU	Accredited	**FORMULA**: (Globulin = Total Protein - Albumin)
Alkaline Phosphatase	U/L	Serum: Serum separator Plasma: Lithium heparin Lithium heparin separator Sodium heparin	20-25°C: 7 days 2-8°C: 7 days -20°C: 7 days	24 hours	Abbott Alinity c Spectrophotometry Hydrolysis of Para-Nitrophenyl phosphate	16 to 21 years (Male)	56 - 167	Abbott IFU	Accredited	
						16 to 29 years (Female)	44 - 107			
						22 to 79 years (Male)	50 - 116			
						30 to 79 years (Female)	46 - 122			
Alpha-1 Antitrypsin A1AT	g/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Sodium heparin Potassium EDTA Sodium citrate	2-8°C: 2 days -20°C: not specified	24 hours	Abbott Alinity c Immunoturbidimetry		0.9 - 2.0	Abbott IFU	Accredited	
Alpha- FetoProtein AFP	IU/mL	Serum: Serum, Serum separator. Plasma: Sodium heparin, Lithium heparin, Dipotassium EDTA Sodium EDTA	20-25°C: 3 days 2-8°C: 7 days -20°C: longer	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	0.74 - 7.29	Abbott IFU	Accredited	
Amikacin	mg/L	Serum: Serum tubes (with or without gel barrier) Plasma- Acceptable anticoagulants are: Lithium heparin, Sodium heparin K2-EDTA, K3-EDTA	2-8°C: 7 days -20°C: 14 days	24 hours	Abbott Alinity c Homogeneous particle-enhanced turbidimetric inhibition immunoassay (PETINIA).	Trough	4 - 8	Abbott IFU	Accredited	
						Severe Infection (Peak)	25 - 35			
						Toxic Levels (Peak)	>35			
Amphetamine/ Meth amphetamine - Urine	ng/mL	Urine Clean plastic or glass container	2-8°C: 5 days -20°C:longer	24 hours	Abbott Alinity c Enzymatic Immunoassay	Positivity Cut-off	1000	Abbott IFU	Accredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.

Amylase 2	U/L	Serum: Serum tubes (with or without gel barrier) Plasma- Acceptable anticoagulants are: Lithium heparin Sodium heparin	20-25°C: 24 hr 2-8°C: 7 days -20°C: 3 month	24 hours	Abbott Alinity c Enzymatic + Colorimetric	**Pediatric** 0-14 days 15 day to < 13 week 13 week to < 1 year 1 year to < 18 year **Adult**	 3 - 10 2 - 22 3 - 50 25 - 101 28 - 100	Abbott IFU	Accredited	
Angiotensin Converting Enzyme (ACE)	U/L	Serum is the preferred specimen. Plasma: Lithium heparin Lithium heparin separator Sodium heparin	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c Enzymatic/ Colorimetric Hydrolysis of Furylacryloylphenylalanylglyclglycine (FAPGG)	>14 years	8 - 65	Glenbio IFU	Accredited	Serum, which has been separated from the cells as soon as possible after collection, is the only suitable sample type. ACE is a zinc-dependant enzyme and anticoagulants, especially EDTA, can lead to falsely low results.
Anti-TG	IU/mL	Serum: Serum, Serum separator	20-25°C: 8hours 2-8°C: 72 hours -20°C: 30 days	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	< 4.11	Abbott IFU	Accredited	
Anti-TPO	IU/mL	Serum: Serum, Serum separator	20-25°C: 8hours 2-8°C: 72 hours -20°C: 30 days	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	< 5.61	Abbott IFU	Accredited	
Aspartate Amino transferase AST	U/L	Serum Serum Separator Plasma: Lithium heparin Lithium heparin separator Sodium heparin	20-25°C: 4 days 2-8°C: 7 days -20°C: 3 months	24 hours	Abbott Alinity c Spectrophotometry	Adults	11- 34	Abbott IFU	Accredited	
Barbiturates, semiquantitative	ng/mL	Urine Clean plastic or glass container	2-8°C: 5 days - 20°C:longer	24 hours	Abbott Alinity c Enzymatic Immunoassay	Positivity Cut-off	200	Abbott IFU	Accredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
Benzodiazepines semiquantitative	ng/mL	Urine Clean plastic or glass container	2-8°C: 5 days - 20°C: longer	24 hours	Abbott Alinity c Enzymatic Immunoassay	Positivity Cut-off	200	Abbott IFU	Accredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
Beta-2-Microglobulin	mg/L	Plasma Collection tubes Acceptable anticoagulants are: EDTA Sodium heparin	2-8°C: 8 days	24 hours	Abbott Alinity c Turbidimetric/ Immunoturbidimetry	Adult	0.97 - 2.64	Abbott IFU	Accredited	
Beta-HCG, Total	mIU/mL	Serum: Serum, Serum separator Plasma: Dipotassium EDTA, Tripotassium EDTA	2-8°C: 7 days -	24 hours	Abbott Alinity i Chemiluminescent	Males and Non-Pregnant Females Pregnancy- Weeks LMP 1-10	< 5.0 202 - 231000	Abbott IFU	Accredited	In patients receiving therapy with high biotin doses no sample should be

Beta HCG, Total	mIU/mL	Dipotassium EDTA, Tripotassium EDTA Lithium heparin Lithium heparin plasma separator Sodium heparin	20°C: 1 year	24 hours	Microparticle Immunoassay (CMIA)	11- 15	22536 - 234990	Abbott IFU	Accredited	taken until at least 8 hours after the last biotin administration.
						16 - 22	8007 - 50064			
						23 - 40	1 600 - 49 413			
Bile acid	µmol/L	Serum Plastic tubes (with or without gel barrier) Plasma- Acceptable anticoagulants are: Lithium Heparin (with or without gel barrier) Sodium Heparin K2EDTA	20-25°C: 1 day 2-8°C: 7 days - 20°C: 1 year	24 hours	Abbott Alinity c Cyclic-enzymatic/ colorimetric	Adult	1.0 - 6.0	Abbott IFU	Accredited	The blood sample must be collected before the administration of Ursodeoxycholic Acid. ideally, sample should be taken after an 8-hour fast.
						Pregnancy	1.3 - 9.0			
Bilirubin 2 Total	µmol/L	Serum: Serum separator Plasma: Lithium heparin and Lithium heparin separator Sodium heparin Dipotassium EDTA	20-25°C: 8 hr 20-25°C: 24 hr (serum separator and Lithium heparin separator) 2-8°C: 7 days -20°C: 3 mth	24 hours	Abbott Alinity c Spectrophotometry, Diazonium salt	Premature: Full-term Premature: Full-term Adult	0 - 1day <136.8 1-2 day <205.2 3-5 day <273.6 0 - 1day 34.2 - 102.6 1-2 day 102.6 - 171 3-5 day 25.7 - 205.2 5.1 - 20.5	Abbott IFU (revised Dec 2023)	Accredited	Specimens should be protected from bright light as bilirubin is photolabile. Tubes containing sodium fluoride/ potassium oxalate is not recommended due to the potential for hemolysis with this anticoagulant.
Bilirubin Direct	µmol/L	Serum: Serum tubes (with or without gel barrier) Plasma - Acceptable anticoagulants are:Lithium heparin Lithium heparin (with or without gel barrier) Sodium heparin EDTA	20-25°C: 2 days 2-8°C: 7 days - 20°C: 3months	24 hours	Abbott Alinity c Spectrophotometry, Diazo-Reaction	Adult	0.0 - 8.6	Abbott IFU	Accredited	
Bilirubin, Indirect		Serum: Serum tubes (with or without gel barrier) Plasma- Acceptable anticoagulants are: Lithium heparin, Sodium heparin, EDTA	20-25°C: 8hours 2-8°C: 7 days - 20°C: 3months	24 hours	CALCULATION based on Abbott Alinity methodologies for Total Bilirubin and Direct Bilirubin	Adult	3.0 - 12.0	Abbott IFU	Accredited	**FORMULA**: (Indirect Bilirubin = Total Bilirubin - Direct Bilirubin)
CA 125 II	U/mL	Serum: Serum, Serum separator. Plasma: Tripotassium EDTA, Sodium Heparin, Lithium Heparin	2-8°C: 7days - 20°C: longer	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	< 35	Abbott IFU	Accredited	
CA 15-3	U/mL	Serum: Serum, Serum separator. Plasma: Tripotassium EDTA, Sodium Heparin, Lithium Heparin	2-8°C: 7days - 20°C: longer	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	< 31.3	Abbott IFU	Accredited	
CA 19-9XR	U/mL	Serum: Serum, Serum separator. Plasma: Tripotassium EDTA, Sodium Heparin, Lithium Heparin	2-8°C: 7days - 20°C: longer	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	<37	Abbott IFU	Accredited	
						Serum: upto 1 month	1.9 - 2.5			

Calcium 2	mmol/L	**Serum :** Serum tubes Serum separator tubes . **Plasma:** Lithium heparin, Sodium heparin . **Urine:** Random or 24 hour	**Serum:** 20-25°C: 3 days 2-8°C: 3 weeks -20°C: 8months . **Urine**: 20-25°C: 4 days 2-8°C: 7 days - 20°C: 3months	24 hours	Abbott Alinity c Spectrophotometry, Arsenazo III	upto 1 year upto 4 year upto 20 year Adult **Urine:** Pediatric Adult Ca-free diet Adult Ca diet Random - male Random - female	2.1 - 2.7 2.1 - 2.6 2.3 - 2.75 2.1 - 2.6 Up to 0.15 mmol/kg/day 0.13 - 1.00 mmol/day 2.50 - 7.50 mmol/day 0.23 - 9.48 mmol/L 0.13 - 8.93 mmol/L	https://www.rcpa.edu.au/Manuals/RCPA-Manual/General-Information/IG/Table-6-Harmonised-reference-intervals-for-chem Abbott IFU	Accredited	**Urine:** use clean urine collection container. Keep specimens on ice during collection **Random urine:** collect specimen in a bottle containing 1 to 2 mL of 6 mol/L HCL to prevent calcium salt precipitation. **24 hour Urine:** collect specimen in a bottle containg 20 to 30 mL of 6 mol/L HCL to prevent calcium salt precipitation.
Calcium, Calculated	mmol/L			24 hours	CALCULATION based on Abbott Alinity methodologies for Calcium and Albumin.			Abbott IFU	Accredited	**FORMULA:** Calcium Corrected = ((40 - Albumin)*0.02) + Calcium))
Cannabinoids, semiquantitative	ng/mL	Urine Clean plastic or glass container	2-8°C: 5 days - 20°C:longer	24 hours	Abbott Alinity c Enzymatic Immunoassay	Positivity Cut-off	50	Abbott IFU	Accredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
Carbon Dioxide/ Bicarbonate	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Sodium heparin	20-25°C:2hours 2-8°C: 2 days - 20°C: 2 weeks	24 hours	Abbott Alinity c Spectrophotometry, PEP Carboxylase	Adult > 60 years	22 to 29 23 to 31	Abbott IFU	Accredited	Note: Bicarbonate content in uncapped tubes decreases approximately 4 mmol/L after one hour. Serum stored in open tubes is stable for up to 4 hours. Samples must be run immediately once uncapped.
Carcino Embryonic Antigen CEA	ng/mL	Serum: Serum, Serum separator. Plasma: Sodium heparin, Lithium heparin, Potassium EDTA	2-8°C: 7days - 20°C: longer	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	<5	Abbott IFU	Accredited	
Ceruloplasmin	g/L	Serum: Serum tubes (not gel tubes) Plasma: Lithium heparin (not gel tubes)	20-25°C: 8 days 2-8°C: 2 weeks -20°C: 3months	24 hours	Abbott Alinity c Turbidimetric/ Immunturbidimetric	Adult	0.2 to 0.6 g/L	Abbott IFU	Accredited	
Chloride	mmol/L	Serum : Serum tubes (with or without gel barrier) For Potassium, hemolyzed specimens must not be used. Plasma -Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin	20-25°C: 7 days 2-8°C: 7 days - 20°C: 1 year	24 hours	Abbott Alinity c Indirect ISE	Adult	98 - 107	Abbott IFU	Accredited	Must be seperated ASAP

Chloride-Urine	mmol/ 24hr	Urine (timed, 24- hour) Without preservatives	20-25°C: 7 days 2-8°C: 7 days 20°C: 7 days	24 hours	Abbott Alinity c Indirect ISE	Infant	2 - 10.	Abbott IFU (revised May 2024)	Accredited	
						child < 6 years	15 - 40			
						Male 6 -10 years	36 - 110			
						Female 6 -10 years	18 - 74			
						Male 10 -14 years	64 - 176			
						Female 10 -14 yrs	36 - 173			
						Adult <60 years	110 - 250			
						Adult >60 years	95 - 195			
	mmol/L	Spot urine (random)		24 hours	No reference range available					
Cholesterol, Total	mmol/L	Serum: Serum separator Plasma Lithium heparin Lithium heparin separator Sodium heparin	20-25°C: 7 days 2-8°C: 7 days -20°C: 3 months	24 hours	Abbott Alinity c Enzymatic	Adult	< 5.0	Source: ESC/EAS Guidelines for the management of dyslipidaemias. http://www.eas-society.org/guidelines-2.aspx; Abbott IFU	Accredited	Fasting sample required
Cholesterol, LDL (Direct)	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma - Acceptable anticoagulants are: Lithium heparin, Sodium heparin, EDTA Anticoagulants containing citrate should not be used.	2-8°C: 5 days -80°C: 3 months	24 hours	Abbott Alinity c, Selective resolution of LDL-Particles under dye formation		0.0 – 3.0	Source: ESC/EAS Guidelines for the management of dyslipidaemias. http://www.eas-society.org/guidelines-2.aspx; Abbott IFU	Accredited	Fasting sample required. Separate plasma from red blood cells or gel as soon after collection as possible (within 3hours)
Cholesterol, Ultra HDL	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma Collection tubes Acceptable anticoagulants are: Lithium heparin, Sodium heparin, EDTA	20-25°C: 2 days 2-8°C: 7 days 20°C: 3 months	24 hours	Abbott Alinity c, Accelerated enzymatic Reaction/selective solvent	Adult	>1.0	National Cholesterol Education Program (NCEP) Adult Treatment Panel III Report and European Guidelines http://www.eas-society.org/guidelines-2.aspx; Abbott IFU	Accredited	Fasting sample required.
Cocaine, semiquantitative	ng/mL	Urine Clean plastic or glass container	2-8°C: 5 days -20°C:longer	24 hours	Abbott Alinity c, Enzyme immunoassay	Positivity Cut-off	300	Abbott IFU	Accredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
Complement C3	g/L	Serum: Serum tubes (with or without gel barrier) Plasma - Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin	2-8°C: 3 days -20°C: 8 days	24 hours	Abbott Alinity c Immunoturbidimetry	Adult Male 14 - 80 years	0.82 - 1.85	Abbott IFU	Accredited	
						Adult Female 14 - 80 years	0.83 - 1.93			
						Adult Male 14 - 80 years	0.15 - 0.53			

Complement C4	g/L	Serum : Serum tubes (with or without gel barrier) Plasma - Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin EDTA	2-8°C: 2 days 20°C: 2 days -	24 hours	Abbott Alinity c Immunoturbidimetry	Adult Female 14 - 80 years	0.15 - 0.57	Abbott IFU	Accredited	
Cortisol	nmol/L	Serum: Serum, Serum separator. Plasma: Lithium Heparin, Sodium Heparin, Potassium EDTA Plasma separator tubes with Lithium Heparin.	2-8°C: 14 days -20°C: 30days	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Morning 08H00	171 - 800	Handbook of Diagnostic Endocrinology, 2nd Edition, 2008. William E Winter & al. AACC Press; Abbott IFU	Accredited	Time of collection should be written on the tube as the time of injection in the case of dynamic test (Synacthen / Dexamethasone test). Allow serum to clot completely at room temperature. Separate serum or plasma from cells ASAP.
						Afternoon	Approx. half the morning values			
						In the evaluation of Adrenal failure				
						Highly Unlikely	>550			
						Virtually Diagnostic	<138			
						Evening 24H00: In the evaluation of Cushing's Syndrome				
						Virtually excludes	<138			
						Highly suggestive	<207			
Cortisol - Urinary	nmol/24hr	Urine: The urine sample must be collected in a clean, previously unused container. Preservatives are not required; however, ten grams of boric acid per liter of urine may be used.	2-8°C: 14 days -20°C: 30days	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	12 - 486	Abbott IFU	Accredited	
C-peptide	ug/L	Serum: Serum, Serum separator. Plasma: Potassium EDTA, Lithium heparin, Sodium heparin, Ammonium heparin Sodium fluoride / potassium oxalate Plasma separator (lithium heparin)	20-25°C: 24hrs 2-8°C: 48hrs 20°C: 3 months -	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult (fasting, 12hours)	0.80-5.20	Abbott IFU	Accredited	Overnight fast.
						Adult (post-prandial)	2.0 - 9.0			
C-Reactive Protein - High Sensitivity	mg/L	Serum: Serum tubes (with or without gel barrier) Plasma - Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin EDTA	20-25°C: 15days 2-8°C: 2 months -20°C: 1 year	24 hours	Abbott Alinity c, Turbidimetric/ Immunturbidimetric	Adult	< 5.0	Pearson TA et al, Circulation 2003; 107:499-511; Abbott IFU	Accredited	
						Lowest relative CVD risk	< 1.0			
						Average relative CVD risk	1.0 - 3.0			
						Highest relative CVD risk	> 3.0			
Creatine kinase CK	U/L	Serum Serum tubes (with or without gel barrier) Plasma - Acceptable anticoagulants: Lithium heparin Sodium heparin	20-25°C: 2 days 2-8°C: 7 days	24 hours	Abbott Alinity c, NAC (N-Acetyl-L-Cystein)	Adult Male	30 - 200	Abbott IFU	Accredited	
						Adult Female	29 - 168			
		Serum Serum tubes (with or without gel barrier)				Adult Male	64 - 104			

Creatinine Enzymatic	µmol/L	Plasma -Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin EDTA is not recommended.	20-25°C: 7 days 2-8°C: 7 days 20°C: 3 months -	24 hours	Abbott Alinity c, Enzymatic	Adult Female	49 - 90	Abbott IFU	Accredited	
Creatinine Enzymatic -Urine	mmol/ 24hr	Urine -Timed specimens collected over intervals shorter than 24 hours	20-25°C: 2 days 2-8°C: 6 days -20°C: 6 months	24 hours	Abbott Alinity c, Enzymatic	Adult Male	7.7 - 21.3	Abbott IFU	Accredited	
						Adult Female	5.9 - 14.1			
		Urine (random/spotspecimens) Clean plastic or glass container without preservatives					N/A			
							N/A			
EGFR		Serum Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin EDTA is not recommended.	20-25°C: 7 days 2-8°C: 7 days 20°C: 3 months -	24 hours	CALCULATION based on Creatinine methodology and patient demographics.	Adult Male	> 90: Normal 60 - 89: Normal or Stage 2 CKD 30 - 59: Moderate Impairment, Stage 3 CKD 15 - 29: Severe Impairment, Stage 4 CKD <15: Established renal failure, Stage 5 CKD	https://kdigo.org/	Accredited	**FORMULA:** EGFR= ((Creatinine^1.154)*32788)*1) / (Age ^0.203)
						Adult Female			Accredited	**FORMULA:** EGFR= ((Creatinine^1.154)*32788)* 0.742)*1)) / (Age ^0.203)
DHEA-S	µmol/L	Serum: Serum, Serum separator. Plasma: Potassium EDTA, Sodium citrate Sodium heparin	2-8°C: 8days 20°C: longer -	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Male: 19Y	1.2 -10.4	Abbott IFU	Accredited	
						Male: 24Y	6.5 -14.6			
						Male: 34Y	4.6 -16.1			
						Male: 44Y	3.8 -13.1			
						Male: 54Y	3.7 -12.1			
						Male: 64Y	1.3 -9.8			
						Male: >64	6.2 -7.7			
						Female: 19Y	1.7 -13.4			
						Female: 24Y	3.6 -11.1			
						Female: 34Y	2.6 -13.9			
						Female: 44Y	2 -11.1			
						Female: 54Y	1.5 -7.7			
						Female: 64Y	0.8 -4.9			
						Female: >64	0.9 -2.1			

Digoxin	ug/L	Serum : Serum tubes (with or without gel barrier) Plasma - Acceptable anticoagulants are: Lithium heparin Sodium heparin Potassium EDTA Heparin gel plasma separator	2-8°C: 48 hours -20°C: 7 days	24 hours	Abbott Alinity c, Particle-enhanced turbidimetric inhibition immunoassay (PETINIA)		0.6 – 1.2 >2 associated with toxicity	Therapeutic range for digoxin as recommended by European Society of Cardiology Guidelines for the diagnosis and treatment of acute and chronic heart failure. European Heart Journal (2008) 29, 2388 - 2442.); Abbott IFU	Accredited	
Ecstasy, semiquantitative	ng/mL	Urine Clean plastic or glass container	2-8°C: 5 days -20°C:longer	24 hours	Abbott Alinity c, Enzyme immunoassay	Positivity Cut-off	500	Abbott IFU	Accredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
EDDP Methadone Metabolite	g/ml	Urine Clean plastic or glass container	20-25°C: 7 days 2-8°C: 2months -20°C: >2months	24 hours	Abbott Alinity c Immunalysis assay	Positivity Cut-off	100	Immunalysis EDDP IFU	Accredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
Estradiol	pmol/L	Serum: Serum, Serum separator Plasma: Lithium heparin, Plasma separator, Potassium EDTA	2-8°C: 7 days -20°C: longer	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Follicular phase	77 – 922	Abbott IFU	Accredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
						Mid Cycle phase	140 – 2383			
						Luteal phase	77 – 1145			
						Post- meno pausal no HRT	< 103			
						Post- meno pausal on HRT	< 529			
						Male	40 – 161			
Ethanol	mg/dL	Urine Clean plastic or glass container	2-8°C: 30 days -20°C:longer	24 hours	Abbott Alinity c Enzymatic (Alcohol Dehydrogenase)	Positivity Cut-off	10	Abbott IFU	Accredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
Faecal Elastase	ug/g	Stool/Faecal Container 30 ml with attached screw cup, conical bottom and a spoon	Raw stool : 3 days at 15-30ºC, 3 days at 4-8ºC, up to a year at -20ºC. Stoold extract: 3 days at 15-30ºC, 7 days at 2-8ºC and -20ºC.	5 working days	Agility/IDK/ELISA	Normal value (adults)	>200	Immundiagnostik, AG IFU	Unaccredited	Please note, liquid or hard stools may lead to falsely low pancreatic elastase results. It is recommended to consider clinical symptoms and other diagnostic tests for the final diagnosis and/or to request another stool sample of formed appearance or soft consistency.
						Mild to moderate insufficiency	100-200			
						Severe insufficiency	<100			
Faecal Immunochemical Test (FIT)	ng/ml	Faeces sample collected into an analyser specific sampling bottle containing buffer (OC Auto Sampling Bottle 3).	2-8°C: 10 days	24 hours	OC-Sensor Pledia, Latex Agglutination Immunoturbidimetry	Normal range cut-off	<100	BowelScreen Guidelines for Quality Assurance in Colorectal Screening, Second Edition, Published 2017, ISBN 978-1-907487-26-2	Accredited	
						NSS Bowel Screen Normal Range Cut-off	<225			
						Adult Male	15 - 200			
						Adult Female	15 - 150			

Ferritin	ng/mL	Serum: Serum, Serum separator Plasma: Tripotassium EDTA, Lithium heparin	2-8°C: 7 days 20°C: 1 year -	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	4 – 14 days M/F	12 – 717	Abbott IFU	Accredited	Reference ranges: According to WHO guidelines and CALIPER database.
						15 days to < 6 months M/F	12 - 647			
						6 months to < 1 year M/F	12 – 182			
						1 to < 5 years M/F	12 – 100			
						5 to < 14 years M/F	15 – 79			
						14 to < 19 years F	15 - 67			
						14 to < 16 years M	15 - 83			
						16 to < 19 years M	15 – 172			
Folate	ng/mL	Folate: Serum: Serum, Serum separator Plasma: Lithium heparin plasma, Lithium heparin plasma separator.	2-8°C: 7 days 20°C: 30 days -	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	3.1 - 20.5	Abbott IFU	Accredited	Protect from light
Free T3	pmol/L	Serum: Serum, Serum separator Plasma: Sodium heparin, Lithium heparin, Potassium EDTA	2-8°C: 6 days 20°C: longer -	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	2.42 - 6.01	Abbott IFU	Accredited	
Free T4	pmol/L	Serum: Serum, Serum separator Plasma: Sodium heparin, Lithium heparin, Lithium heparin plasma separator, Potassium EDTA	2-8°C: 6 days 20°C: longer -	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	9.01 - 19.05	Abbott IFU	Accredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
Follicle Stimulating Hormone FSH	UI/L	Serum: Serum, Serum separator Plasma: Sodium heparin, Lithium heparin, Potassium EDTA	2-8°C: 7 days 20°C: 1 year -	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Follicular phase	3.0 - 8.1	Abbott IFU	Accredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
						Mid Cycle phase	2.6 - 16.7			
						Luteal phase	1.4 - 5.5			
						Post-Meno pausal	26.7 - 133			
						Males	1.0 - 12.0			
Gamma-Glutamyl Transferase	U/L	Serum Serum separator Plasma: Lithium heparin, Sodium heparin	20-25°C: 7 days 2-8°C: 7 days 20°C: 3 months -	24 hours	Abbott Alinity c, L-Gammaglutamyl-3-carboxy-4-nitroanilid-Substrate	Male	< 55	Abbott IFU	Accredited	
						Female	< 38			
		Serum : Serum tubes (with or without gel barrier)				Trough (Less Severe Infection)	<1			
						Trough (Severe Infection)	<2 - 4			

Gentamicin	mg/L	Plasma -Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin K2-EDTA K3-EDTA	2-8°C: 7 days <-10°C: 14 days	24 hours	Abbott Alinity c, Particle enhanced turbidimetric inhibition immunoassay (PETINIA)	Peak (Less Severe Infection)	5 - 8	Abbott IFU	Accredited	Please include dose regime (dose and frequency of administration, and timing of sampling (trough and/or peak)).
						Peak (Severe Infection)	8 - 10			
						Toxic Levels	>10 - 12			
Glucose	mmol/L	Plasma -Acceptable anticoagulants are: Sodium Fluoride Potassium Oxalate Sodium Fluoride/K2 EDTA	20-25°C: 2 days 2-8°C: 7 days -20°C: 3 months	24 hours	Abbott Alinity c, Enzymatic (Hexokinase/ G-6-PDH)	Fasting glucose	≤ 6.00	WHO criteria for the diagnosis of diabetes mellitus. Abbott IFU	Accredited	Fasting sample required.
Haemoglobin A1C (IFCC)	mmol/mol	Blood samples collected in primary tubes containing K2EDTA may be stored at 25 °C for 24 hours or at 4 °C for 14 days before analysis.	20-25°C: 1 day 4°C: 14 days	24 hours	TOSOH High Performance Liquid Chromatography (HPLC)	Adult	20 - 41	HSE and NICE guidelines https://www2.hse.ie/conditions/pre-diabetes/	Accredited	
Homocysteine	µmol/L	Serum: Serum, Serum separator Plasma: Lithium heparin, Potassium EDTA	**ON ICE:** 6hours 2-8°C: 14 days -20°C:1 year	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult Male	5.5 - 16.2	Abbott IFU	Accredited	To minimize increases in homocysteine concentration from synthesis by red blood cells, place all specimens (serum and plasma) on ice after collection and prior to processing.
						Adult Female	4.4 - 13.6			
Immunoglobulin IgA	g/L	Serum : Serum tubes (with or without gel barrier)	20-25°C: 7 days 2-8°C: 7 days -20°C: 6 months	24 hours	Abbott Alinity c, Immuno turbidimetric	Male 12 to 60 years	0.63 - 4.84	Abbott IFU	Accredited	
						Female 12 to 60 years	0.65 to 4.21			
						Male > 60 years	1.01 to 6.45			
						Female > 60 years	0.69 to 5.17			
Immunoglobulin IgE	IU/mL	Serum: Serum tubes	2-8°C: 2 days	24 hours	Abbott Alinity c, Immuno turbidimetric	Adults	< 100 IU/mL	Abbott IFU	Accredited	
Immunoglobulin IgG	g/L	Serum : Serum tubes (with or without gel barrier)	20-25°C: 7 days 2-8°C: 7 days -20°C: 6 months	24 hours	Abbott Alinity c, Immuno turbidimetric	Male 2 to 80 years	5.4 - 18.22	Abbott IFU	Accredited	
						Female 2 to 80 years	5.52 - 16.31			
Immunoglobulin IgM	g/L	Serum : Serum tubes (with or without gel barrier)	20-25°C: 7 days 2-8°C: 7 days -20°C: 6 months	24 hours	Abbott Alinity c, Immuno turbidimetric	Male >12years	0.22 - 2.40	Abbott IFU	Accredited	
						Female >12years	0.33 - 2.93			
		Serum: Serum, Serum separator			Abbott Alinity i	Fasting	3.4 - 19.6			Overnight fast. Provide fresh samples if possible. NB: please note that insulin is unstable in whole blood

Insulin	mIU/L	Serum, Serum Separator Plasma: Potassium EDTA Sodium EDTA, Sodium heparin, Sodium fluoride	-20°C: 7 days	24 hours	Chemiluminescent Microparticle Immunoassay (CMIA)	Post-prandial	3.0 - 50.0	Williams Textbook of Endocrinology 13th edition 2015; Abbott IFU	Accredited	NB: please note that insulin is unstable in whole blood. Serum or plasma must be separated from red cells within 30 minutes. minutes of sampling. Failure to do so may lead to falsely low results.
Intact Parathyroid Hormone PTH	pg/mL	Serum: Serum (use of serum separator tubes may result in a decrease in concentration) Plasma: Potassium EDTA, Lithium Heparin, Sodium Heparin	2-8°C: 2 days -20°C: 6 months	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	15 - 68.3	Abbott IFU	Accredited	Fasting sample required.
Iron	µmol/L	Serum : Serum separator Plasma -Acceptable anticoagulants are: Lithium Heparin Sodium heparin	20-25°C: 10hours 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Ferene	Adult (Female)	9.0 - 30.4	Abbott IFU	Accredited	EDTA, oxalate, or citrate as anticoagulants must not be used, since they bind iron ions, preventing its reaction with the chromogen. Specimens should be collected in the morning to avoid low results due to diurnal variation.
						Adult (Male)	11.6 – 31.3			
Lactate Dehydrogenase LDH	U/L	Serum: Serum separator . Plasma: Lithium heparin Lithium heparin separator Sodium heparin	20-25°C: 3days 2-8°C: 3 days -20°C: 8 weeks	24 hours	Abbott Alinity c, Oxidation of Lactate to Pyruvate	Adult	125 - 220	Abbott IFU	Accredited	Erythrocyte LDH activity is 150 times that of plasma and LDH is extremely sensitive to even minor haemolysis induced by sample transport including transport by pneumatic tube systems. Serum or plasma should therefore be separated from red cells immediately after collection (plasma), or immediately after clotting of serum. Samples should ideally not be sent to the laboratory unseparated.
						0 to <15 days	309 - 1222	https://caliper.research.sickkids.ca/#/	Accredited	
						15 days to < 1 yr	163 - 452			
						1 to < 10 years	192 - 321			
						F: 10 to 15 years	157 - 272			
						M: 10 to 15 years	170 - 283			
						15 to 19 years	130 - 250			
Lipase	U/L	Serum: Serum separator . Plasma: Lithium heparin Sodium heparin EDTA unsuitable	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Kinetic Colorimetric method	Adult	0-60	Sentinel Diagnostics IFU	Accredited	
Lipoprotein [a]	g/L	Serum: Serum tubes Plasma- Acceptable anticoagulants: EDTA	2-8°C: 8 days	24 hours	Abbott Alinity c, Turbidimetric/ Immunturbidimetric	Adult	<500 Values above 0.500 g/L are associated with an increased risk of athero-sclerosis.	Abbott IFU, European Atherosclerosis Society Consensus Position Paper (Lipoprotein(a) as a cardiovascular risk factor: current status. Eur Heart J (2010) doi: 10.1093/eurheartj/ehq386)	Accredited	
Lithium	mmol/L	Serum: Serum tubes (with or without gel barrier) Plasma Collection tubes Acceptable anticoagulants are: Sodium heparin K2-EDTA Do not use lithium heparin.	20-25°C: 1 day 2-8°C: 7 days -20°C: 6 months	24 hours	Abbott Alinity c, Colorimetric Method	Immediate-release formulations	0.5 - 0.8 12hours after last dose	Abbott IFU, https://www.nice.org.uk/guidance/cg185/resources/bipolar-disorder-assessment-and-management-35109814379461)	Accredited	Sample to be taken at trough. Lithium has a narrow therapeutic range and toxicity should also be suspected even when lithium is within the target range if symptoms are present and in compromised patientse.g. older patients, interacting drugs such as NSAIDs/diuretics, sodium depletion, decreased renal function, <50 kg body weight.
						Slow-release formulations	0.8 - 1.20 12hours after last dose			
							0.5 - 0.8 immediately before next dose			

Luteinizing Hormone LH	IU/L	Serum: Serum, Serum separator Plasma: Potassium EDTA, Sodium heparin	2-8°C: 7 days - 20°C: longer	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Follicular phase	1.8 - 11.8	Abbott IFU	Accredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
						Mid Cycle phase	7.6 – 89.1			
						Luteal phase	0.6 - 14.0			
						Post Meno pause	5.2 – 62			
						Male	0.6 - 12.1			
Magnesium	mmol/L	Serum : Serum tubes (with or without gel barrier) Use nonhemolyzed specimens. Plasma Collection tubes Acceptable anticoagulants are: Lithium heparin, Sodium heparin	20-25°C: 1 day 2-8°C: 3 days - 20°C: 3 month	24 hours	Abbott Alinity c, Enzymatic	Adult	0.66 - 1.07	Abbott IFU	Accredited	Plasma samples collected with EDTA anticoagulant or specimens from patients receiving EDTA are unsuitable for analysis, because this compound chelates magnesium, making it unavailable for reaction with the reagent. Sodium fluoride and oxalate also interfere with the results and should be avoided.
Magnesium-Urine	mmol/ 24hr	Urine (24 hour) Collect specimens in a container with boric acid or 20 to 30 mL of 6N HCl to prevent precipitation of magnesium complexes.	20-25°C: 2 days 2-8°C: 2 days - 22°C: 1 year	24 hours	Abbott Alinity c, Enzymatic	Adult	3.00 – 5.00	Abbott IFU	Accredited	Do not use more than 2.5 mL 6N HCl per 100 mL of urine. Excess hydrochloric acid may cause elevated results with this methodology. Do not exceed 10 g/L boric acid.
	mmol/L	Spot urine	20-25°C: 2 days 2-8°C: 2 days - 22°C: 1 year	24 hours	Abbott Alinity c, Enzymatic	No reference range				
Methadone, semiquantitative	ng/mL	Urine Clean plastic or glass container	2-8°C: 5 days - 20°C:longer	24 hours	Abbott Alinity c, Enzyme immunoassay	Positivity Cut-off	300	Abbott IFU	Accredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
Microalbumin - Urine	mg/mmol	Urine spot: Clean, unused plastic or glass container with preservatives	2-8°C: 6 days	24 hours	Abbott Alinity c, Turbidimetric/ Immunturbidimetric	ACR (Albumin/ Creatinine Ratio):	<3.0	Abbott IFU, NICE Guideline NG203, August 2021	Accredited	
		Urine timed/24hr: Clean, unused plastic or glass container with preservatives	2-8°C: 3 days - 70°C: 5 months	24 hours						
Albumin/ Creatinine Ratio (ACR)	mg/mmol	Urine spot/ timed/24hr: Clean, unused plastic or glass container with preservatives		24 hours	CALCULATION based on Abbott Alinity methodologies for Microalbumin and Urinary creatinine.	ACR (Albumin/ Creatinine Ratio):	<3.0	NICE Guideline NG203, August 2021	Accredited	**FORMULA:** ACR = Microalbumin / Urinary creatinine
NT-pro BNP	pg/ml	Serum: Serum, Serum separator Plasma: Potassium EDTA, Lithium heparin	20-25°C: 3 days 2-8°C: 6 days - 20°C: 30days	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adults <75 years	< 125.0	Abbott IFU	Accredited	
						Adults >75 years	< 450.0			
Opiates, semiquantitative	ng/mL	Urine Clean plastic or glass container	2-8°C: 5 days - 20°C:longer	24 hours	Abbott Alinity c, Enzyme immunoassay	Positivity Cut-off	300	Abbott IFU	Accredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.

Osmolality	mOsm/kg	Serum: Serum, Serum separator Plasma: Potassium EDTA, Lithium heparin	20-25°C: 2 days 2-8°C: 8 days -20°C: 30 days	24 hours	Genotech Osmometer, Freezing-point depression osmometry	Adult	280 - 298	Clinical Chemistry 44: 1582, 1998	Unaccredited	Whole blood stability was higher in the presence of anticoagulant. Plasma was less stable when refrigerated. Source for sample stability: https://pubmed.ncbi.nlm.nih.gov/28372954/
		Urine Clean plastic or glass container	20-25°C: 5 days 4°C: 4 days -20°C: 30days			Adult	50 - 1200	Wu, A.H.B. ed: Tietz Clinical Guide to Laboratory Tests 4th Edition, Saunders 2006		Source for sample stability: https://pubmed.ncbi.nlm.nih.gov/28372954/
Phenytoin	µg/mL	Serum Serum tubes (with or without gel barrier) Plasma Collection tubes Acceptable anticoagulants are: Lithium heparin, Sodium heparin,Potassium EDTA, Sodium citrate, Sodium fluoride/potassium oxalate	20-25°C: 2 days 2-8°C: 1 month -20°C: 5 month	24 hours	Abbott Alinity c, Enzyme immunoassay	Adult	10.0 - 20.0	Abbott IFU	Accredited	
						Toxicity	> 20.0			
Phosphate	mmol/L	Serum: Serum tubes Serum separator tubes Plasma-Acceptable anticoagulants: Dipotassium EDTA Lithium heparin Sodium heparin	20-25°C: 1 day 2-8°C: 3 days -20°C: 30 days	24 hours	Abbott Alinity c, Spectrophotometry, Phosphomolybdate	Adult	0.81 - 1.45	Abbott IFU	Accredited	Serum and plasma should be free of fibrin, red blood cells, platelets and with any visible hemolysis. The specimen should be separated from the clot as soon as possible to prevent falsely elevated phosphate levels due to passage of phosphate from the erythrocytes into the serum. The only acceptable anticoagulant is heparin. Sample must be separated (centrifuged) within 6 hours after collection. Whole blood samples which are not separated within 6 hours will be rejected.
Phosphate- Urine	mmol/ 24hr	Urine (24 hour) Clean plastic or glass container (see special note).	20-25°C: 4 days 2-8°C: 7 days -20°C: 1 month	24 hours	Abbott Alinity c, Spectrophotometry, Phosphomolybdate	Adult	12.9 - 42.0	Abbott IFU	Accredited	24hr Urine specimens should be collected in 6 mol/L HCl, 20 to 30 mL, to avoid precipitation of phosphate complexes.
	mmol/ L	Spot Urine (random) Clean plastic or glass container without preservatives				Adult: Male Female	1.6 - 61 2.3 - 48			
Potassium	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma Collection tubes Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin (full draw)	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Indirect ISE	Adult	3.5 - 5.1	Abbott IFU	Accredited	Must be separated ASAP. Unseparated samples >2hours old are unsuitable for analysis. Haemolyzed specimens must not be used.
Potassium-Urine	mmol/ 24hr	Urine (random; 24- hour) Without preservatives	20-25°C: 45 day 2-8°C: 2 months -20°C: 1 year	24 hours	Abbott Alinity c, Indirect ISE	Adult	25 - 125	Abbott IFU (revised May 2024)	Accredited	
						Male 6 -10 years	17 - 54			
						Female 6 -10 years	8 - 37			
						Male 10 -14 years	22 - 57			
						Female 10 -14 yrs	18 - 58			
						Follicular Phase	< 0.95			
						Luteal Phase	3.8 - 51			

Progesterone	nmol/L	Serum: Serum, Serum separator Plasma: Sodium heparin, Lithium heparin Potassium EDTA	2-8°C: 10 days -20°C: 6 months	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Post Meno pausal	< 0.63	Abbott IFU	Accredited	
						1st Trimester	8.9 - 468			
						2nd Trimester	72 - 303			
						3rd Trimester	89 - 771			
						Male	< 0.63 nmol/L			
Prolactin	uIU/ml	Serum: Serum, Serum separator Plasma: Potassium EDTA, Sodium heparin, Lithium heparin	2-8°C: 7 days 20°C: 1 year	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult Female	109 - 557	Abbott IFU	Accredited	
						Adult Male	73 -407			
Prolactin, Macroprolactin	mIU/L	Serum: Serum, Serum separator Plasma: Potassium EDTA, Sodium heparin, Lithium heparin	2-8°C: 7 days 20°C: 1 year	24 hours	CALCULATION based on Abbott Alinity methodology for Prolactin and PEG precipitation	Adult Female	79 - 347	Abbott IFU	Accredited	**FORMULA:** (Prolactin post-PEG / Total Prolactin)*100 Macro-Prolactin is performed on Prolactin results above the normal range The post-PEG prolactin result indicates the approximate concentration of monomeric (biologically active) prolactin in the sample. Reference ranges are according to Beltran, L et al, Clinical Chemistry 54:10 1673-1681 (2008).
						Adult Male	72 - 229			
Rheumatoid Factor RF	IU/mL	Serum Serum tubes	2-8°C: 2 days 20°C: 1 year	24 hours	Abbott Alinity c, Immuno turbidimetric	Negative:	<30	Abbott IFU	Accredited	
Serum Protein Electrophoresis and Immunofixation		Serum : Serum tubes (with or without gel barrier)	2-8°C: 10 days 20°C: 2 months	10 days +2 days if Immunofixation required.	**Electrophoresis**: Sebia Capillarys 3 Octa capillary **Immunofixation:** Hydrasys 2 agarose gel		Fraction % **Source**: In-house study	Fraction g/L **Source:** In-house study	Accredited	
						Albumin Fraction	54.1 - 64.8	38 - 51		
						Alpha - 1 Fraction	3.1 - 5.2	2.3 - 3.9		
						Alpha - 2 Fraction	7.3 - 11.9	5.3 - 9.0		
						Beta -1 Fraction	5.1 - 7.8	3.6 - 5.7		
						Beta- 2 Fraction	3.6 - 7.7	2.6 - 5.9		
						Gamma Fraction	10.9 - 20.0	7.7 - 15.5		
Sex Hormone Binding Globulin SHBG	nmol/L	Serum: Serum, Serum separator Plasma: Lithium heparin, Ammonium heparin, Sodium heparin	2-8°C: 8 days 20°C: 3months	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult Female >19years	20.0 - 155.0	Abbott IFU	Accredited	
						Pregnancy	<500			
						Post Meno pausal	26 - 118			
						Adult Male >19years	13.0 - 71.0			

Sodium	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma Collection tubes Acceptable anticoagulants are: Lithium and Sodium heparin	20-25°C: 2weeks 2-8°C: 2 weeks 20°C: 1 year	24 hours	Abbott Alinity c, Indirect ISE	Adult	136 - 145	Abbott IFU	Accredited	Must be seperated ASAP
Sodium (Urine)	mmol/24hr	Urine (random; 24-hour) Without preservatives	20-25°C: 45 day 2-8°C: 45 days -20°C: 1 year	24 hours	Abbott Alinity c, Indirect ISE	Adult Male	40 - 220	Abbott IFU (revised May 2024)	Accredited	
						Adult Female	27 - 287			
						Male 6 - 10 years	41 - 115			
						Female 6 - 10 years	20 - 69			
						Male 10 - 14 years	63 - 177			
						Female 10 - 14 years	48 - 168			
Tacrolimus	ug/L	Whole Blood: EDTA	2-8°C: 7 days	24 hours	Abbott Alinity I, Manual Pre-treatment precipitation. Chemiluminescent Microparticle Immunoassay (CMIA)	Target 24hr trough levels	5 - 20	Abbott IFU, Consensus document: therapeutic monitoring of tacrolimus (FK-206). Ther Drug Monit 995; 17(6): 606 - 14.	Accredited	The therapeutic range of tacrolimus is not clearly defined, but target 24-hour trough whole blood concentrations are 5 - 20 ug/L early post-transplant. Higher concentrations are associated with an increased incidence of adverse effects. 24-hour trough concentrations are 33 - 50% less than the corresponding 12-hour trough levels.
Testosterone	nmol/L	Serum: Serum, Serum separator Plasma: Dipotassium EDTA	20-25°C: 8hrs 2-8°C: 7 days 20°C: longer	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Male 21 - 49 years	8.33 - 30.19	Abbott IFU	Accredited	
						Male >50 years	7.66 - 24.82			
Free Androgen Index FAI	Ratio	Serum: Serum, Serum separator Plasma: Lithium heparin,	2-8°C: 7 days 20°C: 3months	24 hours	CALCULATION based on Abbott Alinity methodology for Testosterone and SHBG	Male:	20.4 - 81.2	Abbott IFU	Accredited	**FORMULA:** Free Androgen Index = (Testosterone*100) / SHBG
						Female (Pre-meno pausal):	0.5 - 7.3			
						Female (Post-meno pausal):	0.6 - 8.0			
Theophyline	mg/L	Serum: Serum tubes (with or without gel barrier) Plasma Collection tubes Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin Potassium EDTA Sodium citrate Sodium fluoride/potassium oxalate	2-8°C: 3 month 20°C: 3 month	24 hours	Abbott Alinity c, Enzyme Immunoassay	Adult	8 - 20	Abbott IFU	Accredited	Trough sample required.
						Theophylline serum concentrations above 20 mg/L are often associated with toxicity.				
TSH - Thyroid Stimulating Hormone	uIU/mL	**Serum :** Serum tubes Serum separator tubes . **Plasma:** Lithium heparin, Sodium heparin,	2-8°C: 7 days 10°C: 6months	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	**Pediatric**		Pediatric: CALIPER Adult: Abbott IFU	Accredited	
						4 day to < 6 months	0.73 - 4.77			
						6 months to < 14 year	0.70 - 4.17			
						14 to < 19 year	0.47 - 3.41			

		Potassium EDTA								
						Adult				
						19 - 120 year	0.35 - 4.94			
Thyroxine (TT4)	nmol/L	Serum: Serum, Serum separator Plasma: Potassium EDTA, Lithium heparin, Lithium heparin plasma separator, Sodium heparin	2-8°C: 6 days 20°C: 6 days	-	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	63 - 151	Abbott IFU	Accredited	
Total Prostate Specific Antigen PSA	µg/L	Serum : Serum, Serum separator	2-8°C: 1 day 20°C: 24weeks	-	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult Male <50 years	< 2.0	NCCP Prostate Cancer GP Referral Guideline v 5 2018; Abbott IFU	Accredited	Do not take sample within 1 week of digital rectal examination, or 6 weeks after prostate biopsy.
							Adult Male 50 - 59 years	< 3.0			
							Adult Male 60 - 69 years	< 4.0			
							Adult Male >70 years	< 5.0			
Total Protein	g/L	Serum : Serum Serum separator Plasma Dipotassium EDTA Lithium heparin Lithium heparin separator Sodium heparin	20-25°C: 7 days 2-8°C: 7 days 20°C: 3 months	-	24 hours	Abbott Alinity c, Biuret Reaction	Adult, ambulatory	64 - 83	Abbott IFU	Accredited	
Total T3	nmol/L	Serum: Serum, Serum separator Plasma: Potassium EDTA, Lithium heparin, Sodium heparin	2-8°C: 6 days 20°C: 6 days	-	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	0.54 - 2.96	Abbott IFU	Accredited	
Transferrin	g/L	Serum: Serum tubes (with or without gel barrier) Plasma Collection tubes Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin EDTA	20-25°C: 3 days 2-8°C: 3 days 20°C: 6 months	-	24 hours	Abbott Alinity c, Immuno turbidimetric	Male 14 to 60 Years	1.74 - 3.64	Abbott IFU	Accredited	
							Female 14 to 60 Years	1.80 - 3.64			
							Male 60 to 80 Years	1.63 - 3.44			
							Female 60 to 80 Years	1.73 - 3.60			
Transferrin Saturation	%	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Sodium heparin Potassium EDTA Sodium citrate	20-25°C: 7 days 2-8°C: 7 days 20°C: 1 year	-	24 hours	CALCULATION based on Abbott Alinity methodologies for Iron and UIBC (Latent capacity)	Male Adult	20.0 - 50.0	Abbott IFU	Accredited	**FORMULA:** Transferrin Saturation = ((Iron*100) / (Iron + UIBC))
							Female Adult	15.0 -50.0			
Tricyclic Antidepressant (TCA)	ng/ml	Urine Clean plastic or glass container	2-8°C: 2 days 20°C:longer	-	24 hours	Nal Von Minden GmbH-Point of Care dipstick	Positivity Cut-off	1000	Nal Von Minden GmbH IFU	Unaccredited	The Drugs Of Abuse assays (with the exception of ethanol and urinary creatinine) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request. Specimen storage 2 days as per Kit insert: version 1.02 2023-05-22.

Triglyceride	mmol/L	Serum: Serum separator Plasma: Lithium heparin Lithium heparin separator Sodium heparin	20-25°C: 2 days 2-8°C: 7 days 20°C: 3 months -	24 hours	Abbott Alinity c, Glycerinphosphate oxidase	Adult (ideal, fasting)	0.6 - 1.7	Abbott IFU, European Guidelines. http://www.eas-society.org/guidelines-2.aspx	Accredited	Fasting sample required.
Troponin-I, STAT high sensitive	pg/mL	Serum: Serum with and without separator Serum with thrombin-based clot activator Plasma: Lithium heparin with and without separator K2 EDTA K3 EDTA	20-25°C: 8hrs 2-8°C: 24hours 20°C: 31 days -	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Male Female	< 34 < 16	Abbott IFU	Accredited	
Total Iron Binding Capacity (TIBC)		Serum : Serum tubes (with or without gel barrier) Plasma Collection tubes Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin	20-25°C: 7 days 2-8°C: 7 days 20°C: 1 year -	24 hours	CALCULATION based on Abbott Alinity methodologies for Iron and UIBC (Latent capacity)	Adult	44.8 - 76.1	Abbott IFU	Accredited	**Formula:** TIBC = Iron + UIBC (LC)
Unsaturated Iron Binding Capacity UIBC	µmo/L	Serum : Serum tubes (with or without gel barrier) Plasma Collection tubes Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin	20-25°C: 7 days 2-8°C: 3 weeks -20°C: 1 year	24 hours	Abbott Alinity c, Ferene	Male Female	12.4 - 43.0 12.5 - 55.5	Abbott IFU	Accredited	Specimen should be collected in the morning to avoid low results due to diurnal variation. Drugs: Methyldopa and oxytetracycline cause artificially high UIBC values. Other: Pathologically high levels of albumin (7 g/l) decrease the apparent UIBC value significantly
Urea	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma Collection tubes Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin	20-25°C: 7 days 2-8°C: 7 days 20°C: 1 year -	24 hours	Abbott Alinity c, Urease	Adult, Male <50years Adult, Female <50years Adult Male >50years Adult Female >50years	3.2 - 7.4 2.5 - 6.7 3.0 - 9.2 3.5 - 7.2	Abbott IFU	Accredited	
Urea - Urine	mmol/ 24hr mmol/L	Urine (24 hour) Clean plastic or glass container with or without preservatives Spot urine (random)	20-25°C: 7 days 2-8°C: 7 days 20°C: 1 year -	24 hours 24 hours	Abbott Alinity c, Urease	Adult No reference range available	428 - 714	Abbott IFU	Accredited	
Uric acid	umol/L	Serum: Serum tubes Serum separator tubes Plasma Lithium heparin tubes Lithium heparin separator tubes Sodium heparin tubes	20-25°C: 8 hour 2-8°C: 3 days 20°C: 3 months -	24 hours	Abbott Alinity c, Uricase	Male 13-79 years Female 13-79 years	220 - 450 150 - 370	Abbott IFU	Accredited	
	umol/ 24hr	Urine (24 hour) Clean plastic or with or without preservatives.				Male (Purine Free Diet) Female (Purine Free Diet)	<2480 slighly lower			

Uric acid - Urine	umol / L	Urine (random specimens or timed specimens collected over intervals shorter than 24 hours) Clean plastic or glass container with or without preservatives.	20-25°C: 2 days 2-8°C: 2 days	24 hours	Abbott Alinity c, Uricase	Male (Low Purine Diet) Female (Low Purine Diet) High Purine Diet Average Diet	< 2830 < 2360 < 5900 1480 - 4430	Abbott IFU	Accredited	
Urine Protein	mg/24hr	Urine (24hr/timed). Clean plastic or glass container without preservatives.	20-25°C: 1 day 2-8°C: 7 days - 20°C: 1 month	24 hours	Abbott Alinity c, Benzethonium chloride	Adult	0 - 300	Abbott IFU	Accredited	Keep specimens on ice during collection. Testing of fresh urine specimens is suggested. Avoid collection of specimens within 24 hours of intense exercise since this can falsely elevate protein excretion.
Urinary Protein/ Creatinine Ratio				24 hours	CALCULATION based on Abbott Alinity methodologies for urinary protein and urinary creatinine				Accredited	**Formula:** Protein: Creatinine = Urinary Protein / Urinary Creatinine
Urinary Ph (DOA)		Urine Clean plastic or glass container	2-8°C: 5 days	24 hours	Abbott Alinity c, DRI pH-Detect Test	Normal	4.7 - 7.8	DRI pH-Detect test IFU	Accredited	
Urinary Creatinine (DOA)	mmol/L	Urine Clean plastic or glass container	20-25°C: 2 days 2-8°C: 6 days - 20°C: 6 months	24 hours	Abbott Alinity c, Enzymatic	Normally concentrated urine Dilute urine sample Sample inegrity questionnable	> 2.0 0.5 - 2.0 < 0.5	EWDTS guidelines 2004; Abbott IFU	Accredited	
Valproic acid	µg/mL	Serum : Serum tubes (with or without gel barrier) Plasma-Acceptable anticoagulants: Lithium heparin, Sodium heparin Potassium EDTA. Heparin gel plasmsa separator	2-8°C: 2 days - 20°C: 7 days	24 hours	Abbott Alinity c, Particle-enhanced turbidimetric inhibition immunoassay (PETINIA)	Adult	50 - 100	Abbott IFU	Accredited	
Vancomycin	µg/mL	Serum : Serum tubes (with or without gel barrier / clot activator) Plasma -Acceptable anticoagulants are: Sodium heparin, Lithium heparin K2-EDTA, K3-EDTA	2-8°C: 7 days - 10°C: 14 days	24 hours	Abbott Alinity c, Homogeneous particle enhanced turbidimetric inhibition immunoassay (PETINIA)	Trough: Peak:	5 - 20 20 - 40	Abbott IFU, Therapeutic monitoring of vancomycin in adult patients Consensus review. Am J Health-Syst Pharm. 2009; 66:82 - 98.)	Accredited	A trough level of 15 - 20 ug/mL is recommended for certain infections: treatment of MRSA, hospital acquired pneumonia, bacterial meningitis & osteomyelitis. Vancomycin toxicity is not seen with a trough level of up to 20 ug/mL. Therapeutic peak serum levels of 20 to 40 µg/mL (13.80 to 27.60 µmol/L) and trough levels of 5 to 10 µg/mL (3.45 to 6.90 µmol/L) have been reported to be effective for most strains of staphylococci and streptococci.
Vitamin B12	pg/mL	Serum: Serum, Serum separator. Plasma: Lithium heparin plasma separator, Sodium heparin, Dipotassium EDTA	20-25°C: 3 days 2-8°C: 7 days - 20°C: longer	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	200 - 883	Abbott IFU	Accredited	Fasting sample recommended. Please note that, with effect from the 01st of March 2025, due to uncertainty of measurement of vitamin B12 at lower levels, our reference range for Serum Vitamin B12 changed from 187 to 200.
Vitamin D, 25-OH	nmol/L	Serum: Serum, Serum separator Plasma: Dipotassium EDTA, Tripotassium EDTA Sodium heparin Lithium heparin powder Lithium heparin plasma separator	20-25°C: 72hrs 2-8°C: 12 days - 20°C: 1 year	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult **25-OH-VITAMIN D CUTOFFS BASED ON DIETARY REFERENCE INTAKES** Increased risk of deficiency Increased risk of in-adequacy Adequacy	30 - 125 < 30 < 40 > 50	1. Dietary reference intakes for calcium and Vitamin D. Washington, DC: The National Academies Press. 2. J Clin Endocrinol Metab, October 2011, 96(10):2987- 2996. 3. Abbott IFU	Accredited	

						Increased risk of excess:	> 125			