

# 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](#).

Please note that these lists were complete at the time of publishing. Eurofins Biomnis is continuously updating its menu of tests, and some tests may be available even though they are not listed in this document or at the above link. 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 [client.services@eurofins-biomnis.ie](mailto:client.services@eurofins-biomnis.ie).

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 [logistics@eurofins-biomnis.ie](mailto:logistics@eurofins-biomnis.ie).

### 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 below<sup>1</sup>.

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](mailto: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.

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### 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.

**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)

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Analyte Name	Units	Suitable Specimen/ Container Types	Sample Stability	Turn Around Time	Instrument/ Platform/ Method	Reference Range		Source	Accreditation status	Note:
<b>6MAM Heroin Metabolite</b>		Urine Clean plastic or glass container	2-8°C: 5 days -20°C: longer	24 hours	Abbott Alinity c Cedia assay	Positivity Cut-off	10	Cedia 6MAM IFU	Unaccredited	The Drugs Of Abuse assays (with the exception of ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
<b>Alanine Amino Transferase ALT</b>	U/L	Serum Serum Separator	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	Unaccredited	
<b>Alanine Amino Transferase ALT</b>	U/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 3 days 2-8°C: 7 days -20°C: >7 days	24 hours	Roche Cobas c501 Spectrophotometry	Adult Female	< 41	Roche IFU	Unaccredited	
<b>Albumin</b>	g/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 10weeks 2-8°C: 5months -20°C: 4months	24 hours	Roche Cobas c501 Spectrophotometry	Adult	35 - 52	Roche IFU	Unaccredited	
<b>Globulin</b>	g/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Sodium heparin Potassium EDTA Sodium citrate	20-25°C: 10weeks 2-8°C: 5months -20°C: 4months	24 hours	CALCULATION based on Roche Cobas methodologies for Total Protein and Albumin.	Adult	19 - 35	Roche IFU	Unaccredited	<b>FORMULA:</b> (Globulin = Total Protein - Albumin)
<b>Albumin</b>	g/L	Serum: Serum separator Plasma :	20-25°C: 7 days 2-8°C: 7 days -20°C: 3 months	24 hours	Abbott Alinity c Spectrophotometry (Bromocresol Green)	Adults 60 – 90 years > 90 years	35 - 50 32 - 46 29 - 45	Abbott IFU	Unaccredited	
<b>Globulin</b>	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	Unaccredited	<b>FORMULA:</b> (Globulin = Total Protein - Albumin)
<b>Alkaline Phosphatase</b>	U/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 1 day 2-8°C: 7days -20°C: 2months	24 hours	Roche Cobas c501 Spectrophotometry	Adult Male Adult Female	40 - 129 35 - 104	Roche IFU		
<b>Alkaline Phosphatase</b>	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) 16 to 29 years (Female) 22 to 79 years (Male) 30 to 79 years (Female)	56 - 167 44 - 107 50 - 116 46 - 122	Abbott IFU	Unaccredited	
<b>Alpha-1 Antitrypsin A1AT</b>	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	Unaccredited	
<b>Alpha-FetoProtein AFP</b>	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			
<b>Amikacin</b>	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 Severe Infection (Peak) Toxic Levels (Peak)	4 - 8 25 - 35 >35	Abbott IFU	Unaccredited	
<b>Amphetamine/ Methamphetamine - Urine</b>	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	Unaccredited	The Drugs Of Abuse assays (with the exception of ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
<b>Amylase</b>	U/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin	20-25°C: 7days 2-8°C: 1 month	24 hours	Roche Cobas c501 Enzymatic Colorimetric Spectrophotometry	Adult	28 - 100	Roche IFU	Unaccredited	
<b>Amylase</b>		Serum: Serum tubes (with or without gel barrier)	20-25°C: 7 days 2-8°C: 7 days	24 hours	Abbott Alinity c Enzymatic +	Adult > 70 years	25 - 125 20 - 160	Abbott IFU	Unaccredited	

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<b>Angiotensin Converting Enzyme (ACE)</b>	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 Furylacryloylphenylalan ylglycylglycine (FAPGG)	>14 years	8 - 65	Glenbio IFU	Unaccredited	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.
<b>Anti-Mullerian Hormone AMH</b>	pmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin	20-25°C: 3days 2-8°C: 5days -20°C: 6months	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Female 20-24 years Female 25-29 years Female 30-34 years Female 35-39 years Female 40-44 years Female 45-50 years PCOS Women Healthy Men	8.71 - 83.6 6.35 - 70.3 4.11 - 58.0 1.05 - 53.5 0.193 - 39.1 0.071 - 19.3 13.3 - 135 5.5 - 103	Roche IFU	Unaccredited	
<b>Anti-TG</b>	IU/mL	Serum: Serum, Serum separator Plasma: Lithium heparin Potassium EDTA	20-25°C: 8hours 2-8°C: 72 hours -20°C: 30days	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	< 4.11	Abbott IFU	Unaccredited	
<b>Anti-TPO</b>	IU/mL	Serum: Serum, Serum separator Plasma: Lithium heparin Potassium EDTA	20-25°C: 8hours 2-8°C: 72 hours -20°C: 30days	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	< 5.61	Abbott IFU	Unaccredited	
<b>Aspartate Amino Transferase AST</b>	U/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 4days 2-8°C: 7days -20°C: 3months	24 hours	Roche Cobas c501 Spectrophotometry	Adult Male Adult Female	0 - 40 0 - 32	Roche IFU	Unaccredited	Anticoagulants: Citrate and fluoride inhibit the enzyme activity. Drugs: In vitro therapeutic drug interference on the assay was tested according to the recommendations of the Symposium of Drug Effects in Clinical Chemistry Methods (1996). Doxycycline HCl cause artificially low AST values at the tested drug level.
<b>Aspartate Amino transferase AST</b>	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	Unaccredited	
<b>Barbiturates, semiquantitative</b>	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	Unaccredited	The Drugs Of Abuse assays (with the exception of ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
<b>Benzodiazepines semiquantitative</b>	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	Unaccredited	The Drugs Of Abuse assays (with the exception of ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
<b>Beta-2- Microglobulin</b>	mg/L	Plasma Collection tubes Acceptable anticoagulants are: EDTA Sodium heparin	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c Turbidimetric/ Immunoturbidimetry	Adult	0.97 - 2.64	Abbott IFU	Unaccredited	
<b>Beta-HCG, Total</b>	IU/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	2-8°C: 3days -20°C: 1year	24 hours	Roche Cobas e602 Chemiluminescent Microparticle	Adult Male Adult Female	< 2 < 1	Roche IFU	Unaccredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
<b>Beta-HCG, Total</b>	mIU/mL	Serum: Serum, Serum separator Plasma: Dipotassium EDTA, Tripotassium EDTA Lithium heparin Lithium heparin plasma separator Sodium heparin	2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Males and Non-Pregnant Females Pregnancy- Weeks LMP 1-10 11- 15 16 - 22 23 - 40	< 5.0 202 - 231000 22536 - 234990 8007 - 50064 1 600 - 49 413	Abbott IFU	Unaccredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
<b>Bile acid</b>	μmol/L	Serum Plastic tubes (with or without gel barrier) Serum :	20-25°C: 1 day 2-8°C: 7 days	24 hours	Abbott Alinity c Cyclic-enzymatic/ colorimetric	Adult Pregnancy	1.0 - 6.0 1.3 - 9.0	Abbott IFU	Unaccredited	The blood sample must be collected before the administration of Ursodeoxycholic Acid. ideally, sample should be taken after an 8-hour fast.
<b>Bilirubin Total</b>	μmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 1day 2-8°C: 7days -20°C: 6months	24 hours	Roche Cobas c501 Colorimetric, diazo Spectrophotometry	Adult Male Adult Female	0 - 24 0 - 15	Roche IFU	Unaccredited	
<b>Bilirubin Total</b>	μmol/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: 8hours 2-8°C: 7 days -20°C: 3months	24 hours	Abbott Alinity c Spectrophotometry, Diazonium salt	Adult	3.4 - 20.5	Abbott IFU	Unaccredited	

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<b>Bilirubin Direct</b>	µmol/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: 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	Unaccredited	
<b>Bilirubin, Indirect</b>		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	Unaccredited	<b>FORMULA:</b> (Indirect Bilirubin = Total Bilirubin - Direct Bilirubin)
<b>CA 125</b>		Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 8hours 2-8°C: 5days -20°C: 24weeks	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	< 35	Roche IFU	Unaccredited	
<b>CA 125 II</b>	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	Unaccredited	
<b>CA 15-3</b>	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	Unaccredited	
<b>CA 19-9XR</b>	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	Unaccredited	
<b>Calcium</b>	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin	20-25°C:7days 2-8°C: 3weeks -20°C: 8months	24 hours	Roche Cobas c501 Spectrophotometry	Adult	2.15 - 2.55	Roche IFU	Unaccredited	Anticoagulants: Complexing anticoagulants such as citrate, oxalate and EDTA must be avoided.
<b>Calcium, Adjusted</b>	mmol/L	Serum : Serum tubes (with or without gel barrier)  Plasma -Acceptable anticoagulants are: Sodium heparin Potassium EDTA Sodium citrate	20-25°C:7days 2-8°C: 3weeks -20°C: 8months	24 hours	CALCULATION based on Roche Cobas c501 methodologies for Calcium and Albumin. FORMULA:	Adult	2.15 - 2.55	Roche IFU	Unaccredited	<b>FORMULA:</b> Calcium Adjusted = ((40 - Albumin)*0.02) + Calcium))
<b>Calcium</b>	mmol/L	SSerum : Serum tubes (with or without gel barriers)  Plasma - Acceptable anticoagulants: Lithium heparin, Sodium heparin	20-25°C: 7 days 2-8°C: 3 weeks -20°C: 8months	24 hours	Abbott Alinity c Spectrophotometry, Arsenazo III	Adult	2.1 - 2.55	Abbott IFU	Unaccredited	Anticoagulants: Complexing anticoagulants such as citrate, oxalate and EDTA must be avoided.
<b>Calcium, Calculated</b>	mmol/L	Serum : Serum tubes (with or without gel barriers)  Plasma - Acceptable anticoagulants: Lithium heparin, Sodium heparin	20-25°C: 7 days 2-8°C: 3 weeks -20°C: 8months	24 hours	CALCULATION based on Abbott Alinity methodologies for Calcium and Albumin. FORMULA:	Adult	2.1 - 2.55	Abbott IFU	Unaccredited	<b>FORMULA:</b> Calcium Corrected = ((40 - Albumin)*0.02) + Calcium))
<b>Calcium-Urine</b>	mmol/L	Spot Urine	20-25°C: 2 days 2-8°C: 4 days -20°C: 3 weeks	24 hours	Abbott Alinity c Spectrophotometry, Arsenazo III	Adult Male	0.23 to 9.47	Abbott IFU	Unaccredited	
						Adult Female	0.13 to 8.92			
						Calcium-free	0.13 to 1.00			
	mmol/24hr	Timed Specimen (24hours)				Low to average	1.25 to 3.75			
						Average (20 mmol/day)	2.5 to 7.5			
<b>Cannabinoids, semiquantitative</b>	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	Unaccredited	The Drugs Of Abuse assays (with the exception of ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
<b>Carbon Dioxide/ Bicarbonate</b>	mmol/L	Serum : Serum tubes (with or without gel barrier)	20-25°C:2hours 2-8°C: 2 days	24 hours	Abbott Alinity c Spectrophotometry,	Adult > 60 years	22 to 29 23 to 31	Abbott IFU	Unaccredited	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
<b>Carbon Dioxide/ Bicarbonate</b>	mmol/L	Serum : Serum tubes (with or without gel barrier)  Plasma -Acceptable anticoagulants are: Lithium heparin	20-25°C: 2hrs 2-8°C: 7days -20°C: 6months	24 hours	Roche Cobas c501 Spectrophotometry	Adult	22 - 29	Roche IFU	Unaccredited	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.
<b>Carcino Embryonic Antigen CEA</b>	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	Unaccredited	

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<b>Ceruloplasmin</b>	g/L	Serum : Serum tubes  Plasma -Acceptable anticoagulants are: Lithium heparin EDTA	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	Unaccredited	
<b>Chloride</b>	mmol/L	Serum : Serum tubes (with or without gel barrier) Lithium Plasma	20-25°C: 7days 2-8°C: 7days	24 hours	Roche Cobas c501 Indirect ISE	Adult	98 - 107	Roche IFU		Must be seperated ASAP
<b>Chloride</b>	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	Unaccredited	Must be seperated ASAP
<b>Chloride-Urine</b>	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	Adult <60 years Adult >60 years	110 - 250 95 - 195	Abbott IFU	Unaccredited	
	mmol/L	Spot urine (random)		24 hours		No reference range available				
<b>Cholesterol, Total</b>	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 7days 2-8°C: 7days -20°C: 3months	24 hours	Roche Cobas c501 Spectrophotometry	Adult	< 5.0	ESC/EAS Guidelines for the management of dyslipidaemias. <a href="http://www.eas-society.org/guidelines-2.aspx">http://www.eas-society.org/guidelines-2.aspx</a>		Fasting sample required
<b>Cholesterol, Total</b>	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. <a href="http://www.eas-society.org/guidelines-2.aspx">http://www.eas-society.org/guidelines-2.aspx</a>	Unaccredited	Fasting sample required
<b>Cholesterol, LDL</b>	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 7days 2-8°C: 7days -20°C: 3months	24 hours	Roche Cobas c501 Friedewald Equation	Adult	< 3.0	ESC/EAS Guidelines for the management of dyslipidaemias. <a href="http://www.eas-society.org/guidelines-2.aspx">http://www.eas-society.org/guidelines-2.aspx</a>		Fasting sample required.  Desirable level depends on other CVD risk factors
<b>Cholesterol, LDL (Direct)</b>	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. <a href="http://www.eas-society.org/guidelines-2.aspx">http://www.eas-society.org/guidelines-2.aspx</a>	Unaccredited	Fasting sample required.  Separate plasma from red blood cells or gel as soon after collection as possible (within 3hours)
<b>Cholesterol HDL</b>	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 72hours 2-8°C: 7days	24 hours	Roche Cobas c501 Spectrophotometry	Adult Male Adult Female	> 1.0 > 1.2	Roche IFU		Fasting sample required.
<b>Cholesterol, Ultra HDL</b>	mmol/L	Serum : Serum tubes (with or without gel barrier)  Plasma Collection tubes Acceptable anticoagulants are: Lithium heparin, Sodium heparin, EDTA	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	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 <a href="http://www.eas-society.org/guidelines-2.aspx">http://www.eas-society.org/guidelines-2.aspx</a>	Unaccredited	Fasting sample required.
<b>Cholesterol, Non HDL</b>	mmol/L	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 Roche Cobas c501 methodologies for Total Cholesterol, HDL Cholesterol.	Adult	< 4.0	Roche IFU	Unaccredited	Fasting sample required.  <b>FORMULA:</b> (Non-HDL Cholesterol = Total Cholesterol - HDL Cholesterol)
<b>Cocaine, semiquantitative</b>	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	Unaccredited	The Drugs Of Abuse assays (with the exception of ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
<b>Complement C3</b>	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	Unaccredited	
						Adult Female 14 - 80 years	0.83 - 1.93			
		Serum : Serum tubes (with or without gel barrier)	2-8°C: 2 days		Abbott Alinity c	Adult Male 14 - 80 years	0.15 - 0.53			

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Complement C4	g/L	Plasma - Acceptable anticoagulants are: Lithium heparin (with or without gel barrier) Sodium heparin EDTA	-20°C: 2 days	24 hours	Immunoturbidimetry	Adult Female 14 - 80 years	0.15 - 0.57	Abbott IFU	Unaccredited	
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 Afternoon Approx. half the morning values In the evaluation of Adrenal Highly Unlikely Virtually Diagnostic Evening 24H00: In the Virtually excludes Highly suggestive	171 - 800 >550 <138 <138 <207	Blood: Handbook of Diagnostic Endocrinology, 2nd Edition, 2008. William E Winter & al. AAC Press	Unaccredited	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.
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	Unaccredited	
C-peptide	ug/L	Serum: Serum, Serum separator. Plasma: Potassium EDTA, Lithium heparin, Sodium heparin, Ammonium 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) Adult (post-prandial)	0.80-5.20 2.0 - 9.0	Abbott IFU	Unaccredited	Overnight fast.
C-Reactive Protein CRP	mg/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 14days 2-8°C: 3 weeks -20°C: 12 months	24 hours	Roche Cobas c501 Particle enhanced immunoturbidimetry	Adult	< 5.0	Roche IFU	Unaccredited	
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 Lowest relative CVD risk Average relative CVD risk Highest relative CVD risk	< 5.0 < 1.0 1.0 - 3.0 > 3.0	Pearson TA et al, Circulation 2003; 107:499-511	Unaccredited	
C-Reactive Protein - High Sensitivity	mg/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 11days 2-8°C: 2months -20°C: 3years	24 hours	Roche Cobas c501 Particle enhanced immunoturbidimetry	Adult	< 5.0	Roche IFU	Unaccredited	
Creatine Kinase CK	U/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 2days 2-8°C: 7days -20°C: 4weeks	24 hours	Roche Cobas c501 Spectrophotometry	Adult Male Adult Female	0 - 190 0 - 170	Roche IFU	Unaccredited	
Creatine kinase CK	U/L	Serum Serum tubes (with or without gel barrier) Plasma - Acceptable anticoagulants:	20-25°C: 2 days 2-8°C: 7 days	24 hours	Abbott Alinity c, NAC (N-Acetyl-L-Cysteine)	Adult Male Adult Female	30 - 200 29 - 168	Abbott IFU	Unaccredited	
Creatinine (Jaffe)	μmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 7days 2-8°C: 7days -20°C: 3 months	24 hours	Roche Cobas c501 Jaffe Spectrophotometry	Adult Male Adult Female	62 - 106 44 - 80	Roche IFU	Unaccredited	
Creatinine (Enzymatic)	μmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 7days 2-8°C: 7days -20°C: 3 months	24 hours	Roche Cobas c501 Enzymatic Colorimetric Spectrophotometry	Adult Male Adult Female	45 - 84 59 - 104	Roche IFU	Unaccredited	
Creatinine Enzymatic	μmol/L	Serum Serum tubes (with or without gel barrier)	20-25°C: 7 days 2-8°C: 7 days -20°C: 3 months	24 hours	Abbott Alinity c, Enzymatic	Adult Male Adult Female	64 - 104 49 - 90	Abbott IFU	Unaccredited	
Creatinine Enzymatic -Urine	mmol/ 24hr g/L	Urine -Timed specimens collected over intervals shorter than 24 hours Urine (random/spotspecimens) Clean plastic or glass container without preservatives	20-25°C: 2 days 2-8°C: 6 days -20°C: 6 months	24 hours	Abbott Alinity c, Enzymatic	Adult Male Adult Female Adult Male Adult Female	7.7 - 21.3 5.9 - 14.1 5.1 - 14.2 3.9 - 9.4	Abbott IFU	Unaccredited	
EGFR		Serum Serum tubes (with or without gel barrier)	20-25°C: 7 days 2-8°C: 7 days -20°C: 3 months	24 hours	CALCULATION based on Creatinine methodology and	Adult Male Adult Female Male: 19Y Male: 24Y Male: 34Y Male: 44Y Male: 54Y Male: 64Y Male: >64 Female: 19Y	> 90: Normal 60 - 89: Normal or Stage 2 CKD 1.2 -10.4 6.5 -14.6 4.6 -16.1 3.8 -13.1 3.7 -12.1 1.3 -9.8 6.2 -7.7 1.7 -13.4	<a href="https://kdigo.org/">https://kdigo.org/</a>		FORMULA: EGFR= ((Creatinine^1.154)*32788)^1) / (Age ^0.203) FORMULA: EGFR= ((Creatinine^1.154)*32788)^* 0.742)*1) / (Age ^0.203)

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<b>DHEA-S</b>	µmol/L	Serum, Serum separator. Plasma: Potassium EDTA, Sodium citrate Sodium heparin	2-8°C: 8days -20°C: longer	24 hours	Chemiluminescent Microparticle Immunoassay (CMIA)	Female: 24Y Female: 34Y Female: 44Y Female: 54Y Female: 64Y Female: >64	3.6 -11.1 2.6 -13.9 2 -11.1 1.5 -7.7 0.8 -4.9 0.9 -2.1	Abbott IFU	Unaccredited	
<b>Digoxin</b>	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 associated with toxicity  >2	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.)	Unaccredited	
<b>Ecstasy, semiquantitative</b>	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	Unaccredited	The Drugs Of Abuse assays (with the exception of ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
<b>EDDP Methadone Metabolite</b>	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	Unaccredited	The Drugs Of Abuse assays (with the exception of ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
<b>Estradiol</b>	pmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 1day 2-8°C: 2days -20°C: 6months	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Follicular phase: Ovulatory phase: Luteal phase: Post- menopaus al: Male	114 - 332 222-1959 222-854 <505 41 - 159	Roche IFU	Unaccredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
<b>Estradiol</b>	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 Mid Cycle phase Luteal phase Post- meno pausal no HRT Post- meno pausal on HRT Male	77 – 922 140 – 2383 77 – 1145 < 103 < 529 40 – 161	Abbott IFU	Unaccredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
<b>Ethanol</b>	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	Unaccredited	The Drugs Of Abuse assays (with the exception of ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
<b>Faecal Immunochemical Test (FIT)</b>	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 NSS Bowel Screen Normal Range Cut- off	<100 <225	BowelScreen Guidelines for Quality Assurance in Colorectal Screening, Second Edition, Published 2017, ISBN 978-1- 907487-26-2	Accredited	
<b>Ferritin</b>	µg/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 8days 2-8°C: 8days -20°C: 6months	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Adult Male Adult Female	30 - 400 13 - 150	Roche IFU	Unaccredited	
<b>Ferritin</b>	ng/mL	Serum: Serum, Serum separator Plasma: Tripotassium EDTA, Lithium	2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity i Chemiluminescent Microparticle	Adult Male Adult Female	22 - 275 5 - 204	Abbott IFU	Unaccredited	
<b>Folate</b>	µg/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin	20-25°C: 2hours 2-8°C: 48hours -20°C: 28days	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Adult Male Adult Female	4.4 - 31.0 5.6 - 45.8	Roche IFU	Unaccredited	Protect from light



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<b>Folate</b>	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	Unaccredited	Protect from light
<b>Free T3</b>	pmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	2-8°C: 7days -20°C: 30days	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	3.1 - 6.8	Roche IFU	Unaccredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
<b>Free T3</b>	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	Unaccredited	
<b>Free T4</b>	pmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 5days 2-8°C: 7days -20°C: 30 days	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	12 - 22	Roche IFU	Unaccredited	
<b>Free T4</b>	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	Unaccredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
<b>Follicle Stimulating Hormone FSH</b>	IU/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 5days 2-8°C: 14days -20°C: 6months	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Follicular phase:	3.5 - 12.5	Roche IFU	Unaccredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
						Ovulatory phase:	4.7 - 21.5			
						Luteal phase:	1.7 - 7.7			
						Post-meno pausal:	25.8- 134.8			
<b>Follicle Stimulating Hormone FSH</b>	IU/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)	Male	1.5 - 12.4	Abbott IFU	Unaccredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
						Follicular phase:	3.0 - 8.1			
						Mid Cycle phase:	2.6 - 16.7			
						Luteal phase:	1.4 - 5.5			
<b>Gamma-Glutamyl Transferase</b>	U/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants:	20-25°C: 7days 2-8°C: 7days -20°C: 1year	24 hours	Roche Cobas c501 Spectrophotometry	Adult Male	8 - 61	Roche IFU	Unaccredited	
<b>Gamma-Glutamyl Transferase</b>	U/L	Serum Serum separator	20-25°C: 7 days 2-8°C: 7 days	24 hours	Abbott Alinity c, L- Gammaglutamyl-3-	Male	< 55	Abbott IFU	Unaccredited	
<b>Gentamicin</b>	mg/L	Serum : Serum tubes (with or without gel barrier)  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)	Trough (Less Severe Infection)	<1	Abbott IFU	Unaccredited	Please include dose regime (dose and frequency of administration, and timing of sampling (trough and/or peak)).
						Trough (Severe Infection)	<2 - 4			
						Peak (Less Severe Infection)	5 - 8			
						Peak (Severe Infection)	8 - 10			
						Toxic Levels	>10 - 12			
<b>Glucose</b>	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.	Unaccredited	Fasting sample required.
<b>Glucose</b>	mmol/L	Plasma -Acceptable anticoagulants are: Sodium Fluoride Potassium Oxalate Sodium Fluoride/K <sub>2</sub> EDTA	20-25°C: 72hours 2-8°C: 72hours	24 hours	Roche Cobas c501 Hexokinase/G-6-PDH	Adult, fasting	3.9 - 5.5	ICGP A practical Guide to integrated Type II Diabetes Care-2016	Unaccredited	Fasting status required.
						Adult, random	< 7.8			

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<b>Haemoglobin A1c (HbA1c)</b>	mmol/mol	Whole Blood- Acceptable anticoagulants are: Lithium heparin Potassium EDTA Fluoride/Na2-EDTA Sodium-Heparin Fluoride/potassium oxalate	20-25°C: 3days 2-8°C: 7days -20°C: 6months	24 hours	Roche Cobas c501 Turbidimetric inhibition immunoassay (TINIA)	Adult	20 - 42	<a href="http://www.diabetes.org.uk/About-us/What-we-say/Diagnosis-prevention/New-diagnostic-criteria-for-diabetes/">http://www.diabetes.org.uk/About-us/What-we-say/Diagnosis-prevention/New-diagnostic-criteria-for-diabetes/</a>		For the diagnosis of diabetes using HbA1c, a cut off of 48 mmol/mol is recommended by the World Health Organisation
<b>Homocysteine</b>	µmol/L	Serum: Serum, Serum separator Plasma: Lithium heparin, Potassium EDTA	<b>ON ICE:</b> 6hours 2-8°C: 14 days -20°C: 1 year	24 hours	Abbott Alinity i Chemiluminescent Microparticle	Adult Male Adult Female	5.5 - 16.2 4.4 - 13.6	Abbott IFU	Unaccredited	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.
<b>Immunoglobulin IgA</b>	g/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: 7 days 2-8°C: 7 days -20°C: 6 months	24 hours	Abbott Alinity c, Immuno turbidimetric	Male 12 to 60 years Female 12 to 60 years Male > 60 years Female > 60 years	0.63 - 4.84 0.65 to 4.21 1.01 to 6.45 0.69 to 5.17	Abbott IFU	Unaccredited	
<b>Immunoglobulin IgE</b>	IU/mL	Serum: Serum tubes  Plasma -Acceptable anticoagulants are: Sodium heparin, Lithium heparin, Sodium EDTA Potassium EDTA, Sodium citrate	2-8°C: 2 days	24 hours	Abbott Alinity c, Immuno turbidimetric	Adults	< 100 IU/mL	Abbott IFU	Unaccredited	
<b>Immunoglobulin IgG</b>	g/L	Serum : Serum tubes (with or without gel barrier)  Plasma -Acceptable anticoagulants are: Lithium heparin (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 Female 2 to 80 years	5.4 - 18.22 5.52 - 16.31	Abbott IFU	Unaccredited	
<b>Immunoglobulin IgM</b>	g/L	Serum : Serum tubes (with or without gel barrier)  Plasma -Acceptable anticoagulants are:	20-25°C: 7 days 2-8°C: 7 days -20°C: 6 months	24 hours	Abbott Alinity c, Immuno turbidimetric	Male >12years Female >12years	0.22 - 2.40 0.33 - 2.93	Abbott IFU	Unaccredited	0.22 - 2.40
<b>Insulin</b>	mIU/L	Serum: Serum, Serum separator Plasma: Potassium EDTA	-20°C: 7 days	24 hours	Abbott Alinity i Chemiluminescent Microparticle	Fasting Post-prandial	3.4 - 19.6 3.0 - 50.0	Williams Textbook of Endocrinology 13th edition 2015	Unaccredited	Overnight fast. Provide fresh samples if possible. NB: please note that insulin is unstable in whole blood.
<b>Intact Parathyroid Hormone PTH</b>	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	Unaccredited	Fasting sample required.
<b>Iron</b>	µmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin	20-25°C: 7days 2-8°C: 3weeks -20°C: >1year	24 hours	Roche Cobas c501 Spectrophotometry	Adult	5.8 - 34.5	Roche IFU	Unaccredited	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.
<b>Iron</b>	µmol/L	Serum : Serum separator  Plasma -Acceptable anticoagulants are:	20-25°C: 10hours 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Ferene	Adult (Female) Adult (Male)	9.0 - 30.4 11.6 – 31.3	Abbott IFU	Unaccredited	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.
<b>Lactate Dehydrogenase LDH</b>	U/L	Serum : Serum tubes (with or without gel barrier)  Plasma -Acceptable anticoagulants are: Lithium heparin	20-25°C: 7days 2-8°C: 4days -20°C: 6weeks	24 hours	Roche Cobas c501 Spectrophotometry, UV assay- LDH catalyses conversion of Lactate to Pyruvate	Adult	0 - 250	Roche IFU	Unaccredited	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.
<b>Lactate Dehydrogenase LDH</b>	U/L	Serum: Serum separator .  Plasma: Lithium heparin Lithium heparin separator Sodium heparin	20-25°C: 3 days 2-8°C: 3 days -20°C: 8 weeks	24 hours	Abbott Alinity c, Oxidation of Lactate to Pyruvate	Adult	125 - 220	Abbott IFU	Unaccredited	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.
<b>Lipase</b>	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	Unaccredited	
<b>Lipoprotein [a]</b>	g/L	Serum: Serum tubes  Plasma- Acceptable anticoagulants: Sodium EDTA, Potassium EDTA, Lithium heparin, Sodium heparin, Citrate Gel separator tubes were not tested.	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Turbidimetric/ Immunturbidimetric	Adult	<500 Values above 0.500 g/L are associated with an increased risk of athero- sclerosis.	European Atherosclerosis Society Consensus Position Paper (Lipoprotein(a) as a cardiovascular risk factor: current status. Eur Heart J (2010) doi: 10.1093/eurheartj/ehq386)	Unaccredited	

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<b>Lithium</b>	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Plasma EDTA	20-25°C: 1 day 2-8°C: 7days -20°C: 6months	24 hours	Roche Cobas c501 Colorimetric	Adult Therapeutic Range Adult Toxicity Range	0.6 - 1.2 > 2.0	Roche IFU	Unaccredited	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.
<b>Lithium</b>	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: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Colorimetric Method	Immediate-release formulations  Slow-release formulations	0.5 - 0.8 12hours after last dose  0.8 - 1.20 12hours after last dose  0.5 - 0.8 immediately before next dose	<a href="https://www.nice.org.uk/guidan&lt;br/&gt;ce/cg185/resources/bipolar-&lt;br/&gt;disorder-assessment-and-&lt;br/&gt;management-&lt;br/&gt;35109814379461">https://www.nice.org.uk/guidan ce/cg185/resources/bipolar- disorder-assessment-and- management- 35109814379461</a>	Unaccredited	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.
<b>Luteinizing Hormone LH</b>	IU/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 5days 2-8°C: 14days -20°C: 6months	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Follicular phase: Mid-Cycle Luteal phase: Post- menopaus e: Male	2.4 - 12.6 14.0 - 95.6 1.0 - 11.4 7.7 - 58.5 1.7 - 8.6	Roche IFU	Unaccredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
<b>Luteinizing Hormone LH</b>	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 Mid Cycle phase Luteal phase Post Meno pause Male	1.8 - 11.8 7.6 - 89.1 0.6 - 14.0 5.2 - 62 0.6 - 12.1	Abbott IFU	Unaccredited	In patients receiving therapy with high biotin doses no sample should be taken until at least 8 hours after the last biotin administration.
<b>Magnesium</b>	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin	20-25°C: 7days 2-8°C: 7days -20°C: 1year	24 hours	Roche Cobas c501 Spectrophotometry, colorimetric end-point assay	Adult <60years 60 - 90 years >90 years	0.66 - 1.07 0.66 - 0.99 0.70 - 0.95	Roche IFU	Unaccredited	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.
<b>Magnesium</b>	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: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Enzymatic	Adult	0.66 - 1.07	Abbott IFU	Unaccredited	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.
<b>Magnesium-Urine</b>	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: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Enzymatic	Adult	3.00 – 5.00	Abbott IFU	Unaccredited	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.
<b>Methadone, semiquantitative</b>	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	Unaccredited	The Drugs Of Abuse assays (with the exception of ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
<b>Microalbumin - Urine</b>	mg/mmol	Urine spot/ timed/24hr: Clean, unused plastic or glass container with preservatives	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Turbidimetric/ Immunturbidimetric	ACR (Albumin/ Creatinine Ratio):	<3.0	NICE Guideline NG203, August 2021	Unaccredited	
<b>Albumin/ Creatinine Ratio (ACR)</b>		Urine spot/ timed/24hr: Clean, unused plastic or glass container with preservatives	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	CALCULATION based on Abbott Alinity methodologies for Microalbumin and Urinary creatinine.	ACR (Albumin/ Creatinine Ratio):	<3.0	NICE Guideline NG203, August 2021	Unaccredited	<b>FORMULA:</b> ACR = Microalbumin / Urinary creatinine
<b>NT-pro BNP</b>	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 Adults >75 years	< 125.0 < 450.0	Abbott IFU	Unaccredited	
<b>Opiates, semiquantitative</b>	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	Unaccredited	The Drugs Of Abuse assays (with the exception of ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.
<b>Osmolality</b>	mOsm/kg	Serum: Serum, Serum separator Plasma: Potassium EDTA, Lithium heparin  Urine Clean plastic or glass container	20-25°C:3hours 2-8°C: 1 day -20°C: 30days  20-25°C: 3 days 2-8°C: 6 days -20°C: 30days	24 hours	Genotech Osmometer, Freezing-point depression osmometry	Adult	280 - 298  50 - 1200	Clinical Chemistry 44: 1582, 1998  Wu, A.H.B. ed: Tietz Clinical Guide to Laboratory Tests 4th Edition, Saunders 2006	Unaccredited	
<b>Phenytoin</b>	µg/mL	Serum Serum tubes (with or without gel barrier)	20-25°C: 7 days 2-8°C: 7 days	24 hours	Abbott Alinity c, Enzyme immunoassay	Adult Toxicity	10.0 - 20.0 ≥ 20.0	Abbott IFU	Unaccredited	

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Phosphate	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 24hours 2-8°C: 4days -20°C: 1year	24 hours	Roche Cobas c501 Spectrophotometry, Molybdate UV assay	Adult	0.81 - 1.45	Roche IFU	Unaccredited	Serum with any visible hemolysis cannot be used because of the large amount of phosphate released from the erythrocytes. 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.
Phosphate	mmol/L	Serum: Serum tubes (with or without gel barrier) Plasma-Acceptable anticoagulants: Lithium heparin Sodium heparin	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Spectrophotometry, Phosphomolybdate	Adult	0.74 - 1.52	Abbott IFU	Unaccredited	Serum with any visible hemolysis cannot be used because of the large amount of phosphate released from the erythrocytes. 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.
Phosphate- Urine	mmol/ 24hr	Urine (24 hour) Clean plastic or glass container with preservatives.	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Spectrophotometry, Phosphomolybdate	Adult	12.9 - 42.0	Abbott IFU	Unaccredited	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				No reference range available				
Potassium	mmol/L	Serum : Serum tubes (with or without gel barrier) Lithium Plasma	20-25°C:14days 2-8°C: 14days	24 hours	Roche Cobas c501 Indirect ISE	Adult	3.5 - 5.1 (serum) 3.4 - 4.5 (plasma)	Roche IFU	Unaccredited	Must be separated ASAP. Unseparated samples >2hours old are unsuitable for analysis. Haemolyzed specimens must not be used.
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	Unaccredited	Must be separated ASAP. Unseparated samples >2hours old are unsuitable for analysis. Haemolyzed specimens must not be used.
Potassium-Urine	mmol/ 24hr	Urine (24- hour) Without preservatives	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Indirect ISE	Adult	25 - 125	Abbott IFU	Unaccredited	
Progesterone	nmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 1day 2-8°C: 5days -20°C: 6months	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Follicular phase:	< 0.62	Roche IFU	Unaccredited	
						Ovulatory phase:	0.18 - 13.2			
						Luteal phase:	13.1 - 46.3			
						Post-meno pausal:	0.16 - 0.40			
						Male	0.16 - 0.47			
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)	Follicular Phase	< 0.95	Abbott IFU	Unaccredited	
						Luteal Phase	3.8 - 51			
						Post Meno pausal	< 0.63			
						1st Trimester	8.9 - 468			
						2nd Trimester	72 - 303			
						3rd Trimester	89 - 771			
						Male	< 0.63 nmol/L			
						Adult Male	86 - 324			
Prolactin	mIU/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 5days 2-8°C: 14days -20°C: 6months	24 hours	Roche Cobas e602 Chemiluminescent Microparticle	Adult Male	102 - 496	Roche IFU	Unaccredited	
Prolactin, Bioactive	mIU/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 5days 2-8°C: 14days -20°C: 6months	24 hours	CALCULATION based on Roche Cobas e602 methodology for	Adult Male	63 - 245	Roche IFU	Unaccredited	FORMULA: (Prolactin post-PEG / Total Prolactin)*100 Bioactive Prolactin is performed on Prolactin results above the normal range
						Adult Female	75 - 381			
Prolactin	uIU/ml	Serum: Serum, Serum separator Plasma:	2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity i Chemiluminescent Microparticle	Adult Female	109 - 557	Abbott IFU	Unaccredited	
Prolactin, Macroprolactin	mIU/L	Serum: Serum, Serum separator Plasma:	22-8°C: 7 days -20°C: 1 year	24 hours	CALCULATION based on Abbott Alinity methodology for	Adult Male	73 -407	Abbott IFU	Unaccredited	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
						Adult Female	79 - 347			
Rheumatoid Factor RF	IU/MI	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 1day 2-8°C: 8days -20°C: 3months	24 hours	Roche Cobas c501 Immunoturbidimetry	Negative	<14	Roche IFU	Unaccredited	
Rheumatoid Factor RF	IU/mL	Serum Serum tubes	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Immuno turbidimetric	Negative:	<30	Abbott IFU	Unaccredited	

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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	Unaccredited	
						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) Lithium Plasma	20-25°C: 14days 2-8°C: 14days	24 hours	Roche Cobas c501 Indirect ISE	Adult	136 - 145	Roche IFU	Unaccredited	Must be seperated ASAP
Sodium	mmol/L	Serum : Serum tubes (with or without gel barrier)  Plasma Collection tubes Acceptable anticoagulants are: Lithium 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	Unaccredited	Must be seperated ASAP
Sodium (Urine)	mmol/24hr	Spot Urine (random) Without preservatives	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Indirect ISE	Adult Male	40 - 220	Abbott IFU	Unaccredited	
	mmol/L	Urine (random; 24- hour)		24 hours		Adult Female	27 - 287			
						No reference range available				
Tacrolimus	ug/L	Whole Blood: EDTA	2-8°C: 8 days -20°C: 6months	24 hours	Abbott Alinity I, Manual Pre-treatment precipitation. Chemiluminescent Microparticle Immunoassay (CMIA)	Target 24hr trough levels	5 - 20	Consensus document: therapeutic monitoring of tacrolimus (FK-206). Ther Drug Monit 995; 17(6): 606 - 14.	Unaccredited	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 tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	2-8°C: 7days -20°C: 6months	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Adult Male 18 - 49 years	8.64 - 29.0	Roche IFU	Unaccredited	
						Adult Male >50 years	6.68 - 25.7			
						Adult Female 20- 49 years	0.29 - 1.67			
						Adult Female >50 years	0.101 - 1.42			
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	Unaccredited	
						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	Unaccredited	FORMULA: Free Androgen Index = (Testosterone*100) / SHBG
						Female (Pre-meno pausal):	0.5 - 7.3			
						Female (Post-meno pausal):	0.6 - 8.0			
Theophylline	mg/L	Serum: Serum tubes (with or without gel barrier)	20-25°C: 7 days 2-8°C: 7 days	24 hours	Abbott Alinity c, Enzyme Immunoassay	Adult	8 - 20	Abbott IFU	Unaccredited	Trough sample required.
Thyroid Stimulating Hormone TSH	mIU/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 8days 2-8°C: 14days -20°C: 2years	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	0.27 - 4.2	Roche IFU	Unaccredited	
Thyroid Stimulating Hormone TSH	mIU/L	Serum: Serum, Serum separator Plasma: Potassium EDTA Sodium heparin Lithium heparin	2-8°C: 7 days -20°C: 6months	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	0.35 - 4.94	Abbott IFU	Unaccredited	

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<b>Thyroxine (TT4)</b>	nmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA Sodium Citrate	2-8°C: 1week -20°C: 30days	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	66 - 181	Roche IFU	Unaccredited	
<b>Thyroxine (TT4)</b>	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	Unaccredited	
<b>Total Prostate Specific Antigen PSA</b>	µg/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 1day 2-8°C: 5days -20°C: 24weeks	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Adult Male <50 years Adult Male 50 - 59 years Adult Male 60 - 69 years Adult Male >70 years	< 2.0 < 3.0 < 4.0 < 5.0	NCCP Prostate Cancer GP Referral Guideline v 5 2018	Unaccredited	Do not take sample within 1 week of digital rectal examination, or 6 weeks after prostate biopsy..
<b>Total Prostate Specific Antigen PSA</b>	µg/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 1day 2-8°C: 5days -20°C: 24weeks	24 hours	Abbott Alinity i Chemiluminescent Microparticle Immunoassay (CMIA)	Adult Male <50 years Adult Male 50 - 59 years Adult Male 60 - 69 years Adult Male >70 years	< 2.0 < 3.0 < 4.0 < 5.0	NCCP Prostate Cancer GP Referral Guideline v 5 2018	Unaccredited	Do not take sample within 1 week of digital rectal examination, or 6 weeks after prostate biopsy..
<b>Total Protein</b>	g/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA Sodium citrate Flouride Oxalate	20-25°C: 6days 2-8°C: 4weeks -20°C: 1year	24 hours	Roche Cobas c501 Colorimetric, Spectrophotometry	Adult	60 - 80	Roche IFU	Unaccredited	
<b>Total Protein</b>	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: 1 year	24 hours	Abbott Alinity c, Biuret Reaction	Adult, ambulatory	64 - 83	Abbott IFU	Unaccredited	
<b>Total T3</b>	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	Unaccredited	0.35 - 1.93
<b>Transferrin</b>	g/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin	20-25°C: 8days 2-8°C: 8days -20°C: 6months	24 hours	Roche Cobas c501 Immunoturbidimetry	Adult	2.0 - 3.6	Roche IFU	Unaccredited	
<b>Transferrin Saturation</b>	%	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin	20-25°C: 7days 2-8°C: 3weeks -20°C: >1year	24 hours	CALCULATION based on Roche Cobas methodologies for Iron and UIBC (Latent capacity)	Adult	16 - 45	Roche IFU	Unaccredited	<b>FORMULA:</b> Transferrin Saturation = ((Iron/ TIBC)*100)
<b>Transferrin</b>	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: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Immuno turbidimetric	Male 14 to 60 Years Female 14 to 60 Years Male 60 to 80 Years Female 60 to 80 Years	1.74 - 3.64 1.80 - 3.64 1.63 - 3.44 1.73 - 3.60	Abbott IFU	Unaccredited	
<b>Transferrin Saturation</b>	%	Serum : Serum tubes (with or without gel barrier)	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	CALCULATION based on Abbott Alinity methodologies for Iron	Male Adult Female Adult	20.0 - 50.0 15.0 -50.0	Abbott IFU	Unaccredited	<b>FORMULA:</b> Transferrin Saturation = ((Iron*100) / (Iron + UIBC))
<b>Tricyclic Antidepressant (TCA)</b>	ng/ml	Urine Clean plastic or glass container	2-8°C: 5 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 ALC and UCRD) are screening tests which provide preliminary positive or negative results. If clinically indicated, confirmation by GCMS is available on request.

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<b>Triglyceride</b>	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: 1 year	24 hours	Abbott Alinity c, Glycerinphosphate oxidase	Adult (ideal, fasting)	0.6 - 1.7	European Guidelines. <a href="http://www.eas-society.org/guidelines-2.aspx">http://www.eas-society.org/guidelines-2.aspx</a>	Unaccredited	Fasting sample required.
<b>Triglyceride</b>	mmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 2days 2-8°C: 10days -20°C: 3months	24 hours	Roche Cobas c501 Enzymatic Colorimetric Spectrophotometry	Adult (ideal, fasting)	< 1.7	Roche IFU	Unaccredited	Fasting sample required.
<b>Troponin-I, STAT high sensitive</b>	pg/mL	Serum: Serum with and without separator Serum with thrombin-based clot activator	20-25°C: 8hrs 2-8°C: 24hours	24 hours	Abbott Alinity i Chemiluminescent	Male Female	< 34 < 16	Abbott IFU	Unaccredited	
<b>Total Iron Binding Capacity (TIBC)</b>		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	Unaccredited	<b>Formula:</b> TIBC = Iron + UIBC (LC)
<b>Total Iron Binding Capacity (TIBC)</b>		Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin	20-25°C: 4days 2-8°C: 7days	24 hours	CALCULATION based on Roche Cobas methodologies for Iron and UIBC (Latent capacity)	Adult	41.0 - 77.0	Roche IFU	Unaccredited	<b>Formula:</b> TIBC = Iron + UIBC (LC)
<b>Unsaturated Iron Binding Capacity</b>	µmol/L	Serum : Serum tubes (with or without gel barrier)	20-25°C: 7 days 2-8°C: 7 days	24 hours	Abbott Alinity c, Ferene	Male Female	12.4 - 43.0 12.5 - 55.5	Abbott IFU	Unaccredited	Specimen should be collected in the morning to avoid low results due to diurnal variation. Drugs: Methylodopa and oxytetracycline cause artificially high UIBC values.
<b>Unsaturated Iron Binding Capacity UIBC</b>	µmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 4days 2-8°C: 7days	24 hours	Roche Cobas c501 Spectrophotometry	Adult Male Adult Female	22.3 - 61.7 24.2 - 70.1	Roche IFU	Unaccredited	Specimen should be collected in the morning to avoid low results due to diurnal variation. Drugs: Methylodopa and oxytetracycline cause artificially high UIBC values. Other: Pathologically high levels of albumin (7 g/l) decrease the apparent UIBC value
<b>Urea</b>	mmol/L	Serum : Serum tubes (with or without gel barrier)  Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 7days 2-8°C: 7days -20°C: 1 year	24 hours	Roche Cobas c501 Enzymatic Colorimetric Spectrophotometry	Adult	2.8 - 8.1	Roche IFU		
<b>Urea</b>	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	Unaccredited	
<b>Urea - Urine</b>	mmol/ 24hr	Urine (24 hour) Clean plastic or glass container with or without preservatives	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Urease	Adult	428 - 714	Abbott IFU	Unaccredited	
	mmol/L	Spot urine (random)		24 hours		No reference range available				
<b>Uric Acid</b>	µmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are:	20-25°C: 3days 2-8°C: 7days -20°C: 6months	24 hours	Roche Cobas c501 Enzymatic Colorimetric Spectrophotometry	Adult Male Adult Female	202 - 416 143 - 339	Roche IFU		
<b>Uric acid</b>	µmol/L	Serum: Serum tubes Serum separator tubes Plasma Lithium heparin tubes	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Uricase	Male 13-79 years Female 13- 79 years	220 - 450 150 - 370	Abbott IFU	Unaccredited	
<b>Uric acid - Urine</b>	µmol/ 24hr	Urine (24 hour) Clean plastic or with or without preservatives.				Male (Purine Free Diet) Female (Purine Free Diet) Male (Low Purine Diet)	<2480 slightly lower < 2830	Abbott IFU	Unaccredited	
	µmol / 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: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Uricase	Female (Low Purine Diet)  High Purine Diet Average Diet	< 2360  < 5900 1480 - 4430			
<b>Urine Protein</b>	mg/24hr	Urine (24hr/timed). Clean plastic or glass container without preservatives.	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Benzethonium chloride	Adult	0 - 300	Abbott IFU	Unaccredited	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.

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CLINICAL CHEMISTRY**

<b>Urinary Protein/ Creatinine Ratio</b>		Urine (24hr/timed). Clean plastic or glass container without preservatives.	20-25°C: 2 days 2-8°C: 6 days -20°C: 6 months	24 hours	CALCULATION based on Abbott Alinity methodologies for urinary protein and urinary creatinine					<b>Formula:</b> Protein: Creatinine = Urinary Protein / Urinary Creatinine
<b>Urinary Ph (DOA)</b>		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	Unaccredited	
<b>Urinary Creatinine (DOA)</b>	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 integrity questionable	> 2.0 0.5 - 2.0 < 0.5	EWDTs guidelines 2004	Unaccredited	
<b>Valproic acid</b>	µg/mL	Serum : Serum tubes (with or without gel barrier) Plasma-Acceptable anticoagulants: Lithium heparin, Sodium heparin Potassium EDTA, Sodium citrate Sodium fluoride	20-25°C: 7 days 2-8°C: 7 days -20°C: 1 year	24 hours	Abbott Alinity c, Particle-enhanced turbidimetric inhibition immunoassay (PETINIA)	Adult	50 - 100	Abbott IFU	Unaccredited	
<b>Vancomycin</b>	µg/mL	Serum : Serum tubes (with or without gel barrier)	20-25°C: 7 days 2-8°C: 7 days	24 hours	Abbott Alinity c	Trough: Peak:	5 - 20 20 - 40	Therapeutic monitoring of vancomycin in adult patients	Unaccredited	A trough level of 15 - 20 µg/mL is recommended for certain infections: treatment of MRSA.
<b>Vitamin B12</b>	ng/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 2hours 2-8°C: 48hours -20°C: 56days	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Adult	197 - 771	Roche IFU	Unaccredited	Fasting sample recommended.
<b>Vitamin B12</b>	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	187-883	Abbott IFU	Unaccredited	Fasting sample recommended.
<b>Vitamin D 25Oh</b>	nmol/L	Serum : Serum tubes (with or without gel barrier) Plasma -Acceptable anticoagulants are: Lithium heparin Potassium EDTA	20-25°C: 8hours 2-8°C: 4days -20°C: 24weeks	24 hours	Roche Cobas e602 Chemiluminescent Microparticle Immunoassay (CMIA)	Adult 25-OH-VITAMIN D CUTOFFS Increased risk of deficiency Increased risk of inadequacy Adequacy Increased risk of excess:	30 - 125 < 30 < 40 > 50 > 125	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.		
<b>Vitamin D, 25-OH</b>	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 Increased risk of deficiency Increased risk of inadequacy Adequacy Increased risk of excess:	30 - 125 < 30 < 40 > 50 > 125	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.	Unaccredited	