

**Oxford University Hospitals  
Department of Clinical Biochemistry  
Reference Ranges for common analytes**

The following reference data provides guidance to clinicians; however additional advice can be obtained through discussion with the Duty Biochemist on bleep 1718. For information regarding order of draw/tube colour guides, pre-analytical variables, interferences / cross-reactivity or further interpretative guidance please refer to our webpage: (<https://www.ouh.nhs.uk/biochemistry/default.aspx>).

Analyte	Reference Range	Sampling
<b>25-hydroxyvitamin D</b>	<p><u>Oxford Adult 25-hydroxyvitamin D Guidelines:</u>            Less than 25 nmol/L: Vitamin D deficiency, requires replacement            25-50 nmol/L: Vitamin D insufficiency, consider replacement            Greater than 50 nmol/L: Adequate Vitamin D status            Greater than 375 nmol/L: Toxicity possible, review dose/reduce vitamin D replacement</p> <p><u>Oxford Paediatric 25-hydroxyvitamin D guidelines:</u> Greater than 50 nmol/L - vitamin D sufficiency            30-50 nmol/L - vitamin D insufficiency Consider supplementation if risk factors present            Less than 30 nmol/L - vitamin D deficiency</p>	Serum - SST
<b>Adrenocorticotrophic hormone (ACTH)</b>	0-46.0 ng/L	Plasma - EDTA The specimen must be collected into a plastic Vacutainer and must not come into contact with glass (syringe or tube). ACTH is unstable; record the time of sampling on the request form

**Alanine Aminotransaminase (ALT)**

10-35 IU/L

Serum - SST

**Albumin**

32-50 g/L

Serum - SST

**Albumin (urinary)**

0-3 mg/mmol creatinine

Random urine (plain bottle – early morning sample preferred).

Guide to interpretation for children <18y:

Urine albumin:creatinine reference intervals (mg/mmol):

<3: A1 Normal

3-30: A2 Moderately increased (microalbuminuria)

>30: A3 Severely increased (macroalbuminuria)

**Aldosterone**

Interpretative comments provided. Renin should also be requested.

Plasma - EDTA

**Alkaline Phosphatase (ALP)**

Age and gender dependent:

Males:

<2 wks: 90- 275 IU/L

2-51 wks: 134-520 IU/L

1-9 yrs: 160-370 IU/L

10-12 yrs: 140-460 IU/L

13-14 yrs: 130-520 IU/L

15-16 yrs: 90-370 IU/L

17-18 yrs: 60-165 IU/L

>18 yrs: 30-130 IU/L

Females:

<2 wks: 90- 275 IU/L

2-51 wks: 134- 520 IU/L

1-9 yrs: 160-370 IU/L

10-12 yrs: 140-460 IU/L

Serum - SST

13-14 yrs: 60- 280 IU/L  
15-16 yrs: 55-130 IU/L  
17-18 yrs: 50-95 IU/L  
>18 yrs: 30-130 IU/L

<b>Alpha fetoprotein (AFP)</b>	0-7 IU/mL	Serum - SST
<b>Amino acids</b>	Available on request	Plasma – PST Heparin Urine (plain bottle) CSF (plain bottle)
<b>Ammonia</b>	Premature neonate <150 µmol/L Term neonate <100 µmol/L Infant/child/adult <50 µmol/L	Plasma – EDTA Specimen must be received in the laboratory within 30 minutes of collection
<b>Amylase</b>	25-125 IU/L	Serum - SST
<b>Androstenedione</b>	<10 yrs: <1.1 nmol/L ≥10 yrs: 3.0-8.0 nmol/L	Serum - SST
<b>Angiotensin Converting Enzyme (ACE)</b>	16-85 IU/L ACE activity is inhibited by EDTA or heavy metals	Serum – SST
<b>Aspartate Aminotransferase (AST)</b>	0-14d 32-162 IU/L 15d-<12m 20-67 IU/L 12m-6y 21-44 IU/L 7-11y 18-36  Males 12-17y 14-35 IU/L 18y+ 15-34 IU/L  Females	Serum - SST AST is not offered as part of the routine liver function panel

	12-17y 13-26 IU/L 18y+ 15-34 IU/L	
<b>Beta-hydroxybutyrate</b>	Advice: Duty Biochemist, bleep 1718	Serum - SST
<b>Bicarbonate</b>	22-29 mmol/L	Serum - SST
<b>Bile Acids</b>	0-19 µmol/L	Serum - SST
<b>Bilirubin (total)</b>	0-21 µmol/L	Serum - SST
<b>Bilirubin (conjugated)</b>	0-5 µmol/L	Serum - SST
<b>C-peptide</b>	A fasting C-peptide of <80 pmol/L or a stimulated C-peptide of <200 pmol/L suggests absolute insulin deficiency. In insulin-treated diabetic patients, a stimulated C-peptide of <600 pmol/L suggests marked insulin deficiency and type1 DM. C-peptide values close to thresholds should be interpreted with great caution and may not assist clinical decision. C-peptide increases and is uninterpretable in renal impairment.	Serum - SST
<b>C-reactive protein (CRP)</b>	0-5 mg/L	Serum - SST
<b>Calcitonin</b>	<10 ng/L	Plasma – PST Heparin Specimen must be separated and frozen within 1 hour of collection
<b>Calcium (adjusted)</b>	2.20-2.60 mmol/L N.B. adjusted calcium reference range	Serum - SST
<b>Calcium (urinary)</b>	24 h urine calcium: 2.5-7.5 mmol / 24h Dependent on dietary/fluid intake. Advice: Duty Biochemist, bleep 1718	Urine, spot (plain or 24h collection (plain/HCl acid)

<b>Calprotectin (faecal)</b>	<p>Faecal Calprotectin &lt;100 ug/g; IBD is highly unlikely. If other diagnosis excluded, suggest treat as IBS and review in 6 weeks.</p> <p>Faecal Calprotectin =&gt;100 ug/g; repeat within 2 weeks. If repeat is &lt;100 ug/g then as above.</p> <p>If repeat Faecal Calprotectin 100 - 250 ug/g; IBD is possible, refer to Gastroenterology routinely.</p> <p>Faecal calprotectin &gt;250 ug/g: IBD likely, refer to Gastroenterology urgently.</p>	<p>Stool (plain bottle) Specimen must be a formed stool</p>
<b>Carbamazepine</b>	<p>Therapeutic ranges: 4-12 mg/L</p>	<p>Serum - SST</p>
<b>Carbohydrate antigen 125 (CA 125)</b>	<p>0-34 IU/mL</p>	<p>Serum - SST</p>
<b>Carbohydrate antigen 15-3 (CA 15-3)</b>	<p>0-32 IU/mL</p>	<p>Serum – SST</p>
<b>Carbohydrate antigen 19-9 (CA 19-9)</b>	<p>0-37 IU/mL</p>	<p>Serum - SST</p>
<b>Carcinoembryonic antigen (CEA)</b>	<p>0-5 µg/L</p>	<p>Serum - SST</p>
<b>Chloride</b>	<p>95-108 mmol/L</p>	<p>Serum - SST</p>
<b>Chloride (urinary)</b>	<p>Dependent on dietary/fluid intake. Advice: Duty Biochemist, bleep 1718.</p>	<p>Urine, spot (plain) or 24h collection (plain/acetic acid)</p>
<b>Cholesterol (total), HDL and LDL</b>	<p>Advice: Duty Biochemist, bleep 1718.</p>	<p>Serum - SST</p>
<b>Cortisol</b>	<p>09:00am cortisol &lt;150nmol/l patient may have adrenal insufficiency (AI)- discuss with, or refer to endocrinology</p>	<p>Serum - SST</p>

09:00am Cortisol 150 to 300nmol/l - Indeterminate, result may be normal. Interpret in the clinical context. Consider repeat test and endocrinology consult.

09:00am Cortisol > 300 nmol/l - adrenal insufficiency very unlikely

NICE NG243

9am cortisol <50 nmol/L after overnight dexamethasone suppression excludes endogenous Cushing's syndrome.

A random (non-9am) cortisol or a value when the patient is taking steroid treatment is uninterpretable.

<b>Cortisol (free, urinary)</b>	0-135 nmol/24h	Urine, 24h collection (plain)
<b>Creatine Kinase (CK)</b>	Males: 40-320 IU/L  Females: 25-200 IU/L	Serum - SST
<b>Creatinine</b>	<2weeks: 29-82 µmol/L 2w-1yr: 9-32 µmol/L 2-4 yrs: 18-38 µmol/L 5-11yrs: 27-54 µmol/L 12-14yrs: 40-72 µmol/L  Males 15-18yrs: 55-96 µmol/L >18yrs: 64-104 µmol/L  Females 15-18 yrs: 43-74 µmol/L >18yrs: 49-90 µmol/L	Serum - SST

Urine, spot (plain) or 24h collection (plain/HCl/acetic acid)

**Creatinine (urinary)**24h reference intervals:

Adult Males: 7.1-17.7 mmol/24h  
Adult Females: 5.2-15.9 mmol/24h

Dependent on dietary/fluid intake.  
Advice: Duty Biochemist, bleep 1718

**Cyclosporin**

Therapeutic range depends on the indication for its prescription.  
Advice: Duty Biochemist, bleep 1718

Whole blood – EDTA. If sending with FBC, please send a separate EDTA sample. Pre-dose specimen should reach lab by 09:30 (11:00 at weekends) for same day analysis.

**Cystatin C**

Males:  
<4 wks: 1.49-2.85 mg/L  
4-20 wks: 1.01-1.92 mg/L  
21-51 wks: 0.75-1.53 mg/L  
1 yrs: 0.77-1.85 mg/L  
2-18 yrs: 0.62-1.11 mg/L  
19-49 yrs: 0.31-0.79 mg/L  
>49 yrs: 0.41-0.99 mg/L

Females:  
<4 wks: 1.49-2.85 mg/L  
4-20 wks: 1.01-1.92 mg/L  
21-51 wks: 0.75-1.53 mg/L  
1 yr: 0.60-1.20 mg/L  
2-18 yrs: 0.62-1.11 mg/L  
19-49 yrs: 0.40-0.99 mg/L  
>49 yrs: 0.41-0.99 mg/L

Serum - SST

<b>Dehydroepiandrosterone Sulphate (DHEAS)</b>	<p>&lt;6m: 0.0-29.5 µmol/L          6m-&lt;1y: 0.2-4.8 µmol/L          1-&lt;6y: 0.1-3.0 µmol/L          6-&lt;9y: 0.1-4.1 µmol/L          9-&lt;13y: 0.9-7.3 µmol/L          13-&lt;16y: 1.5-12.5 µmol/L</p> <p><b>Males</b>          16-&lt;18y: 3.4-18.2 µmol/L          18-&lt;25y: None          25-&lt;35y: 4.6-16.1 µmol/L          35-&lt;45y: 3.8-13.1 µmol/L          45-&lt;55y: 3.7-12.1 µmol/L          55-&lt;65y: 1.3-9.8 µmol/L          65y+: 6.2-7.7 µmol/L</p> <p><b>Females</b>          16-&lt;18y: 4.0-15.5 µmol/L          18-&lt;25y: 3.6-11.1 µmol/L          25-&lt;35y: 2.6-13.9 µmol/L          35-&lt;45y: 2.0-11.1 µmol/L          45-&lt;55y: 1.5-7.7 µmol/L          55-&lt;65y: 0.8-4.9 µmol/L          65y+: 0.9-2.1 µmol/L</p>	
<b>Digoxin</b>	0.8-2.0 µg/L	Serum - SST Sample collected 6 hours post dose
<b>eGFR</b>	<p>For guidance on eGFR, please refer to:  <a href="https://www.nice.org.uk/guidance/ng203/chapter/recommendations#classification-of-ckd-in-adults">https://www.nice.org.uk/guidance/ng203/chapter/recommendations#classification-of-ckd-in-adults</a></p>	eGFR is automatically calculated on adult creatinine requests
<b>Elastase (faecal)</b>	<p>&gt;200 µg/gram stool          Moderate exocrine pancreatic insufficiency: &lt;200 µg/gram</p>	Stool (plain bottle)

	Severe: <100 µg/gram	Specimen must be a formed stool
<b>Electrolytes (urine)</b>	No reference ranges are available for some urine electrolytes - these results need to be interpreted on an individual basis in relation to e.g. the concomitant blood concentrations of the electrolyte and/or the water content and dilution status of the urine sample.	Urine, spot (plain) or 24h collection
<b>Erythropoietin (EPO)</b>	5-25 IU/L	Serum - SST
<b>Ferritin</b>	30-336 µg/L	Serum - SST
<b>FIT (Faecal immunochemical test)</b>	Negative: <10 mcg/g faeces Positive: ≥10 mcg/g faeces  Positive / negative result provided	Stool sample in specific FIT collection device
<b>Folate</b>	3.1-20.0 µg/L	Serum - SST
<b>Follicle Stimulating Hormone (FSH)</b>	Males: <1m: None 1m-<1 yr: <2.4 IU/L 1-9 yrs: <1.6 IU/L >9yrs 1.0-12.0 IU/L  Females:  <1m: None 1m-<1 yr: <10.4 IU/L 1-9 yrs: <5.5 IU/L >9 yrs: None  Interpretative guidance for FSH in adult females: Follicular phase: 3.0-8.1 IU/L Mid-cycle peak: 2.6-16.7 IU/L	Serum - SST

Luteal phase: 1.4-5.5 IU/L  
Post-menopausal: 26.7 – 133.4 IU/L

<b>Free fatty acids (FFA)</b>	Values (mmol/L) interpreted with simultaneous b-hydroxybutyrate and glucose values. Advice: Duty Biochemist, bleep 1718	Serum - SST
<b>Gamma glutamyl transferase (GGT)</b>	0-14d 23-219 IU/L 15d-<12m 8-127 IU/L 12m-10y 6-16 IU/L 11-17y 7-21 IU/L  Males 18y+ 0-38 IU/L  Females 18y+ 0-55 IU/L	Serum - SST
<b>Gentamicin</b>	Please see local Trust antimicrobial guidelines for interpretation	Serum - SST
<b>Glucose</b>	No reference ranges are available for plasma Glucose. These results need to be interpreted on an individual basis taking into account the WHO criteria for diagnosing Diabetes Mellitus and other disorders of glucose homeostasis.	Plasma - FluOx
<b>Glucose (CSF)</b>	Approx 60% of plasma glucose result when samples are taken simultaneously – ensure paired plasma glucose specimen is collected	CSF - FluOx
<b>Growth Hormone (GH)</b>	Advice: Duty Biochemist, bleep 1718	Serum - SST
<b>Haptoglobin</b>	0.3-2.0 g/L	Serum - SST

Due to the lack of appropriate reference range, testing of Haptoglobin in children under 1 year of age may not be informative.

**HbA1c**

Whole blood - EDTA

Adults:

20-41 mmol/mol Hb  
Non-diabetic

42-47 mmol/mol Hb  
(High risk of developing Diabetes Mellitus consider referral to NHS Diabetes Prevention Programme if >18yrs, non-pregnant or not known DM.

>48 mmol/mol Hb  
Diagnostic of Diabetes Mellitus. Refer to local guidance for further management.

Children:

For patients aged under 18 years with an HBA1c of 39-47mmol/mol (inclusive) please discuss the result with the paediatric diabetes consultant-on-call at the John Radcliffe as this may represent pre-diabetes

**Human Chorionic Gonadotrophin (hCG)**

0-4 IU/L

Serum - SST

**Holotranscobalamin (Active B12)**

>72 pmol/L - B12 sufficiency  
45-72 pmol/L - B12 deficiency cannot be excluded  
27-44 pmol/L - B12 deficiency is likely  
<27 pmol/L - B12 deficiency

Serum - SST

**Insulin-like Growth Factor-1 (IGF-1)**

Reference ranges are age, sex and Tanner stage dependent:  
Males:  
Up to 1 yr: 2.5-17.1 nmol/L  
1-3 yrs: 3.1-27.3 nmol/L

Serum - SST

4-5 yrs: 5.0-34.0 nmol/L  
6-7 yrs: 6.4-41.9 nmol/L  
8-9 yrs: 8.3-51.4 nmol/L  
10-11 yrs: 10.6-60.8 nmol/L  
12-17 yrs: 12.7-66.5 nmol/L  
18-20 yrs: 13.6-64.1 nmol/L  
21-24 yrs: 11.5-54.8 nmol/L  
25-30 yrs: 9.6-43.3 nmol/L  
31-60 yrs: 7.0-31.7 nmol/L  
>60 yrs: 4.6-24.9 nmol/L

Females:

Up to 1 yr: 2.0-19.7 nmol/L  
1-2 yrs: 2.3-25.3 nmol/L  
3-5 yrs: 3.5-30.7 nmol/L  
6-7 yrs: 4.8-37.9 nmol/L  
8-9 yrs: 6.8-48.1 nmol/L  
10-11 yrs: 9.5-59.6 nmol/L  
12-17 yrs: 12.5-65.1 nmol/L  
18-20 yrs: 14.3-61.7 nmol/L  
21-24 yrs: 12.0-50.1 nmol/L  
25-30 yrs: 10.3-39.6 nmol/L  
31-60 yrs: 6.4-31.0 nmol/L  
>61 yrs: 4.5-22.5 nmol/L

**Insulin**

Fasting insulin (>11 years) is up to 72 pmol/L

Serum - SST

Paediatric data available:

Males:

3-4 yrs: 7-45 pmol/L  
5-7 yrs: 9-54 pmol/L  
8-9 yrs: 13-66 pmol/L  
10 yrs: 18-73 mol/L  
11yrs+: <72 pmol/L

Females:

3-6 yrs: 8-52 pmol/L

7-8 yrs: 13-64 pmol/L  
9 yrs: 18-73 pmol/L  
10 yrs: 22-83 pmol/L  
11yrs+: <72 pmol/L

Insulin and C-peptide results should be interpreted in the context of concurrent glucose concentration

<b>Iron</b>	11-32 µmol/L	Serum - SST
<b>Lactate</b>	0-2.0 mmol/L	Plasma - FluOx
<b>Lactate Dehydrogenase (LDH)</b>	125-220 IU/L	Serum - SST
<b>Lipase</b>	8-78 IU/L	Serum - SST
<b>Lipid profile</b>	A reference range is available for serum triglycerides; samples are ideally taken fasting for serum triglycerides. No reference ranges are available for Total Cholesterol, HDL Cholesterol or the related calculated values in the Lipid Profile. These results need to be interpreted on an individual basis along with other cardiovascular risk factors such as blood pressure, diabetes status etc. and in relation to current cardiovascular risk calculations.	Serum - SSR
<b>Lithium</b>	Adults: 0.5-0.8 mmol/L	Serum - SST
<b>Luteinising Hormone (LH)</b>	Reference ranges depend on age, sex and stage of menstrual cycle.  Males: <3m: <4.1 IU/L 3m-<1y: <2.9 IU/L 1-8 yrs: <0.3 IU/L >8 yrs: 0.6-12.1 IU/L  Females:	Serum - SST

<3m: <2.4 IU/L  
3m-<1y: <1.2 IU/L  
1-8 yrs: <0.3 IU/L  
>8 yrs: No reference interval

Interpretative guidance for LH in females:  
Follicular phase: 1.8 - 11.8 IU/L  
Mid cycle peak: 7.6 – 89.1 IU/L  
Luteal phase: 0.6 - 14.0 IU/L  
Post-menopausal: 5.2 - 62.0 IU/L

<b>Magnesium</b>	<1 month: 0.60-1.00 >1 month: 0.70-1.00 mmol/L	Serum - SST
<b>Methotrexate</b>	Dependant on treatment protocol	Serum - SST
<b>Microalbumin</b>	See Albumin, urinary	
<b>N-terminal pro B-type Natriuretic Peptide (NTproBNP)</b>	For guidance on interpretation of NT-proBNP: <a href="https://heartfailureoxford.org.uk/gp/gp-summary">https://heartfailureoxford.org.uk/gp/gp-summary</a>	Serum - SST
<b>Oestradiol</b>	<p>Males:</p> <p>&lt;1y: &lt;92 pmol/L 1-10 yrs: &lt;46 pmol/L 11-12 yrs: &lt;95 pmol/L 13-14yrs: &lt;102 pmol/L 15-18yrs: &lt;141 pmol/L &gt;18 yrs: &lt;161 pmol/L</p> <p>Females:</p> <p>&lt;1y: &lt;92 pmol/L 1-8 yrs: &lt;37 pmol/L 9-10y: &lt;176 pmol/L 11y: &lt;345 pmol/L</p>	Serum - SST

Oestradiol female reference data:  
Follicular phase: 77 – 921 pmol/L  
Mid-cycle phase: 139 – 2382 pmol/L  
Luteal phase: 77 – 1145 pmol/L  
Post-menopausal: less than 103 pmol/L

<b>Osmolality</b>	275-295 mosmol/kg	Serum - SST
<b>Osmolality (urinary)</b>	Advice: Duty Biochemist, bleep 1718	Urine, spot (plain)
<b>P1NP</b>	20-60 µg/L	Serum - SST
<b>Paracetamol</b>	The critical level for risk of liver damage decreases with time after ingestion, see algorithm in the BNF	Serum - SST
<b>Parathyroid Hormone</b>	0-18 years: 1.6-7.2 pmol/L >18 years: 3.0-12.0 pmol/L	Plasma - EDTA
<b>Phenobarbitone</b>	15-40 mg/L	Serum – SST Pre-dose specimen
<b>Phenytoin</b>	≤2 months: 6-15 mg/L >2 months: 10-20 mg/L	Serum - SST
<b>Phosphate</b>	<1y 1.54-2.72 mmol/L 1-4 yrs: 1.38-2.19 mmol/L 5-12 yrs: 1.33-1.92 mmol/L 13-15 yrs: 1.02-1.79 mmol/L 15-18 yrs: 0.95-1.62 mmol/L >18 yrs: 0.8-1.5 mmol/L	Serum - SST
<b>Phosphate (urinary)</b>	Dependent on dietary/fluid intake. Advice: Duty Biochemist, bleep 1718	Urine, spot (plain) or 24h collection (plain/HCl acid)
<b>Potassium</b>	3.5-5.3 mmol/L	Serum - SST

<b>Potassium (urinary)</b>	Dependent on dietary/fluid intake. Advice: Duty Biochemist, bleep 1718	Urine, spot (plain) or 24h collection (plain/acetic acid)
<b>Progesterone</b>	Progesterone reference data for adult females: Post-menopausal/follicular phase progesterone: <2 nmol/L Luteal phase progesterone of >25 nmol/L usually indicates ovulation	Serum - SST
<b>Prolactin</b>	Males: 70-140 mIU/L Females: 110-560 mIU/L	Serum - SST
<b>Prostate Specific Antigen (PSA)</b>	2 week referral thresholds for elevated PSA: Age 40-49: $\geq 2.5 \mu\text{g/L}$ Age 50-59: $\geq 3.5 \mu\text{g/L}$ Age 60-69: $\geq 4.5 \mu\text{g/L}$ Age 70 and over: $\geq 6.5 \mu\text{g/L}$ Age specific PSA thresholds are quoted, as recommended by NICE - NG12. Values may be lower in patients undergoing androgen deprivation therapy.	Serum - SST
<b>Protein (CSF)</b>	150-400 mg/L	CSF (plain)
<b>Renin</b>	Interpretative comments provided.	Plasma – EDTA Specimen needs to be taken directly to the lab.
<b>Salicylate</b>	None	Serum - SST
<b>Sex Hormone Binding Globulin (SHBG)</b>	Males: <4 wks: 14-120 nmol/L 4 wks-11 mths: 36-229 nmol/L 1-7 yrs: 42-189 nmol/L 8-10 yrs: 26-162 nmol/L 11-12 yrs: 15-108 nmol/L 13-14 yrs: 11-98 nmol/L 15-18 yrs: 10-50 nmol/L	Serum - SST

>18 yrs: 17-78 nmol/L

Females:

<4 wks: 14-120 nmol/L

4 wks-11 mths: 36-229 nmol/L

1-7 yrs: 42-189 nmol/L

8-10 yrs: 26-162 nmol/L

11-12 yrs: 15-108 nmol/L

13-14 yrs: 11-98 nmol/L

15-16 yrs: 10-84 nmol/L

17-18 yrs: 11-155 nmol/L

19-49 yrs: 34-148 nmol/L

>49 yrs: 26-118 nmol/L

**sFlt:PIGF ratio**

<38 ratio

Serum - SST

**Sirolimus**

Therapeutic range depends on the indication for its prescription.  
Advice: Duty Biochemist, bleep 1718.

Whole blood – EDTA  
If sending with FBC, please send a separate EDTA sample. Pre-dose specimen should reach lab by 09:30 (11:00 at weekends) for same day analysis.

**Sodium**

133-146 mmol/L

Serum - SST

**Sodium (urinary)**

Dependent on dietary/fluid intake.  
Advice: Duty Biochemist, bleep 1718

Urine, spot (plain) or 24h collection (plain)

**Tacrolimus**

Therapeutic range depends on the indication for its prescription.  
Advice: Duty Biochemist, bleep 1718.

Whole blood – EDTA  
If sending with FBC, please send a separate EDTA sample. Pre-dose specimen should reach lab by 09:30 (11:00 at weekends) for same day analysis.

<b>Testosterone</b>	<p>Males:</p> <p>&lt;6 mths: 0.3-10.4 nmol/L 6 mths-8 yrs: &lt;1.2 nmol/L 9-10 yrs: &lt;0.8 nmol/L 11-13 yrs: &lt;15.4 nmol/L 14-15 yrs: 1.3-21.9 nmol/L 16-18 yrs: 5.1-27.6 nmol/L ≥19 yrs: 8.0-32.0 nmol/L</p> <p>Females:</p> <p>0-8yrs: &lt;2.2 nmol/L 9-12 yrs: &lt;1.0 nmol/L 13-14 yrs: 0.4-1.5 nmol/L ≥15 yrs: &lt;1.91 nmol/L</p> <p>This assay measures total testosterone</p>	Serum - SST
<b>Theophylline</b>	10-20 mg/L	Serum - SST
<b>Thyroglobulin</b>	For the management of follicular thyroid cancer only	Serum - SST
<b>Thyroid Stimulating Hormone (TSH)</b>	<p>4 days to 6m: 0.73-4.77 mIU/L 6m- 13 yrs: 0.70-4.17 mIU/L 14-18 yrs: 0.47-3.41 mIU/L &gt;18 yrs 0.35-4.94 mIU/L</p>	Serum - SST Please give relevant clinical information and the laboratory normally selects appropriate thyroid tests according to the data on the request card
<b>Thyroxine, free (fT4)</b>	<p>&lt;1 year: 10.5-18.8 pmol/L 1-18 yrs: 10.0-14.3 pmol/L &gt;18 yrs: 9.0-19.0 pmol/L</p>	Serum - SST
<b>Total Protein</b>	60-80 g/L	Serum - SST

<b>Total Protein, urinary</b>	Advice: Duty Biochemist, bleep 1718	Urine – spot (plain) or 24h collection (plain)
<b>Transferrin</b>	1.7-3.6 g/L	Serum - SST
<b>Transferrin saturation</b>	20-55 %	Serum - SST
<b>Triglycerides</b>	Fasting: <1.70 mmol/L	Serum - SST Patient must fast for at least 12h
<b>Triiodothyronine, free (fT3)</b>	<p>Males</p> <p>4d -&lt;1yr: 3.6-7.5 pmol/L</p> <p>1-11 yrs: 4.3-6.8 pmol/L</p> <p>12-14 yrs: 4.4-6.7 pmol/L</p> <p>15-18 yrs: 3.5-5.9 pmol/L</p> <p>&gt;18 yrs: 3.0-5.4 pmol/L</p> <p>Females</p> <p>4d-&lt;1yr: 3.6-7.5 pmol/L</p> <p>1-11 yrs: 4.3-6.8 pmol/L</p> <p>12-14 yrs: 3.8-6.1 pmol/L</p> <p>15-18 yrs: 3.6-5.7 pmol/L</p> <p>&gt;18 yrs: 3.0-5.4 pmol/L</p>	Serum - SST
<b>Troponin I</b>	<p>Males: 0-34 ng/L</p> <p>Females: 0-17 ng/L</p> <p>For guidance, please refer to:  <a href="https://www.ouh.nhs.uk/media/w50ilmwy/troponin-pathway.pdf">https://www.ouh.nhs.uk/media/w50ilmwy/troponin-pathway.pdf</a></p>	Serum - SST
<b>Urate (uric acid)</b>	<p>Children 0-&lt;3 yrs: 105-300 µmol/L</p> <p>Children 3-&lt;9 yrs: 120-290 µmol/L</p> <p>Males ≥9 yrs: 200-430 µmol/L</p>	Serum - SST

	Females $\geq 9$ yrs: 140-360 $\mu\text{mol/L}$	
<b>Urea</b>	<1y: 1.2-6.0 mmol/L <18y: 3.2-7.9 mmol/L 18y+: 2.5-7.8 mmol/L	Serum - SST
<b>Urea, urinary</b>	Dependant on dietary/fluid intake Advice: Duty Biochemist, bleep 1718	Urine – spot (plain) or 24h collection (plain)
<b>Valproate</b>	Advice: Duty Biochemist, bleep 1718	Serum - SST
<b>Vancomycin</b>	Please see local Trust antimicrobial guidelines for interpretation	Serum – SST
<b>Vitamin B12</b>	Total Vitamin B12 reference intervals: > 350ng/l - B12 deficiency highly unlikely 180 - 350ng/l - B12 deficiency cannot be excluded < 180ng/l - B12 deficiency highly likely In pregnancy B12 levels are significantly lower and holotranscobalamin should be used instead.	Serum - SST
<b>Xanthochromia (CSF Spectroscopy)</b>	Advice: Duty Biochemist, bleep 1718	CSF (plain) Specimens must be protected from light
<b>Zinc</b>	10-18 $\mu\text{mol/L}$	Plasma – PST Heparin

Signed:



Zoe Maunsell, Clinical Biochemist. 6<sup>th</sup> May 2026