

BioChem results v1.3a

Introduction.

This document is provided as a **free reference** for the medical and nursing communities in the United Kingdom.

Also, several 'clients' in my particular client group have asked for specific test results so that they can understand a bit more what their doctor is telling them. Whilst researching for them I discovered that there doesn't seem to be one single source for the results. So, to try to remedy that fact here is my solution. But, it should also be noted that different testing laboratories use different machines for testing the sample, and there seems to be no consistent standard, which helps to account for the disparity of some of the ranges below, and also why you can have such widely differing figures. The solution may be to ask what the 'normal range' is for the particular test that they are using on your sample.

Please also note the age of this document, it was first written in 1998 and hasn't really been updated since 2000. Therefore, its for reference only.

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Disclaimer.

This document is provided as is. The author takes no responsibilities for any problems, damages, or loss of individual or corporate sanity resulting from any usage of this document. Any mistakes are my own, but I would also refer you to my original sources to see what they say. Please also note that different medical institutions may use different 'normal reference ranges' dependant on their local sample testing machine tolerances and their clinical speciality.

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Blood/Serum/Plasma tests.

A1- antitrypsin	S.I. units.	Conventional units.
Adult	1.3 – 3.2 g/l [GRIB, 1999].	
Amyla se	S.I. units.	Conventional units.
Adult	70 – 200 u/l [GRIB, 1999].	
B2- microglobulin	S.I. units.	Conventional units.
Adult	1 – 3 mg/l [GRIB, 1999].	
Blood Gases	S.I. units.	Conventional units.
Adults		
Hydrogen ion	35 – 45 nmol/l	
pCO2	4.4 – 5.6 kPA	
pO2	12 – 15 kPA [GRIB, 1999].	
Caeruloplasm in	S.I. units.	Conventional units.
Adult	200 – 600 mg/l [GRIB, 1999].	
Calciu m	S.I. units.	Conventional units.
Adult	2.2 – 2.6 nmol/l [GRIB, 1999].	
Carboxyhaemoglo bin	S.I. units.	Conventional units.
Non- smoker	< 5% [GRIB, 1999].	

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Cholinesterase		S.I. units.	Conventional units.
Adult		600 – 1350 U/l (serum) [GRIB, 1999].	
<hr/>			
C-reactive		S.I. units.	Conventional units.
Adult		< 10 mg/l [GRIB, 1999].	
<hr/>			
Creatine-kinase		S.I. units.	Conventional units.
Adult		< 150 U/l [GRIB, 1999].	
<hr/>			
CK-MB		S.I. units.	Conventional units.
Adult	Percent MB/CK	CK- < 3% Excludes MI 3 – 5% Equivocal	Nb –
only valid if sample is collected 12 – 36 hours after suspected MI. [GRIB, 1999].			
<hr/>			
Electrolytes		S.I. units.	Conventional units.

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Adult	Sodium	135	-145
		nmol/l	
	Potassium	3.4	4.9
		nmol/l	
	CL	95	105
		nmol/l	
	Bicarbonate	21	28
		nmol/l	
	Urea	2.5	8
		nmol/l	
	Creatinine	40	130
		umol/l	

[GRIB, 1999].

	S.I. units.	Conventional units.
Fibrinogen		
Adult	1.5 – 4.0 g/l	
Elderly	1.5 – 6.0 g/l	
Pregnancy	4.0 – 6.5 g/l	
Neonate	1.0 – 3.5 g/l [Canterbury, 2000].	
Adult ¹	150 - 450 mg/dl. CRITICAL VALUE: Low-less than 100 mg/dl, possible effect: haemorrhage[Michigan, 2000]	

	S.I. units.	Conventional units.
g-Glutamyl		
Male	< 90 U/l	
Female	< 55 U/l [GRIB, 1999].	

	S.I. units.	Conventional units.
Glucose		
Adult	4.0 – 5.5 nmol/l	
	(Nb – Fasting, venous plasma) [GRIB, 1999].	

	S.I. units.	Conventional units.
Immunoglobulins		

¹ Increased in patients on oral contraceptives or with active inflammatory processes. Interpretation of results may be limited if patient is receiving anticoagulant therapy. May be decreased in disseminated intravascular coagulation, severe liver disease, and congenital hypofibrinogenemia. This procedure tests for clottable proteins and will be of limited usefulness for investigating a dysfibrinogenemia.

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IgA	0.8 – 4.5 g/l
IgG	6 – 15 g/l
IgM	0.4 – 3.0 g/l [GRIB, 1999].

	S.I. units.	Conventional units.
Lactate		
Adult	0.6 – 2.4 nmol/l 230 – 525 U/l [GRIB, 1999].	

	S.I. units.	Conventional units.
Lithium		
Adult	0.4 – 1.0 nmol/l [GRIB, 1999].	

	S.I. units.	Conventional units.
Liver Function Tests		
(Aspartate Aminotransferase) AsT	12 – 48 U/l [GRIB, 1999].	
(Alanine Aminotransferase) ALT	3 – 55 U/l	
Bilirubin	3 – 22 μ mol/l	
Conjugated phosphate	alkaline 80 – 280 U/l	
Adults –	200 – 800	
Children -	U/l	

	S.I. units.	Conventional units.
Magnesium		
Adult	0.7 – 1.0 mmol/l [GRIB, 1999].	

	S.I. units.	Conventional units.
Methaemoglobin		
Range :	< 1.5% (Nb – protect sample from light) [GRIB, 1999].	

	S.I. units.	Conventional units.
Osmolality		

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Adult	275 – 295 mmol/kg	[GRIB, 1999].	
Paracetamol	S.I. units.	Conventional units.	
Range	Nil	[GRIB, 1999].	
Phosphate	S.I. units.	Conventional units.	
Adult	0.7 – 1.4 mmol/l	[GRIB, 1999].	
Protein	S.I. units.	Conventional units.	
Protein total	62 – 82 g/l		
Albumin	40 – 52 g/l	[GRIB, 1999].	
Salicylate	S.I. units.	Conventional units.	
Normal	Nil		
Therapeutic	Up to 2.5 mmol/l	[GRIB, 1999].	
Transferrin	S.I. units.	Conventional units.	
Adult	2.0 – 4.0 g/l	[GRIB, 1999].	
Urate	S.I. units.	Conventional units.	
Males	210 – 540 umol/l		
Premenopausal females	150 – 360 umol/l		
Postmenopausal females	160 – 480 umol/l	[GRIB, 1999].	

Urine and other tests.

Albumin	S.I. units.	Conventional units.
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Adult
 Albumin < 20 mg/l
 Albumin/creatinine < 2 [GRIB, 1999].

	S.I. units.	Conventional units.
Amylase		
Adult	1 – 4 ml/min [GRIB, 1999].	

	S.I. units.	Conventional units.
B2-microglobulin		
Adult	< 0.3 mg/l [GRIB, 1999].	

	S.I. units.	Conventional units.
Calcium		
Adult	3.0 – 6.0 mmol/24 hours on normal diet [GRIB, 1999].	

	S.I. units.	Conventional units.
Catecholamines		
Adult		
Adrenaline	< 230 nmol/24 hours	
Noradrenaline	< 900 nmol/24 hours	
Dopamine	< 3300 nmol/24 hours [GRIB, 1999].	

	S.I. units.	Conventional units.
Chloride		
Adult	150 – 250 mmol/24 hours (usually, but varies with diet) [GRIB, 1999].	

	S.I. units.	Conventional units.
Creatinine		
Adult		
Creatinine	9 – 18 mmol/24 hours	
Creatinine clearance	80 – 130 ml/min [GRIB, 1999].	

	S.I. units.	Conventional units.
5HIAA		
A		

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Adult < 50 umol/l [GRIB, 1999].

	S.I. units.	Conventional units.
Magnesium		
m		

Adult	2.3 – 10.7 mmol/24 hours	[GRIB, 1999].
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	S.I. units.	Conventional units.
Myoglobin		
n		

Adult	Absent	[GRIB, 1999].
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	S.I. units.	Conventional units.
Osmolality		
ty		

Adult	< 1400 mmol/kg	[GRIB, 1999].
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	S.I. units.	Conventional units.
Phosphate		
te		

Adult	13 – 39 mmol/24 hours (usually, but varies with diet)	[GRIB, 1999].
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	S.I. units.	Conventional units.
Potassium		
m		

Adult	40 – 90 mmol/24 hours (usually, but varies with diet)	[GRIB, 1999].
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	S.I. units.	Conventional units.
Protein		
Quantitative		
Bence-Jones		

Adult	< 0.1g/24 hours	[GRIB, 1999].
	Nil	[GRIB, 1999].

	S.I. units.	Conventional units.
Sodium		
m		

Adult	130 – 250 mmol/24 hours (usually, but varies with diet)	[GRIB, 1999].
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Urea	S.I. units.	Conventional units.
Adult	160 – 500 mmol/24 hours [GRIB, 1999].	
Urate	S.I. units.	Conventional units.
Adult	2.8 – 4.4 mmol/24 hours [GRIB, 1999].	
Glucose, csf	S.I. units.	Conventional units.
Adult	Not less than 70% of simultaneously taken plasma glucose [GRIB, 1999].	
Lactate, csf	S.I. units.	Conventional units.
Adult	1.2 – 2.1 mmol/l [GRIB, 1999].	
Protein, csf	S.I. units.	Conventional units.
Adult	150 – 450 mg/l (lumbar fluid) [GRIB, 1999].	
Glucose, fluid-aspirate	S.I. units.	Conventional units.
Adult	Not less than 70% of simultaneously taken plasma glucose [GRIB, 1999].	
Protein, fluid aspirate	S.I. units.	Conventional units.
Indicative of exudate	> 30 g/l	
Indicative of transudate	< 30 g/l [GRIB, 1999].	

Endocrine Analyses.

Adrenocorticotrophin (ACTH)	S.I. units.	Conventional units.
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Adults 0700 – 0900 < 20
mU/l

Precautions – Haemolysed specimen unsuitable; separate and freeze specimen immediately; timing of collection important; avoid stress; transport frozen [GRIB, 1999].

	S.I. units.	Conventional units.
Aldosterone		
Adults (supine) 0700 - 0900	100 – 400 pmol/l	
Neonates 0 – 1 month	1060 – 5480 pmol/l	
Neonates 1 – 6 months	500 – 4450 pmol/l	

Precautions – collect after overnight recumbency and remaining so [GRIB, 1999].

	S.I. units.	Conventional units.
Androstenedione		
Males; 18 – 40 years	1.8 – 8.4 nmol/l	
Males; 41 – 65 years	1.3 – 6.6 nmol/l	
Females; 18 – 40 years	0.6 – 8.8 nmol/l	
Females; 41 – 65 years	0.9 – 6.8 nmol/l	
Prepubertal children	< 2 nmol/l	[GRIB, 1999].

	S.I. units.	Conventional units.
Cortisol		
Adults; 0700 - 0900	280 – 720 nmol/l	
Adults; 2100 – 2400 Morning - evening	60 – 340 nmol/l > 100 nmol/l	

Precautions – Timing of collection important; avoid stress [GRIB, 1999].

	S.I. units.	Conventional units.
Dehydroepiandrosterone		
Males	2 – 9 umol/l	
Females < 50 years	2 – 11 umol/l	
Prepubertal children	< 2 umol/l	[GRIB, 1999].

	S.I. units.	Conventional units.
17- hydroxyprogesterone		

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Normal infants (> 4 days)	<	13 nmol/l
Stressed/premature infants	<	40 nmol/l
Proven congenital adrenal hyperplasia	>	50 nmol/l

Precautions – Timing of collection important [GRIB, 1999].

Plasma Renin activity (Angiotensin I)	S.I. units.	Conventional units.
Upright	0.98 – 4.18 ng/ml/h	
Supine	0.51 – 2.64 ng/ml/h	

Precautions – Separate and freeze specimen immediately; collect after overnight recumbency and remaining so; transport frozen [GRIB, 1999].

Cortisol (UFC)	S.I. units.	Conventional units.
Adults (EMU)	< 25 umol/mol creatinine	
Adults (24 hour collection)	< 250 nmol/24 hours	

Precautions – No preservative in sample container [GRIB, 1999].

Synacthen Test	S.I. units.	Conventional units.
	Criteria for normal response:	
0.25 mg Synacthen intravenously between 0800 and 1000.	Basal Cortisol > 225 nmol/l	
Blood samples at times 0 and 30 minutes for serum Cortisol.	Increment post Synacthen > 200 nmol/l Final Cortisol > 500 nmol/l [GRIB, 1999].	

Insulin Induced Hypoglycaemia test (ITT)	S.I. units.	Conventional units.
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Test between 0800 and 1000 after overnight fast.

Insulin given intravenously. in doses varying between 0.1 and 0.3 U/kg depending on pathology.

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Pregnancy	13 – 28 weeks	94 – 175 nmol/l
Pregnancy	29 – 40 weeks	86 – 195 nmol/l
Infants	0 – 5 days	100 – 250 nmol/l
Infants	11 – 15 days	80 – 170 nmol/l
Infants	> 15 days	55 – 144 nmol/l [GRIB, 1999].

Triiodothyronine (T3)		S.I. units.	Conventional units.
Adults		0.9 – 2.8 nmol/l	
Contraceptive pill		1.5 – 3.1 nmol/l [GRIB, 1999].	

Thyroid Hormone (TSH) Stimulating		S.I. units.	Conventional units.
Adults		< 5 mU/l	
Infants	< 15 days	< 25 mU/l [GRIB, 1999].	

Free Thyroxine (fT4)		S.I. units.	Conventional units.
Adult		9 – 26 pmol/l [GRIB, 1999].	

Thyroxine Globulin (TBG) Binding		S.I. units.	Conventional units.
Adult		9 – 26 pmol/l [GRIB, 1999].	

Thyrotrophin releasing hormone test (TRH)		S.I. units.	Conventional units.
Criteria for "normal" response - Basal serum TSH < 5.0 mU/l			
200 ug TRH intravenously		Increment post TRH > 2.0 mU/l	
Blood samples at times 0, 20 and 60 min for serum TSH		20 min TSH > 60 min TSH [GRIB, 1999].	

Prolactin		S.I. units.	Conventional units.
Adults		< 500 mU/l	

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Contraceptive pill	80	–	1720	
	mU/l			
Pregnancy < 12 weeks	290	–	1750	
	mU/l			
Pregnancy 13 – 28 weeks	330	–	4800	
	mU/l			
Pregnancy 29 – 40 weeks	770	–	5700	
	mU/l			
Children < 3 months	540	–	13000	
	mU/l			
3 months – 12 years	85	–	300	mU/l
Precautions – Avoid stress [GRIB, 1999].				

Follicle Stimulating Hormone (FSH)	S.I. units.	Conventional units.
Infants < 11 years	0.6 – 3.6	
	U/l	
Menstruating females		
- follicular phase	3 – 13	U/l
- mid- cycle	9 – 18	U/l
- luteal phase	1 – 10	U/l
Postmenopausal females *	18 – 150	
	U/l	
Males (< 50 years)	1 – 12	0.5 – 5.0 MIu/ml [OCTM, 1996].
	U/l	
*FSH > 25 U/l together with oestradiol < 200 pmol/l in an amenorrhoeic woman suggests ovarian failure/menopause [GRIB, 1999].		

Luteinising Hormone (LH)	S.I. units.	Conventional units.
Infants < 11 years	1.3 – 3.4	U/l
Menstruating females		
- follicular phase	2 – 15	U/l
- mid- cycle	22 – 90	U/l
- luteal phase	1 – 19	U/l
Postmenopausal females *	16 – 64	U/l
Males (< 50 years)	2 – 12	U/l
*FSH > 25 U/l together with oestradiol < 200 pmol/l in an amenorrhoeic woman suggests ovarian failure/menopause [GRIB, 1999].		

Oestradiol (E2)	S.I. units.	Conventional units.
Menstruating females		
- follicular phase	180 – 1500	pmol/l
- luteal phase	440 – 800	pmol/l
Postmenopausal females	< 200	pmol/l
Males	< 300	pmol/l [GRIB, 1999].

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	S.I. units.	Conventional units.
Progesterone (Direct)		
Menstruating females		
- follicular phase	< 5 nmol/l	
- mid- cycle	> 5 nmol/l	
*- luteal phase	18 – 72 nmol/l	
Pregnant females		
9 – 16 weeks gestation	50 – 130 nmol/l	
16 – 18 weeks gestation	65 – 250 nmol/l	
28 – 30 weeks gestation	180 – 490 nmol/l	
Term	350 - 790 nmol/l	
Postmenopausal women	< 5 nmol/l	
Adult men (50 years)	< 5 nmol/l	
*Progesterone > 20nmol/l in an untreated cycle is consistent with ovulation.		
Precautions – Timing of collection important [GRIB, 1999].		

	S.I. units.	Conventional units.
Testosterone		
Males	11 – 36 nmol/l	2.6 – 12.1 ng/ml
Females (< 50 years)	1.0 – 3.2 nmol/l	0.3 – 0.7 ng/ml [OCTM, 1996].
Females (contraceptive pill)	0.7 – 2.7 nmol/l [GRIB, 1999].	

Sex	Hormone Binding Globulin (SHBG)	S.I. units.	Conventional units.
Males (< 50 years)		6- 45 nmol/l	
Females (< 50 years)		30 – 120 nmol/l [GRIB, 1999].	

	Free Androgen Index (FAI)	S.I. units.	Conventional units.
Males		36 – 156	
Females		< 7	
Calculation – testosterone * 100 / SHBG [GRIB, 1999].			

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Amended	Insulin (mU/l)/	<
Insulin/Glucose ratio	Glucose (mmol/l) – 1.7	5. 0
	Proven	>
	Insulinoma	30

Precautions – Separate and freeze specimen immediately; Collect after overnight fast; Transport frozen [GRIB, 1999].

Insulin C-peptide

	S.I. units.	
Fasting Adults	0.36 – 1.12	nmol/l

Precautions – Separate and freeze specimen immediately; Collect after overnight fast; Transport frozen [GRIB, 1999].

Gastrin

	S.I. units.	
Fasting Adults	< 120	ng/l

Precautions – Haemolysed specimen unsuitable; Separate and freeze specimen immediately; Collect after overnight fast; Transport frozen [GRIB, 1999].

Parathyroid (PTH)

Hormone

	S.I. units.	
Normal Adults	1.3 – 7.6	pmol/l

Precautions - Haemolysed specimen unsuitable; Separate and freeze specimen immediately; Timing of collection important; Transport frozen [GRIB, 1999].

Calcitonin

	S.I. units.	
Normal Adults	< 15	ng/l [GRIB, 1999].

Precautions - Haemolysed specimen unsuitable; Separate and freeze specimen immediately; Transport frozen [GRIB, 1999].

25-hydroxy Vitamin D3 (25 HCC)

	S.I. units.	
Normal Adults		
Winter	15 – 50	nmol/l
Summer	15 – 100	nmol/l
	[GRIB, 1999].	

1,25 Dihydroxy Vitamin D3 (1,25 DHCC)

	S.I. units.	
Normal Adults	20 – 120	pmol/l
	[GRIB, 1999].	

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	S.I. units.	Conventional units.
Cyclic AMP		
Normal Adults	16 – 32 nmol/l	
Precautions - Haemolysed specimen unsuitable; Separate and freeze specimen immediately; Timing of collection important; Transport frozen [GRIB, 1999].		

	S.I. units.	Conventional units.
Urinary Cyclic AMP		
Normal Adults	a) 0.23 – 0.59 umol/mmol creatinine b) 2.6 – 6.6 nmol/100 ml GF c) Nephrogenous cAMP 0.20 – 2.52 nmol/100ml GF	
Precautions – Collect after overnight recumbency and remaining so; No preservative; Transport frozen [GRIB, 1999].		

Insulin Induced Hypoglycaemia (ITT) of Growth Hormone Reserve	S.I. units.	Conventional units.
Test between 0800 and 1000 after overnight fast. Insulin given intravenously in doses varying between 0.1 and 0.3 U/kg depending on pathology. Blood samples at times 0, 30, 60, 90 and 120min for plasma glucose and serum GH	Plasma glucose trough < 2.2 mmol/l Peak GH > 20 mU/l excludes GH deficiency Peak GH < 15 mU/l suggests GH deficiency, repeat test (after sex steroid priming in children)	
NB Dextrose and hydrocortisone solutions should be available for intravenous administration if clinical hypoglycaemia is excessive [GRIB, 1999].		

	S.I. units.	Conventional units.
Glucose Tolerance Test (GTT) of Growth Hormone Suppressibility		

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75 g of glucose orally as a drink. Trough HGH < 3.0
excludes acromegaly.
[GRIB, 1999].

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