General Chemistry

				Date Revised
Sodium	**135**	**145**	**mmol/L**	Jun-09
All ages				
Potassium	**3.5**	**5.2**	**mmol/L**	Jun-09
All ages				
Chloride	**95**	**110**	**mmol/L**	Jun-09
Bicarbonate			**mmol/L**	
0-2yrs	**19**	**24**		Dec-21
>2yr - Adult	**22**	**32**		
Anion Gap	**10**	**20**	**mmol/L**	Dec-04
Glucose- Random	**3.5**	**7.7**	**mmol/L**	Jun-09
Glucose - Fasting	**3.5**	**6.0**	**mmol/L**	Jun-09
Urea			**mmol/L**	Aug-14
1 day - 30 days	**1.1**	**6.1**		
>1 mth - 2yr	**0.7**	**5.0**		
>2 yrs - 4yrs	**1.1**	**5.0**		
>4 yrs - 6 yrs	**1.1**	**5.7**		
>6 yrs - 10 yrs	**1.4**	**5.7**		
>10 yrs - 13 yrs	**1.8**	**6.4**		
>13 - yrs Adult	**3.2**	**7.7**		
Creatinine			**µmol/L**	Aug-14
0 - 1 month	**20**	**60**		
>1 mth - 2 yr	**20**	**50**		
>2 yrs - 4 yrs	**20**	**60**		
>4 yrs - 6 yrs	**25**	**65**		
>6 yrs - 10 yrs	**25**	**70**		
>10 yrs - 15 yrs	**40**	**80**		
Male >15yr + Adult	**50**	**110**		
Female >15 yr + Adult	**45**	**90**		
est GFR	**80**	**120**	**ml/min/1.73m^2**	Mar-05
Osmolality	**280**	**300**	**mmol/kg**	

524 Hagley Avenue, Christchurch 8011, NZ
PO Box 151, Christchurch 8140, NZ

General Chemistry

Urate (Uric Acid)			**mmol/L**	
0-11 yrs	**0.08**	**0.34**		Jun-09
Male	**0.20**	**0.42**		
Female	**0.15**	**0.36**		
Calcium	**2.2**	**2.6**	**mmol/L**	Jun-09
Calcium - Ionised, serum pH7.4	**1.13**	**1.26**	**mmol/L**	Oct-05
Phosphate			**mmol/L**	Jun-09
0- 30 days	**1.3**	**2.5**		
31 days - 1 yr	**1.2**	**2.2**		
> 1 yr - 4 yrs	**1.1**	**2.0**		
> 4 yrs - 11 yrs	**1.0**	**2.0**		
> 11 yrs - 16 yrs	**0.9**	**1.9**		
16 yr + Adult	**0.8**	**1.5**		
Albumin			**g/L**	
0-14 days	**28**	**41**		Jun-15
>14 d -1 yr	**28**	**45**		
>1yr - 8yr	**35**	**45**		
>8yr - 15 yr	**37**	**47**		
> 15yr - Adult	**32**	**48**		Nov-15
Bilirubin			**µmol/L**	Aug-14
Cord blood	**10**	**40**		
Bilirubin				
age same as DOB	**0**	**50**		
1 day	**0**	**100**		
2 days	**0**	**140**		
3 days	**0**	**200**		
4-14 days	**0**	**170**		
>2 - 6 weeks	**3**	**23**		
>6weeks	**2**	**20**		
Conjugated Bilirubin	**0**	**5**	**µmol/L**	
Alkaline Phosphotase (ALP)			**U/L**	
0-1 yr	**60**	**500**		Aug-14
>1-11 yrs	**80**	**360**		
Male >11-16yrs	**90**	**450**		
Female >11-16 yrs	**80**	**400**		
Male >16-18 yrs	**60**	**300**		
Female >16-18 yrs	**50**	**200**		
> 18 + Adult	**30**	**150**		

524 Hagley Avenue, Christchurch 8011, NZ
PO Box 151, Christchurch 8140, NZ

General Chemistry

Gamma glutamyl transferase (GGT)			**U/L**	Aug-14
0 - 6 mths		**<150**		
>6mth - 1 yr		**<50**		
>1 yr - 12 yrs		**<30**		
>12 yr - Adult Male	**10**	**50**		
>12yr- Adult Female	**10**	**35**		
Lactate	**0.5**	**2.0**	**mmol/L**	Jul-08
C-Reactive Protein (CRP)		**<5**	**mg/L**	Jun-09
β Hydoxybutrate		**<0.3**	**mmol/L**	Nov-13
Total Protein			**g/L**	Aug-14
0 - 2 mth	**45**	**70**		
>2mth - 1 yr	**50**	**80**		
>1yr - 6 years	**55**	**80**		
> 6yrs - 11 yrs	**60**	**83**		
> 11 yrs -adult	**64**	**83**		
AST (Aspartate aminotransferase)			**U/L**	Aug-14
0 - 1 month	**20**	**200**		
>1 mth - 2 yr	**20**	**80**		
>2 years - 5 years	**15**	**60**		
> 5 years + adult	**10**	**50**		
ALT (Alanine aminotransferase)			**U/L**	Jun-09
Male	**0**	**40**		
Female	**0**	**30**		
Magnesium	**0.6**	**1.2**	**mmol/L**	Jun-09
LD (Lactate Dehydrogenase)(L-P)	**(M & F)**		**U/L**	Sept-17
0-14d	**310**	**1220**		
>14d - 1yr	**190**	**450**		
>1yr - 10yr	**190**	**320**		
>10yr - 15 yr	**160**	**280**		
>15yr - 18 yr	**130**	**250**		
>18yr	**110**	**220**		

524 Hagley Avenue, Christchurch 8011, NZ
PO Box 151, Christchurch 8140, NZ

General Chemistry

CK (Creatine Kinase)			**U/L**	Jul-13
Male	**60**	**220**		
Female	**30**	**180**		
Amylase (Total)		**<100**	**U/L**	Jun-09
Pancreatic Amylase	**8**	**53**	**U/L**	
Lipase	**10**	**70**	**U/L**	Jun-13
Ammonia		**<50**	**µmol/L**	May-10
< 30 days				
> 30days, Adult	**11**	**32**		
Bile Acids (Non-fasting)		**<15**	**µmol/L**	Sept-19

Lipids

Cholesterol	**<4.0**	**mmol/L**	Jun-09
Triglyceride	**<1.7**	**mmol/L**	Jun-09
HDL Cholesterol	**>1.0**	**mmol/L**	Jun-09
LDL Cholesterol (Calculated)	**<2.5**	**mmol/L**	Jun-09
Cholesterol/HDL Cholesterol ratio	**<4.5**	**ratio**	Jun-09

Optimal lipid levels are suggested by the New Zealand Guidelines Group http://www.health.govt.nz/publication/new-zealand-primary-care-handbook-2012 though an individualised multifactorial approach s preferred.

524 Hagley Avenue, Christchurch 8011, NZ
PO Box 151, Christchurch 8140, NZ

Iron Studies

Iron			**µmol/L**	Aug-14
0 - 2 months	**10**	**31**		
>2 mths - 1 year	**4**	**27**		
>1 - 3 yrs	**5**	**23**		
>3 - 10 years	**6**	**25**		
>10 - 18 years	**8**	**32**		
>18yr + adult	**10**	**30**		
Transferrin			**g/L**	Aug-14
0 - 2 months	**1.3**	**2.3**		
>2 mths - 3 years	**1.6**	**3.3**		
>3yr + Adult	**2.0**	**3.5**		
Transferrin Saturation (Iron x 3.98/ Transferrin)	**16**	**45**	**%**	
Ferritin			**µg/L**	Sep-21
0 - 15 years	**15**	**150**		
Male >15 - 30 years	**20**	**350**		
Male >30 years	**20**	**400**		
Female >15 - 50 years	**20**	**150**		
Female >50 years	**20**	**300**		
Vitamin B12	**105**	**675**	**pmol/L**	Sept-21
Folate - Serum		**>7**	**nmol/L**	Sept-21

524 Hagley Avenue, Christchurch 8011, NZ
PO Box 151, Christchurch 8140, NZ

Cardiac Markers

BNP		**<30**	**pmol/L**	Dec-05
CKMB		**<5.0**	**µg/L**	Oct-05
Myoglobin				Oct-05
Male		**<155**	**µg/L**	
Female		**<106**	**µg/L**	
hs TNI				
Male	**0**	**20**	**ng/L**	Sept-21
Female	**0**	**10**	**ng/L**	
High Sensitive C-Reactive Protein (hsCRP)		**<3**	**mgl/L**	Nov-17

Foetal Fibronectin	**<50**	**Negative**	**ng/mL**	May-17
	≥50	**Positive**		

Pregnancy β-HCG	**<5**	**Negative**	**U/L**
	25	**Equivocal**	
	>25	**Positive**	

Tumour Markers

Total β-HCG		**<5**	**U/L**	Aug-18
AFP	**0**	**16**	**ug/L**	Aug-18
CEA	**0**	**5**	**ug/L**	Aug-18
CA 125	**0**	**35**	**kIU/L**	Aug-18
CA 15-3	**0**	**24**	**kIU/L**	Sept-21
CA 19-9	**0**	**35**	**kIU/L**	Sept-21
PSA	**0**	**4.0**	**ug/L**	

524 Hagley Avenue, Christchurch 8011, NZ
PO Box 151, Christchurch 8140, NZ

Thyroid Function Tests

T3 (Free)				
0 - 1yr	**4.3**	**6.9**	**pmol/L**	Sept-21
>1 -15 years	**4.0**	**6.2**		
>15 - Adult	**3.3**	**6.8**		
T4 (Free)				
0- 20 days	**13**	**58**	**pmol/L**	Dec-21
>20dy - 3 years	**9**	**18**		
>3yrs - Adult	**8**	**20**		
TSH				
1 - 4 days	**0.8**	**20.0**	**mU/L**	Sept-21
>4 dy - 1 mth	**0.8**	**12.0**		
>1 mth - 6 mths	**0.8**	**5.9.0**		
> 6 mths + Adult	**0.4**	**5.3.0**		
Anti-TPO		<10	**U/mL**	Sept-21

(Anti – TG removed Feb -20)

Vitamin D

Optimum Target Range for bone health	**50**	**150**	**nmol/L**	Feb-19

25-OH-Vitamin D levels < 25 nmol/L are indicative of moderate to severe vitamin D deficiency.

25-OH-Vitamin D levels 20 – 50 nmol/L are indicative of mild vitamin D deficiency

25-OH-Vitamin D levels > 200 nmol/L are found in vitamin D toxicity.

524 Hagley Avenue, Christchurch 8011, NZ
PO Box 151, Christchurch 8140, NZ

Serum Indicies(c16000)

Haemolysis	**0**	**34**	**Specimen not haemolysed**
	35	**99**	**Specimen slightly haemolysed**
	100	**249**	**Specimen haemolysed**
		≥250	**Specimen grossly haemolysed**
Icterus Index		**>40**	**Specimen icteric**
Lipaemic Index		**>3.3**	**Specimen lipaemic**

Drug Monitoring

Digoxin	**0.6**	**2.0**	**nmol/L**	Jun-09
Salicylate	**1.5**	**1.8**	**mmol/L**	
Paracetamol	**umol/L**	**as per latest edition of Hospital Health Pathways**		
Ethanol	**<3**	**Undetected**	**mmol/L**	
Gentamicin				
(trough)	**<0.5**		**mg/L**	Aug-09
AUC	**70**	**100**	**mg/L/hr**	
Tobramycin				
(trough)	**<0.5**		**mg/L**	Aug-09
AUC	**70**	**100**	**mg/L/hr**	
Vancomycin	**5**	**10**	**mg/L**	Aug-09
Carbamezapine	**16**	**50**	**µmol/l**	Aug-09
Unbound	**4**	**10**	**µmol/L**	
Lamotrigine	**12**	**55**	**µmol/L**	Dec-15
Phenobarbitone	**65**	**130**	**µmol/l**	Aug-09
Phenytoin	**40**	**80**	**µmol/L**	Aug-09
Unbound	**4**	**9**	**µmol/L**	
Theophylline	**55**	**110**	**µmol/L**	Aug-09
Valproate			**umol/L**	Aug-09
Adult	**350**	**700**		

Blood Gases – Whole Blood

524 Hagley Avenue, Christchurch 8011, NZ
PO Box 151, Christchurch 8140, NZ

	Arterial	Venous		
pH	**7.35 - 7.45**	**7. 30 - 7.40**	**Units**	Jan-20
pCO2	**35 - 45**	**40 - 50**	**mmHg**	Jan-20
pO2	**75 - 105**		**mmHg**	Jan-20
p50		**22 - 27**	**mmHg**	
HCO3	**22 - 28**	**22 - 32**	**mmol/L**	Jan-20
Base Excess	**±3**	**±3**	**mmol/L**	
Total CO2	**24.0 - 30.0**	**25.0 - 33.0**	**mmol/L**	
O_2 Saturation	**>97**		**%**	
Lactate	**< 2.0**	**< 2.0**	**mmol/L**	Jan-20
Ionised Calcium	**1.15 - 1.30**	**1.15 - 1.30**	**mmol/L**	Jan-20
Ionised Calcium pH corrected 7.4	**1.13 - 1.26**	**1.13 - 1.26**	**mmol/L**	May-10
tHb	**Refer Core Haematology**			May-10
Oxy Hb	**94 - 97**		**%**	
Carboxy Hb				
non-smokers	**0 - 1.5**	**0 - 1.5**	**%**	
smokers	**<9.0**	**<9.0**	**%**	
MetHb	**0 - 1.5**	**0 - 1.5**	**%**	
DeOxy Hb	**0 - 5.0**		**%**	

Blood Gases – Cord Blood

	Cord Arterial	Cord Venous		
pH	**7.10 -7.40**	**7. 22 - 7.44**	**Units**	Jan-20
pCO2	**42 - 74**	**28 - 53**	**mmHg**	Jan-20
pO2	**6 - 28**	**16 - 40**	**mmHg**	Jan-20
HCO3	**18 - 28**	**17 - 26**	**mmol/L**	Jan-20
Base Excess	**-12 to +2**	**-12 to +2**	**mmol/L**	Jan-20
Lactate	**< 6.1**	**<6.1**	**mmol/L**	Jan-20

524 Hagley Avenue, Christchurch 8011, NZ
PO Box 151, Christchurch 8140, NZ

CSF Chemistry

Appearance	**Clear & Colourless**			
Protein	**0.15**	**0.4**	**g/L**	
Glucose	**2.8**	**4.4**	**mmol/L**	
Creatinine	**20**	**50**	**µmol/L**	
LD			**U/L**	
Lactate	**1.1**	**2.3**	**mmol/L**	
Xanthochromia	**Not detected**			

Urine Chemistry

Sodium	**100**	**250**	**mmol/24hr**	
Potassium	**35**	**100**	**mmol/24hr**	
Chloride	**110**	**250**	**mmol/24hr**	
Calcium	**2.5**	**7.5**	**mmol/24hr**	
Calcium/Creatinine Ratio	**0.06**	**0.45**	**mole/ratio**	
Phosphate	**16**	**48**	**mmol/24hr**	
TRP (Tubular Reabsorption of Phosphate)	**82**	**97**	**%**	2003
Glucose		**<1**	**mmol/24hr**	
Creatinine			**mmol/24hr**	Aug-14
0 - 6 months	**0.2**	**1.6**		
>6mths - 2 years	**0.2**	**2.0**		
>2 - 6 years	**0.5**	**6.0**		
>6 - 10 years	**1.5**	**12.6**		
>10 - 15 years	**2.0**	**20.0**		
Male >15 years	**9.0**	**18.0**		
Female >15years	**7.0**	**12.5**		
Osmolality				
0 - 6 years	**50**	**1200**	**mm/Kg**	
>6 yrs + Adult	**300**	**1200**		
Protein	**0**	**0.14**	**g/24Hr**	
UPRO/CRN ratio		**<22.7**	**g/mol**	
Albumin		**<30**	**mg/L**	
UALB/CRN ratio				
Male		**<2.5**	**g/mol**	
Female		**<3.5**	**g/mol**	
Urea	**165**	**580**	**mmol/24hr**	
Amylase		**<35**	**U/mmol CRN**	
Creatinine Clearance		**>1.5**	**ml/sec**	

524 Hagley Avenue, Christchurch 8011, NZ
PO Box 151, Christchurch 8140, NZ

Copies of this Document are kept as follows:

1 APS Operations Manual
2 Manual Test Procedures
3 Checkout Bench
4 CE Bench
5 Section manual
Clinical
6 Haematology
Mark Warner -
7 CCST
Research Team
8 CHL

E-mail copies to:
Biochemistry Peer Review Group

Reference Range updates required:
Instrument
1 Manager
2 POCT devices, ABL90, iStat

524 Hagley Avenue, Christchurch 8011, NZ
PO Box 151, Christchurch 8140, NZ