

CHEMISTRY REFERENCE RANGES					
Analyte	Sex	Age	Reference Range	Notes	Units
Acetaminophen	All	All	10.0 - 30.0	Possible toxicity > 50 at 4 hrs post ingestion Toxic > 200 at 12 hrs post ingestion Refer to Rumak-Matthews Nomogram for further information	ug/mL
Albumin	All	0 - 3 Years	3.0 - 4.8		g/dL
		4 - 15/16 Yr	3.8 - 5.4		
		≥ 16/17 Years	3.5 - 5.0		
Alcohol - Ethyl (For Medical Use Only)	All	All	< 10	Potentially Toxic: 50 - 100 Depression of CSN: > 100 Fatalities Report: >400 Results divided by 1000 = gm/% KY Intoxication = 80 mg/dL (0.08 gm/%)	mg/dL
Alkaline Phosphatase (ALP)	All	0 - 30 Days	62 - 368		u/L
		1 M - 1 Year	80 - 270		
		2 - 10 Yr	15 - 460		
		≥ 11 Years	38 - 126		
ALT/SGPT	M	All	< 50		u/L
	F	All	< 35		
Amikacin	All	All	2.5 - 8.0	Trough	ug/mL
			25 - 30	Peak	
			None	Random	
Ammonia	All	0 - 1 Day	64 - 107		mmol/L
		2 - 14 Days	56 - 92		
		15 D - 17 Year	21 - 50		
		≥ 18 Years	9 - 39		
Amylase	All	All	30 - 110		u/L
Amylase (24 Hr Urine)	All	All	59 - 401		u/24 Hr
AST/SGOT	All	All	15 - 46		u/L
Beta-hydroxybutyrate	All	All	0.02 - 0.27		mmol/L
Bilirubin (Cord Blood)	All	N/A	0.1 - 2.8		mg/dL
Bilirubin - Direct	All	0 - 13/24 Days	0.0 - 0.6		mg/dL
		≥ 14/15 D	0.0 - 0.3		
Bilirubin - Indirect	All	0 - 14 Days	0.6 - 10.5		mg/dL
		≥ 15 D	0.0 - 1.1		
		0 - 1 Day	2.0 - 6.0		mg/dL
Bilirubin - Total	All	2 Days	6.0 - 7.0		
		3 - 5 D	4.0 - 60		
		6 - 30 D	0.0 - 6.0		
		1 M - 5 Years	0.0 - 0.9		
		≥ 6 Years	0.2 - 1.3		
BUN	All	0 - 12 Months	4 - 15		mg/dL
		1 - 2 Year	5 - 15		
		≥ 3 Years	7 - 20		
BUN (24 Hr Urine)	All	All	7 - 20		g/dL
CA 125	All	All	≤ 35		u/mL
CA 15.3	All	All	< 35		u/mL
CA 19.9	All	All	< 37		u/mL
Calcium	All	0 - 6 Days	6.0 - 11.9		mg/dL
		1 week - 15 Year	8.6 - 11.2		
		≥ 16 Years	8.4 - 10.2		
Calcium - Ionized	All	All	1.14 - 1.29		mmol/L
Calcium (24 Hr Urine)	All	All	42 - 353		mg/24Hr
Carbamazepine/ Tegretol	All	All	4 - 9	Trough	ug/mL
			4 - 12	Peak	
			None	Random	
Carboxyhemoglobin	All	All	0.0 - 1.5		%
CEA	All	All	< 3.0	Normal based on non-smoking adult	ng/mL
Chloride (Blood)	All	0 - 3 Days	96 - 106		mmol/L
		≥ 4 Days	98 - 107		
Cholesterol	All	All	0 - 199		mg/dL
CK	All	All	30 - 170		u/L
CO2 (Bicarbonate)	All	0 - 10 Year	18 - 27		mmol/L
		≥ 11 Years	22 - 30		
C-Peptide	All	All	0.78 - 5.19		ng/mL
Cortisol	All	All	1.7 - 22.7	Serum cortisol levels show diurnal variation: Before 10am: 4.46 - 22.7 After 5pm: 1.7 - 14.1	ug/dL
Creatinine	All	0 - 4 Year	0.3 - 0.5		mg/dL
		5 - 9 Yr	0.5 - 0.8		
		10 - 15 Yr	0.3 - 1.2		
		≥ 17 Years	0.7 - 1.5		
Creatinine (24 Hr Urine)	M	All	0.6 - 2.5		gm/24 Hr
	F	All	0.6 - 1.5		
Creatinine Clearance - 24 Hr	F	20 - 29 Years	97 - 137	Decreases 6.5 per decade over age 30 Yr	ml/Min/1.73m ²
CRP	All	All	< 1.0		mg/dL
CRP (High Sensitivity)	All	All	< 3.0		mg/dL
Cyclosporine	All	0 - 14 Years	150 - 300		ng/mL
	All	≥ 15 Years	100 - 300		ng/mL
Digoxin/Lanoxin	All	All	0.50 - 2.0		ng/mL
Drug Screen (Urine)	All	All	Negative	Amphetamines, Barbiturates, Benzodiazepine, Cannabinoids, Cocaine, Methadone, Opiates, TCA	
Estradiol	F	All	5.4 - 65.9		pg/mL
			26.6 - 161.3	Normal Follicular Phase	
			186.6 - 382.5	Normal Pre-Ovulatory Phase	
			32.7 - 201.0	Normal Luteal Phase	
			5.4 - 38.4	Post Menopause	
Ferritin	M	All	17.9 - 464		ng/mL
	F	0 - 49 Years	6.24 - 264		
		≥ 50 Years	11.1 - 264		
fPate	All	All	7.0 - 34.1		ng/mL
FT4 (Free Thyroxine Index)	All	All	0.78 - 2.19		ng/dL
FT3 (Free Triiodothyronine)	All	All	4.26 - 8.30		pmol/L
FSH	F	Normal Menstruating Female	1.9 - 11.6	Follicular Phase	mIU/mL
			5.1 - 23.4	Mid-Cycle Peak	
			1.3 - 9.5	Luteal Phase	
			21.5 - 131.0	Post-Menopausal	
Gentamicin	All	All	< 2.0	Trough	ug/mL
			5.0 - 10.0	Peak	
			None	Random	
GGT/SGTP	All	0 - 2 Days	13 - 198		u/L
		3D - 20 Days	4 - 130		
		21 D - 2 Months	4 - 120		
		3M - 1 Year	5 - 65		
		2 - 14 Yr	4 - 23		
		≥ 15 Years	12 - 38		
Glucose	All	0 - 30 Days	45 - 125		mg/dL
		31D - 15 Years	60 - 100		
		≥ 16 Years	74 - 99		
Glucose Tolerance(s)	All	All	74 - 99	Fasting	mg/dL
			120 - 170	1 Hour	
			70 - 120	2 Hour	
			70 - 140	2 Hour Post Prandial	
			70 - 145	3 Hour	
			60 - 145	4 Hour	
			60 - 145	5 Hour	
			74 - 99	Fasting	
Glucose - Gestational	All	All	70 - 190	1 Hour	mg/dL
			70 - 165	2 Hour	
			70 - 145	3 Hour	
Glucose - O'Sullivan	All	All	70 - 140		mg/dL
Glucose (CSF)	All	All	40 - 70		mg/dL
Glucose (Random Urine)	All	All	15 - 1en		mg/dL
Glucose (24 Hr Urine)	All	All	< 0.5		gm/24 Hr
hCG Qualitative	All	All	Negative/Positive		
hCG Quantitative	M	All	< 2.4	Instrument linear down to 2.4	mIU/mL
	F	< 55 Years	< 6.0		
		≥ 55 Years	< 14.0		
LDL Cholesterol	All	All	≥ 60		mg/dL
Hepatitis A IgM	All	All	Nonreactive		
Hepatitis B Core IgM	All	All	Nonreactive		
Hepatitis B Surface Ab	All	All	< 8.0	Nonreactive	mIU/mL
			≥ 8.0 - < 12.0	Intermediate	

			≥ 12.0	Reactive	
Hepatitis B Surface Ag	All	All	Nonreactive		
Hepatitis C Ab	All	All	Nonreactive		
HIV	All	All	Nonreactive		
Homocysteine	M	All	6.6 - 14.8		umol/L
	F	All	4.7 - 12.6		
Iron	All	All	37 - 181		ug/dL
Lactic Acid (Blood Gas)	All	All	0.7 - 2.0	Norton and Norton Children's Only	mmol/L
Lactic Acid	All	All	0.7 - 2.0	Audubon, Brownsboro, NCMC and NWCH	mmol/L
LDH (Blood)	All	All	113 - 618		u/L
LDL (Calculated)	All	All	< 100		mg/dL
LDL (Direct)	All	All	< 100		mg/dL
Lithium	All	All	0.6 - 1.6	Therapeutic	mmol/L
			> 3.0	Toxic	
Lipase	All	All	23 - 300		u/L
	M	All	1.7 - 11.2		
LH		Normal Menstruating Female	2.5 - 12.1	Follicular Phase	mIU/mL
	F		27.3 - 96.9	Mid-Cycle Peak	
			0.8 - 15.5	Luteal Phase	
			13.1 - 86.5	Post-Menopausal	
Lidocaine	All	All	1.5 - 5.0	Therapeutic	mcg/mL
Magnesium (Ma)	All	All	1.6 - 2.3		mg/dL
Magnesium (24 Hr Urine)	All	All	24 - 255		mg/24Hr
Methemoglobin	All	All	0.0 - 0.24		%
Methotrexate	All	All	< 0.5	After 48 Hours	umol/L
Micro-Albumin	All	All	0 - 1.7	Random Urine	mg/dL
			0 - 30	24 Hour Urine	mg/24Hr
Myoglobin	M	All	< 121		ng/mL
	F	All	< 61.5		
NGAL	All	All	≤ 50	Low risk of acute kidney injury (AKI), this does not exclude subsequent development of AKI. Repeat if clinically indicated.	
NT - ProBNP	All	0 - 75 Years	≤ 124		pg/mL
	All	> 75 Years	≤ 449		
Osmolality (Blood)	All	All	280 - 300		mOsm/Kg
Osmolality (Random Urine)	All	All	50 - 1200		mOsm/Kg
Osmolality (24 Hour Urine)	All	All	300 - 900		mOsm/Kg
Procainamide/NAPA	All	All	4.0 - 10.0	Therapeutic	mcg/mL
pH	All	All	Undefined		
Phenobarbital	All	All	15.0 - 40.0		ug/mL
Phenytoin/Dilantin	All	All	10.0 - 20.0		ug/mL
		0 - 2 Days	5.0 - 7.5		
		3 - 5D	5.8 - 9.0		
Phosphorus	All	6D - 5 Weeks	4.9 - 8.9		mg/dL
		6W - 2 Years	3.8 - 6.7		
		≥ 3 Years	2.5 - 4.5		
Phosphorus (24Hour Urine)	All	All	0.4 - 1.3		gm/24 Hr
Potassium (K)	All	0 - 3 Months	4.0 - 6.2		mmol/L
	All	> 4 Months	3.5 - 5.1		
Potassium (24 Hour Urine)	All	All	25 - 125		mmol/24 Hr
		0 - 30 Days	7.0 - 39.0		
Prealbumin	All	1 - 5 Months	8.3 - 34.0		mg/dL
		6M - 3 Years	2.0 - 36.0		
		4 - 5Yr	12.0 - 30.0		
		6 - 19Yr	12.0 - 42.0		
		≥ 20 Years	17.6 - 36.0		
Procalcitonin	All	All	< 0.5		ng/mL
Prolactin	M	All	3.7 - 17.10		ng/mL
	F	All	4.5 - 29.1		
PSA	All	All	< 0.5		ng/mL
PTH (Intact and Rapid)	All	All	11.5 - 82.7		pg/mL
RBC Folate	All	All	141 - 1018	Normal	ng/mL
			31 - 146	Folate Deficient	
Salicylate	All	All	2.0 - 20.0	Normal	mg/dL
			> 30.0	Toxic	
Sirolimus/Rapamune	All	All	5 - 15		ng/mL
Sodium (Na)	All	0 - 11 Months	132 - 142		mmol/L
		≥ 1 Years	137 - 145		
Sodium (24 Hour Urine)	All	All	40 - 220		mmol/24Hr
Sodium (Random Urine)	All	All	30 - 90		mmol/L
			0 - 29	Normal	
Sweat chloride	All	All	30 - 59	Borderline	mmol/L
			≥ 60	Positive	
Tacrolimus (FK506/Prograf)	All	All	5 - 15		ng/mL
		1 - 6 Days	1 - 3.8		
		1 - 4 Weeks	.99 - 3.1		
		1 - 11 Months	1.02 - 2.64		
		1 - 5 Years	1.05 - 2.69		
		6 - 10 Yr	0.94 - 2.41		
		11 - 15 Yr	0.83 - 2.13		
		16 - 17 Yr	0.80 - 2.10		
		≥ 18 Years	0.97 - 1.69		
T3 Uptake	All	All	23.5 - 40.5		%
T4 Total (Thyroxine)	All	All	5.5 - 11.0		ug/dL
TIBC (Direct)	M	All	261 - 462		ug/dL
	F	All	265 - 497		
Total Testosterone	M	20 - 49 Years	252.73 - 803.24		ng/dL
		≥ 50 Years	247.50 - 674.13		
Sex Hormone Binding Globulin (SHBG)	M	All	11.2 - 78.1		nmol/L
Theophylline/Aminophylline	All	All	10.0 - 20.0	Therapeutic Trough	ug/mL
			< 2.0	Possible Toxic	
Tobramycin	All	All	4.0 - 10.0	Therapeutic Peak	gm/dL
			None	Random	
Total Protein (Blood)	All	0 - 11 Months	5.0 - 7.5		gm/dL
		1 - 10 Years	5.5 - 7.7		
		≥ 11 Years	6.3 - 8.2		
Total Protein (CSF)	All	All	12 - 60		mg/dL
Total Protein (24 Hour Urine)	All	All	< 149		mg/24Hr
TPO (Thyroid Peroxidase Abs)	All	All	< 5.61		IU/mL
Transferrin	All	All	206 - 381		mg/dL
Triglyceride	All	0 - 11 Months	35 - 293		mg/dL
		1 - 19 Years	10 - 140		
		≥ 20 Years	≤ 150		
Troponin - I	All	All	0 - 0.034	Clinical correlation and serial testing suggested.	ng/mL
			≥ 0.035		
TSH	All	All	0.47 - 4.68		uIU/mL
Urea (24 Hour Urine)	All	All	7 - 20		gm/24 Hr
Uric Acid	All	All	2.5 - 8.5		mg/dL
Uric Acid (24 Hour Urine)	All	All	150 - 990		mg/24Hr
Valproic Acid/Depakene	All	All	50 - 150	Therapeutic	ug/mL
			> 150	Possible Toxic	
Vancomycin	All	All	10.0 - 20.0	Therapeutic Trough	ug/mL
			25 - 40	Peak	
Vitamin B12	All	All	213 - 816		pg/mL
Vitamin D (25-OH VitD/VitD)	All	0 - 17 Years	≥ 20		ng/mL
		≥ 18 Years	> 30		

References:

The adult reference ranges were established through an internal, normal reference range study performed by the following Norton Hospital laboratories: Audubon, Brownsboro, Norton & Norton Children's and Women's & Children's. The pharmacy department also provided input for the establishment of reference ranges for the therapeutic drugs. In the Vitros study, each site provided 30 data points that were compiled together. From that data a mean, standard deviation and reference range was established. The normal reference ranges for 24 hour urines were established in compliance with the appropriate site text.

- Pediatric Clinical Chemistry, Meites, Samuel, 2nd Edition, American Association for Clinical Chemistry, Washington DC, 1981.
- Pediatric Clinical Chemistry, Meites, Samuel, 3rd Edition, American Association for Clinical Chemistry, Washington DC, 1989.
- Clinical Laboratories Handbook, 5th Edition, Lexi-Comp, Stow City, Ohio, 1984.
- Pediatric Reference Ranges, AACC Press, 4th Edition, Washington DC, 2003
- The Fundamentals of Clinical Chemistry, Teltz, 5th Edition, Salt Lake City, UT, 2001.
- National Institute of Health, www.nih.gov/medlineplus/ency/article/003611.htm

Other reference ranges verified using the process outlined in the Test Method Validation Procedure.

The reference ranges are used on the Norton Healthcare Formulary and Drug Therapy Guide, Louisville Medical Center, 2001-2002. The ranges have been accepted for our laboratory.

Adult Hemogram Reference Ranges					
Analyte	Sex	Age	Reference Range	Units	Notes
WBC	All	18+ Yr	4.5 - 11.0	K/uL	
RBC	M	18+ Yr	4.5 - 5.9	M/uL	
	F	18+ Yr	4.0 - 5.2	M/uL	
HGB	M	18+ Yr	13.5 - 17.5	g/dL	
	F	18+ Yr	12.0 - 16.0	g/dL	
HCT	M	18+ Yr	41.0 - 53.0	%	
	F	18+ Yr	36.0 - 46.0	%	
MCV	All	18+ Yr	80.0 - 100.0	fL	fL = Femtoliters
MCH	All	18+ Yr	26 - 34.0	pg	pg = Picograms
MCHC	All	18+ Yr	31.0 - 37.0	g/dL	
RDW	All	18+ Yr	12.0 - 16.8	%	
PLT	All	18+ Yr	140 - 440	K/uL	
MPV	All	18+ Yr	6.7 - 10.8	fL	

Adult Differential % Reference Ranges				
Analyte	Sex	Age	Reference Range	Units
Neutrophil (Segs)	All	18+ Yr	45 - 80	%
Bands	All	18+ Yr	0 - 5	%
Lymphocytes	All	18+ Yr	15 - 50	%
Monocytes	All	18+ Yr	0 - 15	%
Eosinophils	All	18+ Yr	0 - 7	%
Basophils	All	18+ Yr	0 - 2	%
Adult Differential Absolute Reference Ranges				
Neutrophil (Segs)	All	18+ Yr	2.0 - 8.8	k/uL
Bands	All	18+ Yr	0.0 - 0.6	k/uL
Lymphocytes	All	18+ Yr	0.7 - 5.5	k/uL
Monocytes	All	18+ Yr	0.0 - 1.7	k/uL
Eosinophils	All	18+ Yr	0.0 - 0.8	k/uL
Basophils	All	18+ Yr	0.0 - 0.2	k/uL

Pediatric Hemogram Reference Ranges						
Age	Sex	RBC (m/uL)	HGB (g/dL)	HCT (%)	MCV (fL)	MCH (pg)
< 24 Hours	All	3.9 - 6.6	13.5 - 22.5	42.0 - 67.0	88.0 - 126.0	31.0 - 37.0
1 - 7 Days	All	3.9 - 6.6	13.5 - 21.5	42.0 - 67.0	88.0 - 126.0	28.0 - 40.0
8 - 14 Days	All	3.6 - 6.3	12.5 - 20.5	39.0 - 63.0	86.0 - 124.0	25.0 - 40.0
15 - 30 Days	All	3.0 - 6.2	12.5 - 20.5	31.0 - 63.0	86.0 - 124.0	28.0 - 40.0
31 D - < 2 Months	All	2.7 - 5.4	10.0 - 18.0	31.0 - 55.0	85.0 - 123.0	25.0 - 35.0
2 M - < 6 Months	All	3.1 - 4.5	9.0 - 14.0	28.0 - 42.0	74.0 - 115.0	25.0 - 35.0
6 M - < 2 Years	All	3.7 - 5.3	10.5 - 13.5	30.0 - 42.0	70.0 - 86.0	23.0 - 31.0
2 Yr - < 6 Years	All	3.7 - 5.3	10.5 - 13.5	34.0 - 46.0	72.0 - 88.0	24.0 - 31.0
6 Yr - < 12 Years	All	4.0 - 5.2	11.5 - 15.5	35.0 - 45.0	77.0 - 95.0	25.0 - 33.0
12 Yr - < 18 Years	M	4.5 - 5.3	13.0 - 16.0	37.0 - 49.0	78.0 - 98.0	25.0 - 35.0
	F	4.1 - 5.1	12.0 - 16.0	36.0 - 46.0	78.0 - 102.0	
Age	Sex	MCHC (g/dL)	RDW (%)	PLT (k/uL)	MPV (fL)	
< 24 Hours	All	30.0 - 36.0	14.1 - 21.6	140 - 440	6.7 - 10.8	
1 - 7 Days	All	29.0 - 37.0	14.1 - 21.6	140 - 440	6.7 - 10.8	
8 - 14 Days	All	28.0 - 38.0	14.1 - 21.6	140 - 440	6.7 - 10.8	
15 - 30 Days	All	28.0 - 38.0	14.1 - 21.6	140 - 440	6.7 - 10.8	
31 D - < 2 Months	All	29.0 - 37.0	14.1 - 21.6	140 - 440	6.7 - 10.8	
2 M - < 6 Months	All	29.0 - 37.0	14.1 - 21.6	140 - 440	6.7 - 10.8	
6 M - < 2 Years	All	29.0 - 37.0	14.1 - 21.6	140 - 440	6.7 - 10.8	
2 Yr - < 6 Years	All	31.0 - 37.0	12.0 - 16.8	140 - 440	6.7 - 10.8	
6 Yr - < 12 Years	All	31.0 - 37.0	12.0 - 16.8	140 - 440	6.7 - 10.8	
12 Yr - < 18 Years	M	31.0 - 37.0	12.0 - 16.8	140 - 440	6.7 - 10.8	
	F	31.0 - 37.0	12.0 - 16.8	140 - 440	6.7 - 10.8	

Pediatric WBC and Differential % Reference Ranges					
Age	Sex	WBC (k/uL)	Neutrophils (Segs) %	Bands %	Lymphocytes %
< 24 Hours	All	9.0 - 30.0	32 - 62	0 - 18	23 - 36
1 - 7 Days	All	9.4 - 34.0	33 - 66	0 - 15	15 - 29
8 - 14 Days	All	5.0 - 21.0	27 - 61	0 - 15	23 - 53
15 - 30 Days	All	5.0 - 20.0	20 - 55	0 - 15	29 - 59
31D - < 2Months	All	5.0 - 19.5	19 - 50	0 - 13	30 - 69
2M - < 3 Months	All	5.5 - 18.0	19 - 50	0 - 13	30 - 69
3 M - < 4Months	All	5.5 - 18.0	15 - 43	0 - 10	35 - 72
4M - < 6Months	All	6.0 - 17.5	15 - 43	0 - 10	35 - 72
6M - < 2 Years	All	6.0 - 17.5	16 - 48	0 - 10	35 - 74
2 Yr - < 4 Years	All	5.0 - 14.5	16 - 48	0 - 10	32 - 72
4 Yr - < 6 Years	All	5.5 - 15.5	19 - 51	0 - 8	28 - 68
6 Yr - < 8 Years	All	5.0 - 14.5	31 - 62	0 - 8	30 - 62
8 Yr - < 10 Years	All	4.5 - 13.5	31 - 62	0 - 8	24 - 54
10 Yr - < 14 Years	All	4.5 - 13.5	33 - 67	0 - 8	24 - 54
14 Yr - < 16 Years	All	4.5 - 13.0	33 - 67	0 - 5	22 - 50
16 Yr - < 18 Years	All	4.5 - 13.0	35 - 69	0 - 5	15 - 50
Age	Sex	Monocytes %	Eosinophils %	Basophils %	Variant Lymphocytes %
< 24 Hours	All	0 - 15	0 - 7	0 - 2	0 - 8
1 - 7 Days	All	0 - 15	0 - 7	0 - 2	0 - 8
8 - 14 Days	All	0 - 15	0 - 7	0 - 2	0 - 8
15 - 30 Days	All	0 - 15	0 - 7	0 - 2	0 - 8
31D - < 2Months	All	0 - 15	0 - 7	0 - 2	0 - 8
2M - < 3 Months	All	0 - 15	0 - 7	0 - 2	0 - 8
3 M - < 4Months	All	0 - 15	0 - 7	0 - 2	0 - 8
4M - < 6Months	All	0 - 15	0 - 7	0 - 2	0 - 8
6M - < 2 Years	All	0 - 15	0 - 7	0 - 2	0 - 8
2 Yr - < 4 Years	All	0 - 15	0 - 7	0 - 2	0 - 8
4 Yr - < 6 Years	All	0 - 15	0 - 7	0 - 2	0 - 8
6 Yr - < 8 Years	All	0 - 15	0 - 7	0 - 2	0 - 8
8 Yr - < 10 Years	All	0 - 15	0 - 7	0 - 2	0 - 8
10 Yr - < 14 Years	All	0 - 15	0 - 7	0 - 2	0 - 8
14 Yr - < 16 Years	All	0 - 15	0 - 7	0 - 2	0 - 8
16 Yr - < 18 Years	All	0 - 15	0 - 7	0 - 2	0 - 8

Pediatric WBC and Differential Absolute Reference Ranges					
Age	Sex	WBC (k/uL)	Neutrophils (Segs) (k/uL)	Bands (k/uL)	Lymphocytes (k/uL)
< 24 Hours	All	9.0 - 30.0	2.9 - 18.6	0.0 - 5.4	2.1 - 10.8
1 - 7 Days	All	9.4 - 34.0	3.1 - 22.4	0.0 - 5.1	1.4 - 9.9
8 - 14 Days	All	5.0 - 21.0	1.4 - 12.8	0.0 - 3.2	1.2 - 11.1
15 - 30 Days	All	5.0 - 20.0	1.0 - 11.0	0.0 - 3.0	1.5 - 11.8
31D - < 2Months	All	5.0 - 19.5	1.0 - 9.8	0.0 - 2.5	1.5 - 13.5
2M - < 3 Months	All	5.5 - 18.0	1.0 - 9.0	0.0 - 2.3	1.7 - 12.4
3 M - < 4Months	All	5.5 - 18.0	0.8 - 7.7	0.0 - 1.8	1.9 - 13.0
4M - < 6Months	All	6.0 - 17.5	0.9 - 7.5	0.0 - 1.8	2.1 - 12.6
6M - < 2 Years	All	6.0 - 17.5	1.0 - 8.4	0.0 - 1.8	2.1 - 13.0
2 Yr - < 4 Years	All	5.0 - 14.5	1.0 - 8.2	0.0 - 1.7	1.9 - 12.2
4 Yr - < 6 Years	All	5.5 - 15.5	1.0 - 7.9	0.0 - 1.2	1.5 - 10.5
6 Yr - < 8 Years	All	5.0 - 14.5	1.6 - 9.0	0.0 - 1.2	1.5 - 9.0
8 Yr - < 10 Years	All	4.5 - 13.5	1.4 - 8.4	0.0 - 1.1	1.4 - 8.4
10 Yr - < 14 Years	All	4.5 - 13.5	1.5 - 9.0	0.0 - 1.1	1.1 - 7.3
14 Yr - < 16 Years	All	4.5 - 13.0	1.5 - 8.7	0.0 - 1.0	1.1 - 7.0
16 Yr - < 18 Years	All	4.5 - 13.0	1.6 - 9.0	0.0 - 0.7	0.9 - 6.5
Age	Sex	Monocytes (k/uL)	Eosinophils (k/uL)	Basophils (k/uL)	Variant Lymphocytes (k/uL)
< 24 Hours	All	0.0 - 4.5	0.0 - 2.1	0.0 - 0.6	0.0 - 2.4
1 - 7 Days	All	0.0 - 5.1	0.0 - 2.4	0.0 - 0.7	0.0 - 2.7
8 - 14 Days	All	0.0 - 3.2	0.0 - 1.5	0.0 - 0.4	0.0 - 1.7
15 - 30 Days	All	0.0 - 3.0	0.0 - 1.4	0.0 - 0.4	0.0 - 1.6
31D - < 2Months	All	0.0 - 2.9	0.0 - 1.4	0.0 - 0.4	0.0 - 1.6
2M - < 3 Months	All	0.0 - 2.7	0.0 - 1.3	0.0 - 0.4	0.0 - 1.4
3 M - < 4Months	All	0.0 - 2.7	0.0 - 1.3	0.0 - 0.4	0.0 - 1.4
4M - < 6Months	All	0.0 - 2.6	0.0 - 1.2	0.0 - 0.4	0.0 - 1.4
6M - < 2 Years	All	0.0 - 2.6	0.0 - 1.2	0.0 - 0.4	0.0 - 1.4
2 Yr - < 4 Years	All	0.0 - 2.6	0.0 - 1.2	0.0 - 0.3	0.0 - 1.4
4 Yr - < 6 Years	All	0.0 - 2.3	0.0 - 1.1	0.0 - 0.3	0.0 - 1.2
6 Yr - < 8 Years	All	0.0 - 2.2	0.0 - 1.0	0.0 - 0.3	0.0 - 1.2
8 Yr - < 10 Years	All	0.0 - 2.0	0.0 - 0.9	0.0 - 0.3	0.0 - 1.1
10 Yr - < 14 Years	All	0.0 - 2.0	0.0 - 0.9	0.0 - 0.4	0.0 - 1.1
14 Yr - < 16 Years	All	0.0 - 2.0	0.0 - 0.9	0.0 - 0.4	0.0 - 1.0
16 Yr - < 18 Years	All	0.0 - 2.0	0.0 - 0.9	0.0 - 0.4	0.0 - 1.0

Other Hematology Reference Ranges					
Analyte	Sex	Age	Reference Range	Units	Notes
Erythrocyte Sedimentation Rate (ESR)	M	≥ 18 Years	0 - 15	mm/Hr	
	F	≥ 18 Years	0 - 20		
	All	< 18 Years	0 - 20		
Reticulocyte Count	All	< 2 Days	2.3 - 6.9	%	
	All	> 2 Days	0.5 - 2.9		
Hgb A1C (Glycated Hgb)			4.3 - 5.6	%	Normal
* For diagnosis of diabetes in individuals without unequivocal hyperglycemia, results should be confirmed by repeat testing.	All	All	5.7 - 6.4	%	Pre-Diabetic: Patient has increased risk for developing diabetes mellitus.
			≥ 6.5	%	Diabetic: Patients are diagnostic of diabetes mellitus.

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COAGULATION REFERENCE RANGES					
Analyte	Sex	Age	Reference Range	Units	Notes
aPTT	All	All	25.3 - 35.0	Seconds	
Antithrombin III (ATIII - functional)	All	All	83 - 128	%	
D-Dimer	All	All	< 500	ng/mL FEU	Negative Predictive Value
Factor II Assay	All	All	79 - 131	%	
Factor V Assay	All	All	62 - 139		
Factor VII Assay	All	All	50 - 129		
Factor VIII Assay	All	All	50 - 150		
Heparin LMW	All	All	0.4 - 1.1	IU/mL	Twice daily SubQ dosing
Low Molecular Weight	All	All	1.0 - 2.0		Once daily SubQ dosing
Heparin Assay (unfractionated)	All	All			Physician to correlate with case
Factor VIII Inhibitor Assay (Bethesda Assay)	All	All	No Inhibitor Demonstrated		
Lupus Anticoagulant - dRVVT	All	All	Negative		
Lupus Anticoagulant - Silica Clotting Time	All	All	Negative		
PFA - Coll/Epin	All	All	82 - 150	Seconds	
PFA - Coll/ADP	All	All	62 - 100	Seconds	
Platelet Aggregation Screen - Collagen	All	All	70 - 100	%	
Platelet Aggregation Screen - ADP	All	All	86 - 100	%	
Platelet Function (Aggregation and Secretion)	All	All			Pathologist to interpret
Platelet Function - Aspirin	All	All			Physician to correlate with case
Platelet Function - Plavix	All	All			Physician to correlate with case
Protein C	All	All	70 - 140	%	Functional/Activity
Free Protein S	All	All	55 - 146	%	
Prothrombin Time (PT)	All	All	10.3 - 13.3	Seconds	
TEG (Thrombelastograph)	All	All			Pathologist to interpret
Ristocetin Cofactor Assay (vW Factor)	All	All	40 - 163	%	
Therapeutic Anticoagulation - PT INR Low Intensity	All	All	2.0 - 3.0		
Therapeutic Anticoagulation - PT INR High Intensity	All	All	3.0 - 4.5		
Therapeutic Anticoagulation (aPTT)	All	All	59 - 97	Seconds	
Thrombin Time	All	All	10.3 - 16.6	Seconds	

URINALYSIS PHYSICAL AND CHEMISTRY REFERENCE RANGES				
Analyte	Sex	Age	Reference Range	Units
Color	All	All	Pale yellow to dark amber	
Appearance	All	All	Clear	
Specific Gravity	All	All	1.005 - 1.030	
pH	All	All	5.0 - 9.0	
Protein	All	All	Negative	mg/dL
Glucose	All	All	Negative	mg/dL
Ketones	All	All	Negative	mg/dL
Occult Blood	All	All	Negative	mg/dL
Bilirubin	All	All	Negative	mg/dL
Urobilinogen	All	All	Negative	mg/dL
Nitrites	All	All	Negative	
Leukocytes	All	All	Negative	mg/dL
Reducing Substances	All	All	Negative	

URINALYSIS MICROSCOPIC REFERENCE RANGES					
Analyte	Sex	Age	Reference Range	Units	Notes
WBC (White Blood Cells)	All	All	0 - 3	HPF	
RBC (Red Blood Cells)	All	All	0 - 2	HPF	
Squamous Epithelial Cells	All	All	0 - 4	HPF	Cells that line the structures that make up the lower genitourinary tract and are usually of little significance when found in the urine.
Transitional Epithelial Cells	All	All	0 - 2	HPF	Cells that line the upper parts of the urinary tract and, due to normal desquamation, are present in the urine in small numbers.
Renal Tubular Epithelial Cells	All	All	0 - 5	HPF	Cells that line the nephron tubules and may be seen in small numbers in normal urine.
Mucous Thread	All	All	Present	LPF or HPF	Commonly present in urine sediment, no clinical significance.
Bacteria	All	All	Negative	HPF	The presence of a few bacteria, due to contamination during collection, is found in most urine specimens. If the specimen has been allowed to sit any length of time before processing bacteria may appear but is generally not of clinical significance.
Yeast - Budding or Hyphae	All	All	Negative	LPF or HPF	
Hyaline Cast	All	All	0 - 5	LPF	
Fine Granular Cast	All	All	0	LPF	
Coarse Granular Cast	All	All	0	LPF	
White Cell Cast	All	All	0	LPF	
Red Cell Cast	All	All	0	LPF	
Renal Tubular Cast	All	All	0	LPF	
Waxy Cast	All	All	0	LPF	
Fatty Cast	All	All	0	LPF	
Crystals					Crystals are not usually seen in freshly voided urine but can form after urine is allowed to sit.
Uric Acid Crystals	All		Rare - Moderate		Non-pathogenic crystals seen in urine sediment.
Calcium Oxalate Crystals					
Calcium Carbonate Crystals					
Triple Phosphate Crystals					
Amorphous Crystals					
Ammonium Biurates					

Bilirubin	All	None	Abnormal crystals seen in urine sediment.
Cystine			
Cholesterol			
Leucine			
Tyrosine			
Drug Related			

References:					
CHEMISTRY REFERENCE RANGES					
Order Code	Analyte	Sex	Age	Reference Range	Units
ABG (Arterial Blood Gas)	pH	All	All	7.35 - 7.45	
	pCO2	All	All	35 - 45	mmHg
	pO2	All	All	83 - 108	mmHg
	HCO3	All	0 - 10 Years	18 - 27	mmol/L
			≥ 11 Yr	22 - 30	
	TCO2	All	0 - 10 Years	18 - 27	mmol/L
			≥ 11Yr	22 - 30	
	Base Excess	All	All	0 - 3	mmol/L
	Base Deficit	All	All	0 - 3	mmol/L
CBG (Capillary Blood Gas)	O2 Saturation	All	All	95 - 98	%
	pH	All	All	7.35 - 7.45	
	pCO2	All	All	35 - 45	mmHg
	pO2	All	All	40 - 70	mmHg
	HCO3	All	0 - 10 Years	18 - 27	mmol/L
			≥ 11 Yr	22 - 30	
	TCO2	All	0 - 10 Years	18 - 27	mmol/L
			≥ 11 Yr	22 - 30	
	Base Excess	All	All	0 - 3	mmol/L
VBG (Venous Blood Gas)	Base Deficit	All	All	0 - 3	mmol/L
	pH	All	All	7.31 - 7.41	
	pCO2	All	All	41 - 51	mmHg
	pO2	All	All	30 - 40	mmHg
	HCO3	All	0 - 10 Years	18 - 27	mmol/L
			≥ 11 Yr	22 - 30	
	TCO2	All	0 - 10 Years	18 - 27	mmol/L
			≥ 11 Yr	22 - 30	
	Base Excess	All	All	0 - 3	mmol/L
MIX (Mixed Venous Blood Gas)	Base Deficit	All	All	0 - 3	mmol/L
	pH	All	All	7.14 - 7.42	
	pCO2	All	All	34 - 78	mmHg
	pO2	All	All	3 - 40	mmHg
	HCO3	All	All	21 - 29	mmol/L
	TCO2	All	All	22 - 32	mmol/L
	Base Excess	All	All	0 - 2	mmol/L
	Base Deficit	All	All	0 - 7	mmol/L
ACB (Arterial Cord Blood Gas)	pH	All	All	7.22 - 7.44	
	pCO2	All	All	30 - 63	mmHg
	pO2	All	All	12 - 43	mmHg
	HCO3	All	All	20 - 28	mmol/L
	TCO2	All	All	21 - 29	mmol/L
	Base Excess	All	All	0 - 2	mmol/L
	Base Deficit	All	All	0 - 6	mmol/L
AHGBBG (Arterial OXY Hemoglobin Saturation)	Total Hgb	All	< 1 Days	13.5 - 22.5	g/dL
			1 - 7 D	13.5 - 21.5	
			8 D - < 1 Month	12.5 - 20.5	
			1 M - < 2 M	10.0 - 18.0	
			2M - < 6 M	9.0 - 14.0	
			6M - < 2 Years	10.5 - 13.5	
			2 - < 6 Yr	11.5 - 13.5	
			6 - <12 Yr	11.5 - 15.5	
			≥ 12 Yr	12.0 - 16.0	
			12 - <18 Yr	13.0 - 16.0	
			≥ 18 Yr	13.5 - 17.5	
	O2 Saturation	All	All	95 - 98	%
	Oxy Hgb	All	All	90.1 - 95.1	%
	Carboxy Hgb	All	All	0 - 3	%
	Met Hgb	All	All	0 - 2	%
VOXYHB (Venous OXY Hemoglobin Saturation)	Total Hgb	All	< 1 Days	13.5 - 22.5	g/dL
			1 - 7 D	13.5 - 21.5	
			8 D - < 1 Month	12.5 - 20.5	
			1 M - < 2 M	10.0 - 18.0	
			2M - < 6 M	9.0 - 14.0	
			6M - < 2 Years	10.5 - 13.5	
			2 - < 6 Yr	11.5 - 13.5	
			6 - <12 Yr	11.5 - 15.5	
			≥ 12 Yr	12.0 - 16.0	
			12 - <18 Yr	13.0 - 16.0	
			≥ 18 Yr	13.5 - 17.5	
	Oxy Hgb	All	All	60.1 - 85.1	%
	Carboxy Hgb	All	All	0 - 3	%
	Met Hgb	All	All	0 - 2	%

