

Last Reviewed: (Revised 05.08.2018)

Chemistry Reference Ranges:

DXC 600 Reference Ranges:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Acetaminophen	DXC 600		Therapeutic	10 - 30	ug/mL	> 150
			Hepatotoxic			
			4 hrs Post Ingestion	> 150	ug/ml	
			8 hrs Post Ingestion	> 75	ug/ml	
			12 hrs Post Ingestion	> 40	ug/ml	
A/G Ratio	Calculation			1.1 - 2.2		
Albumin BCG	DXC 600		0 Day - 30 Days	2.6 - 4.3	gm/dL	
			1 Month - 5 Months	2.8 - 4.6	gm/dL	
			6 Months - 1Year	2.8 - 4.8	gm/dL	
			2+ Years	3.2 - 4.9	gm/dL	
Alcohol (ETOH)	DXC 600			<0.005 (none detected)	gm/dL	> 0.300
Alkaline Phosphatase	DXC 600	Both	0 - 4 Years	80 - 350	IU/L	
		Both	5 Years - 9 Years	60 - 385	IU/L	
		Both	10 Years - 13 Years	60 - 485	IU/L	
		Male	14 Years - 18 Years	50 - 350	IU/L	
		Female	14 Years - 18 Years	40 - 195	IU/L	
		Both	19+ Years	32 - 91	IU/L	
ALT (SGPT)	DXC 600	Male		17 - 63	IU/L	
		Female		14 - 54	IU/L	
Ammonia	DXC 600			9 - 35	uMOL/L	> 100
Amylase	DXC 600			28 - 100	U/L	
Anion Gap	DXC 600			7 - 17	mmol/L	
AST (SGOT)	DXC 600		0 Years - 4 Years	10 - 60	IU/L	
			5 Years - 9 Years	5 - 50	IU/L	
			10+ Years	15 - 41	IU/L	
Beta Hydroxybutyrate	DXC 600			0.0 - 0.3	mmol/L	
BUN	DXC 600			8 - 26	mg/dL	> 100
BUN/Creatinine Ratio	Calculation			15 - 25	Ratio	
Calcium	DXC 600		0-2 days	6.2 - 11.0	mg/dL	< 5.8, > 13.3
			> 2 days	8.5 - 10.3	mg/dl	< 6.3, > 13.3
Cardiac Risk Factor	Calculation	Male		1/2 Average	3.43	
				Average	4.97	
				2X Average	9.55	
				3X Average	23.99	
		Female		1/2 Average	3.27	
				Average	4.44	
				2X Average	7.05	
				3X Average	11.04	

Chemistry Reference Ranges: DXC 600 Reference Ranges: (cont.)

Chloride	DXC 600			98 - 110	mmol/L	
Cholesterol	DXC 600		0 - 17 Years	0 - 169 desirable	mg/dL	
				170-199 borderline high	mg/dL	
				>200 high	mg/dL	
			18+ Years	0 - 199 desirable	mg/dL	
				200-239 borderline high	mg/dL	
			>239 high	mg/dL		
CO2 (Carbon Dioxide)	DXC 600			22 - 32	mmol/L	< 10, > 40
CPK	DXC 600	Male		49 - 397	IU/L	
		Female		38 - 234	IU/L	
Creatinine	DXC 600	Male		0.61 - 1.24	mg/dl	> 7.0
		Female		0.44 - 1.03	mg/dl	> 12.0 (Male or Female) if patient location is DIA
CRP (Ultra Sensitive)	DXC 600			0.0 - 0.75	mg/dL	
Digoxin	DXC 600			0.8 - 2.0	ng/mL	> 2.4
Dilantin	DXC 600			10 - 20	ug/mL	> 30
Direct Bilirubin	DXC 600			0.1 - 0.5	mg/dL	
Gentamicin	DXC 600		Peak	5 - 10	ug/mL	> 10
			Trough	< 2	ug/ml	
GGT	DXC 600			7 - 50	IU/L	
Glomerular Filtration Rate	Calculation			> or = 60	ml/min./ 1.73 M ²	
				GFR		
				30 - 59		
				Moderate decrease in GFR		
				15 - 29		
		Severe decrease in GFR				
		< 15				
			Kidney failure or Dialysis			
<p>Chronic kidney disease is defined as either kidney damage or GFR < 60 mL/min/1.73 m² for > or = 3 months. Kidney damage is defined as pathologic abnormalities or markers of damage including abnormalities in blood or urine tests or imaging studies. This GFR is NOT used for medication dosing.</p>						
Glucose	DXC 600		0-2 days	42 - 110	mg/dL	< 40, > 250
			2-5 days	50 - 110	mg/dl	< 40, > 250
			5 days - 1 year	60 - 110	mg/dl	< 40, > 250
			1+ year	74 - 118	mg/dl	< 50, > 400
HDL (Direct)	DXC 600	0 Years - 17 Years		< 40 low	mg/dl	
				40 - 59 borderline low		
				> = 60 normal		
			18+ Years	40 - 60	mg/dl	

Chemistry Reference Ranges: DXC 600 Reference Ranges: (cont.)

IgA	DXC 600		0-5 years	30 - 250	mg/dL	
			6+ years	66 - 436	mg/dl	
IgG	DXC 600		0-5 years	500 - 1550	mg/dL	
			6+ years	791 - 1643	mg/dl	
IgM	DXC 600			43 - 279	mg/dL	
Indirect Bilirubin	Calculation			0.0 - 1.0	mg/dL	
Ionized Calcium	AVL9180		0-1 day	1.08 - 1.28	mmol/L	
			1-2 days	1.00 - 1.18	mmol/L	
			3+ days	1.12 - 1.32	mmil/L	
Iron	DXC 600	Both	0 - 1 Month	100 - 250	ug/dL	
		Male	2+ Months	45 - 182	ug/dL	
		Female	2+ Months	28 - 170	ug/dl	
TIBC	Calculation			261 - 478	ug/dL	
% Saturation Fe	Calculation			> 16	%	
Lactic Acid	DXC 600			0.5 - 2.0	mmol/L	> 4.0
Lipase	DXC 600			22 - 51	IU/L	
LDH	DXC 600			98 - 192	IU/L	
LDL (Calculated and Direct)	Calculation		0 - 17 years	0 - 109 desirable	mg/dL	
				110 - 129 borderline high	mg/dL	
				> = 130 high	mg/dL	
			18 + years	0 - 99 optimal	mg/dL	
				100 - 129 near optimal	mg/dL	
				130 - 159 borderline high	mg/dL	
				160 - 189 high	mg/dL	
				> = 190 very high	mg/dL	
Lithium	AVL 9180			0.5 - 1.3	meq/L	> 2.0
Magnesium	DXC 600			1.7 - 2.4	mg/dL	< 1.5, > 2.6
Osmolality	Osmometer			280 - 295	mosm/kg	
Phenobarbital	DXC 600			15 - 40	ug/mL	> 60
Phosphorus	DXC 600		0 - 9 Days	4.5 - 9.0	mg/dL	< 1.0
			10 Days - 2 Years	4.0 - 6.5	mg/dL	
			3 Years - 9 Years	3.2 - 5.8	mg/dL	
			10 Years - 15 Years	3.3 - 5.4	mg/dL	
			16+ Years	2.5 - 4.6	mg/dL	
Potassium	DXC 600		0 - 7 Days	3.2 - 5.5	mmol/L	< 2.5, > 6.5
			8 Days - 1 Year	3.4 - 6.0	mmol/L	< 2.5, > 6.5
			2+ Years	3.4 - 4.8	mmol/L	< 2.5, > 6.0

Chemistry Reference Ranges: DXC 600 Reference Ranges: (cont.)

Prealbumin	DXC 600		18 - 38	mg/dL		
			10-17.9 mg/dL Indicates moderate protein calorie malnutrition			
			< 10 mg/dL Indicates serious malnourishment.			
Salicylate	DXC 600		0 - 30	mg/dL	> 40	
Sodium	DXC 600	0 - 1 Year	130- 145	mmol/L	< 120, > 160	
		2+ Years	133 - 142			
Tegretol	DXC 600		4 - 12	ug/mL	> 20	
Theophylline	DXC 600	< 8 mos Neonatal Apnea	6 - 13	ug/mL	> 20	
		< 8 mos Bronchodilator	10 - 20	ug/ml	> 20	
		> 8 months	8 - 20	ug/ml	> 25	
Tobramycin	DXC 600	Peak	5 - 10	ug/mL	> 10	
		Trough	< 2	ug/ml		
Total Bilirubin	DXC 600	0-1 Day	1.4 - 8.7	mg/dL	> 12.0	
		1-2 Days	3.4 - 11.5	mg/dL	> 15.0	
		3-5 Days	1.5 - 12.0	mg/dL		
		> 5 Days	0.3 - 1.2	mg/dL		
Total Protein	DXC 600	0 Day - 1 Month	4.1 - 6.3	gm/dl		
		2 Month - 6 Months	4.4 - 6.7	gm/dl		
		7 Months - 1 Year	5.5 - 7.9	gm/dl		
		Both 2+ Years	6.5 - 8.1	gm/dL		
Transferrin	DXC 600	Male	180 - 329	mg/dL		
		Female	192 - 382	mg/dl		
Triglycerides	DXC 600	0 - 17 Years	0 - 89 normal	mg/dL		
			90 - 129 borderline high	mg/dL		
			> = 130 high	mg/dL		
		18+ Years	0 - 149 normal	mg/dL		
			150-199 borderline high	mg/dL		
			200-499 high	mg/dL		
> 499 very high	mg/dL					
Uric Acid	DXC 600	Both	0 - 11 Years	1.0 - 6.6	mg/dl	
		Male	12 Years - 19 Years	3.0 - 7.7	mg/dl	
		Female	12 Years - 19 Years	2.7 - 5.7	mg/dl	
		Male	20+ Years	4.8 - 8.7	mg/dl	
		Female	20+ Years	2.6 - 8.0	mg/dl	
Valproic Acid	DXC 600		50 - 100	ug/mL	> 150	
Vancomycin	DXC 600	Peak	20 - 40	ug/mL	> 40	
		Trough	10 - 15	ug/ml		
VLDL	Calculation		8 - 39	mg/dL		

Chemistry Cerebrospinal Fluid Tests

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
CSF Glucose	DXC 600			40 - 70	mg/dL	< 25
CSF Micro Total Protein	DXC 600			15 - 45	mg/dL	
CSF Xanthochromia	Visual			Clear		Xanthochromic

Chemistry Urine Tests:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Urine Amy (2 hr Collection)	DXC 600			4 - 37	U/2hr	
Amy/Creat Clearance Ratio	DXC 600			0 - 5	%	
Urine BUN (UUN) (24 Hr)	DXC 600			12 - 20	gm/24hr	
Urine Calcium (24 Hr)	DXC 600			100 - 300	mg/24hr	
Urine Chloride (24 Hr)	DXC 600			110 - 250	meq/24hr	
Urine Creatinine (24 Hr)	DXC 600	Male		800 - 2000	mg/24hr	
		Female		600 - 1800	mg/24hr	
Creatinine Clearance (24 Hr)	DXC 600	Male		74 - 140	mL/min	
		Female		74 - 130	mL/min	
Urine Glucose (Random)	DXC 600			1 - 15	mg/dl	
Urine Magnesium (24 Hr)	DXC 600			72.9 - 121.5	mg/24hr	
Urine Microalbumin	DXC 600					
Random MicroAlb/Creat Ratio			20-300 mg/G is indicative of Microalbuminuria > 300 mg/G is indicative of Clinical Albuminuria	0 - 19	mg/G	
Total 24 hr Urine Microalbumin			15-300 mg/24hr is indicative of Microalbuminuria > 300 mg/24hr is indicative of Clinical Albuminuria	0 - 14	mg/24hr	
24 hr Microalbumin Rate			10-200 ug/min is indicative of Microalbuminuria > 200 ug/min is indicative of Clinical Albuminuria	0 - 9	ug/min	
Urine Osmolality, Random	Osmometer			50 - 1200	mosm/kg	
Urine Phosphorus	DXC 600			0.4 - 1.3	gm/24hr	
Urine Potassium	DXC 600			25 - 125	meq/24hr	
Urine Sodium	DXC 600			40 - 220	meq/24hr	
Urine Total Protein	DXC 600	Male		31 - 137	mg/24hr	
		Female		27 - 93	mg/24hr	
		Random		< 10	mg/dL	
Urine Uric Acid	DXC 600			0.25 - 0.75	gm/24hr	

Chemistry Urine Drug Screening Tests:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Amphetamines (AMPH)	DXC 600			Negative = < 1000	ng/mL	
Barbiturates (BARB)	DXC 600			Negative = < 200	ng/mL	
Benzodiazepine (BENZ)	DXC 600			Negative = < 200	ng/mL	
Cocaine Metabolites (COCM)	DXC 600			Negative = < 300	ng/mL	
Methadone (METD)	DXC 600			Negative = < 300	ng/mL	
Oxycodone (OXY)	DXC 600			Negative = < 100	ng/mL	
Opiate (OP)	DXC 600			Negative = < 300	ng/mL	
Phencyclidine (PCP)	DXC 600			Negative = < 25	ng/mL	
Buprenorphine (BUP)	DXC 600			Negative = < 10	ng/mL	
Cannabinoid (TCH50)	DXC 600			Negative = <50	ng/mL	
Urine Alcohol	DXC 600			Negative - < 0.020	gm/dl	

Chemistry Reference Ranges: (cont.)

Glucose Tolerance Test (75 grams of Glucola)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Fasting Glucose	DXC 600			70 - 115	mg/dL	< 50, > 400
1/2 Hour Glucose	DXC 600			70 - 199	mg/dL	< 50, > 400
1 Hour Glucose	DXC 600			70 - 199	mg/dL	< 50, > 400
2 Hour Glucose	DXC 600			70 - 139	mg/dL	< 50, > 400
3 Hour Glucose	DXC 600			70 - 115	mg/dL	< 50, > 400
4 Hour Glucose	DXC 600			70 - 115	mg/dL	< 50, > 400
5 Hour Glucose	DXC 600			70 - 115	mg/dL	< 50, > 400
6 Hour Glucose	DXC 600			70 - 115	mg/dL	< 50, > 400

Glucose Challenge Test (75 grams Glucola)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Fasting Glucose	DXC 600			70 - 92	mg/dL	< 50, > 400
1 Hour Glucose	DXC 600			70 - 180	mg/dL	< 50, > 400
2 Hour Glucose	DXC 600			70 - 153	mg/dL	< 50, > 400

Gestational Diabetes Tolerance Test (100 grams Glucola)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Fasting Glucose	DXC 600			70 - 92	mg/dL	< 50, > 400
1 Hour Glucose	DXC 600			70 - 180	mg/dL	< 50, > 400
2 Hour Glucose	DXC 600			70 - 153	mg/dL	< 50, > 400
3 Hour Glucose	DXC 600			70 - 140	mg/dL	< 50, > 400

Gestational Diabetes Screen Test (50 grams Glucola)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
1 Hour Glucose	DXC 600			70 - 140	mg/dL	< 50, > 400

2 Hour Post-Prandial Glucose Test:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
2 Hour Glucose	DXC 600			70 - 139	mg/dL	< 50, > 400

Beckman Access 2 / DXI :

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Beta HCG	Access/Dxl	Female	Negative for pregnancy	0.0 - 4.9	miU/mL	
			Indeterminate-Suggest repeat testing in 72 hours	5.0 - 25.0	miU/mL	
			Positive for pregnancy	> 25.0	miU/mL	
BNP	Access/Dxl			0 - 100	pg/mL	
CA 15-3	Access/Dxl			0.0 - 31.3	U/mL	
CA 125	Access/Dxl			0 - 35	U/mL	
CEA	Access/Dxl		Smokers	< 5.0	ng/mL	
			Non-Smokers	< 3.0	ng/ml	
Cortisol	Access/Dxl		AM	6.7 - 22.6	ug/dL	
			PM	< 10	ug/dl	
Estradiol	Access/Dxl	Male		< 20 - 47	pg/mL	
		Female	Mid-follicular phase	27 - 122	pg/ml	
			periovulatory	95 - 433	pg/ml	
			mid-luteal phase	49 - 291	pg/ml	
			Post-Menopausal	< 20 - 40	pg/ml	
Ferritin	Access/Dxl	Male		23.9 - 336.2	ng/ml	
		Female		11.0 - 306.8	ng/ml	
Folate	Access/Dxl			≥ 5.9	ng/mL	
Free T3	Access/Dxl			2.5 - 3.9	pg/mL	
hFSH	Access/Dxl	Male		1.27 - 19.26	miU/mL	
		Female	mid-follicular phase	3.85 - 8.78	miU/mL	
			mid-cycle peak	4.54 - 22.51	miU/mL	
			mid-luteal phase	1.79 - 5.12	miU/mL	
			Post-menopausal	16.74 - 113.59	miU/mL	
HybriTech % Free PSA (DRE NEGATIVE) (if Total PSA is 4.0 - 10.0)	Access/Dxl		Probability of Cancer			
			56%	0 - 10	%	
			28%	10 - 15	%	
			20%	15 - 20	%	
			16%	20 - 25	%	
			8%	> 25	%	
HybriTech PSA (total)	Access/Dxl			0.0 - 4.0	ng/mL	
Insulin	Access/Dxl			1.9 - 23.0	uIU/mL	
hLH	Access/Dxl	Male		1.24 - 8.62	miU/mL	
		Female	mid-follicular phase	2.12 - 10.89	miU/mL	
			mid-cycle peak	19.18 - 103.03	miU/mL	
			mid-luteal phase	1.20 - 12.86	miU/mL	
			Post-menopausal	10.87 - 58.64	miU/mL	
Myoglobin	Access/Dxl	Male		17.4 - 105.7	ng/mL	
		Female		14.3 - 65.8	ng/mL	
Progesterone	Access/Dxl	Male		0.14 - 2.06	ng/mL	
		Female	Non-Pregnant:			
			mid-follicular phase	0.31 - 1.52	ng/mL	
			mid-luteal phase	5.16 - 18.56	ng/mL	
			Pregnant:			
			first trimester	4.73 - 50.74	ng/mL	
			second trimester	19.41 - 45.30	ng/mL	
			Post-menopausal	< 0.08 - 0.78	ng/mL	
			(not on hormone therapy)			

Beckman Access 2 / DXI : (cont.)

Prolactin	Access/DxI	Male		2.64 - 13.13	ng/mL	
		Female	Premenopausal	3.34 - 26.72	ng/mL	
			Postmenopausal	2.74 - 19.64	ng/mL	
PTH, Intact	Access/DxI			12 - 88	pg/mL	
Rubella	Access/DxI		Negative (non-reactive)	< 10	IU/mL	
			Equivocal	10.0 - 14.9	IU/mL	
			Positive (reactive)	15.0 - > 500.0	IU/mL	
Testosterone (serum only)	Access/DxI	Male		175 - 781	ng/dL	
		Female		10 - 75	ng/dL	
T3 Uptake	Access/DxI			32.0 - 48.4	%	
Total T3	Access/DxI		0 Day - 30 Days	0.48 - 1.84	ng/ml	
			1 Month - 1 Year	0.73 - 2.29	ng/ml	
			2 Years - 5 Years	0.93 - 2.16	ng/ml	
			6 Years - 10 Years	1.04 - 1.98	ng/ml	
			11+ Years	0.87 - 1.78	ng/ml	
Free T4	Access/DxI		0 Day - 10 Years	0.60 - 1.34	ng/dL	
			11-18 Years	0.50 - 1.25	ng/dL	
			19+ Years	0.61 - 1.12	ng/dL	<=0.30 or >=3.00
Total T4	Access/DxI		0 Day - 7 Days	8.2 - 21.5	ug/dL	< 7 or > 23
			8 Days - 3 Months	7.2 - 15.6	ug/dL	< 5 or > 23
			4 Months - 2 Years	5.5 - 14.5	ug/dL	< 3 or > 16
			3+ Years	5.0 - 11.5	ug/dL	< 3 or > 17
T7	Calculation			1.1 - 4.0		
Troponin	Access/DxI			<0.03	ng/mL	≥ 0.04
TSH (3rd Generation)	Access/DxI		0 days - 1 day	2.43 - 24.03	uIU/mL	
			1 day - 2 days	1.9 - 17.58	uIU/mL	
			2 days - 3 days	1.4 - 13.1	uIU/mL	
			3 days - 4 days	0.94 - 9.65	uIU/mL	
			4 days - 1 week	0.6 - 6.82	uIU/mL	
			1 week - 5 years	0.57 - 5.58	uIU/mL	
			5 years - 8 years	0.56 - 5.41	uIU/mL	
			8 years - 12 years	0.55 - 5.31	uIU/mL	
			12 years - 15 years	0.53 - 5.16	uIU/mL	
			15 years - 18 years	0.52 - 5.05	uIU/mL	
18+ years	0.45 - 5.33	uIU/mL				
Vitamin B12	Access/DxI			180 - 914	pg/ml	
Vitamin D-25 Hydroxy	DXI		Deficient	< 20	ng/mL	
			Insufficient	20 - 29	ng/mL	
			Sufficient	30 - 100	ng/mL	
			Upper Safety Limit	> 100	ng/mL	

Tosoh G8

HbA1c (in % units)	Tosoh G8			4.0 - 6.0	% A1c	
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Hepatitis Testing:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Hepatitis B Surface Antigen	Ortho ECiQ			Negative		
Hepatitis B Surface Antibody	Ortho ECiQ			Negative		
HBsAb Quantitative	Ortho ECiQ			< 5.00 - Negative		
				5.00 - 11.99 = Indeterminate		
				> 11.99 = Positive		
Hep B Core IgM	Ortho ECiQ			Negative		
Hepatitis A IgM	Ortho ECiQ			Negative		
Hepatitis C Virus	Ortho ECiQ			Negative		

Electrophoresis:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Serum Protein Electrophoresis	Sebia		Total Protein	6.5 - 8.1	gm/dL	
			Albumin	3.0 - 5.0	gm/dL	
			Alpha-1	0.13 - 0.33	gm/dL	
			Alpha-2	0.56 - 1.13	gm/dL	
			Beta	0.60 - 1.25	gm/dL	
			Gamma	0.53 - 1.48	gm/dL	
			A/G Ratio	1.13 - 2.69		
Urine Protein Electrophoresis	Sebia			No Monoclonal Protein		
Serum Immuno Electrophoresis	Sebia			No Monoclonal Protein		
Urine Immuno Electrophoresis	Sebia			No Monoclonal Protein		

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By: Dr. Heidi Budke

(BVH and ACC shared reference ranges)

Hematology Reference Ranges:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
WBC	LH750 DXH800 DXH600		0-1 Day	9.0 - 30.0	x10 ³ / uL	< 2.0 and >50.0
			1-3 Days	9.4 - 34.0		
			4 Days - 1 Month	5.0 - 20.0		
			1 Month - 6 Months	4.0 - 19.5		
			6 Months-2 Years	6.0 - 17.0		
			2-6 Years	5.0 - 15.5		
			6-18 Years	4.5 - 13.5		
	Male	> or = 18 Years	4.5 - 11.0			
	Female	> or = 18 Years	4.5 - 11.0			

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
RBC	LH750 DXH800 DXH600		0-1 Day	3.90 - 5.90	x10 ⁶ / uL	
			1-3 Days	3.90 - 5.90		
			4 Days - 1 Month	3.90 - 5.90		
			1 Month - 6 Months	3.30 - 5.30		
			6 Months-2 Years	3.90 - 4.80		
			2-6 Years	3.70 - 4.90		
			6-18 Years	3.80 - 5.60		
	Male	> or = 18 Years	4.30 - 5.80			
	Female	> or = 18 Years	3.80 - 5.20			

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range	
Hemoglobin (Hgb)	LH750 DXH800 DXH600		0-1 Day	19.0 - 30.0	g/dL	< 9.5 and >22.5	
			1-3 Days	14.5 - 22.5			
			4 Days - 1 Month	13.4 - 19.8			
				1-2 Months	10.7 - 17.1	g/dL	< 6.9 and > 20.8
				2-6 Months	9.4 - 13.0		
				6 Months-2 Years	10.5 - 13.5		
				2-6 Years	11.5 - 13.5		
				6-12 Years	11.5 - 15.5		
				12-18 Years	13.0 - 16.0		
	Male	12-18 Years	12.0 - 16.0	g/dL	< 6.6 and > 19.9		
	Female	12-18 Years	12.0 - 16.0				
	Male	18 Years and Older	13.5 - 17.5				
Female	18 Years and Older	12.0 - 16.0					

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Hematocrit (Hct)	LH750 DXH800 DXH600		0-3 Days	45 - 67	%	
			4 Days - 1 Month	41 - 65		
			1-2 Months	33 - 55		
			2-6 Months	28 - 42		
			6 Months-2 Years	33 - 39		
			2-6 Years	34 - 40		
			6-12 Years	35 - 45		
	Male	12-18 Years	36 - 50			
	Female	12-18 Years	37 - 45			
	Male	18 Years and Older	41 - 53			
	Female	18 Years and Older	36 - 46			

Hematology Reference Ranges: (cont.)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
MCH	LH750 DXH800 DXH600		0-1 Day	30 - 37	pg	
			1-3 Days	30 - 37		
			4 Days - 1 Month	30 - 37		
			1-6 Months	29 - 36		
			6 Months-2 Years	24 - 30		
			2-6 Years	25 - 31		
			6-18 Years	25 - 34		
			Male > or = 18 Years	27 - 35		
			Female > or = 18 Years	27 - 35		

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
MCHC	LH750 DXH800 DXH600		0-3 Days	29.0 - 37.0	g/dL	
			4 Days - 1 Month	28.1 - 34.7		
			1-2 Months	28.1 - 35.5		
			2-6 Months	28.3 - 35.3		
			6 Months-2 Years	30.0 - 36.0		
			2-6 Years	31.0 - 37.0		
			6-12 Years	31.0 - 37.0		
			Male 12-18 Years	31.0 - 37.0		
			Female 12-18 Years	31.0 - 37.0		
			Male 18 Years and Older	31.0 - 37.0		
Female 18 Years and Older	31.0 - 37.0					

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
MCV	LH750 DXH800 DXH600		0-3 Days	95 - 121	fL	
			4 Days - 1 Month	88 - 122		
			1-2 Months	91 - 111		
			2-6 Month	84 - 106		
			6 Months-2 Years	70 - 86		
			2-6 Years	75 - 87		
			6-12 Years	77 - 95		
			Male 12-18 Years	78 - 98		
			Female 12-18 Years	78 - 90		
			Male 18 Years and Older	80 - 100		
Female 18 Years and Older	80 - 100					

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Platelet Count	LH750 DXH800 DXH600		0-3 Days	150 - 350	x10 ³ / uL	< 50 > 999
			4 Days- 1 Month	150 - 350		
			1-2 Months	150 - 350		
			2-6 Months	150 - 350		
			6 Months-2 Years	150 - 350		
			2-6 Years	150 - 350		
			6-12 Years	150 - 350		
			Male 12-18 Years	150 - 350		
			Female 12-18 Years	150 - 350		
			Male > or = 18 Years	150 - 350		
Female > or = 18 Years	150 - 350					

Hematology Reference Ranges: (cont.)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
RDW-CV	LH750		0-6 months	14.9 - 18.7		
	DXH800		> 6 months	11.6 - 14.8		
	DXH600					

Test	Method	Sex	Criteria	Reference Range	Units %	Critical Range
Automated Differential	LH750 DXH800 DXH600	Male	NEUT%	see below	%	
			LYMPH%	see below		
			MONO%	4.7 - 13.9		
			EOS%	0.0 - 6.1		
			BASO%	0.0 - 1.2		
		Female	NEUT%	44.9 - 77.9		
			LYMPH%	12.4 - 42.8		
			MONO%	3.7 - 11.9		
			EOS%	0.0 - 5.4		
			BASO%	0.0 - 1.5		
Total Leukocytes			0 Day	9 - 38	x 10 ³ /uL	
			1 Day	9.4 - 34		
			1 Week	5 - 21		
			2 Week	5 - 20		
			1 Month	5 - 19.5		
			6 Month	6 - 17.5		
			1 Year	6 - 17.5		
			2 Year	6 - 17		
			4 Year	5.5 - 15.5		
			6 Year	5 - 14.5		
			8 Year	4.5 - 13.5		
			10 Year	4.5 - 13.5		
			16 Year	4.5 - 13.0		
			21 Year	4.5 - 11.0		
Neutrophil			Criteria	x 10³/uL	%	
			0 Day	6.0 - 28.0	68 (54.4 - 81.6)	
			24 Hour	5.0 - 21.0	61 (48.8 - 73.2)	
			1 Week	1.5 - 10	45 (36 - 54)	
			2 Week	1 - 9.5	40 (32 - 48)	
			1 Month	1 - 8.5	35 (28 - 42)	
			6 Month	1 - 8.5	32 (25.6 - 38.4)	
			1 Year	1.5 - 8.5	31 (24.8 - 37.2)	
			2 Year	1.5 - 8.5	33 (26.4 - 39.6)	
			4 Year	1.5 - 8.5	42 (33.6 - 50.4)	
			6 Year	1.5 - 8	51 (40.8 - 61.2)	
			8 Year	1.5 - 8	53 (42.4 - 63.6)	
			10 Year	1.5 - 8.5	54 (43.2 - 64.8)	
			16 Year	1.8 - 8	57 (45.6 - 68.4)	
			21 Year	1.8 - 7.7	59 (47.2 - 70.8)	

Lymphocyte			Criteria	x 10 ³ /uL	%	
			0 Day	2 - 11	24 (19.2 - 28.8)	
24 Hour	2 - 11.5	31 (24.8 - 37.2)				
1 Week	2 - 17	41 (32.8 - 49.2)				
2 Week	2 - 17	48 (38.4 - 57.6)				
1 Month	2.5 - 16.5	56 (44.8 - 67.2)				
6 Month	4 - 13.5	61 (48.8 - 73.2)				
1 Year	4 - 10.5	61 (48.8 - 73.2)				
2 Year	3 - 9.5	59 (47.2 - 70.8)				
4 Year	2 - 8	50 (40 - 60)				
6 Year	1.5 - 7	42 (33.6 - 50.4)				
8 Year	1.5 - 6.8	39 (31.2 - 46.8)				
10 Year	1.5 - 6.5	38 (30.4 - 45.6)				
16 Year	1.2 - 5.2	35 (28 - 42)				
21 Year	1 - 4.8	34 (27.2 - 40.8)				

Monocyte			Criteria	Mean	x 10 ³ /uL
			0 Day	1.2	
24 Hour	1.1				
1 Week	1.1				
2 Week	1				
1 Month	0.7				
6 Month	0.6				
1 Year	0.6				
2 Year	0.5				
4 Year	0.5				
6 Year	0.4				
8 Year	0.4				
10 Year	0.4				
16 Year	0.4				
21 Year	0.3				

Absolute Neutrophil	NEUT#	<15 years < 0.5
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Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Automated Retic	LH750 DXH800 DXH600		0-1 Day	0.3 - 2.5	%	
			1-3 Days	1.8 - 4.6		
			4 Days - 6 Months	0.1 - 1.7		
			6 Months - 2 Years	0.7 - 2.3		
			2-6 Years	0.5 - 1.0		
			6-12 Years	0.5 - 1.0		
		Male	12-18 Years	0.5 - 1.0		
		Female	12-18 Years	0.5 - 1.0		
		Male	> or = 18 Years	0.8 - 2.5		
		Female	> or = 18 Years	0.8 - 4.1		

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
ESR	Sedimat	Male	< 50 years	0 - 20	mm	
			> 50 years	0 - 23		
		Female	< 50 years	0 - 23		
			> 50 years	0 - 30		

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Monospot	Manual			Negative		

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Bloodborn Parasite Sc	Manual			No parasites seen.		Any parasites seen.

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Semen Analysis, Post	Manual	Male		No sperm seen.		

Coagulation Reference Ranges:

BCS and XP Analyzers:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Protime (PT)	BCS/XP		Mean = 10.5	8.8 - 11.6	sec	
PTT	BCS/XP		25	20.0 - 30.5	sec	> 100
Fibrinogen	BCS/XP		300	250 - 450	mg/dL	< 75

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Anti-Factor Xa	BCS/XP		at 4 hr Post LMWH Dose	0.6 - 1.0	IU/mL	for twice daily dose

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
D-Dimer	BCS XP			<0.5	mg/L FEU	Considered Negative for VTE Requires further clinical evaluation.
				≥0.5		

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Platelet Function Analys	PFA		COL/EPI	71 - 92	sec	
			COL/ADP	55 - 115	sec	

Last Reviewed: 05.08.2018

Reviewed. No changes required. H Budke, M.D.

New critical values reviewed. No changes. Hbudke, M.D. 5/7/18

Hematology Tests with Critical Ranges:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
WBC	LH750 DXH800 DXH600	Male Female	0-1 Day	9.0 - 30.0	x10 ³ / uL	< 2.0 and >50.0
			1-3 Days	9.4 - 34.0		
			4 Days - 1 month	5.0 - 20.0		
			1 month - 6 months	4.0 - 19.5		
			6 months - 2 years	6.0 - 17.0		
			2 - 6 years	5.0 - 15.5		
			6 - 18 years	4.5 - 13.5		
			> or = 18 years	4.5 - 11.0		
			> or = 18 years	4.5 - 11.0		

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Hemoglobin (Hgb)	LH750 AND DXH800 DXH600	Male Female	0-1 Day	19.0 - 30.0	g/dL	< 9.5 and > 22.5
			1-3 Days	14.5 - 22.5		
			4 Days - 1 month	13.4 - 19.8		
			1-2 months	10.7 - 17.1	g/dL	< 6.9 and > 20.8
			2-6 months	9.4 - 13.0		
			6 months - 2 years	10.5 - 13.5		
			2-6 years	11.5 - 13.5		
			6-12 years	11.5 - 15.5	g/dL	< 6.6 and > 19.9
			12-18 years	13.0 - 16.0		
			18 years and older	13.5 - 17.5		
			12-18 years	12.0 - 16.0		
18 years and older	12.0 - 16.0					
Platelet Count	LH750 AND DXH800 DXH600			150 - 400	x10 ³ / uL	< 50 and > 400

Absolute Neutrophil			NEUT#			<15 years < 0.5
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Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Bloodborn Parasite Screen	Manual			No parasites seen.		Any parasites seen.

BCS and XP Analyzers:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
INR	BCS/XP					> 5.0
PTT	BCS/XP		Mean = 26.5	21.7 - 31.2	sec	> 100
Fibrinogen	BCS/XP		Mean = 388	258 - 518	mg/dL	< 75

Chemistry Tests with Critical Ranges:

DXC 600 Reference Ranges:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Acetaminophen	DXC 600		Therapeutic	10 - 30	ug/mL	> 150
			Hepatotoxic			
			4 hrs Post Ingestion	> 150		
			8 hrs Post Ingestion	> 75		
			12 hrs Post Ingestion	> 40		
Alcohol (ETOH)	DXC 600			<0.005 (none detected)	gm/dL	> 0.300
Ammonia	DXC 600			9 - 35	uMOL/L	> 100
BUN	DXC 600 AU480			8 - 26	mg/dL	> 100
Calcium	DXC 600 AU480		0-2 days	6.2 - 11.0	mg/dL	< 5.8, > 13.3
			> 2 days	8.5 - 10.3		< 6.3, > 13.3
CO2 (Carbon Dioxide)	DXC 600 AU480			22 - 32	mmol/L	< 10, > 40
Creatinine	DXC 600 AU480	Male		0.61 - 1.24	mg/dL	> 7.0
		Female		0.44 - 1.03		> 12.0 (Male or Female) if patient location is DIA
Digoxin	DXC 600			0.8 - 2.0	ng/mL	> 2.4
Dilantin	DXC 600			10 - 20	ug/mL	> 30
Gentamicin	DXC 600		Peak	5 - 10	ug/mL	> 10
			Trough	< 2		
Glucose	DXC 600 AU480		0-2 days	42 - 110	mg/dL	< 40, > 250
			3-5 days	50 - 110		< 40, > 250
			6 days - 1 year	60 - 110		< 40, > 250
			> 1 year	74 - 118		< 50, > 400
Lactic Acid	DXC 600			0.5 - 2.0	mmol/L	> 4.0
Lead	ESA		0-15 years	0.0 - 10.0	ug/dL	> or = 20
			> = 16 years	0.0 - 10.0		> or = 45
Lithium	AVL 9180			0.5 - 1.3	meq/L	> 2.0
Magnesium	DXC 600 AU480			1.7 - 2.4	mg/dL	< 1.5, > 2.6
Phenobarbital	DXC 600			15 - 40	ug/mL	> 60
Phosphorus	DXC 600 AU480			2.5 - 4.6	mg/dL	< 1.0
Potassium	DXC 600 AU480		0-7 Days	3.2 - 5.5	mmol/L	< 2.5, > 6.5
			8 Days - 1 year	3.4 - 6.0		< 2.5, > 6.5
			2 years or greater	3.4 - 4.8		< 2.5, > 6.0
Salicylate	DXC 600			0 - 30	mg/dL	> 40
Sodium	DXC 600 AU480			133 - 142	mmol/L	< 120, > 160
Tegretol	DXC 600			4 - 12	ug/mL	> 20
Theophylline	DXC 600		< 8 mos Neonatal Apnea	6 - 13	ug/mL	> 20
			< 8 mos Bronchodilator	10 - 20		> 20
			> 8 months	8 - 20		> 25
Tobramycin	DXC 600		Peak	5 - 10	ug/mL	> 10
			Trough	< 2		
Total Bilirubin	DXC 600 AU480		0-1 day	0.1 - 6.0	mg/dL	> 12.0
			1-2 days	0.1 - 8.0		> 15.0
			3-5 days	0.1 - 12.0		> 15.0
			> 5 days	0.3 - 1.2		> 15.0

Chemistry Tests with Critical Ranges: (cont.)

DXC 600 Reference Ranges:

Valproic Acid	DXC 600			50 - 100	ug/mL	> 150
Vancomycin	DXC 600		Peak	20 - 40	ug/mL	> 40
			Trough	10 - 15		

Chemistry Cerebrospinal Fluid Tests

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
CSF Glucose	DXC 600			40 - 70	mg/dL	< 25
CSF Xanthochromia	Visual			Clear		Xanthochromic

Glucose Tolerance Test (75 grams of Glucola)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Fasting Glucose	DXC 600			70 - 115	mg/dL	< 50, > 400
1/2 Hour Glucose	DXC 600			70 - 199	mg/dL	< 50, > 400
1 Hour Glucose	DXC 600			70 - 199	mg/dL	< 50, > 400
2 Hour Glucose	DXC 600			70 - 139	mg/dL	< 50, > 400
3 Hour Glucose	DXC 600			70 - 115	mg/dL	< 50, > 400
4 Hour Glucose	DXC 600			70 - 115	mg/dL	< 50, > 400
5 Hour Glucose	DXC 600			70 - 115	mg/dL	< 50, > 400
6 Hour Glucose	DXC 600			70 - 115	mg/dL	< 50, > 400

Glucose Challenge Test (75 grams Glucola)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Fasting Glucose	DXC 600			70 - 92	mg/dL	< 50, > 400
1 Hour Glucose	DXC 600			70 - 180	mg/dL	< 50, > 400
2 Hour Glucose	DXC 600			70 - 153	mg/dL	< 50, > 400

Gestational Diabetes Tolerance Test (100 grams Glucola)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Fasting Glucose	DXC 600			70 - 92	mg/dL	< 50, > 400
1 Hour Glucose	DXC 600			70 - 180	mg/dL	< 50, > 400
2 Hour Glucose	DXC 600			70 - 153	mg/dL	< 50, > 400
3 Hour Glucose	DXC 600			70 - 140	mg/dL	< 50, > 400

Gestational Diabetes Screen Test (50 grams Glucola)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
1 Hour Glucose	DXC 600			70 - 140	mg/dL	< 50, > 400

2 Hour Post-Prandial Glucose Test:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
2 Hour Glucose	DXC 600			70 - 139	mg/dL	< 50, > 400

4 p.m. Glucose Test:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Glucose	DXC 600			75 - 115	mg/dL	< 50, > 400

Beckman Access 2 / DXI:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Total T4	Access/Dxl		0 Day - 7 Days	8.2 - 21.5	ug/dL	< 7 or > 23
			8 Days - 3 Months	7.2 - 15.6	ug/dL	< 5 or > 23
			4 Months - 2 Years	5.5 - 14.5	ug/dL	< 3 or > 16
			3+ Years	5.0 - 11.5	ug/dL	< 3 or > 17
Troponin	Access/Dxl			< 0.03	ng/mL	≥ 0.04

Microbiology Tests with Critical Ranges:

Testing Area:	Test type		Test	Reference Range	Source	Critical Range
Microbiology	Culture		Blood	Negative	Blood	Positive
			CSF	Negative	CSF	Positive
			Acid Fast Bacillus	Negative	All	Positive
			Group A Strep Backup	Negative	Throat	Positive
			Group B Strep	Negative	Nursery only	Positive
			Gonorrhoea	Negative	All	Positive
			HSV Type II	Negative	congenital	Positive
	Organism		MDRO	Negative	All	Positive
			CRE	Negative	All	Positive
			ESBL	Negative	All	Positive
			VRE	Negative	All	Positive
			MRSA	Negative	All	Positive
Microbiology	Rapid Test	PCR	Influenza A	Negative	NP	Positive
			Influenza B	Negative	NP	Positive
			Bordatella pertussis	Negative	NP	Positive
			Bordatella para/ bronch	Negative	NP	Positive
			Bordatella holmesii	Negative	NP	Positive
			Gonorrhoea PCR	Negative	genital / urine	Positive
			Chlamydia PCR	Negative	genital / urine	Positive
			MRSA PCR	Negative	nasal	Positive
			CDT Toxin PCR	Negative	stool	Positive
			HSV Type II PCR	Negative	congenital	Positive
			Microbiology	Rapid Test	EIA	Group A Strep
Exposure HIV 1/2	Negative	Blood				Positive
Giardia Antigen	Negative	Stool				Positive
Cryptosporidium Antigen	Negative	Stool				Positive
CDT Toxin Screen EIA	Negative	Stool				Positive
Ova and Parasite	Negative	Stool				Positive
Legionella Antigen	Negative	Urine				Positive

Critical Tests by Testing Area: Summary

Testing Area:	Test
Hematology Critical Tests:	White Blood Cell Count (WBC)
	Hemoglobin (Hgb)
	Absolute Neutrophil Count
	Platelet Count
	Blood Parasites Screen (Malaria)

Testing Area:	Test
Coagulation Critical Tests:	PT/INR (International Normalized Ratio)
	PTT
	Fibrinogen

Testing Area:	Test
Blood Gases Critical Tests:	pH
	pCO2
	pO2
	Oxyhemoglobin
	Carboxyhemoglobin
	Methemoglobin
	O2 Content
	Total Hemoglobin

Testing Area:	Test
Chemistry Critical Test:	Ammonia
	BUN
	Calcium
	CO2
	Creatinine
	CSF Glucose
	CSF Xanthochromia
	Glucose
	Gestational Diabetes Screen Test (Glucose)
	Gestational Diabetes Tolerance Test (Glucose)
	Glucose Tolerance Test
	2 Hour Post-Prandial Glucose Test
	Hepatitis B Surface Antigen
	HIV Antibody
	Hepatitis B Core IgM
	Hepatitis A IgM

Critical Tests by Testing Area Summary: (cont.)

Testing Area:	Test
Chemistry Critical Test: (cont.)	Hepatitis C Virus
	Lead
	Lactic Acid
	Magnesium
	Phosphorous
	Potassium
	Sodium
	Sweat Chloride
	T4 - Thyroxine (total)
	Free T4
	Total Bilirubin
	Troponin I

Testing Area:	Test
Therapeutic Drug Critical Tests:	Digoxin
	Dilantin
	Gentamicin
	Lithium
	Phenobarbital
	Tegretol
	Theophylline
	Tobramycin
	Valproic Acid
	Vancomycin

Testing Area:	Test
Toxicology Critical Tests:	Acetaminophen
	Alcohol (ETOH)
	Salicylate

Testing Area:	Test
Blood Bank Critical Tests:	Transfusion Reaction Evaluation
	Transfusion associated infection or disease
	Antibody Titer >3 increments or Score increase >10 between samples
	Positive DAT on a newborn

Chemistry Reference Ranges:**5/7/2018 Reviewed Dr. D. Praprotnik****DXC 700 AU Reference Ranges:**

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
A/G Ratio	Calculation			1.1 - 2.2		
Albumin	DXC 700 AU	Both	0 Day - 2 Days	2.8 - 4.2	g/dL	
		Male	3 Days - 18+ Years	4.2 - 5.5	g/dL	
		Female	3 Days - 18+ Years	3.7 - 5.3	g/dL	
Alcohol (ETOH)	Vitros 350			<0.010 (none detected)	gm/dL	> 0.300
Alkaline Phosphatase	DXC 700 AU	Both	0 Days - 2 Years	150 - 420	IU/L	
		Both	3 Years - 10 Years	100 - 320	IU/L	
		Male	10 Years - 18 Years	100 - 390	IU/L	
		Female	10 Years - 18 Years	100 - 320	IU/L	
		Both	18+ Years	34 - 104	IU/L	
ALT (SGPT)	DXC 700 AU	Both		7 - 52	IU/L	
Amylase	DXC 700 AU	Both		29 - 103	IU/L	
Anion Gap	DXC 700 AU	Both		7 - 17	mmol/L	
AST (SGOT)	DXC 700 AU	Both		13 -39	IU/L	
BUN	DXC 700 AU	Both		7 - 25	mg/dL	> 100
BUN/Creatinine Ratio	Calculation	Both		15 - 25	Ratio	
Calcium	DXC 700 AU	Both		8.6 - 10.3	mg/dL	< 5.8, > 13.3
Cardiac Risk Factor	Calculation	Male		1/2 Average 3.43		
				Average 4.97		
				2X Average 9.55		
				3X Average 23.99		
		Female		1/2 Average 3.27		
				Average 4.44		
				2X Average 7.05		
				3X Average 11.04		
Chloride	DXC 700 AU			98 - 107	mmol/L	
Cholesterol	DXC 700 AU	Both	0 - 17 Years	0 - 169 desirable	mg/dL	
				170-199 borderline high	mg/dL	
				>200 high	mg/dL	
		Both	18+ Years	0 - 199 desirable	mg/dL	
				200-239 borderline high	mg/dL	
				>239 high	mg/dL	
CO2 (Carbon Dioxide)	DXC 700 AU	Both		21 - 31	mmol/L	< 10, > 40
CPK	DXC 700 AU	Both		30 - 223	IU/L	
Creatinine	DXC 700 AU	Male		0.7 - 1.3	mg/dl	> 7.0
		Female		0.6 - 1.2	mg/dl	> 12.0 (Male or Female) if patient location is DIA
Direct Bilirubin	DXC 700 AU	Both	0 Days - 5 Days	0.03 - 0.6	mg/dL	
			6 - Days - 17 Years	0.03 - 0.20	mg/dL	
			18+ years	0.03 - 0.18	mg/dL	
GGT	DXC 700 AU	Both		9 - 64	IU/L	

Chemistry Reference Ranges (cont.):**DXC 700 AU Reference Ranges (cont):**

Glomerular Filtration Rate	Calculation	Both		> or = 60 GFR	mL/min/ 1.73 M ²	
				30 - 59 Moderate decrease in GFR		
				15 - 29 Severe decrease in GFR		
				< 15 Kidney failure or Dialysis		
			Chronic kidney disease is defined as either kidney damage or GFR < 60 mL/min/1.73 m ² for > or = 3 months. Kidney damage is defined as pathologic abnormalities or markers of damage including abnormalities in blood or urine tests or imaging studies. This GFR is NOT used for medication dosing.			
Glucose	DXC 700 AU	Both	0 Days - 2 Days	36 - 99	mg/dL	< 40, > 250
			2 Days - 16 Years	60 - 100	mg/dl	< 40, > 250
			17+ Years	75 - 109	mg/dl	< 50, > 400
HDL (Direct)	DXC 700 AU	Both	0 Years - 17 Years	> 45	mg/dl	
		Male	18+ Years	> 40	mg/dl	
		Female	18+ Years	> 50	mg/dl	
Indirect Bilirubin	Calculation			0.0 - 1.0	mg/dL	
Iron	DXC 700 AU	Both	0 Days - 5 Days	100 - 250	ug/dL	
		Both	6 Days - 2 Years	40 - 100	ug/dL	
		Both	2 Years - 17 Years	50 - 120	ug/dL	
		Both	18+ Years	50 - 212	ug/dl	
Lactic Acid	DXC 700 AU	Both		0.5 - 2.2	mmol/L	> 4.0
Lipase	DXC 700 AU	Both		11 - 82	IU/L	
LDH	DXC 700 AU	Both		140 - 271	IU/L	
LDL	Calculation	Both	0 - 17 years	0 - 109 desirable	mg/dL	
				110 - 129 borderline high	mg/dL	
				> = 130 high	mg/dL	
			18 + years	0 - 99 optimal	mg/dL	
				100 - 129 near optimal	mg/dL	
				130 - 159 borderline high	mg/dL	
				160 - 189 high	mg/dL	
> = 190 very high	mg/dL					
Magnesium	DXC 700 AU			1.7 - 2.4	mg/dL	< 1.5, > 2.6
Phosphorus	DXC 700 AU	Both	0 - 9 Days	4.5 - 9.0	mg/dL	< 1.0
			10 Days - 2 Years	4.0 - 6.5	mg/dL	
			3 Years - 10 Years	3.2 - 5.8	mg/dL	
			11 Years - 15 Years	3.3 - 5.4	mg/dL	
			16+ Years	2.5 - 4.6	mg/dL	
Potassium	DXC 700 AU	Both		3.4 - 4.8	mmol/L	< 2.5, > 6.5
Procalcitonin	DXC 700 AU	Both		0.02 - 0.30	ng/mL	
Rhematoid Factor	DXC 700 AU	Both		0 - 14	IU/mL	
Sodium	DXC 700 AU	Both		136 - 145	mmol/L	< 120, > 160
Total Bilirubin	DXC 700 AU		0 Day - 1 Day	0.3 - 8.0	mg/dL	> 12.0
			1 Day - 2 Days	0.3 - 11.5	mg/dL	> 15.0
			3 Days - 5 Days	0.3 - 12.0	mg/dL	
			5+ Days	0.3 - 1.0	mg/dL	

Chemistry Reference Ranges (cont.):**DXC 700 AU Reference Ranges (cont):**

Total Protein	DXC 700 AU	Both	0 Day - 15 days	4.4 - 7.6	g/dL
			16 Days - 1 Year	5.1 - 7.3	g/dL
			1 Year - 2 Years	5.6 - 7.5	g/dL
			3 Years - 16 Years	6.0 - 8.0	g/dL
			17+ Years	6.0 - 8.3	g/dL
Triglycerides	DXC 700 AU	Both	0 - 17 Years	0 - 89 normal	mg/dL
				90 - 129 borderline high	mg/dL
				> = 130 high	mg/dL
			18+ Years	0 - 149 normal	mg/dL
				150-199 borderline high	mg/dL
				200-499 high	mg/dL
		> 499 very high	mg/dL		
Uric Acid	DXC 700 AU	Male		4.4 - 7.6	mg/dl
		Female		2.3 - 6.6	mg/dl
VLDL	Calculation			8 - 39	mg/dL

Chemistry Cerebrospinal Fluid Tests

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
CSF Glucose	DXC 700 AU	Both		40 - 70	mg/dL	< 25
CSF Total Protein	DXC 700 AU	Both	0 Days - 29 Days	15 - 130	mg/dL	
			30+ Days	15 - 45	mg/dL	
CSF Xanthochromia	Visual	Both		Clear		Xanthochromic

Chemistry Urine Tests:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Urine Amy (24 Hr)	DXC 700 AU	Male		16 - 491	IU/24hr	
		Female		21 - 447	IU/24hr	
Urine BUN (24 Hr)	DXC 700 AU	Both		7 - 16	g/24hr	
Urine Calcium (24 Hr)	DXC 700 AU	Both		100 - 300	mg/24hr	
Urine Chloride (24 Hr)	DXC 700 AU	Both		110 - 250	mmol/24hr	
Urine Creatinine (24 Hr)	DXC 700 AU	Male		800 - 2000	mg/24hr	
		Female		600 - 1800	mg/24hr	
Creatinine Clearance (24 H	DXC 700 AU	Male		74 - 140	mL/min	
		Female		74 - 130	mL/min	
Urine Glucose	DXC 700 AU	Both		0 - 10	mg/dL	
Urine Glucose (24 Hr)	DXC 700 AU	Both		0 - 0.10	g/24hr	
Urine Magnesium (24 Hr)	DXC 700 AU	Both		24 - 255	mg/24hr	
Urine Phosphorus	DXC 700 AU	Both		0.3 - 1.3	g/24hr	
Urine Potassium	DXC 700 AU	Both		25 - 125	mmol/24hr	
Urine Sodium	DXC 700 AU	Both		40 - 220	mmol/24hr	
Urine Total Protein	DXC 700 AU	Both		50 - 80	mg/24hr	
		Both	Random	< 10	mg/dL	
Urine Uric Acid	DXC 700 AU	Male		250 - 800	mg/24hr	
		Female		250 - 750	mg/24hr	

Chemistry Reference Ranges: (cont.)**Glucose Tolerance Test (75 grams of Glucola)**

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Fasting Glucose	DXC 700 AU			70 - 115	mg/dL	< 50, > 400
1/2 Hour Glucose	DXC 700 AU			70 - 199	mg/dL	< 50, > 400
1 Hour Glucose	DXC 700 AU			70 - 199	mg/dL	< 50, > 400
2 Hour Glucose	DXC 700 AU			70 - 139	mg/dL	< 50, > 400
3 Hour Glucose	DXC 700 AU			70 - 115	mg/dL	< 50, > 400
4 Hour Glucose	DXC 700 AU			70 - 115	mg/dL	< 50, > 400
5 Hour Glucose	DXC 700 AU			70 - 115	mg/dL	< 50, > 400
6 Hour Glucose	DXC 700 AU			70 - 115	mg/dL	< 50, > 400

Glucose Challenge Test (75 grams Glucola)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Fasting Glucose	DXC 700 AU			70 - 92	mg/dL	< 50, > 400
1 Hour Glucose	DXC 700 AU			70 - 180	mg/dL	< 50, > 400
2 Hour Glucose	DXC 700 AU			70 - 153	mg/dL	< 50, > 400

Gestational Diabetes Tolerance Test (100 grams Glucola)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Fasting Glucose	DXC 700 AU			70 - 92	mg/dL	< 50, > 400
1 Hour Glucose	DXC 700 AU			70 - 180	mg/dL	< 50, > 400
2 Hour Glucose	DXC 700 AU			70 - 153	mg/dL	< 50, > 400
3 Hour Glucose	DXC 700 AU			70 - 140	mg/dL	< 50, > 400

Gestational Diabetes Screen Test (50 grams Glucola)

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
1 Hour Glucose	DXC 700 AU			70 - 140	mg/dL	< 50, > 400

2 Hour Post-Prandial Glucose Test:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
2 Hour Glucose	DXC 700 AU			70 - 139	mg/dL	< 50, > 400

Chemistry Urine Drug Screening Tests:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Amphetamines (AMPH)	Triage/Man			Negative = < 1000	ng/mL	
Barbiturates (BARB)	Triage/Man			Negative = < 300	ng/mL	
Benzodiazepine (BENZ)	Triage/Man			Negative = < 300	ng/mL	
Cocaine Metabolite (COC)	Triage/Man			Negative = < 300	ng/mL	
Opiate (OP)	Triage/Man			Negative = < 300	ng/mL	
Phencyclidine (PCP)	Triage/Man			Negative = < 25	ng/mL	
Cannabinoid (THC50)	Triage/Man			Negative = < 50	ng/mL	

Coagulation Tests:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Fibrinogen	Sysmex CA660			243.70 - 487.63	mg/dL	< 75
PT	Sysmex CA660			8.8 - 11.2	seconds	
INR	Calculation			0.9 - 1.1	Ratio	> 5.00
PTT	Sysmex CA660			22.0 - 29.8	seconds	> 100

Serology Tests:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
ASO Titer	Manual			0 - 199	Units	
HIV	Manual			Negative		
Influenza A/B	Manual			Negative		
Monospot Test	Manual			Negative		
Occult Blood, Fecal	Manual			Negative		
Occult Blood, Gastric	Manual			Negative		
RSV	Manual			Negative for RSV		
RPR	Manual			Non-Reactive		Reactive
Rotavirus	Manual			No antigen detected.		
Serum Pregnancy	Manual			Negative		
Urine Pregnancy	Manual			Negative		

Urinalysis Tests:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
Bacteria	Clinitek Status +			Absent		
Bilirubin	Clinitek Status +			Negative		Large
Glucose	Clinitek Status +			Negative	mg/dL	
Ketones	Clinitek Status +			Negative		
Leukocyte esterase	Clinitek Status +			Negative		
Nitrates	Clinitek Status +			Negative		
pH	Clinitek Status +			4.6 - 8.0		
Proteins	Clinitek Status +			Negative	mg/dL	
RBC/Hgb	Clinitek Status +			Negative		
Specific Gravity	Clinitek Status +			1.001 - 1.035		

Hematology Tests:

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
ESR	ESR Auto Plus	Male	< 50 years	0 - 20	mm	
			> 50 years	0 - 23		
		Female	< 50 years	0 - 23		
			> 50 years	0 - 30		
Semen, Post Vasectomy	Manual	Male		No sperm seen.		
Platelet Count	DXH600 DXH800		0-3 Days	150 - 350	x10 ³ / uL	< 50, > 999
			4 Days - 1 Month	150 - 350		
			1-2 Months	150 - 350		
			2-6 Months	150 - 350		
			6 Months - 2 Years	150 - 350		
			2-6 Years	150 - 350		
		6-12 Years	150 - 350			
		Male	12-18 Years	150 - 350		
		Female	12-18 Years	150 - 350		
		Male	> or = 18 Years	150 - 350		
Female	> or = 18 Years	150 - 350				
RDW-cv	DXH600 DXH800		0-6 months	14.9 - 18.7		
			> 6 months	11.6 - 14.8		
MCH	DXH600 DXH800		0-1 Day	30 - 37	pg	
			1-3 Days	30 - 37		
			4 Days - 1 Month	30 - 37		
			1-6 Months	29 - 36		
			6 Months - 2 Years	24 - 30		
			2-6 Years	25 - 31		
			6-18 Years	25 - 34		
		Male	> or = 18 Years	27 - 35		
		Female	> or = 18 Years	27 - 35		
WBC	DXH600 DXH800		0-1 Day	9.0 - 30.0	x10 ³ / uL	< 2.0, > 50.0
			1-3 Days	9.4 - 34.0		
			4 Days - 1 Month	5.0 - 20.0		
			1 Month - 6 Months	4.0 - 19.5		
			6 Months - 2 Years	6.0 - 17.0		
			2-6 Years	5.0 - 15.5		
			6-18 Years	4.5 - 13.5		
		Male	> or = 18 Years	4.5 - 11.0		
		Female	> or = 18 Years	4.5 - 11.0		
Automated Differential	DXH600 DXH800	Male	Neut%	42.1 - 74.5	%	
			Lymph%	13.9 - 44.1		
			Mono%	4.7 - 13.9		
			Eos%	0.0 - 6.1		
			Baso%	0.0 - 1.2		
		Female	Neut%	44.9 - 77.9		
			Lymph%	12.4 - 42.8		
			Mono%	3.7 - 11.9		
			Eos%	0.0 - 5.4		
			Baso%	0.0 - 1.5		

Hematology Tests (cont.):

Total Leukocytes	DXH600 DXH800		0 Day	9 - 38	x 10 ³ /uL	
			1 Day	9.4 - 34		
			1 Week	5 - 21		
			2 Week	5 - 20		
			1 Month	5 - 19.5		
			6 Month	6 - 17.5		
			1 Year	6 - 17.5		
			2 Year	6 - 17		
			4 Year	5.5 - 15.5		
			6 Year	5 - 14.5		
			8 Year	4.5 - 13.5		
			10 Year	4.5 - 13.5		
			16 Year	4.5 - 13.0		
			21 Year	4.5 - 11.0		
Neutrophil	DXH600 DXH800			x 10 ³ /uL		%
			0 Day	6.0 - 28.0	68 (54.4 - 81.6)	
			24 Hour	5.0 - 21.0	61 (48.8 - 73.2)	
			1 Week	1.5 - 10	45 (36 - 54)	
			2 Week	1 - 9.5	40 (32 - 48)	
			1 Month	1 - 8.5	35 (28 - 42)	
			6 Month	1 - 8.5	32 (25.6 - 38.4)	
			1 Year	1.5 - 8.5	31 (24.8 - 37.2)	
			2 Year	1.5 - 8.5	33 (26.4 - 39.6)	
			4 Year	1.5 - 8.5	42 (33.6 - 50.4)	
			6 Year	1.5 - 8	51 (40.8 - 61.2)	
			8 Year	1.5 - 8	53 (42.4 - 63.6)	
			10 Year	1.5 - 8.5	54 (43.2 - 64.8)	
			16 Year	1.8 - 8	57 (45.6 - 68.4)	
21 Year	1.8 - 7.7	59 (47.2 - 70.8)				
Lymphocyte	DXH600 DXH800			x 10 ³ /uL		%
			0 Day	2 - 11	24 (19.2 - 28.8)	
			24 Hour	2 - 11.5	31 (24.8 - 37.2)	
			1 Week	2 - 17	41 (32.8 - 49.2)	
			2 Week	2 - 17	48 (38.4 - 57.6)	
			1 Month	2.5 - 16.5	56 (44.8 - 67.2)	
			6 Month	4 - 13.5	61 (48.8 - 73.2)	
			1 Year	4 - 10.5	61 (48.8 - 73.2)	
			2 Year	3 - 9.5	59 (47.2 - 70.8)	
			4 Year	2 - 8	50 (40 - 60)	
			6 Year	1.5 - 7	42 (33.6 - 50.4)	
			8 Year	1.5 - 6.8	39 (31.2 - 46.8)	
			10 Year	1.5 - 6.5	38 (30.4 - 45.6)	
			16 Year	1.2 - 5.2	35 (28 - 42)	
21 Year	1 - 4.8	34 (27.2 - 40.8)				

Hematology Tests (cont.):

Monocyte	DXH600 DXH800			Mean	x 10³/uL	
			0 Day	1.2		
			24 Hour	1.1		
			1 Week	1.1		
			2 Week	1		
			1 Month	0.7		
			6 Month	0.6		
			1 Year	0.6		
			2 Year	0.5		
			4 Year	0.5		
			6 Year	0.4		
			8 Year	0.4		
			10 Year	0.4		
			16 Year	0.4		
21 Year	0.3					
Absolute Neutrophil			NEUT#			<15 years < 0.5
RBC	DXH600 DXH800		0-1 Day	3.90 - 5.90	x10⁶ / uL	
			1-3 Days	3.90 - 5.90		
			4 Days - 1 Month	3.90 - 5.90		
			1 Month - 6 Months	3.30 - 5.30		
			6 Months - 2 Years	3.90 - 4.80		
			2-6 Years	3.70 - 4.90		
			6-18 Years	3.80 - 5.60		
			Male > or = 18 Years	4.30 - 5.80		
			Female > or = 18 Years	3.80 - 5.20		
Hemoglobin (Hgb)	DXH600 DXH800		0 - 3 Days	14.5 - 22.5	g/dL	< 9.5, > 22.5
			4 Days - 1 Month	13.4 - 19.8		
			1 Month - 2 Months	10.7 - 17.1		< 6.9, > 20.8
			2-6 Months	9.4 - 13.0		
			6 Months - 2 Years	10.5 - 13.5		
			2-6 Years	11.5 - 13.5		
			6-12 Years	11.5 - 15.5		
			Male 12-18 Years	13.0 - 16.0		< 6.6, > 19.9
			Female 12-18 Years	12.0 - 16.0		
			Male 18 Years and older	13.5 - 17.5		
			Female 18 Years and older	12.0 - 16.0		
Hematocrit (Hct)	DXH600 DXH800		0-3 Days	45 - 67	%	
			4 Days - 1 Month	41 - 65		
			1-2 Months	33 - 55		
			2-6 Months	28 - 42		
			6 Months - 2 Years	33 - 39		
			2-6 Years	34 - 40		
			6-12 Years	35 - 45		
			Male 12-18 Years	36 - 50		
			Female 12-18 Years	37 - 45		
			Male 18 Years and older	41 - 53		
			Female 18 Years and older	36 - 46		

Hematology Tests (cont.):

MCHC	DXH600 DXH800		0-3 Days	29.0 - 37.0	g/dL
			4 Days - 1 Month	28.1 - 34.7	
			1-2 Months	28.1 - 35.5	
			2-6 Months	28.3 - 35.3	
			6 Months - 2 Years	30.0 - 36.0	
			2-6 Years	31.0 - 37.0	
			6-12 Years	31.0 - 37.0	
			Male 12-18 Years	31.0 - 37.0	
			Female 12-18 Years	31.0 - 37.0	
			Male 18 Years and older	31.0 - 37.0	
Female 18 Years and older	31.0 - 37.0				
MCV	HMX DXH600		0-3 Days	95 - 121	fL
			4 Days - 1 Month	88 - 122	
			1-2 Months	91 - 111	
			2-6 Months	84 - 106	
			6 Months - 2 Years	70 - 86	
			2-6 Years	75 - 87	
			6-12 Years	77 - 95	
			Male 12-18 Years	78 - 98	
			Female 12-18 Years	78 - 90	
			Male 18 Years and older	80 - 100	
Female 18 Years and older	80 - 100				

Critical Tests:

Testing Area:	Test
Blood Bank Critical Tests:	Transfusion Reaction Evaluation
	Transfusion associated infection or disease
	Positive DAT on a newborn

Critical Tests:

Testing Area:	Test type		Test	Reference Range	Source	Critical Range				
Microbiology	Culture		Blood	Negative	Blood	Positive				
			CSF	Negative	CSF	Positive				
			Acid Fast Bacillus	Negative	All	Positive				
			Group A Strep Backup	Negative	Throat	Positive				
			Group B Strep	Negative	Nursery only	Positive				
			Gonorrhoea	Negative	All	Positive				
			HSV Type II	Negative	congenital	Positive				
			Organism	MDRO	Negative	All	Positive			
				CRE	Negative	All	Positive			
				ESBL	Negative	All	Positive			
				VRE	Negative	All	Positive			
				MRSA	Negative	All	Positive			
				Microbiology	Rapid Test	PCR	Influenza A	Negative	NP	Positive
							Influenza B	Negative	NP	Positive
Bordatella pertussis	Negative	NP	Positive							
Bordatella para/ bronch	Negative	NP	Positive							
Bordatella holmesii	Negative	NP	Positive							
Gonorrhoea PCR	Negative	genital / urine	Positive							
Chlamydia PCR	Negative	genital / urine	Positive							
MRSA PCR	Negative	nasal	Positive							
CDT Toxin PCR	Negative	stool	Positive							
HSV Type II PCR	Negative	congenital	Positive							

Microbiology	Rapid Test	EIA				
			Group A Strep	Negative	Throat	Positive
			Exposure HIV 1/2	Negative	Blood	Positive
			Giardia Antigen	Negative	Stool	Positive
			Cryptosporidium Antigen	Negative	Stool	Positive
			CDT Toxin Screen EIA	Negative	Stool	Positive
			Ova and Parasite	Negative	Stool	Positive
			Legionella Antigen	Negative	Urine	Positive

Last Reviewed: (Revised 05.08.2018)

Chemistry Reference Ranges:**Au 480 Reference Ranges:**

Test	Method	Sex	Criteria	Reference Range	Units	Critical Range
A/G Ratio	Calculation	Both		1.1 - 2.2	Ratio	
Albumin	AU 480	Both		3.5 - 5.7	gm/dL	
Alkaline Phosphatase	AU 480	Both		34 - 104	IU/L	
ALT (SGPT)	AU 481	Both		7 - 52	IU/L	
Anion Gap	Calculation	Both		7 - 17	mmol/L	
AST (SGOT)	AU480	Both		13 - 39	IU/L	
BUN	AU480	Both		7 - 25	mg/dL	> 100
BUN/Creatinine Ratio	Calculation	Both		15 - 25	Ratio	
Calcium	AU480	Both	> 2 days	8.6 - 10.2	mg/dl	< 6.3, > 13.3
Chloride	AU480	Both		98 - 107	mmol/L	
CO2 (Carbon Dioxide)	AU480	Both		21 - 31	mmol/L	< 10, > 40
Creatinine	AU480	Both		0.6 - 1.3	mg/dl	> 7.0
Direct Bilirubin	AU480	Both		0.1 - 0.5	mg/dL	
Glomerular Filtration Rate	Calculation	Both		> or = 60 GFR 30 - 59 Moderate decrease in GFR 15 - 29 Severe decrease in GFR < 15 Kidney failure or Dialysis	ml/min./ 1.73 M ²	
Chronic kidney disease is defined as either kidney damage or GFR < 60 mL/min/1.73 m ² for > or = 3 months. Kidney damage is defined as pathologic abnormalities or markers of damage including abnormalities in blood or urine tests or imaging studies. This GFR is NOT used for medication dosing.						
Glucose	AU480	Both		70 - 105	mg/dL	< 40, > 250
Indirect Bilirubin	Calculation	Both		0.0 - 1.0	mg/dL	
LDH	AU480	Both		140 - 271	IU/L	
Magnesium	AU480	Both		1.7 - 2.4	mg/dL	< 1.5, > 2.6
Phosphorus	AU480	Both		2.5 - 5.0	mg/dL	< 1.0
Potassium	AU480	Both		3.5 - 5.1	mmol/L	< 2.5, > 6.0
Sodium	AU480	Both	2+ Years	136 - 145	mmol/L	< 120, > 160
Total Bilirubin	AU480	Both		0.3 - 1.0	mg/dL	> 15.0
Total Protein	AU480	Both		6.4 - 8.9	gm/dl	

Evaluation of Reference Ranges
October 2014

Reference ranges for BVHS were evaluated using current information from the following sources:

The Harriet Lane Handbook, A manual for Pediatric House Officers, 20th Edition, John Hopkins Children's Center, 2015

Ohio State University Wexler Medical Center

Cleveland Clinic