

**UPMC Presbyterian Shadyside Automated Testing Laboratories**  
**Department of Pathology**  
**2018 Reference Ranges**

Serum/Plasma Test	Reference Range	Units
AKI Risk Score (Acute Kidney Index)	less than 0.3	No units
Albumin	0DY: 2.9 – 5.5 1M: 3.8 – 5.4 15YR: 3.4 – 5.0	g/dL
Alkaline Phosphatase	0DY: less than 310 1M: less than 360 1YR: less than 290 10YR: less than 400 15YR: 38 – 126	IU/L
ALT (Alanine Aminotransferase)	Male: 17 – 63 Female: 14 – 54	IU/L
Ammonia	1M – 14 YR: 12 – 38 15YR: 9 – 33	μmol/L
AST (Aspartate Aminotransferase)	15-41	IU/L
Amylase	less than 65	IU/L
Bilirubin, Direct	0.1 – 0.5	mg/dL
Bilirubin, Total	0DY: 1 – 12 1M: 0.2 – 1.3 15YR: 0.3 – 1.5	mg/dL
BUN (Blood Urea Nitrogen)	0DY: 6 – 18 15YR: 8 – 26	mg/dL
Calcium	0DY: 7-12 1M: 8.8 – 10.8 15YR: 8.4 – 10.2	mg/dL
Creatinine	0DY: 0.1 – 0.6 10YR: 0.2 – 1.1 15YR: 0.5 – 1.4	mg/dL
Chloride	98 – 107	mmol/L

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Serum/Plasma Test	Reference Range	Units
CO2 (Carbon dioxide)	21 – 31	mmol/L
Glucose	Fasting 70-99	mg/dL
Glucose (less than 1 month)	40 – 99	mg/dL
Magnesium	0DY: 1.2 – 2.6 7DY: 1.6 – 2.6 2YR: 1.6 – 2.2 15YR: 1.6 – 2.3	mg/dL
Phosphorus	0DY: 5.5-9.5 1M: 4.5-6.5 1YR: 4.5-5.5 15YR: 2.5-4.6	mg/dL
Potassium	0DY: 3.7-5.9 1M: 4.1-5.3 1YR: 3.4-4.7 15YR: 3.5-5.0	mmol/L
Sodium	136 – 146	mmol/L
Uric Acid	0DY: 2.0 – 5.5 15YR: 2.5 – 7.5 17YR: 2.5 – 6.2 35YR: 2.5 – 7.0 45YR: 2.5 – 7.5	mg/dL
$\gamma$ GTP (gamma glutamyl transferase)	Male: O DY:less than121 1YR:less than45 15YR: Less than or equal to 65  Female: 0DY:less than121 1YR:45 15YR:Less than or equal to 40	IU/L

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Serum/Plasma Test	Reference Range	Units
Total Protein	ODY: 4.4 – 7.6 1M: 5.1 – 7.3 1YR: 6.0 – 8.0 15YR: 6.3 – 7.7	g/dL
Lipase	15 – 70	U/L
Total CPK (Creatine phosphokinase)	Less than or equal to 200	IU/L
CK-MB (Creatine Kinase-MB)	0 - 5	ng/mL
Lactate (plasma)	0.5 – 2.2	mmol/L
LDH (Lactate dehydrogenase)	OD -: less than 450 1M – less than 250 1Y – less than 171	U/L
Iron	Male: 45 – 182 Female: 28 – 170	µg/dL
Transferrin	202 – 336	mg/dL
TIBC	250 – 420	µg/dL
Ferritin	10 – 282	ng/mL
Folate	greater than 5.0	ng/mL
RBC Folate (Red blood cell Folate)	293 – 809	ng/mL
Vitamin B12	211 – 911	pg/mL

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Serum/Plasma Test	Reference Range	Units
Troponin I	less than 0.1: Normal 0.1 – 0.49: Borderline elevation, 0.2 Clinical significance uncertain.  greater than or equal to 0.50 Elevated Troponin, suggestive of myocardial injury	ng/mL
BNP (Brain natriuretic peptide)	less than 100	pg/mL
CRP	less than 0.75	mg/dL
hs-CRP (high sensitivity C-reactive peptide)	less than 0.748	mg/dL
Total $\beta$ hCG (beta subunit of human chorionic gonadotropin)	less than 5.0	mIU/mL
AFP (Alpha fetal protein)	Newborn: less than 170000 1M: less than 400 3M: less than 30 6M - Adult: less than 20	ng/ml
CEA (Carcinoembryonic Antigen)	less than 5 = Negative	ng/ml
CA 15-3 (Cancer Antigen {breast} 15-3)	less than 30	U/ml
CA 19-9 (Cancer Antigen {GI} 19-9)	less than 33	U/ml
CA 125 (Cancer Antigen 125)	less than 35	U/ml
Total PSA (Prostate-specific antigen)	0 – 4.0	ng/mL

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Serum/Plasma Test	Reference Range	Units																														
Complement C3	79 – 152	mg/dL																														
Complement C4	16 – 38	mg/dL																														
Cortisol	<p style="text-align: center;">Adults:     8-10 AM: 5 - 21                   4-6 PM 2 – 14</p> <p style="text-align: center;">Post ACTH Stimulation Peak – greater than 20 Peak after IM injection – greater than 16</p> <p style="text-align: center;">Child – AM:  0-7D: 2 – 15                   8D- 12M: 3 – 23                   1YR – 17YR: 6 – 22</p> <p style="text-align: center;">ACTH Stimulation</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">Baseline</th> <th style="text-align: center;">60 Min</th> </tr> </thead> <tbody> <tr> <td>1-12M</td> <td style="text-align: center;">3-23</td> <td style="text-align: center;">32-60</td> </tr> <tr> <td>Greater than 1Y – 6Y</td> <td style="text-align: center;">6-25</td> <td style="text-align: center;">22-40</td> </tr> <tr> <td>Greater than 6Y – 12Y</td> <td style="text-align: center;">3-15</td> <td style="text-align: center;">17-28</td> </tr> <tr> <td colspan="3" style="padding-top: 10px;">Tanner II-III</td> </tr> <tr> <td>Males</td> <td style="text-align: center;">4-13</td> <td style="text-align: center;">16-32</td> </tr> <tr> <td>Females</td> <td style="text-align: center;">4-16</td> <td style="text-align: center;">16-32</td> </tr> <tr> <td colspan="3" style="padding-top: 10px;">Tanner IV-V</td> </tr> <tr> <td>Males</td> <td style="text-align: center;">5-15</td> <td style="text-align: center;">18-27</td> </tr> <tr> <td>Females</td> <td style="text-align: center;">6-15</td> <td style="text-align: center;">18-35</td> </tr> </tbody> </table>		Baseline	60 Min	1-12M	3-23	32-60	Greater than 1Y – 6Y	6-25	22-40	Greater than 6Y – 12Y	3-15	17-28	Tanner II-III			Males	4-13	16-32	Females	4-16	16-32	Tanner IV-V			Males	5-15	18-27	Females	6-15	18-35	ug/dL
	Baseline	60 Min																														
1-12M	3-23	32-60																														
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Males	5-15	18-27																														
Females	6-15	18-35																														
FSH (Follicle-stimulating Hormone)	<p style="text-align: center;">Females</p> <p style="text-align: center;">2WKS: 2.1 – 30.5 18M: 1.1 – 14.4 19M: 0.7 – 3.4 8YR: 0.3 – 5.6 10YR: 0.7 – 7.3 12YR: 1.0 – 9.2 15YR: 0.3 – 10.5 Follicular: 1.4 – 9.9 Midcycle peak: 6.2 – 17.2 Luteal: 1.1 – 9.2 Postmenopausal: 14.9 – 124.3 Tanner stages I: 0.5 – 2.4; II: 1.7– 4.7; III: 2.5 – 7.0; IV: 1.3 – 7.4; V: 1.0 – 9.2</p> <p style="text-align: center;">Males</p>	mIU/mL																														

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Serum/Plasma Test	Reference Range	Units
	2WKS: 1.2 – 5.2 18M: 0.2 – 3.0 19M: 0.3 – 1.9 8YR: 0.3 – 1.7 10YR: 0.2 – 5.8 12YR: 0.2 – 10.3 15YR: 0.8 – 8.2 19YR: 1.5 – 14.3 Tanner stages I: 0.3 – 1.9; II: 0.7 – 4.6; III: 1.2 – 10.4; IV: 15 – 40; V: 10 – 40	
LH (Luteinizing Hormone)	<p style="text-align: center;">Females</p> Cord blood: 0.1 – 2.6 2WKS: 0.3 – 7.9 18M: 0.1 – 1.8 19M: 0.1 – 0.6 8YR: 0.1 – 0.2 10YR: 0.1 – 4.1 12YR: 0.3 – 29.4 15YR: 0.1 – 29.4 Follicular phase: 1.7 – 15.0 Midcycle peak: 21.9 – 56.6 Luteal phase: 0.6 – 16.3 Postmenopausal: 9.0 – 52.3 Tanner stages I: 0.1 – 0.2; II: 0.3 – 4.1; III: 0.2 – 4.1; IV: 0.7 – 15.0; V: 0.3 – 29.4  <p style="text-align: center;">Males</p> Cord blood 0.1-2.6 2WKS 4.9-10.0 18M 0.1-3.0 19M 0.1-1.0 8YR 0.1-0.8 10YR 0.1-4.4 12YR 0.3-4.8 15YR 0.7-7.2 19YR 1.0-5.6 Tanner stages I: 0.1 – 0.4; II: 0.3 – 4.8; III: 0.6 – 3.7; IV: 0.6 – 7.2; V: 1.5 – 7.0	mIU/mL
^Haptoglobin	36 – 195	mg/dL

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Serum/Plasma Test	Reference Range	Units
Prealbumin	0M-1M: 7-39 1M-6M: 8-34 6M: 12-36 1YR: 8-34 4YR: 12 – 30 6YR: 12 – 42 20YR: 18 – 38	mg/dL
IgA (SHY) (Immunoglobulin A)	0DY: 0 – 8 1M: 2 – 27 4M: 4 – 63 7M: 15 – 72 13M: 15 – 97 25M: 15 – 144 37M: 15 – 241 5YR: 15 – 161 7YR: 21 – 195 9YR: 59 – 301 12YR: 40 – 218 14YR: 82 – 453	mg/dL
IgG (SHY) (Immunoglobulin G)	0DY: 605 – 1374 1M: 184 – 641 4M: 55 – 765 7M: 214-1055 13M: 330 – 1133 25M: 505 – 1280 37M: 559 – 1116 5YR: 499 – 1198 7YR: 580 – 1256 9YR: 484 – 1309 12YR: 577 – 1322 14YR: 751 – 1560	mg/dL
IgM (SHY) (Immunoglobulin M)	0DY: 1 – 20 1M: 8 – 49 4M: 9 – 73 7M: 8 – 95 13M: 11 – 99 25M: 22 – 94 37M: 22 – 99 5YR: 17 – 86 7YR: 21-120 9YR: 15-103 12YR: 8-133	mg/dL

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Serum/Plasma Test	Reference Range	Units																								
	14YR: 40-274																									
Progesterone	Females: Follicular phase: 0.32 – 4.77 Luteal phase: 7.9 – 87.9 Mid Luteal: 18.0 – 87.9 Pregnancy: 1 <sup>st</sup> trimester: 27.0 – 141.0 2 <sup>nd</sup> trimester: 51.0 – 438.0 3 <sup>rd</sup> trimester: 165.0 – 765.0 Males: 0.0 – 1.2	nmol/L																								
Prolactin	Males: 0.6 – 19 Females: 0.6 – 20	ng/ml																								
Testosterone (SHY)	Males: 10.00 – 42.00 Females: less than 2.8 Female	nmol/L																								
Thyroglobulin	3.0 – 40.0	ng/ml																								
Thyroglobulin antibody	Less than 20	IU/mL																								
Total T3 (PUH) (Triiodothyronine)	<table style="width: 100%; border: none;"> <thead> <tr> <th></th> <th>Female</th> <th>Male</th> </tr> </thead> <tbody> <tr> <td>OD:</td> <td>0.48 – 1.77</td> <td>0.51-1.84</td> </tr> <tr> <td>1M:</td> <td>0.73 – 2.21</td> <td>1.03-2.29</td> </tr> <tr> <td>1YR:</td> <td>1.26 – 2.16</td> <td>0.93-2.13</td> </tr> <tr> <td>6YR:</td> <td>1.10 – 1.95</td> <td>1.04-1.98</td> </tr> <tr> <td>11YR:</td> <td>1.04 – 1.84</td> <td>0.88-1.76</td> </tr> <tr> <td>16YR:</td> <td>1.01 – 1.51</td> <td>0.86-1.76</td> </tr> <tr> <td>18 YR:</td> <td>0.60 – 1.81</td> <td>0.60-1.81</td> </tr> </tbody> </table>		Female	Male	OD:	0.48 – 1.77	0.51-1.84	1M:	0.73 – 2.21	1.03-2.29	1YR:	1.26 – 2.16	0.93-2.13	6YR:	1.10 – 1.95	1.04-1.98	11YR:	1.04 – 1.84	0.88-1.76	16YR:	1.01 – 1.51	0.86-1.76	18 YR:	0.60 – 1.81	0.60-1.81	ng/ml
	Female	Male																								
OD:	0.48 – 1.77	0.51-1.84																								
1M:	0.73 – 2.21	1.03-2.29																								
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11YR:	1.04 – 1.84	0.88-1.76																								
16YR:	1.01 – 1.51	0.86-1.76																								
18 YR:	0.60 – 1.81	0.60-1.81																								
Total T3 (SHY)	60 – 180	ng/dL																								
Total T4 (Thyroxine)	Newborn: 11.5 – 24.0 3DY: 9.0 – 18.0 1M: 7.0 – 15.0 1YR: 7.3 – 15.0 5YR: 6.4 – 13.3 10YR: 5.0 – 12.0	µg/dL																								
Free T4 (analog-PUH)	<table style="width: 100%; border: none;"> <tbody> <tr> <td>Euthyroid</td> <td>0.89-1.76</td> </tr> <tr> <td>Hypothyroid</td> <td>less than 0.89</td> </tr> <tr> <td>Hyperthyroid</td> <td>greater than 1.78</td> </tr> <tr> <td colspan="2" style="text-align: center;">Normal Range</td> </tr> <tr> <td>Females: 1<sup>st</sup> Trimester</td> <td>0.78-1.48</td> </tr> <tr> <td>2<sup>nd</sup> Trimester</td> <td>0.78-1.48</td> </tr> <tr> <td>3<sup>rd</sup> Trimester</td> <td>0.68-1.41</td> </tr> <tr> <td></td> <td style="text-align: right;">Median</td> </tr> <tr> <td></td> <td style="text-align: right;">1.28</td> </tr> <tr> <td></td> <td style="text-align: right;">1.00</td> </tr> <tr> <td></td> <td style="text-align: right;">0.95</td> </tr> </tbody> </table>	Euthyroid	0.89-1.76	Hypothyroid	less than 0.89	Hyperthyroid	greater than 1.78	Normal Range		Females: 1 <sup>st</sup> Trimester	0.78-1.48	2 <sup>nd</sup> Trimester	0.78-1.48	3 <sup>rd</sup> Trimester	0.68-1.41		Median		1.28		1.00		0.95	ng/dL		
Euthyroid	0.89-1.76																									
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	0.95																									
FTI (Free Thyroid Index) {a calculation}	5 – 12	No units																								



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Serum/Plasma Test	Reference Range	Units
T7 (SHY)	1.4- 3.1	
T Uptake (PUH) (Thyroid Hormone Binding Ratio)	0.8-1.2	No units
T3 Uptake (SHY)	22.5 – 37.0	No units
TSH (Thyroid Stimulating Hormone)	0DY: 1.0-38.9 5DY: 3.0-20.0 14DY: 1.7-9.1 147DY: 0.8 – 8.2 25M: 0.7 – 5.7 20YR: 0.30 – 5.0	μIU/mL
Acetaminophen	Therapeutic: 10 – 20 Hepatotoxic: 4 hours post ingestion: greater than 150	μg/mL
Salicylate (SHY)	Therapeutic: 15-30	mg/dl
Carbamazepine	4.0 – 12.0	μ g/mL
Digoxin	1.0 – 2.0	ng/mL
Gentamicin	Peak Level: 6.0 – 10.0 Trough Level: 0.5 – 2.0	μ g/mL
Lithium	0.6 – 1.5	mmol/L
Methotrexate	None established	
Phenobarbital	10.0 – 40.0	μ g/mL
Phenytoin (Dilantin)	0DY-1yr      6-14 1yr-Adult    10 – 20	μ g/mL

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Serum/Plasma Test	Reference Range	Units
Free Phenytoin	1.0 – 2.0	μ g/mL
Tobramycin (SHY)	Peak: 6.0 – 10.0 Trough: 0.5 – 2.0	μ g/mL
Valproic acid	Peak: 50 – 150	μ g/mL
Vancomycin	Trough: 10 – 20	μ g/mL
VLDL (Very Low Density Lipoprotein) {a calculation}	less than or equal to 40	mg/dL
Osmolality	281 – 307	mOsm/Kg

Cerebrospinal Fluid (CSF) Test	Reference Range	Units
CSF Glucose	40 – 75	mg/dL
CSF Lactate	0.9 - 2.8	mmol/L
CSF Protein	ODY-1M 40-120 1M-Adult 15-45	mg/dL

Urine Drugs of Abuse Test	Reference Range	Units
Benzodiazepines (SHY)	Negative	N/A
Amphetamines (SHY)	Negative	N/A
Benzoylcegonine (SHY) (Cocaine Metabolite)	Negative	N/A
Barbiturates (SHY)	Negative	N/A
Opiates (SHY)	Negative	N/A

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Phencyclidine (PCP) (SHY)	Negative	N/A
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<b>Urine Test</b>	<b>Reference Range</b>	<b>Units</b>
Urine Albumin	less than 1.9	<b>mg/dL</b>
Albumin/ Creatinine ratio	less than 30	<b>mg/g creatinine</b>
Urine Urea Nitrogen	7000 – 16000	<b>mg/24 hr</b>
Urine Calcium	100 – 300	<b>mg/24 hr</b>
Urine Phosphorus	400 - 1300	<b>mg/24 hr</b>
Urine Uric Acid	250 – 750	<b>mg/24 hr</b>
Urine Sodium	40 – 220	<b>mmol/24hr</b>
Urine Potassium	25-125	<b>mmol/24hr</b>

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Urine Amylase	less than or equal to 30	IU/2 hr
Urine Creatinine	Female: 800 - 1500 Male: 1300 - 1800	mg/24 hr
Creatinine Clearance	Female: 88 to 128 Male: 97 to 137	mL/min
Urine/Serum $\beta$ hCG	Male: Negative Non-pregnant Female: Negative Pregnant Female: Positive	N/A
Urine Osmolality	50 – 1400	mOsm/Kg
Urine Total Protein	42 – 225	mg/24 hr

\*UPMC Presbyterian Hospital specific reference range

^UPMC Shadyside Hospital specific reference range

# Testing performed at UPMC Presbyterian Immunoserology laboratory

ϕ Testing performed at UPMC CHP Automated Testing laboratory

Urine Test	Reference Range	Units
Urine Color	Yellow	N/A
Urine Character	Clear	N/A
Urine Specific Gravity	1.001 - 1.035	N/A
Urine pH	4.6 – 8	N/A
Urine Protein	Negative	N/A
Urine Glucose	Negative	N/A
Urine Ketone	Negative	N/A
Urine Bilirubin	Negative	N/A

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Urine Blood	Negative	N/A
Urobilinogen	Normal	N/A
Urine Nitrite	Negative	N/A
Urine Leukocyte Esterase	Negative	N/A
Urine WBCs	0 - 5	Per HPF
Urine RBCs	0 - 3	Per HPF
Urine Epithelial Cells	0	Per HPF
Urine: Bacteria	None Seen	Per HPF
Urine: Crystals	None Seen	Per HPF
Hyaline Casts	0 – 2	Per LPF

<b>Blood Gas ( Whole Blood Specimens)</b>	<b>Units Reference Range</b>	<b>Units</b>
pH	7.35 – 7.45 arterial 7.32 - 7.43 venous	N/A
pCO <sub>2</sub> (Partial pressure of carbon dioxide)	35-45 arterial 41-51 venous	mmHg
pO <sub>2</sub> (Partial pressure of oxygen)	80 – 100 arterial 30-50 venous	mmHg
FO <sub>2</sub> HB (Fraction of oxyhemoglobin)	95-99 arterial 70-85 venous	%

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iCa (ionized Calcium)	1.15 – 1.29	mmol/L
Glucose (fasting)	70 – 99	mg/dL
Glucose Less than 1 month	40-99	
Sodium	136 – 146	mmol/L
Potassium	3.5 – 5.0	mmol/L
Lactate (whole blood)	0.5 – 1.6	mmol/L
COHb (Carboxyhemoglobin)	Non Smokers: 0.5 – 1.5 Smokers 1-2 pks: 4 – 5 Smokers greater than 2 pks: 8 – 9	%
MetHb (Methemoglobin)	0.0 – 1.5	%
tHb (total Hemoglobin)	Male 13.5 – 17.5 Female 12.0 – 16.0	g/dL
HCO <sub>3</sub> (Bicarbonate)	22 – 26 arterial 19-25 venous	mq/L
Base Excess/Base Deficient	0 ± 2	No units
O <sub>2</sub> saturation (Oxygen saturation)	95 – 99 arterial 70 – 85 venous	%
a-vO <sub>2</sub> Diff (arteriovenous oxygen difference)	4 – 6	VOL %
O <sub>2</sub> Content (Oxygen content)	15 – 20 arterial 12 - 17 venous	VOL %
Creatinine	0.5 – 1.4	mg/dL
Chloride	98 – 106	mmol/L

References:

- Henry's Clinical Diagnosis and Management by Laboratory methods 22<sup>nd</sup> Edition  
McPherson and Pincus et al.

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2. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics-E-Book by Carl A. Burtis, Edward R. Ashwood, David E. Bruns
3. Kaplan et al. 4<sup>th</sup> edition. Clinical Chemistry Theory, Analysis Correlation (pg 466)

**Lipoprotein Reference Ranges for Adult Population (Age  $\geq$ 20). National Cholesterol Education Program, ATP III Classification**

<b>Triglyceride (mg/dL)</b>	<b>Clinical interpretation</b>
less than 150	Normal
150 -199	Borderline High
200 - 499	High
Greater than or equal to 500	Very High

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<b>Total Cholesterol (mg/dL)</b>	<b>Clinical interpretation</b>
less than 200	Desirable
200 - 239	Borderline High
Greater than or equal to 240	High

<b>HDL (mg/dL)</b>	<b>Clinical interpretation</b>
less than 40	Low
Greater than or equal to 60	High

<b>LDL (mg/dL)</b>	<b>Clinical interpretation</b>
less than 100	Optimal; lower LDL-C may be desirable in high risk patients
100 - 129	Near Optimal/Above Optimal; risk factor evaluation should guide interventions
130 - 159	Borderline High; risk factor evaluation should guide interventions
160 - 189	High; risk factor evaluation should guide interventions
Greater than or equal to 190	Very High

**References:**

NCEP Guidelines: <http://www.nhlbi.nih.gov/guidelines/cholesterol/atp3full.pdf>



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Pediatric Lipid Reference Ranges For Cardiovascular Disease Risk			
Category	Acceptable	Borderline High Risk	High Risk
Total Cholesterol (2-19 years)	less than 170	170–199	Greater than or equal to 200
LDL- Cholesterol (2-19 years)	less than 110	110–129	Greater than or equal to 130
HDL- Cholesterol (2-19 years)	Greater than 45	40–45	less than 40
Triglycerides			
0-9 years	less than 75	75–99	Greater than or equal to 100
10-19 years	less than 90	90–129	≥ 130

**References:**

Values for plasma lipid and lipoprotein levels are from the National Cholesterol Education Program (NCEP) Expert Panel on Cholesterol Levels in Children.

The cutpoints for high and borderline high represent approximately the 95th and 75th percentiles, respectively. Low cutpoints for HDL–C represent approximately the 10th percentile.

From the American Academy of Pediatrics. Lipid Screening and Cardiovascular Health in Childhood. Daniels SR, Greer FR and the Committee on Nutrition. PEDIATRICS 122: 198 -208, 2008. (doi: 10.1542/peds.2008-1349)

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Chen et al. Association of cardiovascular risk factor clustering related to insulin resistance syndrome (Syndrome X) between young parents and their offspring: the Bogalusa Heart Study. Atherosclerosis1999;145(1):197-205. (PM:10428311)

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**2018 Reference Ranges**

Hematology Test	Reference Range	Units
Hemoglobin	Male: 12.9 – 16.9 Female: 11.6 – 14.6	g/dL
Hematocrit	Male: 38.0 – 48.8 Female: 34.1 – 43.3	%
WBC	3.8 – 10.6	x 10 + 9/L
RBC	Male: 4.13 – 5.57 Female: 3.73 – 4.89	x 10 + 12/L
MCV	82.6 – 97.4	fL
MCH	27.8 – 33.4	pg
MCHC	32.7 – 35.5	g/dL
MPV	6.8 – 10.4	fL
RDW	11.8 – 15.2	%
POLYs	44 – 77	%
BANDs	0 – 5	%
LYMPHs	13 – 44	%
MONOs	4 – 13	%
EOS	0 – 6	%
BASOs	0 – 1	%
Myelocytes	0	%
Metamyelocytes	0	%
Promyelocytes	0	%
ABS Poly	2.24-7.68	X10E+09/L
ABS Lymphocytes	0.80-3.65	X10E+09/L
ABS Monocytes	0.30-0.90	X10E+09/L
ABS Eosinophils	0.00-0.40	X10E+09/L
ABS Basophils	0.00-0.06	X10E+09/L
ABS Bands	0.10-0.80	X10e+09/L
ABS Myelocytes	0	X10e+09/L
ABS Metamyelocytes	0	X10e+09/L

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ABS Promyelocytes	0	X10e+09/L
ABS Blasts	0	X10e+09/L
Reticulocyte	0.4 – 2.4	%
Absolute Reticulocyte	0.018 – 0.158	X 10 + 12/L
Westergren Sed Rate	Greater than or equal to 18 yr Male: 0-23 Female: 0-40 less than 18 yr Male: 0-18 Female: 0-20	mm/hr
Sickle Cell Screen	Negative	N/A
Monospot	Negative	N/A
Gastric Occult	Negative	N/A
Occult Blood	Negative	N/A
Fluid Crystals	Negative	N/A

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<b>Synovial Fluid:</b> Appearance RBCs Nucleated Cells Neutrophils Lymphocytes Monocytes Mononuclear cells	Yellow, clear, or slightly cloudy 0 – 2000 13 – 180 0 – 25 0 – 78 0 – 71 0 – 26	N/A  /mm <sup>3</sup> /mm <sup>3</sup> % % % %
<b>Pleural Fluid:</b> Nucleated Cell Count Macrophages Lymphocytes Neutrophils Mesothelial Cells	1395 – 3734 64 – 80 18 – 36 0 – 1 0 – 2	/mm <sup>3</sup> % % % %
<b>Peritoneal Dialysate Fluid:</b> Red Blood Cells Total Nucleated Cells Leukocytes Neutrophils Lymphocytes Monocytes Eosinophils Basophils	24 ± 48* 36 ± 48* 21 ± 27 18 ± 15.8 24 ± 26 35 ± 26 7 ± 7 3 ± 2	/μl /μl /μl % % % % %
<b>Cerebrospinal Fluid:</b> Gross Appearance Supernatant RBCs Nucleated Cells Lymphocytes Monocytes Histiocytes Neutrophils	Clear Colorless 0 – 5 0 – 5 63 – 99% (0.63 – 0.99) 3 – 37% (0.03 – 0.37) Rare 0 – 2% (0.00 – 0.02)	N/A  /mm <sup>3</sup> /mm <sup>3</sup>

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<p><b>BAL Fluid:</b>          Alveolar macrophages          Lymphocytes          Neutrophils          Eosinophils</p>	<p align="center">&gt;85          10 – 15          less than3          less than1</p>	<p align="center">%</p>
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\* Results expressed as mean ± SD

No Definitive Reference Ranges determined for peritoneal, amniotic and pericardial fluids

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**WBC DIFFERENTIAL COUNT (%)**

<b>AGE</b>	<b>POLY</b>	<b>BANDS</b>	<b>EOS</b>	<b>BASO</b>	<b>LYMPHS</b>	<b>MONOS</b>
18 years and older	44 - 77	0 - 5	0 - 6	0 - 1	13 - 44	4 - 13
17 years up to 18 years	37 - 67	2 - 8	0 - 3	0 - 2	25 - 45	3 - 9
12 years up to 17 years	31 - 61	2 - 8	0 - 3	0 - 2	28 - 48	3 - 9
6 years up to 12 years	26 - 48	2 - 8	0 - 3	0 - 2	35 - 65	3 - 9
2 years up to 6 years	12 - 34	4 - 10	0 - 3	0 - 2	45 - 75	2 - 8
6 months up to 2 year	14 - 34	6 - 12	0 - 3	0 - 2	41 - 71	3 - 9
1 month up to 6 months	19 - 39	8 - 14	0 - 3	0 - 2	33 - 63	4 - 12
1 week up to 1 month	28 - 43	8 - 14	0 - 3	0 - 2	20 - 50	4 - 12
1 day up to 1 week	32 - 62	12 - 18	0 - 3	0 - 2	26 - 36	3 - 9

**RETIC NORMAL VALUES**

**RETIC %**

**ABSOLUTE RETIC (X 10<sup>12</sup>/L)**

<b>AGE</b>	<b>NORMAL RANGE</b>	<b>NORMAL RANGE</b>
Newborn (0 days)	3.0 – 7.0	Unavailable
Newborn to 5 days	1.0 – 4.6	Unavailable
6 days to 49 days	0.1 – 1.9	Unavailable
50 days to 84 days	0.4 – 2.8	Unavailable

**RETIC %**

**ABSOLUTE RETIC (X 10<sup>12</sup>/L)**

**85 days through adulthood**

	<b>MALE</b>	<b>FEMALE</b>	<b>MALE</b>	<b>FEMALE</b>
<b>Manual</b>	0.4 – 2.4	0.4 - 2.4	0.018 – 0.158	0.018 – 0.158
<b>Automated</b>	0.4 – 2.4	0.4 – 2.4	0.018 – 0.158	0.018 – 0.158

**Immature Reticulocyte Fraction**

**0.17-0.51**

	<b>PLATELET COUNT</b>
Adults	156 – 369 × 10 <sup>9</sup> /L
Children	
0 – 31 days	145 – 450 x 10 <sup>9</sup> L
32 days – 18 yrs	140 – 450 x 10 <sup>9</sup> /L

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Hematology Test	Reference Range	Units
Fibrinogen	219-510	mg/dL
D-dimer (greater or equal to 18 yrs)	Less than 0.50	µg/mL FEU
16 years to 18 years	0.05-0.42	
11 years to 16 years	0.16-0.39	
6 years to 10 years	0.10-0.56	
1 year to 5 years	0.09-0.53	
1 month to 1 year	0.11-0.42	
3 days to 1 month	0.58-2.74	
1 day to 3 days	0.41-2.47	
FDP	Negative	n/a
Closure Time	Collagen/ADP 65-117 Collagen/EPI 84-175	Seconds Seconds
INR		
0 – 1 m	less than 1.2	
1 m – 16 y	0.9 – 1.3	
16 years and older	0.8 – 1.2	
Prothrombin Time		
less than 1 month	No established reference range	
1 month to 16 years	11.2 – 15.1 seconds	
Greater than 16 years	11.2-15.1	
Partial Thromboplastin Time		
less than 1 month	No established reference range	
1 month to 16 years	27.0 – 39.4 seconds	
Greater than 16 years	22.8-33.8 seconds	
^Thrombin Time	14.5 – 18.4	Seconds
Aspirin Response	550 – 700 ARU 350 – 549 ARU	Non-therapeutic baseline Therapeutic response to aspirin
Plavix Response	194 – 418 Base PRU	Normal Baseline Range
LMW Heparin	Call Pharmacy	Iµ/ml
UF Heparin	Call Pharmacy	Iµ/ml
Acetone	negative	
Lamellar Body Count (LBC)	Mature greater than or equal to 40 x 10 <sup>9</sup> /L Immature less than or equal to 20 x 10 <sup>9</sup> /L	10 <sup>9</sup> /L 10 <sup>9</sup> /L
Kleihauer Betke: Fetal HGB Fetal Bleed	less than 0.04 less than 2.00	% mL
Fetal APT Test	Negative	

^UPMC Shadyside Hospital specific reference range

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AGE	WBC RANGE × 10 <sup>9</sup> /L
1 DAY UP TO 1 WEEK	9.0 – 38.0
1 WEEK UP TO 2 WEEKS	5.0 – 21.0
2 WEEKS UP TO 4 WEEKS	5.0 – 20.0
4 WEEKS UP TO 2 MONTHS	5.0 – 19.5
2 MONTHS UP TO 3 MONTHS	6.0 – 17.5
3 MONTHS UP TO 6 MONTHS	6.0 – 17.5
6 MONTHS UP TO 2 YEARS	6.0 – 17.5
2 YEARS UP TO 6 YEARS	5.0 – 17.0
6 YEARS UP TO 12 YEARS	4.5 – 14.5
12 YEARS UP TO 18 YEARS	4.5 – 13.0
18 YEARS TO ADULT	3.8 – 10.6

AGE	HGB g/dL	HCT %	RBCx10+9/L	MCV fl	MCH pg	MCHC g/dL
1 DAY UP TO 1 WEEK	13.5-21.0	42.0 – 60.0	3.9 – 6.60	98 - 118	35 - 39	31 – 35
1 WEEK UP TO 2 WEEKS	13.5 – 21.0	42.0 – 66.0	3.90 – 6.30	88 - 126	33 - 41	31 – 35
2 WEEKS UP TO 4 WEEKS	12.5 – 20.5	39.0 – 63.0	3.60 – 6.20	86 – 124	31 – 39	31 – 35
4 WEEKS UP TO 2 MONTHS	10.0 – 18.0	31.0 – 55.0	3.00 – 5.40	85 - 123	29 - 35	31 - 35
2 MONTHS UP TO 3 MONTHS	9.0 – 14.0	28.0 – 42.0	2.70 – 4.90	77 - 115	29 - 35	31 - 35
3 MONTHS UP TO 6 MONTHS	9.5 – 13.5	29.0 – 41.0	3.10 – 4.50	74 - 108	27 - 33	31 - 35
6 MONTHS UP TO 2 YEARS	10.5 – 13.5	33.0 – 39.0	3.70 – 5.30	70 - 86	27 - 33	31 – 35
2 YEARS UP TO 6 YEARS	11.5 – 13.5	34.0 – 40.0	3.90 – 5.30	75 - 87	25 – 31	31 – 35
6 YEARS UP TO 12 YEARS	11.5 – 15.5	35.0 – 45.0	4.00 – 5.20	77 - 95	24 - 30	31 – 36
12 YEARS UP TO 18 YEARS	Female 12.0 – 16.0 Male 13.5 – 17.5	Female 36.0 – 46.0 Male 37.0 – 49.0	Female 4.10 – 5.20 Male 4.50 – 5.30	78 - 102	28 – 32	32 – 36
18 YEARS TO ADULT	Female 11.6 – 14.6 Male 12.9 – 16.9	Female 34.1 – 43.3 Male 38.0 – 48.8	Female 3.73 – 4.89 Male 4.13 – 5.57	82.6 – 97.4	27.8 – 33.4	32.7 – 35.5



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**Changes/Updates/Modifications**

02/11/04	Revised
01/20/05	Revised
02/8/06	Revised Barbara Hill (B.H.)
03/12/07	Magnesium unit change; updated Automated Testing/2006 Adult Ref Ranges/ Hem Pediatric; BH
01/22/08	PT adult range changed; BH/WJW
08/08/08	New D-dimer ref range; BH
10/14/08	Lipase reference range and unit changed; BH
03/06/09	PT reference range changed; LMW /UFH assay added; BH New Beckman instrumentation implemented; BH
08/11/09	Estradiol reference range modified; Added Creatinine Clearance and INR reference range; Octavia Peck Palmer (OPP)
01/14/2010	Revised; OPP
01/21/2010	Added Ref Ranges for Blood Gases; Jeff Bycura (JB)/Pat Kress (pk)
02/10/2011	Revised; Katie Mulvey (KM)/pk Added Aspirin and Plavix Response; Betty Austin (BA/pk)
03/2011	Changed TgAb reference range from less than or = 4.0 to less than 20 because TgAb testing was moved to immunoserology laboratory; OPP
10/2011	Added urine albumin reference ranges, removed urine glucose; OPP
02/07/2013	Added '>' to TC = 500; Changed 'optimal' to 'normal for TG less than 150; Changed 'levels' to 'concentrations' in lipid section; OPP
02/25/2013	Added Absolute counts for Hematology differentials; Lydia Contis (LC) and KM
12/19/2013	Added Myelocytes, ABS Myelocytes, Meta Myelocytes, ABS Meta Myelocytes, Promyelocytes, ABS Promyelocytes, Blasts, ABS Blasts; Lydia Contis
12/23/13	Changes made to reference range for Amylase, Lipase, Urine Amylase; KM for OPP Added reference ranges to Prothrombin Time and Partial Thromboplastin Time; KM for Lydia Contis
1/14/14	Added reference ranges to Hematology – LMW & UF Heparin; KM for Lydia Contis Added reference ranges to Hematology INR; KM for Lydia Contis
6/16/14	Change made to Troponin I on page 3; KM/OPP
9/17/14	Changed CK-MB reference to 0 – 5 ng/ml (old reference range was TCPK less than or equal to 200: MB less than or equal to 7 TCPK greater than 200: RI less than or equal to 3; OPP
12/08/14	Added Pediatric Lipid Reference Range for Cardiovascular Disease Risks; OPP
12/08/14	Removed Pediatric commentary in Lipid sections; OPP
1/07/2015	Revised Adult lipid section into Tables and added the title; OPP Added Creatinine Clearance RR; removed units from RR column to Unit Column; OPP
01/12/15	Added LDH Pediatric Reference ranges; OPP Added Methotrexate performed by SHY ATL; OPP Added Urine Drugs of Abuse tests performed by SHY ATL; OPP Added Acetaminophen and Salicylate tests performed by SHY ATL: OPP

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09/14/15      Added Acetone; KM  
                 Added Lamellar Body Count (LBC); KM  
11/23/15      PT, APTT, Fibrinogen reference range changes  
12/16/2015    Chemistry test complete names added in addition to abbreviations; calculated  
                 values and not direct values for test were noted;OPP  
4/18/2017     pCO<sub>2</sub>, pO<sub>2</sub> and Bicarbonate reference range changes.  
1/3/2018      Added reference ranges for children under 18 yrs old