

### CHEMISTRY REFERENCE RANGE CHANGES

Effective Dates:

Dearborn Laboratory – November 14, 2018

Royal Oak and Troy Laboratory – December 10, 2018

Grosse Pointe Laboratory – Mid-January, 2019

Due to a gradual change-over to Abbott Diagnostic instrumentation within Beaumont Health Laboratories, the reference range for certain tests, including Troponin I, will be changed.

Effective dates for new Troponin cut-offs and implementation of other changes:

Dearborn Laboratory – November 14, 2018

**Royal Oak and Troy Laboratory – December 10, 2018**

Grosse Pointe Laboratory – Mid-January, 2019

Additional notification will be sent out for Farmington Hills Laboratory, Taylor Laboratory, Trenton Laboratory and Wayne Laboratory prior to the change-over.

A listing of chemistry ranges is attached with changes noted as “**update**”, although most changes are relatively minor. Attached reference ranges are divided into Routine chemistries, Immunoassays and Specific proteins. Updates for a number of pediatric reference ranges have been made using the CALIPER data from Canada (Reference: Closing the gaps in pediatric laboratory reference ranges. Clin Chem 58: 854-68. [www.sickkids.ca/Caliperproject/intervals/index.html](http://www.sickkids.ca/Caliperproject/intervals/index.html) )

Troponin I		
New cut-off	Interpretation	Old cut-off
< 0.04 ng/mL	Normal	< 0.06 ng/mL
0.04 – 0.29 ng/mL	Indeterminate	0.06 – 0.19 ng/mL
≥ 0.30 ng/mL	Suggestive of myocardial damage	> 0.20 ng/mL

#### Iron and Transferrin Saturation

The reporting of TIBC and percent saturation (now transferrin saturation) will be changed to align with Oakwood Health System reporting. TIBC will be calculated based on transferrin and a factor of 1.4. This approach is now generally considered to be the preferred way of reporting TIBC. When ordering Iron/TIBC, results will be as follows:

Iron (mcg/dL)

Transferrin (mg/dL)

TIBC (mcg/dL) – calculated as [transferrin] x 1.4

Transferrin saturation (%)

**Date submitted:** November 11, 2018

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### ATTACHMENT ROUTINE CHEMISTRY RANGES

ROUTINE CHEMISTRY TEST	NEW RANGES		Old Ranges		
	Low	High		Low	High
<b>ACE (U/L)</b>	<b>12</b>	<b>60</b>		8	52
<b>ALT (w/o P5P) (U/L)</b>					
<b>MALE</b>					
0 - < 1 Year	5	33	0 - 30 Days	1	25
1 - 12 Years	9	25	31 - 364 Days	4	35
13 - 18 Years	9	24	365 Days - 3 Years	5	30
			4 - 6 Years	5	20
			7 - 9 Years	5	25
			10 - 18 Years	5	30
≥19 Years	9	47	19 - Adult	9	47
<b>FEMALE</b>					
0 - < 1 Year	5	33	0 - 30 Days	2	25
1 - 12 Years	9	25	31 - 364 Days	3	30
13 - 18 Years	8	22	365 Days - 3 Years	5	30
			4 - 6 Years	5	25
			7 - 9 Years	5	20
			10 - 18 Years	8	37
≥19 Years	8	37	19 - Adult		
<b>ALP (U/L)</b>					
<b>MALE</b>					
0 - 14 Days	90	273	0 - 30 Days	63	275
15 Days - < 1 Year	134	518	31 - 365 Days	69	333
1 - 9 Years	156	369	366 Days - 3 Years	88	300
10 - 12 Years	141	460	4 - 6 Years	104	303
13 - 14 Years	127	517	7 - 9 Years	128	374
15 - 16 Years	89	365	10 - 12 Years	120	405
17 - 18 Years	59	164	13 - 15 Years	78	414
			16 - 18 Years	52	237
> 19 Years	33	120	19 >Years	30	110

ROUTINE CHEMISTRY TEST	NEW RANGES		Old Ranges		
	Low	High		Low	High
<b>ALP (U/L) continued</b>					
<b>FEMALE</b>					
0 - 14 Days	<b>90</b>	<b>273</b>	0 - 30 Days	39	353
15 Days - < 1 Year	<b>134</b>	<b>518</b>	31 - 365 Days	106	296
1 - 9 Years	<b>156</b>	<b>369</b>	366 Days - 3 Years	92	275
10 - 12 Years	<b>141</b>	<b>460</b>	4 - 6 Years	128	315
13 - 14 Years	<b>62</b>	<b>280</b>	7 - 9 Years	127	362
15 - 16 Years	<b>54</b>	<b>128</b>	10 - 12 Years	85	403
17 - 18 Years	<b>48</b>	<b>95</b>	13 - 15 Years	48	213
			16 - 18 Years	37	134
19 - 60 Years	<b>33</b>	<b>120</b>	19 >Years	30	110
> 60 Years	<b>37</b>	<b>135</b>		34	125
<b>AMMONIA (mcmol/L)</b>	<b>15</b>	<b>50</b>		11	35
<b>AMYLASE (U/L) ALL ages</b>		<b>&lt; 100</b>		20	104
<b>AST (w/o P5P) (U/L)</b>		<b>&lt; 35</b>		10	37
<b>CALCIUM (mg/dL)</b>					
0 - < 1 Year	<b>8.5</b>	<b>11.0</b>	0 - 23 Months	8.8	11.2
1 - 18 Years	<b>9.2</b>	<b>10.5</b>	24 Months - 13 Yrs	8.6	11.0
			14 - 16 Years	8.7	11.0
19 Years - Adult	<b>8.4</b>	<b>10.2</b>	17 Years - Adult	8.4	10.4
<b>CHLORIDE (mmol/L)</b>	<b>98</b>	<b>111</b>		98	110
<b>CARBON DIOXIDE (mmol/L)</b>					
< 1 Year	<b>20</b>	<b>28</b>		17	27
1 - 13 Years	<b>20</b>	<b>28</b>		20	29
> 13 Years	<b>22</b>	<b>29</b>		22	32
> 60 Years					
<b>CREATININE (mg/dL)</b>					
<b>MALE</b>					
0 - 14 Days	<b>0.42</b>	<b>1.05</b>	0 - 12 Months	0.10	0.50
15 Days - < 1 Year	<b>0.32</b>	<b>0.53</b>	13 - 24 Months	0.10	0.60
1 - 3 Years	<b>0.38</b>	<b>0.54</b>	49 Months - 7 Years	0.20	0.70
4 - 6 Years	<b>0.44</b>	<b>0.64</b>	8 - 10 Years	0.20	0.80

ROUTINE CHEMISTRY TEST	NEW RANGES		Old Ranges		
	Low	High		Low	High
<b>CREATININE (mg/dL) continued</b>					
MALE 7 - 11 Years	0.52	0.69	11 – 12 Years	0.20	0.90
15 - 16 Years	0.66	1.04			
17 - 18 Years	0.69	1.1	13 – 19 Years	0.30	1.10
19 - Adult	0.60	1.30	20 Years - Adult	0.60	1.40
<b>FEMALE</b>					
0 - 14 Days	0.42	1.05	0 – 12 Months	0.10	0.40
15 Days - < 1 Year	0.32	0.53	13 – 24 Months	0.10	0.40
1 - 3 Years	0.38	0.54	49 Months – 7 Years	0.10	0.50
4 - 6 Years	0.44	0.64	8 – 10 Years	0.20	0.70
7 - 11 Years	0.52	0.69	11 – 12 Years	0.20	0.80
12 - 14 Years	0.57	0.8			
15 - 16 Years	0.59	0.86			
17 - 18 Years	0.6	0.88	13 – 19 Years	0.20	1.00
19 - Adult	0.50	1.10	20 Years - Adult	0.60	1.40
<b>GGT (U/L)</b>					
<b>MALE &amp; FEMALE</b>					
0 - 14 Days	23	219	0 – 1 Day	22	317
15 Days - < 1 Year	8	127	2 – 3 Days	15	232
1 - 10 Years	6	16	4 – 21 Days	0	153
11 - 18 Years	7	21	22 Days –3 Months	5	141
			4 – 12 Months	6	76
			13 Months – 15yrs	0	27
			16 Years	0	41
ADULT MALE	13	60	ADULT MALE	13	60
ADULT FEMALE	8	39	ADULT FEMALE	8	39
<b>IRON (mcg/dL)</b>					
MALES	65	175		45	160
FEMALES	50	170		30	160
<b>POTASSIUM (mmol/L)</b>					
0 - 1 Day	5.0	7.5		5.0	7.5
2 Days - 3 Months	4.0	6.0		4.0	6.2

ROUTINE CHEMISTRY TEST	NEW RANGES		Old Ranges		
	Low	High		Low	High
<b>POTASSIUM (mmol/L)</b> (continued)					
4 Months - Adult	<b>3.5</b>	<b>5.2</b>		3.5	5.2
<b>MAGNESIUM (mg/dL)</b>	<b>1.7</b>	<b>2.5</b>		1.6	2.4
<b>SODIUM (mmol/L)</b>					
0 - 1 Day	<b>126</b>	<b>166</b>		126	166
2 - 29 Days	<b>134</b>	<b>144</b>		134	144
30 Days - 1year	<b>139</b>	<b>146</b>		139	146
2 - 12 Years	<b>138</b>	<b>145</b>		138	145
13 Years - Adult	<b>135</b>	<b>145</b>		135	145
<b>PHOSPHORUS (mg/dL)</b>					
0 - 14 Days	<b>5.6</b>	<b>10.5</b>	0 – 4 Days	3.5	8.6
15 Days - 1 Year	<b>4.8</b>	<b>8.4</b>	5 Days –23 Months	4.2	7.0
1 - 4 Years	<b>4.3</b>	<b>6.8</b>	24 – 60 Months	3.5	6.8
5 - 12 Years	<b>4.1</b>	<b>5.9</b>	61 Months – 7years	3.1	6.3
13 - 15 Years	<b>3.2</b>	<b>6.2</b>	8 – 11 Years	3.0	6.0
16 - 18 Years	<b>2.9</b>	<b>5.0</b>	12 – 16 Years	2.5	5.0
19 - Adult	<b>2.3</b>	<b>4.4</b>	17 Years - Adult	2.3	4.3
<b>PROTEIN, TOTAL (g/dL)</b>					
0 - 14 Days	<b>5.3</b>	<b>8.3</b>	0 – 30 Days	4.6	7.4
15 Days - < 1 Year	<b>4.4</b>	<b>7.1</b>	31 Days – 7 Years	6.1	7.9
1 - 5 Years	<b>6.1</b>	<b>7.5</b>	8 – 12 Years	6.4	8.1
6 - 8 Years	<b>6.4</b>	<b>7.7</b>	13 – 18 Years	6.6	8.2
9 - 18 Years	<b>6.5</b>	<b>8.1</b>	19 – 60 Years	6.4	8.6
19 - 60 Years	<b>6.4</b>	<b>8.3</b>	> 60 Years	6.4	8.3
> 60 Years	<b>6.2</b>	<b>8.1</b>			
<b>TRANSFERRIN (mg/dL)</b>	<b>163</b>	<b>382</b>		155	330
<b>TIBC – Total Iron Binding Capacity (mcg/dL)</b>	<b>250</b>	<b>425</b>		228	417
<b>TRANSFERRIN SATURATION (%)</b>	<b>15</b>	<b>50</b>		15	55
<b>UREA (BUN) (mg/dL)</b>					
0- 14 Days	<b>3</b>	<b>23</b>	0 – 1 Day	21	40
15 Days - < 1 Year	<b>3</b>	<b>17</b>	2 – 29 Days	4	15
1 - 10 Years	<b>9</b>	<b>22</b>	30 Days – 16 Years	5	23
10 - 18 Years	<b>7</b>	<b>21</b>			

ROUTINE CHEMISTRY TEST	NEW RANGES		Old Ranges		
	Low	High		Low	High
<b>UREA (BUN) (mg/dL) (continued)</b>					
19 - Adult	<b>7</b>	<b>25</b>	17 Years - Adult	8	22
<b>URIC ACID (mg/dL)</b>					
<b>MALE</b>					
0 - 13 Years	<b>1.5</b>	<b>7.6</b>		1.5	7.0
14 Years - Adult	<b>3.5</b>	<b>7.2</b>		2.5	8.0
<b>FEMALE</b>					
0 - Adult	<b>2.6</b>	<b>6.0</b>		1.5	6.0

### IMMUNOASSAY RANGES

IMMUNOASSAY TEST	NEW RANGES			Old Ranges	
	Low	High		Low	High
<b>B12, VITAMIN</b>	<b>271</b>	<b>1000</b>		271	870
<b>CA 19-9</b>		<b>≤37</b>			< 35
<b>CORTISOL, RANDOM</b>	<b>2.9</b>	<b>19.4</b>		4	27
			AM	8	27
			PM	2	18
<b>ESTRADIOL (E2)</b>					
<b>MALES</b>	<b>11</b>	<b>44</b>		0	40
<b>FEMALES</b>					
Follicular	<b>21</b>	<b>251</b>		20	144
Mid-Cycle	<b>38</b>	<b>649</b>		64	357
Luteal	<b>21</b>	<b>312</b>		56	214
Post-Menopausal		<b>≤28</b>			32
<b>FREE T3</b>	<b>1.7</b>	<b>3.7</b>		2.3	4.2
<b>FREE T4</b>	<b>0.68</b>	<b>1.51</b>		0.8	1.8
Pediatrics (0 To 9 Days)	<b>0.52</b>	<b>1.67</b>		0.6	2.0
<b>Pregnancy</b>					
1st Trimester	<b>0.68</b>	<b>1.51</b>		0.8	1.8
2nd Trimester	<b>0.52</b>	<b>1.01</b>		0.6	1.2
3rd Trimester	<b>0.52</b>	<b>1.01</b>		0.6	1.2
<b>FSH</b>					
<b>MALES</b>	<b>1.0</b>	<b>12.0</b>		1.6	11.0

IMMUNOASSAY TEST	NEW RANGES		Old Ranges	
	Low	High	Low	High
<b>FSH (continued)</b>				
<b>FEMALES</b>				
Follicular	<b>3.0</b>	<b>8.1</b>	3.3	11.3
FEMALES Mid-Cycle	<b>2.6</b>	<b>16.7</b>	5.2	20.4
Luteal	<b>1.4</b>	<b>5.5</b>	1.8	8.2
Post-Menopausal	<b>26.7</b>	<b>133.4</b>	48.6	143.9
<b>LH</b>				
<b>MALES</b>	<b>0.57</b>	<b>12.07</b>	1.3	7.2
<b>FEMALES</b>				
Follicular	<b>1.8</b>	<b>11.78</b>	2.3	12.9
Mid-Cycle	<b>7.59</b>	<b>89.08</b>	9.1	76.7
Luteal	<b>0.56</b>	<b>14.00</b>	0.6	17.3
Post-Menopausal	<b>5.16</b>	<b>61.99</b>	12.4	70.5
<b>PROGESTERONE</b>				
<b>MALES</b>		<b>&lt; 0.2</b>	0.2	1.3
<b>FEMALES</b>				
Follicular	<b>0.1</b>	<b>0.3</b>	0.2	0.9
Mid-Cycle				
Post-Menopausal		<b>&lt; 0.2</b>	0.2	0.4
<b>PREGNANCY</b>				
1st Trimester	<b>2.8</b>	<b>147.3</b>	4.1	33.9
2nd Trimester	<b>22.5</b>	<b>95.3</b>	24.0	76.0
3rd Trimester	<b>27.9</b>	<b>242.5</b>	52.0	302.0
<b>PTH - INTRAOPERATIVE</b>	<b>8.5</b>	<b>72.5</b>	9	69
<b>TESTOSTERONE</b>				
<b>MALES</b>				
19 – 50 Years	<b>240</b>	<b>870</b>	240	1048
> 50 Years	<b>221</b>	<b>716</b>		
<b>TROPONIN-I</b>				
Normal		<b>&lt; 0.04</b>		0.06
Indeterminate		<b>0.04-0.29</b>	0.06	0.19
Suggestive of Myocardial Damage		<b>≥0.30</b>		≥0.2

### Specific Proteins

# Laboratory Bulletin

SPECIFIC PROTEINS TEST	NEW RANGES		Old Ranges	
	Low	High	Low	High
<b>ALPHA-1-ANTITRYPSIN (mg/dL)</b>	<b>90</b>	<b>200</b>	100	240
<b>ASO (IU/mL)</b>				
0 - 4 Years		< 100		< 100
5 - 17 Years		< 250		< 250
Adult		< 200		< 300
<b>C3 (mg/dL)</b>	<b>82</b>	<b>193</b>	80	200
<b>C4 (mg/dL)</b>	<b>10</b>	<b>43</b>	12	43
<b>HS CRP (mg/L)</b>		< 1.0	0.2	3.0
<b>HAPTOGLOBIN (mg/dL)</b>	<b>40</b>	<b>250</b>	40	240
<b>IgA (mg/dL)</b>				
0 - 29 Days	<b>0</b>	<b>30</b>	8	29
1 - 3 Months	<b>0</b>	<b>90</b>	8	29
4 - 6 Months	<b>30</b>	<b>150</b>	10	47
7 - 12 Months	<b>50</b>	<b>220</b>	15	58
13 - 24 Months	<b>50</b>	<b>209</b>	20	88
25 - 36 Months			22	78
3 - 5 Years			29	138
6 - 8 Years			61	201
9 - 11 Years			57	251
12 - 16 Years			27	190
Adult	<b>70</b>	<b>365</b>		
<b>IgE (IU/mL)</b>		< 100	0	120
<b>IgG (mg/dL)</b>				
0 - 29 Days	<b>320</b>	<b>1400</b>	552	1443
1 - 3 Months	<b>110</b>	<b>700</b>	157	592
4 - 6 Months	<b>320</b>	<b>1150</b>	100	474
7 - 12 Months	<b>540</b>	<b>1360</b>	264	822
13 - 24 Months	<b>660</b>	<b>1530</b>	138	901
25 - 36 Months			438	1091



SPECIFIC PROTEINS TEST	NEW RANGES		Old Ranges		
	Low	High		Low	High
<b>IgG (mg/dL) continued</b>					
3 - 5 Years				480	1284
6 - 8 Years				627	1376
9 - 11 Years				701	1452
12 - 16 Years				635	1410
Adult	<b>550</b>	<b>1650</b>		520	1560
<b>IgM (mg/dL)</b>					
0 - 29 Days	<b>10</b>	<b>40</b>		12	28
1 - 3 Months	<b>10</b>	<b>70</b>		27	113
4 - 6 Months	<b>20</b>	<b>90</b>		30	86
7 - 12 Months	<b>40</b>	<b>150</b>		33	74
13 - 24 Months				33	159
25 - 36 Months				45	133
3 - 5 Years				45	166
6 - 8 Years				53	161
9 - 11 Years				49	139
12 - 16 Years				48	253
Adult	<b>40</b>	<b>293</b>		47	206
<b>PREALBUMIN (mg/dL)</b>	<b>18</b>	<b>44</b>		18	45