



Partner Update

Your partners in **care**

July, 2017

Changes to CBC Reference Ranges

At Dynacare, our vision is to be Canada's health and wellness solutions leader. As part of our commitment and continuous efforts to enhance testing and support patient care, Dynacare will be modifying reference ranges for the parameter provided for complete blood counts (CBCs) on July 17th, 2017.

Reference ranges represent laboratory test results found in 95% of the healthy population and are meant as a guide as to what is "normal" in the tested population. In the case of CBCs, reference ranges for hemoglobin, mean red cell volume (MCV) and red blood cell counts (RBC) are dependent upon age and gender and are also influenced by the patient's ethnicity.

Thalassemia and other mostly-asymptomatic genetic mutations are very common in the increasingly multiethnic population of Ontario. For this reason, what might generally be considered to be "normal" in Ontario may not be so in other populations. For this reason, CBC reference intervals that have been reported for standardized reference populations (e.g. World Health Organization, WHO) and used to establish clinical diagnoses such as anemia and microcytosis may not be relevant for Ontarians. People of Asian, Southern Mediterranean and African descent, will on average, have lower MCVs and higher RBCs than their Western European counterparts. Additionally, when common thalassemia traits are combined with varying degrees of iron deficiency, average hemoglobin values in many Ontarians will be lower than that found in other populations.

Why the change?

Our previous reference ranges were derived retrospectively from CBCs performed on Ontario medical patients and using these ranges to define what was "normal" did have some advantages. However, feedback from our clinicians pointed out that it was very likely that many 'anemic' patients were included in the large cohort of patient data used to calculate our reference

ranges. Clinicians were very clear in their comments to us that despite what the retrospective data might show, a hemoglobin of 89g/L (e.g. in an elderly male) cannot be considered “normal” and must be further investigated. Failure to flag such a hemoglobin level could result in the anemia being overlooked.

For this reason, we have decided to introduce new CBC reference ranges, derived from standardized, confirmed-healthy populations. The age stratification in the reference range for those older than 75 has been eliminated. The new reference ranges correlate more closely with clinical diagnostic entities such as the WHO *criteria for anemia and microcytosis* and, when used properly, will be useful clinical decision-making tools for our increasingly ethnically-diverse population.

What are the implications with the change in reference ranges?

Because thalassemia and other, ‘non-disease’ genetic mutations are so common in Ontario, physicians may notice more of their CBC reports with results “flagged” as being outside of the new standardized reference range. For example, many Ontarians with thalassemia traits will have small (microcytic) red cells and correspondingly lower MCVs – these patients’ MCVs might now be flagged – so even though a flagged MCV may be at times be a “normal” finding in our diverse population, many of these healthy patients do in fact require additional work-ups (including hemoglobin fractionation and ferritin) to assess for thalassemia status and/or iron deficiency.

Questions about the changes?

We are committed to providing the highest quality and value to our healthcare system. For further information regarding the new reference ranges please refer to dynacare.ca, under News and Media/Partner Updates. If you would like to further discuss, please feel free to contact Customer Care at 800.565.5721 x 5752.



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Table showing current and new reference ranges

CBC Test Information			Current Reference Ranges			New Reference Ranges		
Test Code	Test	Component	Sex	Age	Normal Range	Sex	Age	Normal Range
399	WBC		M/F	0 - 3 DAYS	8.7 - 29.0 x 10E9/L	M/F	0 - 6 DAYS	9.0 - 30.0 x 10E9/L
			M/F	4 DAYS - 1 YRS	5.0 - 16.7 x 10E9/L	M/F	7 - 13 DAYS	5.0 - 21.0 x 10E9/L
						M/F	14 - 31 DAYS	5.0 - 20.0 x 10E9/L
						M/F	1 - 2 M	5.0 - 20.0 x 10E9/L
						M/F	3 - 11 M	5.0 - 15.0 x 10E9/L
			M/F	2 - 9 YRS	3.3 - 16.6 x 10E9/L	M/F	1 - 4 YRS	5.0 - 12.0 x 10E9/L
			M/F	>= 10 YRS	3.4 - 11.3 x 10E9/L	M/F	5 - 17 YRS	4.0 - 10.0 x 10E9/L
						M/F	>= 18 YRS	3.2 - 9.4 x 10E9/L
397	RBC		M/F	0 - 3 DAYS	3.9 - 6.0 x 10E12/L	M/F	0 - 31 DAYS	3.5 - 6.0 x 10E12/L
			M/F	4 DAYS - 1 M	2.2 - 5.7 x 10E12/L			
			M/F	2 M - 1 YRS	3.5 - 5.4 x 10E12/L	M/F	1 - 2 M	3.5 - 5.5 x 10E12/L
						M/F	3 - 11 M	3.5 - 5.0 x 10E12/L
			M/F	2 - 14 YRS	4.0 - 5.6 x 10E12/L	M/F	1 - 4 YRS	4.0 - 5.0 x 10E12/L
						M/F	5 - 13 YRS	4.5 - 5.5 x 10E12/L
			M	15 - 75 YRS	4.1 - 5.8 x 10E12/L	M	14 - 17 YRS	4.5 - 5.7 x 10E12/L
			F	15 - 75 YRS	3.7 - 5.2 x 10E12/L	F	14 - 17 YRS	4.1 - 5.1 x 10E12/L
			M	> 75 YRS	3.1 - 5.6 x 10E12/L	M	>= 18 YRS	4.2 - 5.8 x 10E12/L
418	HGB		M/F	0 - 3 DAYS	136 - 196 g/L	M/F	0 - 6 DAYS	150 - 220 g/L
			M/F	4 DAYS - 1 M	71 - 194 g/L	M/F	7 - 31 DAYS	140 - 200 g/L
						M/F	1 - 1 M	115 - 180 g/L
			M/F	2 M - 1 YRS	87 - 138 g/L	M/F	2 - 2 M	90 - 135 g/L
						M/F	3 - 11 M	100 - 140 g/L
			M/F	2 - 9 YRS	106 - 143 g/L	M/F	1 - 4 YRS	110 - 140 g/L
			M/F	10 - 14 YRS	114 - 153 g/L	M/F	5 - 13 YRS	120 - 160 g/L
			M	15 - 75 YRS	126 - 170 g/L	M	14 - 17 YRS	140 - 175 g/L
			F	15 - 75 YRS	108 - 151 g/L	F	14 - 17 YRS	120 - 153 g/L
			M	> 75 YRS	87 - 166 g/L	M	>= 18 YRS	129 - 165 g/L
			F	> 75 YRS	89 - 152 g/L	F	>= 18 YRS	110 - 147 g/L

417	HCT		M/F	0 - 3 DAYS	0.42 - 0.64 l/l	M/F	0 - 6 DAYS	0.46 - 0.70 l/l
			M/F	4 DAYS - 1 M	0.20 - 0.59 l/l	M/F	7 - 31 DAYS	0.40 - 0.65 l/l
						M/F	1 - 1 M	0.35 - 0.54 l/l
			M/F	2 M - 1 YRS	0.27 - 0.41 l/l	M/F	2 - 2 M	0.27 - 0.40 l/l
						M/F	3 - 11 M	0.30 - 0.42 l/l
			M/F	2 - 9 YRS	0.33 - 0.42 l/l	M/F	1 - 4 YRS	0.35 - 0.42 l/l
			M/F	10 - 14 YRS	0.35 - 0.45 l/l	M/F	5 - 13 YRS	0.36 - 0.48 l/l
			M	>= 15 YRS	0.37 - 0.50 l/l	M	14 - 17 YRS	0.42 - 0.50 l/l
397V	MCV		F	>= 15 YRS	0.33 - 0.45 l/l	F	14 - 17 YRS	0.36 - 0.45 l/l
						M	>= 18 YRS	0.39 - 0.49 l/l
						F	>= 18 YRS	0.33 - 0.44 l/l
			M/F	0 - 3 DAYS	101 - 122 fl	M/F	0 - 6 DAYS	98 - 118 fl
			M/F	4 DAYS - 1 M	86 - 113 fl	M/F	7 - 13 DAYS	88 - 126 fl
						M/F	14 - 31 DAYS	86 - 124 fl
			M/F	2 M - 1 YRS	58 - 89 fl	M/F	1 - 1 M	85 - 123 fl
						M/F	2 - 2 M	77 - 115 fl
397H	MCH		M/F	2 - 9 YRS	71 - 89 fl	M/F	3 - 11 M	74 - 108 fl
			M/F	10 - 14 YRS	74 - 92 fl	M/F	1 - 5 YRS	70 - 86 fl
						M/F	6 - 12 YRS	77 - 96 fl
			M	>= 15 YRS	81 - 98 fl	M	>= 18 YRS	80 - 98 fl
			F	>= 15 YRS	78 - 98 fl	F	>= 18 YRS	76 - 98 fl
			M/F	0 - 1 M	29 - 39 pg	M/F	0 - 2 M	24 - 34 pg
			M/F	2 M - 1 YRS	18 - 30 pg	M/F	3 M - 17 YRS	24 - 31 pg
			M/F	2 - 9 YRS	23 - 30 pg			
417C	MCHC		M/F	10 - 14 YRS	25 - 31 pg	M/F	>= 18 YRS	24 - 33 pg
			M/F	>= 15 YRS	27 - 33 pg	M/F	>= 18 YRS	24 - 33 pg
RDW	RDW		M/F		317 - 345 g/L	M/F	0 - 17 YRS	320 - 365 g/L
			M/F			M/F	>= 18 YRS	313 - 344 g/L
396	PLT		M/F	0 - 1 YRS	12.3 - 23.7	M/F	0 - 1 YRS	12.3 - 23.3
			M/F	>= 2 YRS	12.2 - 15.7	M/F	2 - 17 YRS	12.3 - 17.7
						M/F	>= 18 YRS	12.5 - 17.3
			M/F	0 - 9 YRS	159 - 537 x 10E9/L	M/F	0 - 17 YRS	150 - 400 x 10E9/L
			M/F	10 - 14 YRS	141 - 406 x 10E9/L			
			M/F	15 - 75 YRS	126 - 367 x 10E9/L	M/F	>= 18 YRS	155 - 372 x 10E9/L
			M/F	> 75 YRS	91 - 420 x 10E9/L			

MPV	MPV		M/F		7.5 - 11.1 fl	M/F		4.0 - 14.0 fl
398	RETIC		M/F	0 - 3 M	8 - 153 x 10E9/L	M/F	0 - 1 DAYS	200 - 300 x 10E9/L
						M/F	2 - 6 DAYS	15 - 250 x 10E9/L
						M/F	7 - 31 DAYS	5 - 50 x 10E9/L
						M/F	1 - 1 M	5 - 100 x 10E9/L
						M/F	2 - 2 M	5 - 150 x 10E9/L
			M/F	> 4 M	22 - 125 x 10E9/L	M/F	3 - 6 M	5 - 250 x 10E9/L
372	DIFFERENTIAL WBC'S	NEUTROPHILS	M/F	0-1 YRS	0.8-7.2 x 10E9/L	M/F	0-1 YRS	0.6-6.7 x 10E9/L
			M/F	2-9 YRS	1.3-10.7 x 10E9/L	M/F	2-9 YRS	1.2-8.5 x 10E9/L
			M/F	10-13 YRS	1.3-9.0 x 10E9/L	M/F	10-17 YRS	1.4-7.6 x 10E9/L
			M/F	>=14 YRS	1.8-7.7 x 10E9/L	M/F	>=18 YRS	1.4-6.3 x 10E9/L
		LYMPHOCYTES	M/F	0-1 M	2.0-9.5 x 10E9/L	M/F	0-1 M	2.0-9.5 x 10E9/L
			M/F	2 M-1 YRS	2.4-9.6 x 10E9/L	M/F	2 M-1 YRS	2.4-9.6 x 10E9/L
			M/F	2-9 YRS	1.1-6.3 x 10E9/L	M/F	2-9 YRS	1.3-6.4 x 10E9/L
			M/F	10-13 YRS	1.2-4.2 x 10E9/L	M/F	10-17 YRS	1.2-4.1 x 10E9/L
			M/F	>=14 YRS	0.9-3.4 x 10E9/L	M/F	>=18 YRS	1.0-2.9 x 10E9/L
		MONOCYTES	M/F	0-1 M	0.1-2.4 x 10E9/L	M/F	0-1 M	0.1-2.4 x 10E9/L
			M/F	2 M-1 YRS	0.2-1.5 x 10E9/L	M/F	2 M-1 YRS	0.2-1.5 x 10E9/L
			M/F	>= 2 YRS	0.3-1.0 x 10E9/L	M/F	2-17 YRS	0.3-1.1 x 10E9/L
		EOSINOPHILS	M/F	0-1 M	0.0-1.6 x 10E9/L	M/F	0-1 M	0.0-1.6 x 10E9/L
			M/F	2 M-1 YRS	0.0-1.1 x 10E9/L	M/F	2 M-1 YRS	0.0-0.9 x 10E9/L
			M/F	2-9 YRS	0.0-0.9 x 10E9/L	M/F	2-9 YRS	0.0-0.9 x 10E9/L
			M/F	10-13 YRS	0.0-0.8 x 10E9/L	M/F	10-17 YRS	0.0-0.7 x 10E9/L
			M/F	>=14 YRS	0.0-0.5 x 10E9/L	M/F	>=18 YRS	0.0-0.5 x 10E9/L
		BASOPHILS	M/F	0-1 M	0.00-0.24 x 10E9/L	M/F	0-1 M	0.00-0.24 x 10E9/L
			M/F	2 M-1 YRS	0.00-0.16 x 10E9/L	M/F	2 M-1 YRS	0.00-0.15 x 10E9/L
			M/F	>= 2 YRS	0.00-0.10 x 10E9/L	M/F	2-17 YRS	0.00-0.11 x 10E9/L
						M/F	>=18 YRS	0.00-0.09 x 10E9/L
		BANDS	M/F		0.00 x 10E9/L	M/F	0-13 YRS	0.00 x 10E9/L
						M/F	>= 14 YRS	0.00-1.00 x 10E9/L