

CBC REFERENCE RANGES AND COMPUTER CODES

SOP Number: HE0049
Author(s): Hematology Work Group

Version: 13

SCOPE

This SOP applies to all employees who perform testing in hematology.

REFERENCE RANGES

Test Code(s) (Result Units)	Name/Alternate name	Age	Male	Female
WBC (K/ μ L)	WBC/ White Blood Cell Count	0 Days	9.0 - 30.0	9.0 - 30.0
		1 - 6 Days	9.0 - 34.0	9.0 - 34.0
		7 - 13 Days	5.0 - 21.0	5.0 - 21.0
		14 - 29 Days	5.0 - 20.0	5.0 - 20.0
		1 Month	5.0 - 19.5	5.0 - 19.5
		2 - 11 Months	5.5 - 17.0	5.5 - 17.0
		1 - 3 Years	6.0 - 17.0	6.0 - 17.0
		4 - 5 Years	5.5 - 15.5	5.5 - 15.5
		6 - 7 Years	5.0 - 14.5	5.0 - 14.5
		8 - 13 Years	4.5 - 13.5	4.5 - 13.5
		14 - 17 Years	4.5 - 13.0	4.5 - 13.0
		18 - 19 Years	4.5 - 12.5	4.5 - 12.5
		20 Years	4.5 - 11.5	4.5 - 11.5
\geq 21 Years	3.6 - 10.6	3.6 - 10.6		
RBC (M/ μ L)	RBC/Red Blood Cell Count	0 Days	3.9 - 5.50	3.9 - 5.50
		1 - 6 Days	4.00 - 6.60	4.00 - 6.60
		7 - 13 Days	3.90 - 6.30	3.90 - 6.30
		14 - 29 Days	3.60 - 6.20	3.60 - 6.20
		1 Month	3.00 - 5.40	3.00 - 5.40
		2 Months	2.70 - 4.90	2.70 - 4.90
		3 - 5 Months	3.10 - 4.50	3.10 - 4.50
		6 - 11 Months	3.70 - 5.30	3.70 - 5.30
		1 Year	3.70 - 5.30	3.70 - 5.30
		2 - 5 Years	3.90 - 5.30	3.90 - 5.30
		6 - 11 Years	4.00 - 5.20	4.00 - 5.20
		12 - 17 Years	4.50 - 5.30	4.10 - 5.10
		\geq 18 Years	4.50 - 5.90	4.20 - 5.40
HGB and HGBB (g/dL)	Hemoglobin/HGB	0 days	13.5 - 19.5	13.5 - 19.5
		1 - 6 days	14.5 - 22.5	14.5 - 22.5
		7 - 13 days	13.5 - 21.5	13.5 - 21.5
		14 - 29 Days	12.5 - 20.5	12.5 - 20.5

Test Code(s) (Result Units)	Name/Alternate name	Age	Male	Female
		1 Month	10.0 - 18.0	10.0 - 18.0
		2 months	9.0 - 14.0	9.0 - 14.0
		3 - 5 months	9.5 - 13.5	9.5 - 13.5
		6 - 11 months	10.5 - 13.5	10.5 - 13.5
		1 year	10.5 - 13.5	10.5 - 13.5
		2 - 5 years	11.5 - 13.5	11.5 - 13.5
		6 - 11 years	11.5 - 15.5	11.5 - 15.5
		12 - 17 years	13.0 - 16.0	12.0 - 16.0
		≥18 Years	13.5 - 17.5	12.0 - 16.0
HCT (%)	Hematocrit/HCT	0 Days	42.0 - 60.0	42.0 - 60.0
		1 - 6 Days	45.0 - 64.9	45.0 - 64.9
		7 - 13 Days	42.0 - 64.9	42.0 - 64.9
		14 - 29 Days	39.0 - 63.0	39.0 - 63.0
		1 Month	31.0 - 55.0	31.0 - 55.0
		2 Months	28.0 - 42.0	28.0 - 42.0
		3 - 5 Months	29.0 - 41.0	29.0 - 41.0
		6 - 11 Months	33.0 - 39.0	33.0 - 39.0
		1 Year	33.0 - 39.0	33.0 - 39.0
		2 - 5 Years	34.0 - 40.0	34.0 - 40.0
		6 - 11 Years	35.0 - 45.0	35.0 - 45.0
		12 - 17 Years	37.0 - 49.0	36.0 - 46.0
		≥18 Years	41.0 - 53.0	36.0 - 46.0
		MCV (fL)	MCV/ Mean Cell Volume	0 Days
1 - 6 Days	95.0 - 121.0			95.0 - 121.0
7 - 13 Days	88.0 - 126.0			88.0 - 126.0
14 - 29 Days	86.0 - 124.0			86.0 - 124.0
1 Month	85.0 - 123.0			85.0 - 123.0
2 Months	77.0 - 115.0			77.0 - 115.0
3 - 5 Months	74.0 - 108.0			74.0 - 108.0
6 - 11 Months	70.0 - 86.0			70.0 - 86.0
2 - 5 Years	75.0 - 87.0			75.0 - 87.0
6 - 11 Years	77.0 - 95.0			77.0 - 95.0
12 - 17 Years	78.0 - 98.0			78.0 - 102.0
≥18 Years	80.0 - 100.0			80.0 - 100.0
MCH (pg)	MCH/	0 Days	31.0 - 37.0	31.0 - 37.0

Test Code(s) (Result Units)	Name/Alternate name	Age	Male	Female
	Mean Cell Hemoglobin	7 - 13 Days	28.0 - 40.0	28.0 - 40.0
		2 Months	26.0 - 34.0	26.0 - 34.0
		3 - 5 Months	25.0 - 35.0	25.0 - 35.0
		6 - 11 Months	23.0 - 31.0	23.0 - 31.0
		1 Year	23.0 - 31.0	23.0 - 31.0
		2 - 5 Years	24.0 - 30.0	24.0 - 30.0
		6 - 11 Years	25.0 - 33.0	25.0 - 33.0
		12 - 17 Years	25.0 - 35.0	25.0 - 35.0
		18 - 48 Years	26.0 - 34.0	26.0 - 34.0
		≥49 Years	25.0 - 34.0	25.0 - 34.0
MCHC (g/dL)	MCHC/ Mean Corpuscular Hemoglobin Concentration	All	32.0 - 36.0	32.0 - 36.0
RDW (%)	RDW/ RBC Distribution Width	All	11.3 - 15.6	11.3 - 15.6
RDWSD (fL)	RDW SD/RBC Distribution Width Standard Deviation	All	36.7 - 47.2	36.7 - 47.2
PLT (K/μL)	Platelets	All	150 - 400	150 - 400
PLTMS (fL/nL)	Platelet Mass	All	No Reference Range	No Reference Range
IPF (%)	Immature Platelet Fraction	All	0.0 – 7.1	0.0 – 7.1
MPV (fL)	MPV/ Mean Platelet Volume	All	8.6 - 12.4	8.6 - 12.4
ANRBC (/100 WBCs)	Nucleated RBCs Automated	All	No Reference Range	No Reference Range
SEG / NEUTP(%) (Neutrophil % for Manual/Auto diff)	Segmented Neutrophils/ Neutrophils	0 - 13 Days	19 - 49	19 - 49
		14 - 29 Days	14 - 44	14 - 44
		2 - 3 Months	15 - 25	15 - 25
		4 - 5 Months	14 - 24	14 - 24
		6 - 9 Months	13 - 23	13 - 23
		10 - 11 Months	12 - 22	12 - 22
		1 Year	13 - 33	13 - 33
		2 - 3 Years	15 - 35	15 - 35
		4 - 5 Years	23 - 45	23 - 45

Test Code(s) (Result Units)	Name/Alternate name	Age	Male	Female
		6 - 7 Years	32 - 54	32 - 54
		8 - 9 Years	34 - 56	34 - 56
		10 - 11 Years	31 - 61	31 - 61
		12 - 13 Years	32 - 62	32 - 62
		14 - 17 Years	33 - 63	33 - 63
		≥18 Years	42 - 72	42 - 72
BAND (%)	Bands Neutrophils	0 Days	10 - 18	10 - 18
		1 - 6 Days	11 - 17	11 - 17
		7 - 13 Days	9 - 15	9 - 15
		14 - 29 Days	7 - 14	7 - 14
		1 - 2 Months	6 - 13	6 - 13
		≥3 Months	0 - 11	0 - 11
LYMPH/LYMPHP (%) (Lymphocyte % for Manual/Auto diff)	Lymphocytes	0 - 6 Days	26 - 36	26 - 36
		7 - 13 Days	36 - 46	36 - 46
		14 - 29 Days	43 - 53	43 - 53
		1 Month	41 - 71	41 - 71
		2 - 3 Months	42 - 72	42 - 72
		4 - 5 Months	44 - 74	44 - 74
		6 - 7 Months	46 - 76	46 - 76
		8 - 9 Months	47 - 77	47 - 77
		10 - 11 Months	48 - 78	48 - 78
		1 Year	46 - 76	46 - 76
		2 - 3 Years	44 - 74	44 - 74
		4 - 5 Years	35 - 65	35 - 65
		6 - 7 Years	27 - 57	27 - 57
		8 - 9 Years	24 - 54	24 - 54
		10 - 13 Years	28 - 48	28 - 48
		14 - 15 Years	27 - 47	27 - 47
16 - 17 Years	25 - 45	25 - 45		
≥18 Years	18 - 45	18 - 45		
MIXP (%)	Mixed cells % (Mono, Eos, Baso) For three part Sysmex Pochi differential	0 - 6 Days	9.4 - 15.2	9.4 - 15.2
		7 - 27 Days	9.4 - 15.2	9.4 - 15.2
		1 Month	6.2 - 14.9	6.2 - 14.9
		2 - 3 Months	7.1 - 13.2	7.1 - 13.2
		≥4 Months	1.1 - 20.4	1.1 - 20.4
MONO/MONOP (%)	Monocytes	0 - 6 Days	0 - 9	0 - 9
		7 - 27 Days	0 - 12	0 - 12

Test Code(s) (Result Units)	Name/Alternate name	Age	Male	Female
(Monocyte % for Manual/Auto diff)		1 Month	0 - 10	0 - 10
		2 - 3 Months	0 - 9	0 - 9
		≥4 Months	2 - 12	2 - 12
EOS/EOSP (%) (Eosinophil % for Manual/Auto diff)	Eosinophils	All	0 - 5	0 - 5
BASO/BASOP (%) (Basophil % for Manual/Auto diff)	Basophils	All	0 - 2	0 - 2
IGRE (%)	Immature Granulocytes	All	0.0 - 0.5	0.0 - 0.5
NEUTA (K/μL)	NEUTA Neutrophils, Absolute Count	0 Days - 11 Months	1.5 - 10.0	1.5 - 10.0
		1 - 5 Years	1.5 - 8.5	1.5 - 8.5
		6 - 13 Years	1.5 - 8.0	1.5 - 8.0
		14 - 20 Years	1.8 - 8.0	1.8 - 8.0
		≥21 Years	1.8 - 6.8	1.8 - 6.8
LYMPHA (K/μL)	Lymphs, Absolute	0 - 6 Days	2.0 - 11.0	2.0 - 11.0
		7 Days - 11 Months	2.0 - 17.0	2.0 - 17.0
		1 - 5 Years	4.0 - 10.5	4.0 - 10.5
		6 - 13 Years	1.5 - 7.0	1.5 - 7.0
		14 - 20 Years	1.2 - 5.8	1.2 - 5.8
		≥21 Years	1.2 - 3.4	1.2 - 3.4
MIXA (K/μL)	Mixed cells, Absolute (Mono, Eos, Baso) For three part Sysmex Pochi differential	0 Days - 11 Months	0.4 - 2.5	0.4 - 2.5
		1 - 5 Years	0.2 - 1.8	0.2 - 1.8
		6 - 20 Years	0.0 - 1.5	0.0 - 1.5
		≥21 Years	0.2 - 1.7	0.2 - 1.7
MONOA (K/μL)	Monocytes, Absolute	0 - 6 Days	0.4 - 3.6	0.4 - 3.6
		7 Days - 11 Months	0.3 - 2.7	0.3 - 2.7
		1 - 5 Years	0.0 - 1.1	0.0 - 1.1
		6 - 20 Years	0.0 - 0.8	0.0 - 0.8
		≥21 Years	0.2 - 0.9	0.2 - 0.9
EOSA (K/μL)	Eosinophils, Abs Count	0 - 6 Days	0.0 - 1.0	0.0 - 1.0
		7 Days - 11 Months	0.1 - 1.1	0.1 - 1.1
		1 - 13 Years	0.0 - 0.7	0.0 - 0.7
		≥14 Years	0.0 - 0.5	0.0 - 0.5
BASOA (K/μL)		All	0.0 - 0.1	0.0 - 0.1

Test Code(s) (Result Units)	Name/Alternate name	Age	Male	Female
	Basophils, Absolute			
IGAB (K/ μ L)	Immature Granulocyte, Absolute	All	0.0 - 0.04	0.0 - 0.04
IGR (Part of IGRAT panel)	I/T Ratio (Immature to Total Neutrophil Ratio)	All	0.0 - 0.3	0.0 - 0.3
RETIC (%)	Retic Percent	0 - 13 Days	2.5 - 6.5	2.5 - 6.5
		\geq 14 Days	0.5 - 2.1	0.5 - 2.1
IRF (%)	Immature Reticulocyte Fraction	All	No Reference Range	No Reference Range
RETABS (K/ μ L)	Retic Absolute	0 - 13 Days	27.9-121.6	27.9-121.6
		\geq 14 Days	27.2 - 104.4	27.2 - 104.4
RETHe (pg)	Retic Hemoglobin	All	29.7 - 37.9	29.7 - 37.9

COMPUTER CODES

A. Ordering codes

CODE	DESCRIPTION
CBC	Complete Blood Count No diff
CBCAD	CBC with Auto diff
CBCADP	CBC with Auto diff (for PC only)
CBCMD	CBC with Manual diff
CBCMDP	CBC with Manual diff (for PC only)
CBCMDG	CBC with Manual diff and IG ratio
CBCGP	CBC with Manual diff and IG ratio (for PC only)
CBCGPP	CBC with Manual diff, IG Ratio and Immature platelets
CBCGIP	CBC with Manual diff, IG Ratio and Immature platelets (for PC only)
DMAN	Differential, Manual
DAUTO	Differential, Auto Diff Added to Hemagram
WBC	WBC, white blood count
HGBO	Hemoglobin only (with suppressed MCHC)
HCTO	Hematocrit only (with suppressed MCHC)
PLT	Platelets

IPF	Immature Platelet Fraction
HH	Hemoglobin/Hematocrit
HCTFL	Hematocrit, fluid
IGRAT	Immature to Total Neutrophil Ratio
IRF	Immature Reticulocyte Fraction
RET	Retic Count
RETIRF	Retic Count with IRF

PROCEDURE NOTES

- A. For LIS laboratories, these reference ranges can be accessed using function MIQ.
- B. For non-LIS laboratories with CBC analyzers that accommodate only a limited number of reference ranges, the medical director will need to determine what reference ranges to program into the analyzer.

ATTACHMENTS

HE0049-A1 Downtime Reference Range Table

REFERENCES

- A. Intermountain Laboratory Hematology Guidance Team Reference Range Study, 1994.
- B. Intermountain Laboratory CBC Reference Intervals Study, 2018.
- C. Department of Health and Human Services, Third National Health and Nutrition Examination Survey (NHANES III), 1988 - 1994.