

TABLE 1 – CHOP Pediatric Reference Ranges for CBC

WBC (10³/μL)

| Age | Male | Female | Unknown |
|-------------|----------|----------|----------|
| ≤ 14 days | 8.0-15.4 | 8.2-14.6 | 8.2-14.6 |
| 15-30 days | 7.8-15.9 | 8.4-14.4 | 8.4-14.4 |
| 1-2 months | 8.1-15.0 | 7.1-14.7 | 8.1-14.7 |
| 2-6 months | 6.5-13.3 | 6.0-13.3 | 6.5-13.3 |
| 6-24 months | 6.0-13.5 | 6.5-13.0 | 6.5-13.0 |
| 2-6 years | 5.1-13.4 | 4.9-13.2 | 5.1-13.2 |
| 6-12 years | 4.3-11.0 | 4.3-11.4 | 4.3-11.0 |
| 12-18 years | 3.8-9.8 | 4.2-9.4 | 4.2-9.4 |
| ≥ 18 years | 3.9-8.8 | 4.4-9.7 | 4.4-8.8 |

RBC (10⁶/μL)

| Age | Male | Female | Unknown |
|-------------|-----------|-----------|-----------|
| ≤ 3 days | | 3.90-6.60 | |
| 4-7 days | | 3.90-6.30 | |
| 8-14 days | | 3.60-6.20 | |
| 15-30 days | | 3.00-5.40 | |
| 1-2 months | | 2.70-4.90 | |
| 2-6 months | | 3.10-4.50 | |
| 6-24 months | | 3.70-5.30 | |
| 2-6 years | | 3.90-5.30 | |
| 6-12 years | | 4.00-5.20 | |
| 12-18 years | 4.50-5.30 | 4.10-5.10 | 4.50-5.10 |
| ≥ 18 years | 4.50-5.90 | 4.00-5.20 | 4.50-5.20 |

MCV (fL)

| Age | Male | Female | Unknown |
|-------------|-------|--------|---------|
| ≤ 3 days | | 98-121 | |
| 4-7 days | | 88-126 | |
| 8-14 days | | 86-124 | |
| 15-30 days | | 85-123 | |
| 1-2 months | | 77-115 | |
| 2-6 months | | 74-108 | |
| 6-24 months | | 70-86 | |
| 2-6 years | | 75-87 | |
| 6-12 years | | 77-95 | |
| 12-18 years | 78-98 | 78-102 | 78-98 |
| ≥ 18 years | | 80-100 | |

MCH (pg)

| Age | Male | Female | Unknown |
|-------------|------|--------|---------|
| ≤ 3 days | | 31-37 | |
| 4-30 days | | 28-40 | |
| 1-2 months | | 26-34 | |
| 2-6 months | | 25-35 | |
| 6-24 months | | 23-31 | |
| 2-6 years | | 24-30 | |
| 6-12 years | | 25-33 | |
| 12-18 years | | 25-35 | |
| ≥ 18 years | | 26-34 | |

ABSOLUTE LYMPHOCYTES (/μL)

| Age | Male | Female | Unknown |
|-------------|-----------|-----------|-----------|
| ≤ 14 days | 2070-7530 | 1750-8000 | 2070-7530 |
| 15-30 days | 2110-8380 | 2420-8200 | 2420-8200 |
| 1-2 months | 2470-7950 | 2290-9142 | 2470-7950 |
| 2-6 months | 2140-8990 | 2140-8990 | 2140-8990 |
| 6-24 months | 1560-7830 | 1520-8090 | 1560-7830 |
| 2-6 years | 1130-5520 | 1250-5770 | 1250-5520 |
| 6-12 years | 970-3960 | 1160-4280 | 1160-3960 |
| 12-18 years | 970-3260 | 1160-3330 | 1160-3260 |
| ≥ 18 years | 850-3000 | 1160-3180 | 1160-3000 |

BASOPHILS (%)

| Age | Male | Female | Unknown |
|--------------------|---------|---------|---------|
| ≤ 14 days | 0.0-0.8 | 0.0-0.6 | 0.0-0.6 |
| 15-30 days | 0.0-0.6 | 0.0-0.5 | 0.0-0.5 |
| 1-2 months | 0.0-0.6 | 0.0-0.5 | 0.0-0.5 |
| 2 months – 6 years | 0.0-0.6 | 0.0-0.6 | 0.0-0.6 |
| 6-12 years | 0.0-0.7 | 0.0-0.6 | 0.0-0.6 |
| 12-18 years | 0.0-0.7 | 0.0-0.6 | 0.0-0.6 |
| ≥ 18 years | 0.0-0.7 | 0.0-0.7 | 0.0-0.7 |

MONOCYTES (%)

| Age | Male | Female | Unknown |
|-------------|----------|----------|----------|
| ≤ 14 days | 6.7-19.9 | 5.2-20.6 | 6.7-19.9 |
| 15-30 days | 4.3-18.3 | 5.6-13.8 | 5.6-13.8 |
| 1-2 months | 4.4-14.0 | 3.8-15.5 | 4.4-14.0 |
| 2-6 months | 3.8-13.4 | 3.8-12.6 | 3.8-12.6 |
| 6-24 months | 4.4-13.4 | 3.8-12.8 | 4.4-12.8 |
| 2-6 years | 4.2-12.2 | 4.1-11.4 | 4.2-11.4 |
| 6-12 years | 4.2-12.3 | 4.2-11.3 | 4.2-11.3 |
| 12-18 years | 4.4-12.3 | 4.1-10.9 | 4.4-10.9 |
| ≥ 18 years | 4.4-12.3 | 4.3-11.0 | 4.4-11.0 |

ABSOLUTE BASOPHIL (/μL)

| Age | Male | Female | Unknown |
|-------------|-------|--------|---------|
| ≤ 14 days | 0-110 | 0-70 | 0-70 |
| 15-30 days | 0-70 | 0-60 | 0-60 |
| 1-2 months | 0-70 | 0-50 | 0-50 |
| 2-6 months | 0-60 | 0-70 | 0-60 |
| 6-24 months | 0-60 | 0-60 | 0-60 |
| 2-6 years | 0-60 | 0-60 | 0-60 |
| 6-12 years | 0-60 | 0-50 | 0-50 |
| 12-18 years | 0-50 | 0-50 | 0-50 |
| ≥ 18 years | 0-50 | 0-50 | 0-50 |

ABSOLUTE MONOCYTES (/μL)

| Age | Male | Female | Unknown |
|-------------|----------|----------|----------|
| ≤ 14 days | 520-1770 | 570-1720 | 570-1720 |
| 15-30 days | 280-1380 | 420-1210 | 420-1210 |
| 1-2 months | 280-1050 | 280-1210 | 280-1050 |
| 2-6 months | 280-1070 | 240-1170 | 280-1070 |
| 6-24 months | 250-1150 | 260-1080 | 260-1080 |
| 2-6 years | 190-940 | 240-920 | 240-920 |
| 6-12 years | 190-850 | 190-810 | 190-810 |
| 12-18 years | 180-780 | 190-720 | 190-720 |
| ≥ 18 years | 190-770 | 290-710 | 290-710 |

IGE (%)

| Age | Male | Female | Unknown |
|-------------|------|---------|---------|
| ≤ 3 days | | 0.0-1.7 | |
| 4-14 days | | 0.0-1.9 | |
| 15-30 days | | 0.0-1.3 | |
| 1-2 months | | 0.0-0.9 | |
| 2-6 months | | 0.0-0.5 | |
| 6-24 months | | 0.0-0.9 | |
| 2-6 years | | 0.0-0.8 | |
| 6-18 years | | 0.0-0.3 | |
| ≥ 18 years | | 0.0-0.6 | |

TABLE 2 – Codes and flags with corrective actions

HEMOGLOBIN (g/dL)

| Age | Male | Female | Unknown |
|-------------|-----------|-----------|-----------|
| ≤ 3 days | | 13.5-22.5 | |
| 4-7 days | | 13.5-19.5 | |
| 8-14 days | | 12.5-20.5 | |
| 15-30 days | | 10.0-18.0 | |
| 1-2 months | | 9.0-13.5 | |
| 2-6 months | | 9.5-13.5 | |
| 6-24 months | | 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 | 12.0-16.0 | 13.0-16.0 |
| ≥ 18 years | 13.5-17.5 | 12.0-16.0 | 13.5-16.0 |

HEMATOCRIT (%)

| Age | Male | Female | Unknown |
|-------------|-----------|-----------|-----------|
| ≤ 3 days | | 42.0-67.0 | |
| 4-7 days | | 42.0-66.0 | |
| 8-14 days | | 39.0-63.0 | |
| 15-30 days | | 31.0-55.0 | |
| 1-2 months | | 28.0-42.0 | |
| 2-6 months | | 29.0-41.0 | |
| 6-24 months | | 33.0-39.0 | |
| 2-6 years | | 34.0-40.0 | |
| 6-12 years | | 35.0-45.0 | |
| 12-18 years | 37.0-49.0 | 36.0-46.0 | 37.0-46.0 |
| ≥ 18 years | 41.0-53.0 | 36.0-46.0 | 41.0-46.0 |

PLT (K/μL)

| Age | Male | Female | Unknown |
|----------|------|---------|---------|
| All ages | | 150-450 | |

MPV (fL)

| Age | Male | Female | Unknown |
|-------------|-----------|-----------|-----------|
| ≤ 14 days | 10.2-11.9 | 10.4-12.0 | 10.4-11.9 |
| 15-30 days | 10.1-12.1 | 10.0-12.2 | 10.1-12.1 |
| 1-2 months | 9.2-10.8 | 9.4-11.1 | 9.4-10.8 |
| 2-6 months | 8.9-10.6 | 9.0-10.9 | 9.0-10.6 |
| 6-24 months | 8.7-10.5 | 8.8-10.6 | 8.8-10.5 |
| 2-6 years | 8.8-10.6 | 8.9-11.0 | 8.9-10.6 |
| 6-12 years | 9.2-11.4 | 9.3-11.3 | 9.3-11.4 |
| 12-18 years | 9.6-11.8 | 9.6-11.7 | 9.6-11.7 |
| ≥ 18 years | 9.7-11.9 | 9.6-12.0 | 9.7-11.9 |

IPF (%)

| Age | Male | Female | Unknown |
|-------------|---------|---------|---------|
| ≤ 6 months | 2.0-6.8 | 1.3-6.8 | 2.0-6.8 |
| 6-24 months | 1.4-3.8 | 1.4-4.5 | 1.4-3.8 |
| 2-6 years | 1.1-3.6 | 1.0-3.6 | 1.0-3.6 |
| 6-12 years | 1.0-4.9 | 1.0-4.7 | 1.0-4.7 |
| 12-18 years | 1.6-6.1 | 1.4-6.4 | 1.6-6.1 |
| ≥ 18 years | 1.6-7.1 | 1.6-4.9 | 1.6-4.9 |

MCHC (g/dL)

| Age | Male | Female | Unknown |
|--------------------|------|--------|---------|
| ≤ 3 days | | 30-37 | |
| 4-14 days | | 28-38 | |
| 15 days - 2 months | | 29-37 | |
| 2-24 months | | 30-36 | |
| ≥ 2 years | | 31-37 | |

RDW-SD

| Age | Male | Female | Unknown |
|-------------|-----------|-----------|-----------|
| ≤ 14 days | 51.0-61.7 | 51.4-65.7 | 51.4-61.7 |
| 15-30 days | 46.3-57.3 | 47.2-59.8 | 47.2-57.3 |
| 1-2 months | 43.9-52.8 | 43.0-55.0 | 43.9-52.8 |
| 2-6 months | 35.3-45.7 | 35.2-45.7 | 35.3-45.7 |
| 6-24 months | 35.3-42.8 | 34.9-42.4 | 35.3-42.4 |
| 2-6 years | 35.1-41.7 | 34.9-42.0 | 35.1-41.7 |
| 6-12 years | 35.1-41.7 | 25.5-41.8 | 35.1-41.7 |
| 12-18 years | 36.7-43.8 | 37.1-44.2 | 37.1-43.8 |
| ≥ 18 years | 37.8-46.1 | 38.4-47.7 | 38.4-46.1 |

RDW-CV

| Age | Male | Female | Unknown |
|-------------|-----------|-----------|-----------|
| ≤ 14 days | 14.8-17.0 | 14.6-17.3 | 14.8-17.0 |
| 15-30 days | 14.3-16.8 | 14.4-16.2 | 14.4-16.2 |
| 1-2 months | 13.8-16.1 | 13.6-15.8 | 13.8-15.8 |
| 2-6 months | 12.4-15.3 | 12.4-15.3 | 12.4-15.3 |
| 6-24 months | 12.9-15.6 | 12.7-15.1 | 12.9-15.1 |
| 2-6 years | 12.5-14.9 | 12.4-14.9 | 12.5-14.9 |
| 6-12 years | 12.3-14.1 | 12.2-14.4 | 12.3-14.1 |
| 12-18 years | 12.4-14.5 | 12.3-14.6 | 12.4-14.5 |
| ≥ 18 years | 12.3-14.3 | 12.4-15.1 | 12.4-14.3 |

RETIC-HE (pg)

| Age | Male | Female | Unknown |
|-------------|-----------|-----------|-----------|
| ≤ 6 months | 27.6-38.7 | 29.2-37.5 | 29.2-37.5 |
| 6-24 months | 28.7-35.7 | 30.1-35.7 | 30.1-35.7 |
| 2-6 years | 27.7-37.8 | 29.3-37.3 | 29.3-37.3 |
| 6-12 years | 32.4-37.6 | 30.4-39.7 | 32.4-37.6 |
| 12-18 years | 30.3-40.4 | 29.9-38.4 | 30.3-38.4 |
| ≥ 18 years | 36.0-38.6 | 30.6-40.7 | 36.0-38.6 |

NRBC (/100 WBC)

| Age | Male | Female | Unknown |
|---------------------|------|---------|---------|
| ≤ 3 days | | 0.1-8.3 | |
| 4 days - ≥ 18 years | | 0.0-0.0 | |

NRBC Absolute (/μL)

| Age | Male | Female | Unknown |
|----------------------|------|-----------|---------|
| ≤ 3 days | | 0.06-1.30 | |
| 4-30 days | | 0.04-0.11 | |
| 31-60 days | | 0.03-0.09 | |
| 61-180 days | | 0.03-0.13 | |
| 6 months - < 2 years | | 0.03-0.12 | |
| 2 - < 6 years | | 0.03-0.32 | |
| 6 - < 12 years | | 0.03-0.15 | |
| 12 - < 18 years | | 0.03-0.13 | |
| ≥ 18 years | | 0.03-0.11 | |

RETIC (%)

| Age | Male | Female | Unknown |
|-------------|------|-----------|---------|
| ≤ 3 days | | 3.47-5.40 | |
| 4-30 days | | 1.06-2.37 | |
| 1-2 months | | 2.12-3.47 | |
| 2-6 months | | 1.55-2.70 | |
| 6-24 months | | 0.99-1.82 | |
| 2-6 years | | 0.82-1.45 | |
| 6-12 years | | 0.98-1.94 | |
| 12-18 years | | 0.90-1.49 | |
| ≥18 years | | 0.86-1.36 | |

ABSOLUTE RETIC (10³/μL)

| Age | Male | Female | Unknown |
|-------------|------|-------------|---------|
| ≤ 3 days | | 147.5-216.4 | |
| 4-30 days | | 51.3-110.4 | |
| 1-2 months | | 51.8-77.9 | |
| 2-6 months | | 48.2-88.2 | |
| 6-24 months | | 43.5-111.1 | |
| 2-6 years | | 36.4-68.0 | |
| 6-12 years | | 42.4-70.2 | |
| 12-18 years | | 41.6-65.1 | |
| ≥18 years | | 39.1-57.0 | |

IMMATURE RETIC FRACTION (%)

| Age | Male | Female | Unknown |
|-------------|------|-----------|---------|
| ≤ 3 days | | 30.5-35.1 | |
| 4-30 days | | 14.5-24.6 | |
| 1-2 months | | 19.1-28.9 | |
| 2-6 months | | 13.4-23.3 | |
| 6-24 months | | 11.4-25.8 | |
| 2-6 years | | 8.4-21.7 | |
| 6-12 years | | 8.9-24.1 | |
| 12-18 years | | 9.0-18.7 | |
| ≥18 years | | 9.3-17.4 | |

NEUTROPHILS (%)

| Age | Male | Female | Unknown |
|-------------|-----------|-----------|-----------|
| ≤ 14 days | 20.2-46.2 | 15.2-66.1 | 20.2-46.2 |
| 15-30 days | 14.0-54.6 | 10.6-57.3 | 14.0-54.6 |
| 1-2 months | 10.2-48.7 | 8.9-68.2 | 10.2-48.7 |
| 2-6 months | 10.9-47.8 | 14.1-76.0 | 14.1-47.8 |
| 6-24 months | 17.5-69.5 | 16.9-74.0 | 17.5-69.5 |
| 2-6 years | 22.4-69.0 | 22.4-69.0 | 22.4-69.0 |
| 6-12 years | 28.6-74.5 | 29.8-71.4 | 29.8-71.4 |
| 12-18 years | 32.5-74.7 | 29.8-71.4 | 32.5-71.4 |
| ≥ 18 years | 40.3-74.8 | 42.5-73.2 | 42.5-73.2 |

ABSOLUTE NEUTROPHILS (/μL)

| Age | Male | Female | Unknown |
|-------------|-----------|-----------|-----------|
| ≤ 14 days | 1600-6060 | 1730-6750 | 1730-6060 |
| 15-30 days | 1108-5450 | 1230-4800 | 1230-4800 |
| 1-2 months | 830-4230 | 1000-4680 | 1000-4230 |
| 2-6 months | 970-5450 | 1040-7200 | 1040-5450 |
| 6-24 months | 1190-7210 | 1270-7180 | 1270-7180 |
| 2-6 years | 1540-7920 | 1600-8290 | 1600-7920 |
| 6-12 years | 1630-7550 | 1640-7870 | 1640-7550 |
| 12-18 years | 1540-7040 | 1820-7470 | 1820-7040 |
| ≥ 18 years | 1820-7420 | 2000-7150 | 2000-7150 |

LYMPHOCYTES (%)

| Age | Male | Female | Unknown |
|-------------|-----------|-----------|-----------|
| ≤ 14 days | 33.7-67.6 | 24.9-68.5 | 33.7-67.6 |
| 15-30 days | 33.6-76.8 | 31.9-82.7 | 33.6-76.8 |
| 1-2 months | 42.5-85.7 | 37.8-86.7 | 42.5-85.7 |
| 2-6 months | 40.7-86.7 | 30.4-85.6 | 40.7-85.6 |
| 6-24 months | 26.0-79.6 | 27.4-79.9 | 26.0-79.6 |
| 2-6 years | 18.4-66.6 | 18.1-68.6 | 18.4-66.6 |
| 6-12 years | 15.5-56.6 | 16.7-57.8 | 16.7-56.6 |
| 12-18 years | 16.4-52.7 | 18.2-49.8 | 18.2-49.8 |
| ≥ 18 years | 12.2-47.1 | 18.2-47.4 | 18.2-47.1 |

EOSINOPHILS (%)

| Age | Male | Female | Unknown |
|-------------|---------|---------|---------|
| ≤ 14 days | 0.0-5.2 | 0.0-4.6 | 0.0-4.6 |
| 15-30 days | | 0.0-5.3 | |
| 1-2 months | 0.0-4.5 | 0.0-4.1 | 0.0-4.1 |
| 2-6 months | 0.0-4.0 | 0.0-3.6 | 0.0-3.6 |
| 6-24 months | 0.0-3.7 | 0.0-3.2 | 0.0-3.2 |
| 2-6 years | 0.0-4.1 | 0.0-3.3 | 0.0-3.3 |
| 6-12 years | 0.0-4.7 | 0.0-4.0 | 0.0-4.0 |
| 12-18 years | 0.0-4.0 | 0.0-3.4 | 0.0-3.4 |
| ≥ 18 years | 0.0-4.4 | 0.0-3.0 | 0.0-3.0 |

ATYPICAL LYMPHOCYTES (%)

| Age | Male | Female | Unknown |
|-------------|---------|---------|---------|
| ≤ 3 days | | 0.0-2.0 | |
| 4-7 days | | 0.0-4.0 | |
| 8-14 days | 0.0-4.0 | 0.0-3.0 | 0.0-3.0 |
| 15-30 days | 0.0-4.0 | 0.0-3.0 | 0.0-3.0 |
| 1-2 months | | 0.0-3.0 | |
| 2-6 months | 0.0-3.0 | 0.0-4.0 | 0.0-3.0 |
| 6-24 months | | 0.0-4.0 | |
| 2-6 years | | 0.0-4.0 | |
| 6-12 years | | 0.0-3.0 | |
| ≥ 12 years | | 0.0-2.0 | |

ABSOLUTE EOSINOPHIL (/μL)

| Age | Male | Female | Unknown |
|-------------|-------|--------|---------|
| ≤ 14 days | 0-660 | 0-640 | 0-640 |
| 15-30 days | 0-800 | 0-750 | 0-750 |
| 1-2 months | 0-570 | 0-630 | 0-570 |
| 2-6 months | 0-610 | 0-740 | 0-610 |
| 6-24 months | 0-820 | 0-580 | 0-580 |
| 2-6 years | 0-530 | 0-460 | 0-460 |
| 6-12 years | 0-520 | 0-470 | 0-470 |
| 12-18 years | 0-380 | 0-320 | 0-320 |
| ≥ 18 years | 0-440 | 0-270 | 0-270 |