COMMON LABS AND WHAT THEY MEAN

Parent Project Muscular Dystrophy
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The following are labs that are commonly drawn in neuromuscular centers. Normal ranges have been provided by **mayocliniclabs.com**. Common reasons for obtaining these labs, as well as possible reasons for high and low values, are included. This list is not exhaustive and any abnormal values, questions, or concerns should be discussed with your neuromuscular center.

Blood Test	Normal Range	About / Common Reasons (not ALL reasons) to be Outside of Normal Range	Notes
Complete Blood Count (CBC)		**CBC includes components of white blood cells (infection fighting cells), red blood cells (oxygen-carrying cells), and measurements of how effectively the blood is able to clot or respond to real or perceived infection.**	
White Blood Cell Count (WBC)	5,000-10,000 WBCs per mm^3 or 5.0-10.0 x 10^9 WBC per Liter	– High: Infection, inflammation; may be elevated with steroid use – Low: Not commonly low	
Red Blood Cell Count (RBC)	– Children: 3.8–6.0 million RBCs per mcL or 3.8–6.0 x 10^{12}/L – Adults: 4.5–5.5 million RBCs per microliter (mcL) or 4.5–5.5 x 10^{12}/liter (L)	– High: Dehydration – Low: Anemia	
Hemoglobin (HGB)	– Children: 9.5–20.5 g/dL or 95–205 g/L – Adults: 14–17.4 grams per deciliter (g/dL) or 140–174 grams per liter (g/L)	– Low: Anemia	
Hematocrit (HCT)	– Children: 29%–59% or 0.29–0.59 volume fraction – Adults: 42%–52% or 0.42–0.52 volume fraction	– Low: Anemia	
Mean Corpuscular Volume (MCV)	– 6 months-23 months: 69.5-81.7 fL – 24 months-35 months: 71.3-84.0 fL – 3-5 years: 77.2-89.5 fL – 6-11 years: 77.8-91.1 fL – 12-14 years: 79.9-93.0 fL – 15-17 years: 82.5-98.0 fL – Adults: 78.2-97.9 fL	Measures the size of the average red blood cell. – Low: Microcytic anemia – High: Macrocytic anemia	
Mean Corpuscular Hemoglobin (MCH)	27-33 pg	Measures the average amount of hemoglobin in a single red blood cell. – Low: Iron deficiency anemia – High: Can indicate macrocytic anemia	

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Mean Corpuscular Hemoglobin Concentration (MCHC)	27-31 pg	Measures the average concentration of hemoglobin within a single red blood cell. – Low: Can indicate iron deficiency anemia	
Red Cell Distribution Width (RDW)	11.5% - 14.5%	Range of sizes of red blood cells.	
Platelets	– 6 months-23 months: 206-445 x 10(9)/L – 24 months-35 months: 202-403 x 10(9)/L – 3-5 years: 187-445 x 10(9)/L – 6-9 years: 187-400 x 10(9)/L – 10-13 years: 177-381 x 10(9)/L – 14-17 years: 139-320 x 10(9)/L – Adults: 135-317 x 10(9)/L	– High: Bleeding, iron deficiency – Low: Not commonly low	
"Differential" measures different types of white blood cells:		**All are part of the immune system, finding and fighting inflammation and infection.**	
Neutrophil %	50% - 62%	Percentage of neutrophils in the blood.	
Band Neutrophil %	0% - 6%	Percentage of neutrophils that are in the process of becoming mature neutrophils. – High: usually infection or inflammation	
Monocyte %	3% - 7%	Percentage of monocytes in the blood.	
Eosinophil %	0% - 3%	Percentage of eosinophils in the blood.	
Basophil %	0% - 1%	Percentage of basophils in the blood.	
Lymphocyte %	24% - 40%	Percentage of lymphocytes in the blood.	
Absolute Neutrophil	– 6 months-23 months: 1.19-7.21 x 10(9)/L – 24 months-35 months: 1.54-7.92 x 10(9)/L – 3-5 years: 1.60-7.80 x 10(9)/L – 6-16 years: 1.40-6.10 x 10(9)/L – 17 years: 1.80-7.20 x 10(9)/L – Adults: 1.56-6.45 x 10(9)/L	Help protect against fungal and bacterial infections. – High: Infection, injury, stress – Low: Disorders or infection	
Absolute Lymphocyte	– 6 months-23 months: 1.56-7.83 x 10(9)/L – 24 months-35 months: 1.13-5.52 x 10(9)/L – 3-5 years: 1.60-5.30 x 10(9)/L – 6-11 years: 1.40-3.90 x 10(9)/L – 12-17 years: 1.00-3.20 x 10(9)/L – Adults: 0.95-3.07 x 10(9)/L	Help to protect against viral infections. – Low: Can indicate infection or significant illness, medications or treatments. – High: Infection, inflammation	

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(Absolute) Eosinophil	– 6 months-23 months: 0.02-0.82 x 10(9)/L – 24 months-35 months: 0.03-0.53 x 10(9)/L – 3-11 years: 0.00-0.50 x 10(9)/L – 12-17 years: 0.10-0.20 x 10(9)/L – Adults: 0.03-0.48 x 10(9)/L	Help activate allergic responses. – High: Generally indicate an allergic reaction, infection (parasitic or otherwise), inflammation	
Absolute Basophil	– 8 weeks-35 months: 0.01-0.06 x 10(9)/L – 3-17 years: 0.00-0.10 x 10(9)/L – Adults: 0.01-0.08 x 10(9)/L	Help wound healing, infection and allergic reactions. – High: Can indicate a blood disorder – Low: Allergic reactions, infections	
(Absolute) Monocytes	– 6 months-23 months: 1.56-7.83 x 10(9)/L – 24 months-35 months: 1.13-5.52 x 10(9)/L – 3-5 years: 1.60-5.30 x 10(9)/L – 6-11 years: 1.40-3.90 x 10(9)/L – 12-17 years: 1.00-3.20 x 10(9)/L – Adults: 0.95-3.07 x 10(9)/L	Circulate in the blood to pick up signs of danger. – High: May indicate a chronic infection, autoimmune diseases or blood disorder – Low: Usually with an overall low white blood cell count or exposure to toxins	
Renal Panel		**Evaluates the health and function of the kidneys.**	
Albumin	3.5 – 5.0 g/dL	Protein filtered by the kidneys. – High: May indicate dehydration – Low: Usually occurs with edema	
Anion Gap	3.5-5.0 – Over 7 years: 7-15	Checks the level of acid in your blood. – High: May indicate acidosis	
Bicarbonate	– 3 years: 18-26 mmol/L – 4-5 years: 19-27 mmol/L – 6-7 years: 20-28 mmol/L – 8-17 years: 21-29 mmol/L – > or =18 years: 22-29 mmol/L	Alteration of bicarbonate and carbon dioxide may reflect an acid-base imbalance. Bicarbonate levels are evaluated with carbon dioxide and other electrolytes to screen for electrolyte imbalances.	
Calcium	– 1-17 years: 9.3-10.6 mg/dL – 18-59 years: 8.6-10.0 mg/dL	Helps to screen for bone, kidney, parathyroid and gastrointestinal health/function. – High: Movement of calcium from the bones to the blood; severely high calcium can cause heart arrhythmias – Low: Poorly functioning parathyroid glands or a lack of vitamin D synthesis of the body; may indicate kidney failure	

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Carbon Dioxide	23-29 mEq/L	Collected and evaluated with bicarbonate. An imbalance indicates an electrolyte imbalance. – High: In Duchenne, can indicate respiratory acidosis, vomiting – Low: In Duchenne, can indicate respiratory alkalosis, diarrhea	
Creatinine	– 0-11 months: 0.17-0.42 mg/dL – 1-5 years: 0.19-0.49 mg/dL – 6-10 years: 0.26-0.61 mg/dL – 11-14 years: 0.35-0.86 mg/dL – > or =15 years: 0.74-1.35 mg/dL	Indicates muscle breakdown. – High: May indicate kidney dysfunction, dehydration, low blood volume – Low: Uncommon	
Chloride	98-107 mmol/L	Indication of fluid/electrolyte balance in the body. – High: May indicate dehydration, kidney dysfunction, diabetes – Low: May indicate over-hydration, prolonged vomiting	
Glucose	70-140 mg/dL	Screen for diabetes. – High: May indicate poor glucose regulation by insulin in the body; a glucose tolerance test will be needed for further evaluation	
Phosphorous	– 1-4 years: 4.3-5.4 mg/dL – 5-13 years: 3.7-5.4 mg/dL – 14-15 years: 3.5-5.3 mg/dL – 16-17 years: 3.1-4.7 mg/dL – > or =18 years: 2.5-4.5 mg/dL	Screen for bone, parathyroid and kidney disease. – High: May indicate kidney dysfunction – Low: Phosphate shifts in the body (fluid/electrolyte imbalances)	
Potassium	3.6-5.2 mmol/L	Indication of fluid/electrolyte balance in the body. – High: Can be dangerous and should be monitored closely – Low: Common with vomiting, diarrhea, iron deficiency	
Sodium	135-145 mmol/L	Indication of fluid/electrolyte balance in the body. – High: May indicate excessive loss of body fluid – Low: Vomiting, diarrhea, use of some diuretics, metabolic acidosis	
Blood Urea Nitrogen (BUN)	– <12 months: not established – 1-17 years: 7-20 mg/dL – > or =18 years: 8-24 mg/dL	Screens for kidney function. – High: Kidney issues or causes that may lead to kidney issues – Low: Uncommon but may indicate severe starvation, severe liver disease	

Blood Test	Normal Range	About / Common Reasons (not ALL reasons) to be Outside of Normal Range	Notes
Liver Profile		**Results are generally evaluated as a set to evaluate liver function.**	
Alanine Aminotransferase (ALT)	7-55 U/L	– High: Normal in Duchenne; indicates skeletal muscle breakdown, not liver dysfunction	
Alkaline Phosphatase (ALP)	– 4 years: 149-369 U/L – 5 years: 179-416 U/L – 6 years: 179-417 U/L – 7 years: 172-405 U/L – 8 years: 169-401 U/L – 9 years: 175-411 U/L – 10 years: 191-435 U/L – 11 years: 185-507 U/L – 12 years: 185-562 U/L – 13 years: 182-587 U/L – 14 years: 166-571 U/L – 15 years: 138-511 U/L – 16 years: 102-417 U/L – 17 years: 69-311 U/L – 18 years: 52-222 U/L – > or =19 years: 45-115 U/L	Evaluation of liver, bone, intestinal and parathyroid diseases. – High: Issues with liver or bone; may be elevated right after accelerated bone growth	
Aspartate Aminotransferase (AST)	– 1-13 years: 8-60 U/L – > or =14 years: 8-48 U/L	– High: Normal in Duchenne; indicates skeletal muscle breakdown, not liver dysfunction	
Albumin	3.5-5.0 g/dL	Screen for nutritional status. – High: May be high if dehydrated – Low: May indicate liver disease, poor protein intake, tissue damage, inflammation	
Total Protein (TP)	6.3-7.9 g/dL	Screen for overall health.	
Total Bilirubin	– 15 days to 17 years: < or =1.0 mg/dL – >18 years: < or =1.2 mg/dL	Screen for liver function. – Abnormal: Jaundice (newborns) – High after Newborn: Breakdown of blood cells – Low: Liver obstruction or hepatitis	
Lipid Profile		**Measured to assess cardiovascular risk**	
Total Cholesterol	Children: – Desirable: <200 mg/dL – Borderline high: 200-239 mg/dL – High: > or =240 mg/dL Adults: <200 mg/dL	Screens for risk of coronary heart disease. – High: Higher risk	
High-Density Lipoprotein Cholesterol (HDL)	Children: – Low HDL: <40 mg/dL – Borderline low: 40-45 mg/dL – Acceptable: >45 mg/dL Adults: 40 mg/dL	Higher levels decrease the risk of coronary heart disease. – Normal: Decreased risk – Low: Higher risk of coronary artery disease	

Blood Test	Normal Range	About / Common Reasons (not ALL reasons) to be Outside of Normal Range	Notes
Low-Density Lipoprotein Cholesterol (LDL)	Children: – Acceptable: <110 mg/dL – Borderline high: 110-129 mg/dL – High: > or =130 mg/dL Adults: – Desirable: <100 mg/dL – Above desirable: 100-129 mg/dL – Borderline high: 130-159 mg/dL – High: 160-189 mg/dL – Very high: > or =190 mg/dL	Marker of cardiovascular risk. – High: Increased risk of coronary heart disease – Low: Decreased risk	
Triglycerides	2-9 years: – Acceptable: <75 mg/dL – Borderline high: 75-99 mg/dL – High: > or =100mg/dL 10-17 years: – Acceptable: <90 mg/dL – Borderline high: 90-129 mg/dL – High: > or =130 mg/dL Adults: <200 mg/dL	Screen for cardiovascular risk in patients with elevated cholesterol. – High: With high cholesterol, increase of cardiovascular risk	
Non-HDL-C	Children: – Acceptable: <120 mg/dL – Borderline high: 120-144 mg/dL – High: > or =145 mg/dL Adults: – Desirable: <130 mg/dL – Above desirable: 130-159 mg/dL – Borderline high: 160-189 mg/dL – High: 190-219 – Very high: > or =220 mg/dL	Screen for cardiovascular risk; subtracts HDL from total cholesterol. – High Ratios: Higher risk	
Iron Studies			
Serum Ferritin	12-300 ng/mL (men)	– Low: Anemia	
Iron	50-150 mcg/dL	– Low: Anemia	
Transferrin (Serum)	200-360 mg/dL	– Low: Indicates a lack of stored iron	
Total Iron Binding Capacity (TIBD)	250-400 mcg/dL	– High: May indicate chronic iron overload diseases	

Blood Test	Normal Range	About / Common Reasons (not ALL reasons) to be Outside of Normal Range	Notes
Endocrine Labs			
25 Hydroxyvitamin D (25 OH Vit D)	– <16 years: 24-86 pg/mL – > or =16 years: 18-64 pg/mL	– Low: A lack of vitamin D stores in the body	
Total Coenzyme Q 10 (CoQ10) Profile	– <18 years: 320-1,558 mcg/L – > or =18 years: 433-1,532 mcg/L	CoQ10 is essential for mitochondrial activity. A low value may reflect a need for supplemental CoQ10.	
Parathyroid Hormone (PTH)	– 4 weeks-11 months: 8.0-61 pg/mL – 12 months-10 years: 11-59 pg/mL – 11 years-17 years: 15-68 pg/mL – 18 years and older: 15-65 pg/mL	Serum calcium levels stimulate PTH release. The values are interpreted with calcium and phosphorous levels. A high level usually reflects a vitamin D deficiency.	
Insulin (Free and Total)	– Free Insulin: 2.6-24.9 mcIU/mL – Total Insulin: 2.6-24.9 mcIU/mL	Insulin regulates the utilization of glucose by the body. High insulin may indicate early type II diabetes (insulin resistance); low levels indicate type I (insulin dependent) diabetes.	
Glucose (Random, Non-Fasting)	– 0-11 months: not established – > or =1 year: 70-140 mg/dL	A random glucose >200 mg/dL may indicate the presence of diabetes.	
Creatine Kinase (CK)	– < or =3 months: not established – >3 months: 39-308 U/L	CK will always be elevated in Duchenne, reflecting skeletal muscle injury.	
Gamma-Glutamyl Transferase Test (GGT)	– 0-11 months: <178 U/L – 12 months-6 years: <21 U/L – 7-12 years: <24 U/L – 13-17 years: <43 U/L – > or =18 years: 8-61 U/L	– High: May indicate liver disease; often interpreted with the alkaline phosphatase (ALP) level. Normal GGT with high ALP is consistent with skeletal disease.	
Hemoglobin A1C (HgbA1C)	Over 18: – 4.0 – 5.6% normal – 5.7 - 6.4% Pre-diabetic; increased risk for Diabetes – >6.5% - diabetes	Result indicates potential risk for the development of pre-diabetes/diabetes.	

Blood Test	Normal Range	About / Common Reasons (not ALL reasons) to be Outside of Normal Range	Notes
Insulin-Like Growth Factor 1 (IGF 1)	By age: – 0-11 months: 18-156 ng/mL – 1 year: 14-203 ng/mL – 2 years: 16-222 ng/mL – 3 years: 22-229 ng/mL – 4 years: 30-236 ng/mL – 5 years: 39-250 ng/mL – 6 years: 47-275 ng/mL – 7 years: 54-312 ng/mL – 8 years: 61-356 ng/mL – 9 years: 67-405 ng/mL – 10 years: 73-456 ng/mL – 11 years: 79-506 ng/mL – 12 years: 84-551 ng/mL – 13 years: 90-589 ng/mL – 14 years: 95-618 ng/mL – 15 years: 99-633 ng/mL – 16 years: 104-633 ng/mL – 17 years: 107-615 ng/mL – 18-22 years: 91-442 ng/mL – 23-25 years: 66-346 ng/mL – 26-30 years: 60-329 ng/mL – 31-35 years: 54-310 ng/mL – 36-40 years: 48-292 ng/mL By Tanner Stage: – Stage I: 81-255 ng/mL – Stage II: 106-432 ng/mL – Stage III: 245-511 ng/mL – Stage IV: 223-578 ng/mL – Stage V: 227-518 ng/mL	– Low: Possible growth hormone deficiency.	

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Insulin-Like Growth Factor bp3 (IGFbp3)	By Age: – 1 year: 0.7-3.6 mcg/mL – 2 years: 0.8-3.9 mcg/mL – 3 years: 0.9-4.3 mcg/mL – 4 years: 1.0-4.7 mcg/mL – 5 years: 1.1-5.2 mcg/mL – 6 years: 1.3-5.6 mcg/mL – 7 years: 1.4-6.1 mcg/mL – 8 years: 1.6-6.5 mcg/mL – 9 years: 1.8-7.1 mcg/mL – 10 years: 2.1-7.7 mcg/mL – 11 years: 2.4-8.4 mcg/mL – 12 years: 2.7-8.9 mcg/mL – 13 years: 3.1-9.5 mcg/mL – 14 years: 3.3-10 mcg/mL – 15 years: 3.5-10 mcg/mL – 16 years: 3.4-9.5 mcg/mL – 17 years: 3.2-8.7 mcg/mL – 18 years: 3.1-7.9 mcg/mL – 19 years: 2.9-7.3 mcg/mL – 20 years: 2.9-7.2 mcg/mL – 21-25 years: 3.4-7.8 mcg/mL – 26-30 years: 3.5-7.6 mcg/mL – 31-35 years: 3.5-7.0 mcg/mL – 36-40 years: 3.4-6.7 mcg/mL By Tanner Stage: – Stage I: 1.4-5.2 mcg/mL – Stage II: 2.3-6.3 mcg/mL – Stage III: 3.1-8.9 mcg/mL – Stage IV: 3.7-8.7 mcg/mL – Stage V: 2.6-8.6 mcg/mL	– Low: Possible growth hormone deficiency	
Free Testosterone	– 20-<25 years: 5.25-20.7 ng/dL – 25-<30 years: 5.05-19.8 ng/dL – 30-<35 years: 4.85-19.0 ng/dL – 35-<40 years: 4.65-18.1 ng/dL	Primary or secondary (due to steroid use) testicular failure.	

Blood Test	Normal Range	About / Common Reasons (not ALL reasons) to be Outside of Normal Range	Notes
Total Testosterone	By Age: – 0-5 months: 75-400 ng/dL – 6 months-9 years: <7-20 ng/dL – 10-11 years: <7-130 ng/dL – 12-13 years: <7-800 ng/dL – 14 years: <7-1,200 ng/dL – 15-16 years: 100-1,200 ng/dL – 17-18 years: 300-1,200 ng/dL – > or =19 years: 240-950 ng/dL By Tanner Stages: – I (prepubertal): <7-20 – II: 8-66 – III: 26-800 – IV: 85-1,200 – V (young adult): 300-950	Primary or secondary (due to steroid use) testicular failure.	