

REFERENCE RANGES AND CRITICAL VALUES, ZSFG (October 2020)

I. REFERENCE RANGES

Reference Ranges (“normal limits”) are usually determined by taking either the lowest and highest values (range) of results obtained on a normal population, the mean 2 standard deviations (S.D.) of the values obtained on a large population or the central 95% range. Thus at least 5% of healthy subjects will have values outside the reference range (“false positives”). The proportion of false positives may be even greater when the patient population is not closely matched to the control subjects with respect to age, sex, ethnic group, and other factors.

The reference range for each test is listed in the [ALPHABETICAL LIST OF TESTS](#) section. (Check Index). Reference ranges for common tests are in printed list form, available at the Administrative Office of the clinical lab. This list will be updated periodically. These reference ranges apply specifically to the ZSFG Clinical Laboratory and the patients we serve.

II. A NOTE ABOUT SI UNITS

The SI System (“Système International d’Unités”) is a “coherent” system of metric units developed around 1970. Its purpose is to standardize and simplify the units of measurement and eliminate the confusion surrounding the many variants of “metric” units that have developed since the meter was defined in 1800.

The World Health Organization recommended the SI system to the medical community in 1977, and most of the world has already adopted it. In the United States, acceptance has been much slower. For your convenience, both traditional units and SI units are listed in the following table. Further information about the SI system is available upon request from the Clinical Laboratory Director's office, NH 2M2, x 8588.

Reference Ranges for Common Laboratory Tests

CONSTITUENT	REFERENCE RANGES*		SI UNITS (if not already reported in SI Units)	
Blood, Plasma, or Serum tests				
Albumin	See specific test information			
ALT	M:10-40 F: 7-35	U/L		

CONSTITUENT	REFERENCE RANGES*		SI UNITS (if not already reported in SI Units)	
AST	10-41	U/L		
B-type natriuretic peptide (BNP)	<100	pg/mL	<7.0	pmol/L
β-hydroxybutyrate	<0.28	mmol/L		
Bilirubin, Total	0.1-1.2	mg/dL	1.7-20.5	mcmol/L
Bilirubin, Direct	0.1-0.3	mg/dL	1.7-5.1	mcmol/L
Blood Gas, Arterial	See specific test information			
Calcium	8.6-10.5	mg/dL		
Calcium, Ionized	1.12 – 1.32	mmol/L		
Chloride	98-109	mmol/L		
Cholesterol	<200	mg/dL	<5.17	mmol/L
CO ₂	22-29	mmol/L		
Cortisol	See specific test information			
Creatinine	M: 0.70-1.30 F: 0.50-1.10	mg/dL		
Ferritin	See specific test information			
Glucose, Fasting	70-99	mg/dL	3.86-5.45	mmol/L
Glucose, Random	70-199	mg/dL	3.86-7.66	mmol/L
Hepatitis A IgM Antibody	Negative			
Hepatitis Bs Antigen	Negative			
Hepatitis Bs Antibody	Negative			

CONSTITUENT	REFERENCE RANGES*		SI UNITS (if not already reported in SI Units)	
Hepatitis B Core Antibody	Negative			
HCG	<5	U/L		
Ionized Calcium	See Calcium, Ionized above			
Iron	M: 65-175 F: 50-170	mcg/dL	11.64-31.34 8.96-30.45	mcmol/L
LD	100-190	U/L		
Lead	<10	mcg/dL	<0.48	mcmol/L
Lipase	7-58	U/L		
Magnesium	1.7-2.4	mg/dL	0.70-0.99	mmol/L
Osmolality	275-295	mOsm/kg		
Phosphatase, Alk.	M: 53-128 F: 42-98	U/L		
Phosphorus	2.5-4.5	mg/dL	0.81-1.45	mmol/L
Potassium	3.5-5.1	mmol/L		
Pregnancy test	Negative			
Protein, total	6.4-8.3	g/dL	64-83	g/L
Sodium	136-145	mmol/L		
Triglyceride	<150	mg/dL	<1.69	mmol/L
TSH- 3 rd Generation	0.37-4.42	mcIU/mL		
Thyroxine, Free	0.80-1.76	ng/dL		
Triiodothyronine, Free	2.30-4.20	pg/mL	3.54-6.47	pmol/L

CONSTITUENT	REFERENCE RANGES*		SI UNITS (if not already reported in SI Units)	
Urea Nitrogen	6-20	mg/dL	2.1-7.1	mmol/L
Uric Acid	M: 3.5-8.5 F: 2.5-7.5	mg/dL	208-506 149-446	mcmol/L
Vitamin B ₁₂	236-888	pg/mL	174-655	pmol/L
Hematologic Values				
Hemoglobin, Men	13.3-17.7	g/dL	133-177	g/L
Hemoglobin, Women	11.7-15.7	g/dL	117-157	g/L
Hematocrit, Men	39.8-52.2	%	0.40-0.52	
Hematocrit, Women	34.9-46.9	%	0.35-0.47	
Red Blood Cell Count:				
Men	4.40-5.90 x 10 ⁶ /mcL		4.4-5.9 x 10 ¹² /L	
Women	3.80-5.20 x 10 ⁶ /mcL		3.8-5.2 x 10 ¹² /L	
MCV	80-100	fL	80-100	fL
Reticulocyte Count	0.5-2.0	%	0.005-0.02	
Reticulocyte, Absolute	20-100	k/mcL		
Sedimentation Rate (Automated)				

CONSTITUENT	REFERENCE RANGES*		SI UNITS (if not already reported in SI Units)	
0 - 30 days, M or F	0-2	mm/h		
30 days - 14 yrs, M or F	< 14	mm/h		
14 - 50 years, M	< 15	mm/h		
14 - 50 years, F	< 20	mm/h		
> 50 years, M	< 20	mm/h		
> 50 years, F	< 30	mm/h		
Leukocytes				
White Blood Cell Count (WBC)	M: 3.9-11.7 x 10 ³ /mcL F: 4.0-11.6 x 10 ³ /mcL		3.9-11.7 x 10 ¹² /L 4.0-11.6 x 10 ¹² /L	
Platelets				
Platelet Count	150-400 x 10 ³ /mcL		150-400 x 10 ⁹ /L	
Coagulation Tests				
Fibrinogen	213-415***	mg/dL		
Fibrin D-Dimer	< 0.5	Mg/L FEU		
Prothrombin Time (PT)	< 15.1***	seconds		
Partial Thrombin Time (APTT)	< 36.5***	seconds		
Drug Levels - Therapeutic [†]				
Acetaminophen	< 30	mg/L	< 199	mcmol/L

CONSTITUENT	REFERENCE RANGES*		SI UNITS (if not already reported in SI Units)	
Carbamazepine (Tegretol)	4.0-10.0	mg/L	17-42	mcmol/L
Digoxin	0.5-2.0	mcg/L	0.6-2.6	nmol/L
Gentamicin [‡]	peak 5.0-10.0	mg/L	10.5-20.9	mcmol/L
	trough 1.0-2.0	mg/L	2.1-4.2	
Lithium	0.5-1.5	mmol/L		
Phenobarbital	15.0-40.0	mg/L	65-172	mcmol/L
Phenytoin (Dilantin)	10.0-20.0	mg/L	40-79	mcmol/L
Salicylate	< 25	mg/dL	< 1.81	mmol/L
Theophylline	10.0-20.0	mg/L	55.5-111	mcmol/L
Tobramycin [‡]	peak 5.0-10.0	mg/L	10.7-21.4	mcmol/L
	trough 0.5-2.0	mg/L	1.07-4.3	
Valproic Acid	50-100	mg/L	347-693	mcmol/L
Vancomycin [‡]	peak 30-40	mg/L		
	trough 10-20			
Urine Tests				
Calcium	50-300	mg/24 hr	12.5-74.9	mmol/24 hr
Chloride	140-250	mmol/24 hr		
Creatinine	0.8-2.0	g/24 hr	7.1-17.7	mmol/24 hr
Creatinine Clearance	90-130	mL/min/ 1.73m ²	0.87- 1.25	mL/s/m ²
Osmolality	50-1200	mOsm/kg		

CONSTITUENT	REFERENCE RANGES*		SI UNITS (if not already reported in SI Units)	
Phosphorus	0.4-1.3	g/24 hr	13-42	mmol/24 hr
Potassium	25-125	mmol/24 hr		
Protein, total	< 0.16	g/24 hr		
Sodium	40-220	mmol/24 hr		
Uric Acid	0.25-0.75	g/24 hr	1.49-4.46	mmol/24 hr
Spinal Fluid (CSF)				
Glucose	40-70	% blood level		
Protein, total	15-45	mg/dL	150-450	mg/L

* Adult values unless otherwise specified.

*** May vary depending on reagent lot number.

† Typical maintenance levels. Actual values differ in each individual.

‡ Therapeutic ranges not established for random sampling