

Requisition #: 9900001 **Practitioner:** NO PHYSICIAN
Patient Name: Report Masked **Date of Collection:** 12/01/2022
Patient Age: 17 **Time of Collection:** Not Given
Sex: M **Report Date:** 8/9/2023

Total Cholesterol

Patient Value mg/dL	Reference Range mg/dL		High/Low Flag
	160.00	-	200.00
2.00			L

Total Cholesterol Interpretation

High and low values are flagged based on clinical studies that generally indicate significant health impairment with cholesterol values below 160 mg/dL or greater than 200 mg/dL. Values between 160-200 mg/dL are flagged as optimal. Population based reference ranges are given below.

Cholesterol is an essential fat needed for production of steroid hormones and bile salts. In addition, cholesterol is needed for the function of cell membranes and is especially important for myelin, the insulating material for the nerves in the peripheral nervous system and the brain. Cholesterol is needed to maintain serotonergic brain function and helps to modulate GABA (gamma-aminobutyric acid) receptors. In addition, cholesterol is an essential activating factor for the developmental protein called sonic hedgehog. Since there are mixed benefits from both high and low cholesterol, all related factors should be considered in the interpretation of results. All values should be examined in light of the patient's history, not only those flagged as high or low.

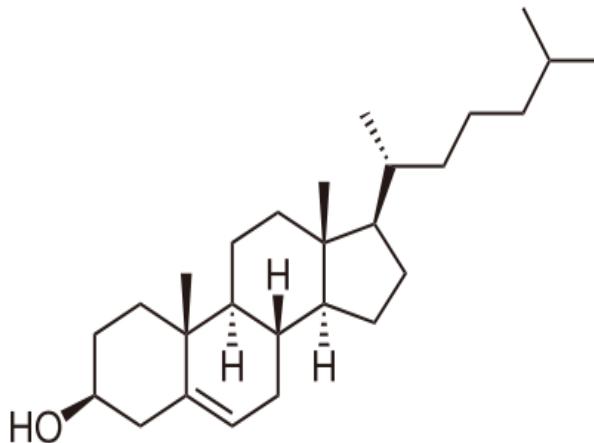
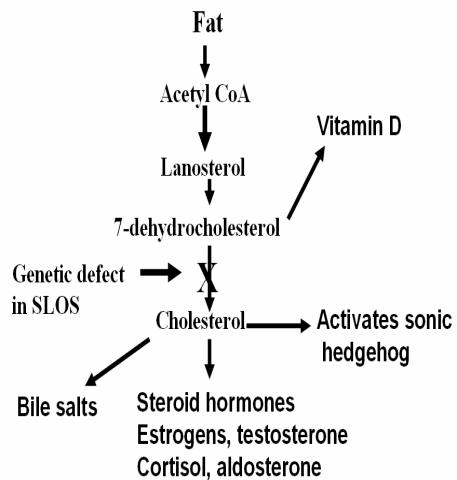
Age -years	Males 5 percentile	Males 95 percentile	Females 5 percentile	Females 95 percentile
0-4	114	203	112	200
5-9	121	203	126	205
10-14	119	202	124	201
15-19	113	197	119	200
20-24	124	218	122	216
25-29	133	244	128	222
30-34	138	254	130	230
35-39	146	270	140	242
40-44	151	268	147	252
45-49	158	276	152	265
50-54	158	277	162	285
55-59	156	276	172	300
60-64	159	276	172	297
65-69	158	274	171	303
>70	144	265	173	280

Population based reference ranges for normal people. These values are not used for interpretive range.

Source: Lipid Research Clinics Population Studies Data Book, NIH publication no. 80-1527

Testing performed at Quest Diagnostics, Lenexa, KS

Formation of cholesterol



Low total cholesterol values (less than 160 mg/dL) are associated with genetic diseases of cholesterol metabolism such as Smith-Lemli-Opitz syndrome (SLOS), Tangier's disease, and abetalipoproteinemia. Low values are more common in vegetarianism, hyperthyroidism, liver disease, use of statin drugs, malabsorption, malnutrition, autism, violent behavior, celiac disease, anxiety, bipolar disease, alcoholism, lung cancer, suicide, depression, and obesity associated with human adenovirus-36 infection. Total serum cholesterol was positively associated with measures of affect, cognitive efficiency, activation, and sociability, suggesting a link between low cholesterol and bad mood. Children with low cholesterol were three times more likely to be suspended from school for disruptive behavior. The number of men whose cholesterol was lower than 160 and who had died from AIDS was four times higher than the number of men who had died from AIDS with a cholesterol above 240.

Optimal cholesterol values (between 160-200 mg/dL) Values in this range are generally considered optimal for cardiovascular health. However, higher cholesterol values may be protective against infections. Values within this range may be associated with increased death risk in the elderly (age greater than 70 years). Individuals with frequent infections may want to consider the possible benefits of increasing dietary cholesterol.

High total cholesterol values (greater than 200 mg/dL) are associated with porphyrias, cardiovascular disease, cholestasis, nephritic syndrome, hypothyroidism, oral contraceptives, normal pregnancy, and lipoproteinemias. Many medical authorities recommend serum cholesterol for adults be less than 200 mg/dL based on concerns about cardiovascular health but ignore all of the beneficial effects of cholesterol on brain function and prevention of mental disease. High cholesterol appears to be protective against respiratory illnesses like tuberculosis and a high cholesterol diet has been shown to significantly decrease length of tuberculosis infections. LDL cholesterol protects against *Staphylococcus* infections. In an elderly group, people with cholesterol levels less than or equal to 175 mg per dL were twice as likely to die as those with cholesterol levels greater than 226 mg per dL.

Requisition #:	9900001	Practitioner:	NO PHYSICIAN
Patient Name:	Report Sample	Date of Collection:	12/01/2022
Patient Age:	62	Time of Collection:	Not Given
Sex:	F	Report Date:	1/25/2024

Apolipoprotein A-I and Apolipoprotein B

Compound	Patient Value	Reference Range			High/Low Flag
	g/L	g/L			
* Apolipoprotein A-I	1.00	1.25	-	2.15	L
* Apolipoprotein B	2.00	0.55	-	1.25	H

* Testing Performed by Quest Diagnostics/SJC, San Juan Capistrano, CA

Apolipoprotein A-I (Apo A-I) is the main protein component of HDL (high density lipoprotein) and accounts for approximately 65% of the total protein content of HDL. Apo A-I activates lecithin cholesterol acyltransferase (LCAT) which catalyses the esterification of cholesterol. The resulting esterified cholesterol can then be transported to the liver, metabolized and excreted. Persons with atherosclerotic vascular changes frequently exhibit decreased levels of Apo A-I. Even if the concentrations of Apo B are normal, a decreased Apo A-I level may be a risk factor for atherosclerotic processes. Decreased concentrations of Apo A-I also occur in dyslipoproteinaemias, acute hepatitis, hepatic cirrhosis and in insulin-treated diabetics. Values of apolipoprotein A-I have been shown to decrease during infection.

Apolipoprotein B (Apo B) is the main protein component of LDL (low density lipoprotein) and accounts for approximately 95% of the total protein content of LDL. Apo B is necessary for the reaction with LDL receptors in the liver and on cell walls and is thus involved in transporting cholesterol from the liver to the vessel cell. Elevated levels of Apo B are frequently found in patients with atherosclerotic vascular changes and are a risk factor for atherosclerosis. Values of Apolipoprotein B or Apo B have been shown to decrease during infection. LDL has been shown to be very effective against infection with *Staphylococcus aureus*; high values may protect against infection. Low values of peptides from Apolipoprotein B have been found in autism. The lowest values of peptides from Apolipoprotein B were found in low-functioning children with autism.

Apolipoprotein A-I g/L	
Group	2.5%-97.5% Range
Adult Male	1.10 - 2.05
Adult Female	1.25 - 2.15
Children	1.22 - 1.67

Apolipoprotein B g/L	
Group	2.5%-97.5% Range
Adult Male	0.55 - 1.40
Adult Female	0.55 - 1.25
Children	0.62 - 1.28

Requisition #: 9900001 **Practitioner:** NO PHYSICIAN
Patient Name: Report Sample **Date of Collection:** 12/01/2022
Patient Age: 62 **Time of Collection:** Not Given
Sex: F **Report Date:** 1/25/2024

Lipoprotein (a)

Patient Value	Reference Range
g/L	g/L
3.000	< 2.50 H

* Testing performed by Quest Diagnostics/Nichols SJC, San Juan Capistrano, CA

Lp(a) consists of two components, the low-density lipoprotein (LDL) and a glycoprotein, the apolipoprotein(a), which are linked by a disulfide bridge. Lp(a) is not related to apolipoprotein A. The individual concentration of Lp(a) in the serum depends primarily on genetic factors; the range of variation in a population is relatively large. Elevated concentrations of Lp(a) are a risk factor for coronary heart disease (CHD). Lp(a) does not change much over time so values in childhood are predictive of adult values. If Lp(a) values are abnormally elevated, the person needs to focus on changing other risk factors that can be modified by diet and lifestyle changes. Mechanisms of pathogenicity associated with high levels include enhanced blood clot formation and impaired clearance of fibrin. Stable lifelong values of Lp(a) are attained by age two. High epsilon 4 gene allele dose of apolipoprotein E correlated with low lipoprotein (a) levels in autism. High dose of this allele is associated with accelerated brain atrophy, Alzheimer's disease, and coronary artery disease.

Values in higher than 2.50-3.00 mg/L in Caucasians are associated with coronary artery blockage. Values of Lp(a) are higher with blockage of all 3 coronary arteries than with blockage of a single coronary artery. Plasma fibrinogen concentration correlated positively and significantly with serum lipoprotein (a) levels in male nonsmokers without cardiovascular disease and in female nonsmokers with cardiovascular disease. In addition, racial differences in Lp(a) values are substantial. Whereas levels of Lp(a) above 3.0 g/L are associated with increased coronary artery disease in Caucasians, no such relationship has been found in black populations. Values are flagged as high when values exceed 2.5 g/L. The tables should be used as a guideline based on the appropriate ethnic group.

Adult Values Lp(a) Lp(a) g/L range 2.5% - 97.5%		
Group	Males	Females
Caucasian	< 0.02 - 0.74	< 0.02 - 0.72
African-American	0.04 - 1.14	0.02 - 1.08
Hispanic	0.02 - 0.53	0.02 - 0.46

Children's values Lp(a) from USA National Health and Nutrition Examination Survey (NHANES)

Ethnic Group	Age Range	5-95% percentile
NonHispanic White	4-5	< 0.1 - 0.62
	6-11	< 0.1 - 0.65
	12-15	< 0.1 - 0.56
	16-19	< 0.1 - 0.62
	4-5	< 0.1 - 0.94
	6-11	< 0.1 - 1.00
NonHispanic Black	12-15	< 0.1 - 0.95
	16-19	< 0.1 - 0.76
	4-5	< 0.1 - 0.48
Mexican American	6-11	< 0.1 - 0.62
	12-15	< 0.1 - 0.58
	16-19	< 0.1 - 0.52

Requisition #:	9900001	Practitioner:	NO PHYSICIAN
Patient Name:	Report Sample	Date of Collection:	Dec 1, 2022
Date of Birth:	Mar 9, 1960	Time of Collection:	Not Given
Gender:	F	Report Date:	Jan 25, 2024

Homocysteine

Patient Value	Reference Range	High/Low Flag
µmol/L	µmol/L	
5.00	0.00 - 6.00	

Reference Ranges

Values at or below 6.0 micromoles/L are considered to be associated with optimum health in all ages and sexes. Therefore, all values above 6.0 are flagged as high (H). The higher the value, the greater the risk of the diseases listed below. Values as high as 300 micromoles/L have been found in children with genetic diseases and severe atherosclerosis.

Homocysteine interpretation

Diseases associated with elevated homocysteine

High homocysteine is associated with increased risk of ischemic heart disease, stroke, peripheral arterial disease and deep venous thrombosis, as well as for neural tube defects and preeclampsia in pregnancy. High concentrations of homocysteine in blood induce endothelial dysfunction, suggesting a causal role in vascular disease. An increased frequency of high homocysteine is observed in the elderly, smokers, patients with renal disease, diabetes or on a strict vegetarian diet deficient in vitamin B12. High homocysteine values have been associated with autism, Alzheimer's disease, depression, schizophrenia, cancer, hip fracture, cognitive impairment, and Parkinson's disease.

Factors that elevate homocysteine

Factors that increase homocysteine include severe or mild genetic deficiencies (SNPs) of enzymes in the transulfuration methylation cycle such as MTHFR, CBS, BHMT and others, a diet high in methionine, or deficiencies of folate, vitamin B12, vitamin B6, or trimethylglycine (betaine). Other factors that elevate homocysteine include megadoses of niacin, nitrous oxide anesthesia, and excessive copper. Severe mutations such as deletions in the above enzymes can lead to extremely high values of homocysteine. SNPs in the transulfuration methylation cycle can be determined by The Great Plains Laboratory DNA methylation pathway profile.

Factors that decrease homocysteine

Homocysteine is decreased by a diet high in folate compounds, vitamin B12, methylcobalamin, trimethylglycine (betaine), or supplements containing these vitamins. Homocysteine may be elevated in Down's syndrome due to the fact that the cystathione beta synthase (CBS) gene is present in higher doses due to the trisomy of chromosome 21 which contains the CBS gene. In addition, exposure to many toxic chemicals can upregulate CBS leading to increased conversion of homocysteine to cystathione with concomitant decrease of homocysteine. Conversely, removal of toxic chemicals may result in increased serum homocysteine as CBS transcription normalizes.