



The Great Plains Laboratory, Inc.

William Shaw, Ph.D Director

11813 W. 77th Street, Lenexa, KS 66214

(913) 341-8949

Fax (913) 341-6207

Requisition #:

Physician Name:

Patient Name:

Date of Collection:

Patient Age:

Time of Collection:

Sex:

Print Date:

Total Cholesterol

| Patient Value mg/dL | Reference Range mg/dL | High/Low Flag |
|------------------------|--------------------------|---------------|
| 213.00 | 160.00 - 200.00 | H |

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



Patient ID #
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Patient age
Physician name

Date reported
Date of collection
Time of collection
Patient Sex

Apolipoprotein A-I and Apolipoprotein B

| Apolipoprotein A-I Result g/L | | 1.37 |
|-------------------------------|--------------|--------|
| Reference Range | | Result |
| < 1.25 | Low | Normal |
| 1.25-2.15 | Normal Range | |
| > 2.15 | High | |

| Apolipoprotein B Result g/L | | 1.11 |
|-----------------------------|--------------|--------|
| Reference Range | | Result |
| < 0.55 | Low | Normal |
| 0.55-1.25 | Normal Range | |
| > 1.25 | High | |

Apolipoprotein A-I

Apolipoprotein A-I (Apo A-I) is the main protein component of HDL (high density lipoprotein) and accounts for approx 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.



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Lipoprotein (a)

| Patient Value | Reference Range |
|---------------|-----------------|
| g/L | g/L |
| 0.17 | < 2.50 |

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 |
| NonHispanic Black | 4-5 | < 0.1 - 0.94 |
| | 6-11 | < 0.1 - 1.00 |
| | 12-15 | < 0.1 - 0.95 |
| | 16-19 | < 0.1 - 0.76 |
| Mexican American | 4-5 | < 0.1 - 0.48 |
| | 6-11 | < 0.1 - 0.62 |
| | 12-15 | < 0.1 - 0.58 |
| | 16-19 | < 0.1 - 0.52 |



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Homocysteine

| Patient Value µmol/L | Reference Range µmol/L | High/Low Flag |
|-------------------------|---------------------------|---------------|
| 10.90 | 3.40 - 8.80 | H |

Homocysteine is an amino acid derived from methionine, requiring folic acid, vitamin B6 and B12 for further metabolizing. Homocysteine exists in both free but predominately in protein-bound form. Mutations in the genes coding for the enzymes involved in homocysteine metabolism, e.g. MTHFR (5, 10 methylene-tetrahydrofolate reductase), result in hyperhomocysteinemia. Folic acid, vitamin B6 and vitamin B12 are necessary cofactors for a proper breakdown of homocysteine. Deficiencies of these vitamins are associated with increased plasma levels of homocysteine. Homozygous mutations of the CBS (cystathionine-B-synthase) gene cause severe hyperhomocysteinemia along with homocysteinuria.

Hyperhomocysteinemia was found to be associated with increased risk for 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 hyperhomocysteinemia is observed especially in the elderly, smokers, patients with renal disease, diabetes or on a strict vegetarian diet. Higher than normal homocysteine values have been reported in autism. In autism, homocysteine is negatively correlated with glutathione peroxidase activity. High homocysteine in autism is associated with suboptimal vitamin B-12.

Homocysteine Reference Ranges:

| Group | Micromoles/L Range | Percentiles |
|-------------------|--------------------|-------------|
| Men and Women | 4.9-15.0 | 2.5%-97.5% |
| Boys | 3.4-8.8 | 5%-95% |
| Girls | 3.0-8.2 | 5%-95% |
| Autism (75% boys) | 4.3-15.3 | 5%-95% |