Cholesterol Deficiency
A Major Factor in Many Chronic Disorders

Cholesterol Balance - Deficiency & Excess
Cholesterol is an essential sterol to life, found in every animal cell, which helps protect human tissues. Many people fear and focus on high cholesterol levels, as they are statistically associated with a greater risk of cardiovascular disease (CVD), yet little attention is paid to low cholesterol levels, which also can have serious health consequences. Like everything in nature, balance is key. Low cholesterol has been connected to autism, depression, anxiety, bipolar disorder, a statistically higher frequency of violent behavior, suicide, Parkinson's disease, and cancer mortality. Susceptibility to tuberculosis and gastrointestinal infections is also associated with low cholesterol levels. Most significantly, the death rate is doubled in older adults with lower total cholesterol, and stroke and cataract rates are higher. Low cholesterol values are also associated with manganese deficiency, celiac disease, hyperthyroidism, liver disease, malabsorption, and malnutrition. Pregnant women with low cholesterol are twice as likely to have premature babies or babies with small heads.

Benefits of Cholesterol
Cholesterol serves several important roles in metabolism: It is a key constituent of all cell membranes and provides the structural framework for vitamin D, adrenal and sex hormones, and brain myelin, as well as for bile acids which help digest fat and increase absorption of fat soluble vitamins. Most cholesterol is made in the liver and can be synthesized from either fatty acids or glucose. Cholesterol synthesized in the brain is the primary component of the myelin that surrounds each nerve cell as a protective sheath. Loss of myelin inevitably causes neurological damage. Both neurons and glial (support) cells in the central nervous system (CNS) require sufficient amounts of unbound cholesterol as an integral part of their cell membranes. Cholesterol is also essential for the activation of the developmental protein, "Sonic Hedgehog", which plays a role in cell growth and the shaping of the body in utero, especially the brain and central nervous system.

Cholesterol & Cardiovascular Disease
High cholesterol may be associated with the development of CVD, but cholesterol may actually be deposited as a beneficial "patch" on inflamed or injured blood vessels, particularly coronary arteries. Macrophages scavenge cholesterol along with other cell debris and may become "foam cells" which accumulate in artery walls and cause atherosclerotic streaks. Assessments of inflammation such as C-reactive protein and Phospholipase A2 (tests available at GPL) or homocysteine level (included in the Advanced Cholesterol Panel) have been suggested as better predictors of CVD risk.

Low Cholesterol Associated with Mental Disorders & Mortality in Elderly
Studying serious genetic disorders that prevent cholesterol synthesis can aid the understanding of the health consequences of low cholesterol. Low cholesterol has been associated with greater risk of suicide, violence, and mood disorders such as depression. Cholesterol levels influence serotonin activity in the brain. Serotonin is the neurotransmitter associated with mood, and low levels are associated with depression and violent and anti-social behavior. If cholesterol in the nerve cell membrane is deficient, serotonin may not properly bind to its receptor. Cholesterol also stabilizes receptors for the social-bonding hormone oxytocin. In the elderly, studies over several decades have pointed to increased risk of death in the population with the lowest cholesterol. Falling cholesterol in the elderly is a sign of increasing morbidity, with controversy over whether it is a sign of underlying chronic disease or a cause of disease.
Why the brain needs cholesterol

- There is a direct correlation between the concentration of cholesterol in the brain, particularly in the myelin, and how well the brain functions.
- The brain is the most cholesterol-rich organ in the body.
- In the central nervous system (CNS), essentially all (99.5%) cholesterol is the free or unesterified form (unattached to fatty acids).
- The majority (70%) of cholesterol present in the CNS is believed to reside in the myelin (the material that insulates the nerve fibers) sheaths and the plasma membranes of astrocytes (brain support cells) and neurons.
- Half of the white matter, which contains the nerve axons that allow for transmission of brain signals, may be composed of cholesterol-rich myelin.

Advanced Cholesterol Panel

The Great Plains Laboratory has developed a special cholesterol test panel that will help determine whether cholesterol deficiency or abnormalities in cholesterol transport are present. This panel also determines if the body is eliminating potentially toxic homocysteine and analyzes risk factors for vascular disease and/or neurological disease.

The Advanced Cholesterol Panel includes the following markers: **Total cholesterol, apolipoprotein A-1, apolipoprotein B, Lipoprotein (a), and homocysteine.** Lipoproteins are involved in cholesterol, lipid, and vitamin E transport. Each of these markers, indicated in high or low levels, has been associated with a variety of genetic diseases of cholesterol metabolism including Smith-Lemli-Opitz Syndrome (SLOS), Tangier’s disease, and abetalipoproteinemia. Low levels of cholesterol have also been linked to Alzheimer’s disease, Crohn’s disease, rheumatoid arthritis, autism, depression, anxiety, hyperthyroidism, liver disease, celiac disease, bipolar disease, alcoholism, lung cancer, suicide, and obesity associated with human adenovirus-36 infection.

For more information about low cholesterol and chronic disorders, go to: [http://www.greatplainslaboratory.com/home/eng/cholesterol_test.asp](http://www.greatplainslaboratory.com/home/eng/cholesterol_test.asp)