

CHOLESTEROL- Our Hero!



Cholesterol is NOT the “Monster”
You Have Been Led to Believe

- ◆ You have been deceived - for the primary purpose of creating a mega-profit market to sell cholesterol-lowering drugs (called statins).

- Give up steak, eggs, cheese, butter, etc. and your cholesterol may not budge a single point – this is because your body can make as much as 1500 grams of cholesterol a day, which may be more *than 6 times the amount you eat*.

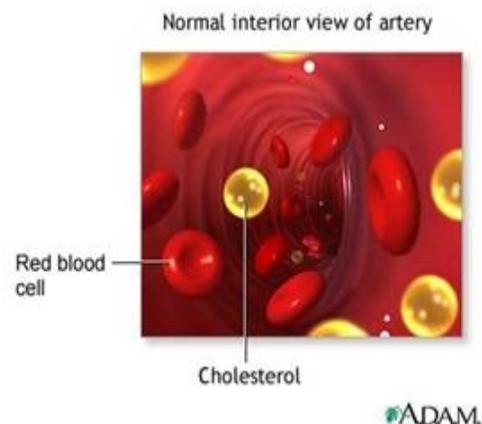
- Dietary fat and cholesterol has little effect on blood cholesterol levels

Supporting studies at:

[Dietary fat and cholesterol has little effect on blood cholesterol levels](#)

Also see:

[Statins don't save lives](#)



- ◆ Elevated cholesterol levels are wrongly blamed for causing atherosclerosis in cardiovascular disease



- “The fireman at the fire” – a very “sticky” cholesterol-based protein, called Lipoprotein (a), “seizes” platelets, calcium, fibrinogen (forms fibrin for blood clots) and LDL cholesterol from the blood to create a protective plaque to repair chronic inflammatory damage to arteries as a consequence of:

- ▶ **Oxidative stressors** - E.g. emotional stress, microbes, toxins, free radicals, high blood sugar;

- ▶ **Relative deficiency of dietary antioxidants** – compared to oxidative stressors; **Antioxidants** include: Vitamins A, C, E, D and beta-carotene, and their cofactors, such as selenium and zinc.
- ▶ **Weak arterial wall** – primarily due to insufficient dietary vitamin C;
- ◆ Oxidized LDL Cholesterol is a small component of atherosclerotic plaque as a consequence of arterial damage to a weakened arterial wall
 - Arterial plaque actually contains less than 25% saturated fat and LDL cholesterol (which is oxidized in the process of healing the damaged vessel wall);

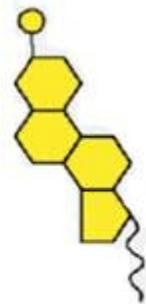


For the truth about atherosclerosis involved in cardiovascular disease (CVD), peripheral artery disease (PAD), and coronary artery disease, see:

Atherosclerosis
CVD – “A Simple Cure”
Cholesterol does not cause CHD

What is Cholesterol ?

- ◆ Cholesterol ($C_{27}H_{46}O$)
 - A white, waxy, fat-like substance - found in the tissues of all vertebrates throughout the animal kingdom; some cholesterol is also found in plants. It is the best-known member of the sterols, a biologically important group of lipid alcohols.
 - A typical 150# body has a total cholesterol content of about 35 g – ~1 tablespoon of water-insoluble cholesterol is carried and circulated in our blood in water-soluble, protein molecular “suitcases”, called **lipoproteins**.
- ◆ ~ 1g cholesterol / day is produced by the body’s cells and tissues

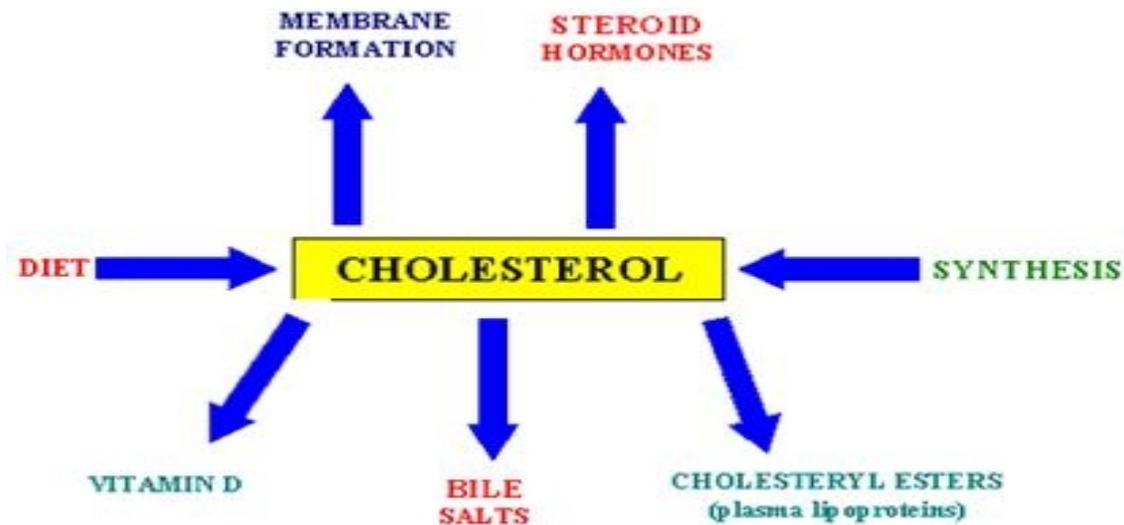


- 20-25% of that production occurs in the liver (from Acetyl CoA via the HMG-CoA reductase pathway) - However, cholesterol is so important to the body, that all of the body cells can also produce it according to demand. In particular, the intestines, adrenal glands, placenta, and sex glands have high synthesis rates.
- The rate of cholesterol synthesis in the liver is under feedback control - to maintain a normally constant cholesterol level. When the dietary intake is high, liver synthesis is low; when intake is low, synthesis increases.
- ◆ Typically 200-300mg cholesterol / day is obtained from foods (i.e. only 20-30% of that produced by the body)
 - Primarily from animal foods such as eggs, meat, poultry, dairy products, fish, and shellfish - E.g. 1 egg and 4oz butter each contain ~ 250 mg of cholesterol;

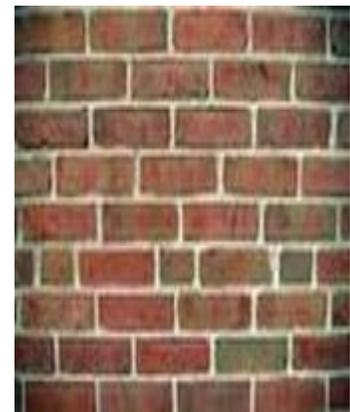


- Breast milk has 6 times more cholesterol than cow's milk - soy milk has none. Infants on low-cholesterol formulas have low cholesterol levels, even though their livers are working hard to produce the missing cholesterol;
- There is no evidence that low-cholesterol “fake foods” prevent heart trouble – these include low-cholesterol dried eggs, margarine, non-dairy creamer. There is evidence, however, that they are linked to cancer.
- **Saturated** Fat intake increases blood cholesterol level / Polyunsaturated fats decreases it – this is natural corrective mechanism to maintain the integrity of the cell membranes. See below.

We cannot function properly without cholesterol



Consider what you will be missing if you lower your cholesterol levels below what is needed . . .



- ◆ Present in ALL our cells, cholesterol regulates cell membrane integrity making membranes less permeable to most biological molecules
- Cholesterol provides membrane integrity when dietary **saturated** fat is missing - when excess dietary **polyunsaturated** fatty acids replace **saturated** fat in the diet, it causes cell walls to become flabby. When this happens, cholesterol from the blood (or synthesized by the cell) is added into the cell membrane giving watertight protection and structural integrity – this is the reason why serum cholesterol levels go down temporarily when we replace dietary **saturated** fats with **polyunsaturated** oils - Cholesterol is removed from the cell membrane

when dietary **saturated** fat provides the required stiffness.

- ◆ Membrane cholesterol content varies with particular tissue membrane function
 - Membranes with high cholesterol-to-phospholipid ratios function as a protective barrier - have high stability and low permeability.
 - ▶ **Nerve Function Protection** - The highest concentration of cholesterol in the body is found in the critical brain and nervous system. *Every second molecule in the myelin sheath surrounding and insulating nerves is **cholesterol**, where it affects proper nerve conduction and normal brain function*, by providing structural balance to their high polyunsaturated content.
 - Organelle membranes inside cells have low cholesterol ratios - making them fluid and permeable; e.g. mitochondria.
 - Intestinal wall Integrity - Cholesterol's role maintaining the intestinal wall integrity prevents leaky gut syndrome and other intestinal problems.
- ◆ Precursor of Sex hormones



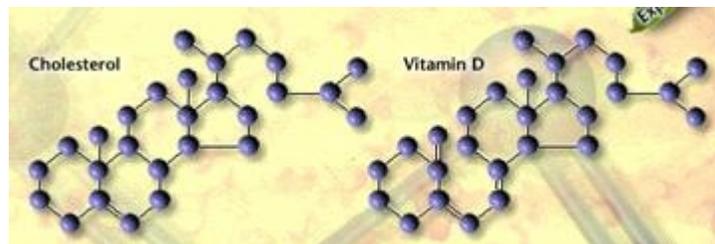
- DHEA (dehydroepiandrosterone), the “mother” steroid hormone - is synthesized from cholesterol by the adrenal cortex. DHEA is the precursor for **ESTROGEN**, **TESTOSTERONE** and **PROGESTERONE** (to prevent miscarriage in pregnancy, the placenta produces cholesterol, from which it makes **PROGESTERONE**); cholesterol stored in the ovaries and testes is converted to steroid hormones.
- DHEA is also called the “anti-aging” hormone - good evidence supports that increasing DHEA blood levels decreases risk of cancer, cardiovascular disease, diabetes, obesity, senility, Alzheimer's disease,

and premature death. People with a positive outlook actually create a self-sustaining cycle of DHEA production!

◆ Raw material for Vitamin D



Cholesterol provides the raw material to make vitamin D - which regulates calcium and phosphorus metabolism to *support bone health*. Vitamin D is also required for *nerve function, growth, mineral metabolism, muscles, insulin production, reproduction, and the immune system*.



◆ Raw material for Adrenal Stress hormones

- The more stress we are under, the more cholesterol our body makes - because the corticosteroid stress hormones are synthesized from cholesterol in the adrenal cortex.
E.g.
 - ▶ **CORTISOL** - Provides suitable response to stress, also controls carbohydrate, fat and protein metabolism and is a potent anti-inflammatory agent that protects against heart disease;
 - ▶ **CORTISONE** - Promotes glucose synthesis for fight or flight response to stress. Suppresses inflammation.
 - ▶ **ALDOSTERONE** - Controls electrolyte and water levels, mainly by promoting sodium retention in the kidney).

◆ Raw material for Bile salts

- Required for fat digestion and the metabolism of the fat soluble vitamins A, D, E and K - Cholesterol is oxidized by the liver into bile acids, which along with cholesterol are excreted from the liver into bile and stored in the gallbladder. Fat consumption causes bile to be “squirted” from the gallbladder into the upper small intestine (duodenum) to digest fat. Approximately 95% of bile acids are reabsorbed from the intestines, and the remainder lost in the feces



◆ Brain's **SEROTONIN** receptors need cholesterol for their proper function - Dozens of studies link cholesterol deficiency to:

- Aggressive emotions and actions –
Annals of Internal Medicine
1998;128(6):478-487;
The Journal of the American
Medical Association
1997;278:313-321;
[Low cholesterol linked to violence](#)



- **Depression / Suicide** – Canadian researchers found that those in the lowest quarter of total cholesterol concentration had > 6 times the risk of committing suicide as those in the highest quarter. [Epidemiology 2001 Mar;12:168-72](#)



◆ “Cholesterol to the rescue!”

- Cholestreol is transferred to tissues in lipoprotein carriers to repair damage caused by chronic inflammation - it is the repair “superglue” used to keep cell membranes from falling apart. E.g. when your arteries are damaged or lacking structural integrity due to insufficient dietary **vitamin C**.

