

Are you a ticking timebomb for a heart attack?



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As a specialist physician in private practice I have done many insurance medicals to declare people “medically fit and healthy.” It is quite alarming that the cardiac assessment required for these insurance medicals is a fasting lipogram, glucose and a stress ECG. First of all, it is inflamed, oxidised cholesterol that is linked to coronary artery disease and not just cholesterol per se. Secondly, a stress ECG is not the best test to assess the state of coronary artery disease since it is frequently negative, even when coronary artery disease is clearly apparent on say CT scanning of the coronaries. Often, in women in particular the stress ECG can be falsely positive as well. Thirdly, there is a much bigger picture to the prevention of coronary artery disease than merely lowering cholesterol.

Contrary to common thought that cholesterol is “bad”, we need cholesterol for normal bodily functioning. Cholesterol is the precursor to vitamin D, steroid hormones (such as estrogen, progesterone, testosterone, DHEA, pregnenolone and cortisol), and the bile acids required for digestion. Cholesterol is also required to form the membrane around cells and for regeneration of damaged endothelial cells.

The liver produces about 800mg of cholesterol per day. The main dietary sources include meat, cheese, milk and eggs. Cholesterol is transported in the blood by lipoproteins. A healthy cell cannot be overfilled with cholesterol unless the cholesterol is oxidised and enters an already inflamed arterial tissue. Cholesterol is in itself not the culprit here. Nature wouldn't give you a system designed to kill you. The issue is inability to process cholesterol, inflammation and oxidative stress.

The body's anti-oxidant system, as well as anti-oxidant supplements and natural anti-inflammatories, safeguards against cholesterol deposition in the blood vessel walls, resulting in atherosclerosis (a blood vessel disease resulting in heart disease, stroke and peripheral vascular disease). The reverse cholesterol transport system that removes cholesterol from one's arteries requires phosphatidylcholine (PC) and LCAT (lecithin cholesterol acyltransferase). LCAT, an enzyme which, removes a fatty acid particle from PC and binds it to cholesterol, producing an ester. HDL, a circulating “good” cholesterol, transports this ester back to the liver.

Forms of good cholesterol include:

- HDL (high density lipoprotein)
- Non-oxidised LDL (essential for normal bodily function).

Forms of bad cholesterol include:

- Oxidised LDL (low-density lipoprotein). This is the cholesterol that leads to blood vessel disease. Deposition in blood vessel walls

lead to foam cell formation, plaque formation, and blood clotting
b) Lipoprotein (a). This is a cholesterol molecule attached to a protein called apolipoprotein (a). This molecule is used to repair the arterial wall, but too much of it (usually genetic) promotes formation of blood clots and build-up of plaque. This narrows the blood vessel and worsens symptoms.

It is also important to remember that one can check the degree of inflammation in the body by doing a test called hsCRP (highly sensitive C-Reactive Protein). A value of less than 1 is normal. Higher values lead to increases in heart and blood vessel diseases.

If you have a high level of hsCRP, natural anti-inflammatories like omega 3 fish oil and curcumin are ideal supplements to lower your risk of cholesterol being oxidised and inflamed in blood vessel walls.

High blood pressure, elevated LDL and triglycerides, cigarette smoking, elevated LDL and triglycerides, low HDL, diabetes, obesity, and lack of exercise, contribute to endothelial dysfunction and the subsequent development of atherosclerosis.¹⁵⁻²⁵

Additional endothelial-damaging factors include excess levels of glucose, insulin, iron, homocysteine, fibrinogen, and C-reactive protein (CRP), as well as low HDL and free testosterone (in men).^{3,9,10,24,26-28}

Homocysteine is particularly dangerous because it can induce the initial injury to the endothelium. It then facilitates oxidation of the fat/LDL that accumulates beneath the damaged endothelium, and finally contributes to the abnormal accumulation of blood components around the atherosclerotic lesion.²⁹

Fibrinogen is a clotting factor that accumulates at the site of the endothelial lesion. It may contribute to plaque build-up or participate in blood clot-induced blockage of an artery after an unstable atherosclerotic plaque ruptures.³⁰

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Glucose at even high-normal levels may accelerate the glycation process that causes arterial stiffening, while high-normal fasting insulin inflicts direct damage to the endothelium.³¹⁻³⁶

High levels of iron promote LDL oxidation in the damaged endothelium, while low levels of testosterone appear to interfere with normal endothelial function.^{9,11,14}

CRP is not only an inflammatory marker, but also directly damages the endothelium. Chronic inflammation, as evidenced by persistent high levels of CRP, creates initial injuries to the endothelium and also accelerates the progression of existing atherosclerotic lesions.^{3,27}

In response to numerous published studies, health-conscious people are altering their diets, taking drugs, hormones, and dietary supplements, and trying to exercise regularly, in order to reduce these atherosclerosis risk factors. But these efforts alone cannot be completely successful, because age itself is a major risk factor for atherosclerosis.

Atherosclerotic risk conferred by age is attributable in large measure to pathological endothelial dysfunction.^{37,38} While endothelial dysfunction is not synonymous with atherosclerosis, the two processes are increasingly intertwined with advancing age.

Endothelial dysfunction markers:

1. VEGF (Vascular endothelial growth factor)
2. ADMA (Asymmetric dimethylarginine)
3. VCAM-1 (Vascular cell adhesion molecule-1)
4. NOS (Nitric oxide synthase).

ADMA is involved in the pathogenesis of hypertension and atherosclerosis through its inhibition of the formation of the endogenous vasculoprotective molecule, nitric oxide (NO). Determination of ADMA can thus help to predict both the likelihood of developing cardiovascular disease and its prognosis. A new, competitive ELISA test for ADMA is a useful and fully validated tool, suitable for routine laboratory use.

Available tests to detect endothelial dysfunction in South Africa include:

- a) hsCRP
- b) Von Willebrand Factor (WF)
- c) PAI-1 (Plasminogen activator inhibitor-1)
- d) FDP (Fibrinogen degradation products) – as D-dimer
- e) NT-proBNP
- f) Homocysteine
- g) Active renin
- h) Lipids (lipogram) and lipoproteins
- i) ACE (angiotensin converting enzyme).

An article published online on October 21, 2008 in the journal *Nutrition & Metabolism*, reported the discovery of an association between

decreased plasma levels of several anti-oxidants and early carotid atherosclerotic lesions in asymptomatic, middle-aged individuals.

The study authors write: "Atherosclerosis remains clinically mute for a long time and frequently manifests itself with an acute cardiovascular event; therefore, the possibility of detecting the disease in a subclinical phase and reducing or reversing its progression is an issue of relevance. Anti-oxidants, which may inhibit lipid peroxidation, could play an important protective role against the formation of simple and complex atherosclerotic lesions, which progressively protrude into the arterial lumen, causing stenosis or occlusion. In particular, increased carotid intima-media thickness represents an early phase of the atherosclerotic process and is widely used as a marker of subclinical atherosclerosis which correlates with established coronary heart disease."

220 men and women between the ages of 45 and 65, without history of transient ischaemic attack, stroke, or other conditions related to carotid artery disease, were enrolled at the San Camillo de Lellis Hospital, in Italy. Participants underwent ultrasonographic evaluation of the extracranial carotid arteries, and blood samples were analysed for lipids, CRP and other factors, such as plasma levels of vitamin A, vitamin E, beta-carotene and lycopene.

125 participants were found to have carotid atherosclerosis, as determined by carotid intima-media thickness of 0.8mm or more. Body mass index, plasma haemoglobin, and high-density lipoprotein cholesterol were marginally higher among those diagnosed with atherosclerosis, and all of the nutrients measured were significantly reduced. Vitamin A, vitamin E, and lycopene levels were decreased by 50% or more among those with atherosclerosis, compared with participants who were not diagnosed with the condition, and beta-carotene levels were less than a third of those without atherosclerosis.

Oxidative stress resulting from the oxidation of LDL cholesterol in the wall of the artery, results in inflammation which stimulates the differentiation of immune system cells called monocytes into macrophages. These macrophages accumulate lipids to form foam cells, which thicken the walls of the artery. Anti-oxidants such as those evaluated in the current study could help protect against this process by preventing LDL oxidation.

The authors conclude: "Regular intake of foods rich in lycopene and other anti-oxidant vitamins may slow the progression of atherosclerotic processes and modify the early stages of atherosclerosis, with a consequent reduction in cardiovascular events."

Oxidative stress profile (blood)

1. Malondialdehyde
2. Glutathione
3. Co-enzyme Q₁₀ (CoQ₁₀)

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4. Vitamin C
5. Beta carotene (including cryptoxanthin and lycopene).

Supplements that lower "bad" cholesterol and heart disease"
Remember that most nutritional supplements work best together rather than as individuals, and you should use natural forms and not synthetic ones.

1. Anti-oxidants

- a) Vitamin E
- b) Vitamin C
- c) Co-enzyme Q₁₀
- d) Bioflavonoids
- e) Alpha lipoic acid
- f) Lycopene
- g) Selenium
- h) Beta-carotene.

2. Fish oil

There is overwhelming evidence for the reduced risk of cardiac disease in the use of omega 3 fish oil. Over and above cardiovascular disease reduction, fish oil has enormous health benefits .

Heart and blood vessel benefits include:

- a) Decreased lipoprotein (a), triglycerides and blood pressure
- b) Elevation of HDL
- c) Reduction of inflammation in the blood vessel walls
- d) Endothelial function improvement (inner lining of blood vessel walls)
- e) Makes blood less likely to form clots
- f) Reverses and stabilises plaques
- g) Contributes to the energy of the heart
- h) Counteracts dysrhythmias (irregular heart beats).

3. Magnesium

Many heart disease sufferers, especially diabetics and postmenopausal women, and those with acute disease, are magnesium-deficient. Magnesium helps so many heart conditions, including arterial disease, stroke, ischaemic heart disease, heart failure and high blood pressure.

4. L-arginine

An amino acid that improves nitric oxide, which relaxes arteries, promotes blood flow and keeps them flexible.

5. Some supplements to lower bad cholesterol:

a) Red Yeast Rice, for example SOLAL's Cholest-Away™

This is a red powder produced by the fermentation of a strain of *monascus purpureus*.

Red yeast rice is an anti-oxidant, may lower LDL cholesterol, increase HDL cholesterol and decrease triglyceride levels.

It may inhibit HMG coA reductase as do statin drugs, and CoQ₁₀ supplementation is recommended, as with statin drugs. Red yeast rice may also lower LDL cholesterol.

Contraindications include:

- The use of grapefruit juice increases levels 15-fold when used in conjunction
- Not to be used in pregnancy or lactation
- Not to be used when taking high doses of nicotinic acid (>1g/d)
- When there is increased risk of muscular breakdown (rhabdomyolysis).

The usual dosage is 600-2400 mg per day taken as 1 to 4 divided doses.

b) Policosanol

A group of related lipid alcohols (long chain fatty alcohols), policosanol may inhibit synthesis of endogenous cholesterol, may inhibit oxidation of cholesterol and may elevate HDL. Usual dosages are 5-20mg /day.

c) Beta-sitosterol

300mg per day may compete with cholesterol absorption in the small intestine, thereby reducing absorption of cholesterol.

Beta-sitosterol is an ingredient in mixed phytosterol products and is used in formulas designed to lower blood cholesterol, treat enlarged prostate (due to 5alpha reductase inhibition), or treat endogenous testosterone levels.

General therapeutic doses are 60-130mg per day

d) Niacin / nicotinic acid

A special form of vitamin B₃.

Benefits include :

- a) Life extension properties due to surtuin gene activation.
- b) Cardiovascular benefits include :
reversal of atherosclerosis, improvement of blood circulation, helps prevent abnormal blood clotting, may lower heart attack risk, may alleviate Raynaud's disease, lowers LDL, increases HDL, decreases VLDL, may inhibit crosslinking, may lower lipoprotein (a), lowers triglycerides.

Side effects include: diarrhoea, nausea, muscle cramps, headaches, dry skin, erythema, flushing.

Niacin is an overlooked, wonderful supplement, that has lost favour to statin drugs. It should be considered by more people wanting natural ways to manage their cholesterol and health.

6. Vitamin K₂

Mk₇ is a form of vitamin K₂.

The most familiar vitamin K is vitamin K₁, found in green leafy vegetables or supplements.

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Vitamin K₂ is less easy to find. It is found in the fermented Japanese soy dish natto as well as in fermented and curded cheese.

Both vitamin K₁ and K₂ are important for the health of the skeletal system and the blood vessel system, but vitamin K₂ is the more beneficial. Vitamin K₂ supplementation equates to better bone, heart and blood vessel health.

7. ATP/ energy enhancers

- a) CoQ₁₀ and SOLAL's superior form idebenone does so many good things and should be seriously considered for those seeking good health as they get older.

CoQ₁₀ does the following:

- Slows the aging process and helps prevent disease
 - Helps heart disease sufferers
 - Reduces hypertension
 - Generates energy and strength
 - Enhances the immune system and helps reduce cancer risk
 - Counteracts depletions caused by statin drug therapy
 - Improves neurological disorders
 - Protects against gum disease.
- b) L-carnitine
L-carnitine helps transport fatty acids into the mitochondria to produce ATP (the molecule of energy). It also transports waste material out of the mitochondria.

- c) D-ribose
It rapidly restores depleted energy in sick hearts since it is a building block of ATP.

8. Other beneficial nutrients:

- Pomegranate juice: lowers blood pressure, reduces oxidised cholesterol, and decreases carotid artery wall thickness
- Garlic contains powerful sulphur and selenium compounds and has been used for the prevention and treatment of diseases for many years
- B vitamins like B₆, B₁₂, folic acid help lower homocysteine levels and cardiovascular disease.

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