THE 5 MOST COMMON MYTHS ABOUT CHOLESTEROL

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THE MYTHS

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MYTH 1. EATING FOODS CONTAINING CHOLESTEROL INCREASES YOUR BLOOD CHOLESTEROL LEVEL

We've all heard it. Dietary cholesterol and saturated fat are "artery clogging". Right?

In November 1985 the National Heart, Lung, and Blood Institute in the United States initiated the National Cholesterol Education Program (NCEP). At that time it was believed that eating cholesterol rich foods would increase blood cholesterol levels. And as a result it was recommended that dietary cholesterol should be limited to 250-300mg per day - about the same amount of cholesterol found in one egg.

The recommendation to limit dietary cholesterol was not based on any scientific evidence but simply the idea that if cholesterol clogs up the arteries then we shouldn't eat too much of it. This seems to make sense however, during the 30 year period following the initiation of the recommendations not one study was able to show that dietary cholesterol increases the blood cholesterol level.

In fact, in the United Kingdom, the National Diet and Nutrition Survey in 2001 stated that "dietary cholesterol has a relatively small and variable effect" on blood cholesterol levels". And the national dietary recommendations for the United States, published in 2010, withdrew the limits on dietary cholesterol.

This is because it is known that most of the cholesterol within the body is made by the liver. If we eat more cholesterol the liver makes less, if we eat less the liver makes more. And in fact, because cholesterol is a vitally important life sustaining nutrient, it can be manufactured in the liver by using any of the macronutrients as raw material (protein, fat, or carbohydrate).

The idea that dietary cholesterol should be avoided persists simply because it was so heavily promoted as part of the cholesterol education program, and also because food manufacturers promoted certain foods as being low in cholesterol.

Associated with this is the idea that eating saturated fat increases blood cholesterol levels. However, here again there were not any studies that actually showed this to be the case. Therefore, the idea was modified to state that saturated fat increases, not total cholesterol levels, but more specifically "bad cholesterol" levels (the LDLs).

You probably know already that LDLs (low density lipoproteins) are called "bad cholesterol". The idea that saturated fat increases the number of LDLs was fueled by studies that were done on animals. During one study hamsters were fed high doses of saturated fat and it was found that this correlated with an increase in blood LDLs.

Of course hamsters normally eat seeds, grains, nuts, and vegetables. Feeding a vegetarian hamster saturated fat, which it doesn't have the metabolic machinery to deal with, will undoubtedly have adverse effects.. The experimental diet caused tissue damage in the hamster's body. The natural response to this would be to make more cholesterol, since cholesterol is needed for the repair processes.

Even if we accept these ill found animal experiments, there is evidence that saturated fats do not increase LDLs, and this evidence is based on studies done on humans.

A study published in the Lancet in 1999 looked at the data collected during the UK National Diet and Nutrition Survey mentioned above. The researchers found no connection between saturated fat and the level of LDLs. No connection was also found between saturated fat and total cholesterol levels.

A study published in The New England Journal of Medicine in 2003 compared the effects of a low fat (conventional) diet with a high fat diet. The people who took part in the study were split into two groups respectively. The people in the high fat diet group were asked to follow the Atkins Diet which advocates large amounts of saturated fats from animal proteins.

After one year, each group was assessed for risk factors associated with heart disease. It was found that there was no significant difference in total cholesterol levels or LDL levels between the two groups.

In 2008, a similar study was again published in The New England Journal of Medicine. In this study three different diets were compared (a low carbohydrate / Atkins type diet, a Mediterranean type diet, and a low fat diet) and this time the trial ran for two years. Again, the researchers found no link between increasing the amount of saturated fat in the diet and LDL levels. Other dietary studies have found similar results.

Therefore, the suggested link between dietary saturated fat and cholesterol and cholesterol levels in the blood is not as simple as we have been led to believe. Next we will discuss the myth of so called "good" and "bad" cholesterol.

MYTH 2. THERE IS A "GOOD" AND A "BAD" CHOLESTEROL

Now its time to look at so called "good" and "bad" cholesterol. We are told that HDL cholesterol is good and LDL cholesterol is bad.

The reason for this is the direction of travel associated with each. HDLs carry cholesterol away from tissues and LDLs carry cholesterol to tissues within the body. Because cholesterol has been perceived to be bad then LDLs have also been thought of as bad because the LDLs are delivering the cholesterol.

However, HDLs and LDLs are not really cholesterol at all!

Cholesterol does not mix with water (or blood) therefore in order for it to be transported through the blood stream it has to be carried inside something called a *lipoprotein*. A lipoprotein is a kind of bundle of fats, protein, and other substances that moves around the body. HDLs are high density lipoproteins and LDLs are low density lipoproteins. So, HDLs and LDLs do contain cholesterol but they also contain many other substances. And the same cholesterol is found in HDLs and LDLs. There are not different types of cholesterol.

In addition to cholesterol HDLs and LDLs also carry:

Coenzyme Q10 (CoQ10)
This is needed for energy production within every cell of the body. In particular, it is needed in the heart muscle cells. CoQ10 is also an antioxidant.

Beta-Carotene (vitamin A)
Beta-Carotene and other carotenoids are thought to protect against diseases in particular, protect against cancer and eye disease.

Vitamin E
Vitamin E is another antioxidant. It is also involved in the immune system and helps to dilate blood vessels - improving circulation. It also helps prevent coagulation, which is a key feature of heart disease.

So, suggesting that LDLs are bad also suggests that all of these essential nutrients are also bad, but doctors who prescribe cholesterol-lowering statins never mention that.

Another thing that is conveniently ignored is the tissue repair actions of cholesterol. When cells become damaged, they need cholesterol to repair themselves. A discussion

of the tissue repair qualities of cholesterol can be found in the scientific literature at least as far back as 1978.

There are a large number of reasons why the cells within the walls of the arteries that supply blood and oxygen to the heart may become damaged. For example, smoking cigarettes, high blood sugar levels, high stress, and toxins can cause this type of damage to the arteries. In response to this, the body may need to make more cholesterol, which it sends to the cells that need it via LDLs. But this is the effect of the damage to the arteries and not the cause.

Suggesting that LDLs cause heart disease is like blaming the traffic police at the scene of a motor vehicle accident. Yes, the police are there, but to clear up the incident, not as the cause of the accident.

Next we will discuss if cholesterol-lowering is a good idea.

MYTH 3. LOWER CHOLESTEROL IS HEALTHIER

Many countries around the world are spending millions (sometimes billions) of dollars each year on lowering national cholesterol levels. And much of the medical community are intent on lowering cholesterol as low as possible. There is a general perception of the lower the better,

However, the lower the better idea ignores all of the data showing that higher cholesterol is beneficial.

People actually live longer with higher cholesterol levels. This is discussed in some detail by Professor Tomohito Hamazaki from Japan in the movie **Statin Nation II**.

We have known for more than 40 years that elderly people with higher cholesterol live longer. However, large studies done more recently in Japan and Korea show that the relationship between higher cholesterol and increased life expectancy applies to adults of any age.

Cholesterol is also good for the brain and smarter people tend to have higher cholesterol. Researchers at Boston University investigated the relationship between total cholesterol levels and cognitive performance in 789 men and 1105 women. They discovered that low cholesterol levels were associated with a lower performance in tests for word fluency, attention/concentration, and overall cognitive performance.

And there could be a lot more to discover about the beneficial actions of cholesterol.. Research led by the University of California, LA found that derivatives of cholesterol play an important role in the immune system and could protect humans from a wide range of viruses, such as Ebola, Rift Valley Fever, Nipah, and other deadly pathogens.

When the immune system is first exposed to a new pathogen, it develops, through the production of memory cells, the ability to recognize the invader when it next enters the body. This 'memory' of the immune system is provided by a clustering of T-cell receptors. A study published in Immunity and Journal of Biological Chemistry demonstrated that cholesterol plays a key role in this process.

Cholesterol is the building block the body uses for making vitamin D, all of the steroidal hormones, and bile acids for digestion. And a large proportion of our cell membranes are made up of cholesterol. We have known for a long time that cholesterol (along with saturated fat) provides the structural rigidity that cells need in order to work properly. However, more evidence has been emerging during recent years to show that cholesterol also plays an important role in the 'intelligence' of the cell.

Cholesterol is important for all cells but particularly for cells associated with the brain, the nervous system and the immune system. Scientists at the Karolinska Institute in Stockholm, Sweden, and Swansea University's College of Medicine have identified two steroid-type molecules, cholic acid (a bile acid) and 24S,25-Epoxycholesterol (a derivative of cholesterol), that play an important role in the survival and production of nerve cells in the brain.

MYTH 4. PEOPLE WHO HAVE A HEART ATTACK HAVE HIGH CHOLESTEROL.

We all know that high cholesterol increases the risk of heart disease and heart attack. Right? Actually it doesn't! What is often not mentioned outside of the medical community is that most heart attacks happen at an average or normal cholesterol level.

In the United Kingdom for example, the typical person who has a heart attack tends to have the same cholesterol level that is seen for middle-aged and older people in the general population. However, the UK is not the only place were this is the case.

A study published in the Lancet medical journal in 2000 included 5,754 patients from Australia and New Zealand who had already had a heart attack. The average cholesterol level of this group of people was around 220 mg/dl (5.7 mmol/l). Data from the World Health Organization Global Infobase shows that around the same time, the average cholesterol level for the general population was between 212 mg/dl (5.5 mmol/l) and 223 mg/dl (5.8 mmol/l). People who suffered a heart attack had the same average cholesterol level as the general population.

A study published in the American Journal of Cardiology included 8,500 men with existing heart disease. The average cholesterol level for this group of people was around 220 mg/dl (5.5 mmol/l), which (again, according to the World Health Organization) is around the same or even slightly lower than the average cholesterol level for the general population.

A study published in the Journal of the American Medical Association in 2003 analyzed data from 122,458 patients enrolled in 14 international clinical trials. The authors compared the frequency of various risk factors in people with heart disease. They found that only 39% of all men and 34% of all women who had heart disease had high cholesterol or high triglycerides. If cholesterol was assessed independently of triglycerides this percentage may have been even less. If we look at the data provided in this study for different age groups we can also see that just 20% of men aged 75 years and above with heart disease had high cholesterol.

But those experts who support the idea that cholesterol causes heart disease tell us that we have to look at the so called "bad cholesterol". In myth number 2 we already saw that the idea of a good and bad cholesterol level is just plain silly. Putting this to one side for a moment, lets look at the data to see if higher levels of so called "bad cholesterol" are associated with an increased risk of heart disease.

Cholesterol-lowering statins are prescribed to lower "bad cholesterol" levels (LDLs). However, a large study published in the American Heart Journal in 2009 found that the level of so called "bad cholesterol" is actually lower in people with heart disease, not higher.

This study included around 137,000 people who had been admitted to hospital with heart disease. It included patients from 541 hospitals in the United States. All of these people had their LDL level measured within 24 hours of admission.

The researchers found that the average level of "bad cholesterol" for this group of people was actually lower than the average level for the American general population.

The average level for people with heart disease was 104 mg/dl and the average for the general population was 123 mg/dl. So, if people with heart disease have lower levels of so called "bad cholesterol" why are some countries around the world spending billions of dollars each year lowering these levels?

MYTH 5. STATINS 'WORK' BY LOWERING CHOLESTEROL

For the last few decades we have been told that cholesterol clogs up the arteries and causes a heart attack. This basic idea persists because there is a global cholesterol-lowering industry that still generates around $20 billion each year.

Statin medications are prescribed to lower cholesterol levels. Statins do actually lower cholesterol levels quite effectively, but as we have already seen, this is often more harmful than beneficial.

Some clinical trials have shown statins can very slightly reduce the number of heart attacks within a population. At the same time, these medications increase this risk for other serious diseases, so overall there is usually no net benefit.

In addition, the slight reduction in the risk of heart attack seen in some studies is unrelated to the cholesterol lowering.

It is now universally accepted that heart disease is an inflammatory condition. It starts with some kind of tissue damage and the body responds with the inflammatory process.

Inflammation is a local reaction to injury. Although it can occur almost anywhere in the body and can take many forms, the type of reaction is always the same. When a child develops a sore throat, microbes have proliferated in the tonsils causing local swelling. This inflammation of the tonsils is called tonsillitis. If microbes get out of control in the appendix and cause swelling we call it appendicitis. Inflammation of the liver is called hepatitis, of the kidney nephritis and of the joints is arthritis. Perhaps in the future, heart disease will be known as coronary arteritis, although this may not describe the complete process, it does depict the condition in a more meaningful way than the simple "artery clogging" description.

Statins not only lower cholesterol levels but also have a wide range of other effects - some good and some bad. Other effects include an anti-inflammatory action, and improved iron metabolism. Therefore, any slight benefits associated with statins could be unrelated to the cholesterol-lowering action.

Evidence for this can be seen in clinical trials where the amount of cholesterol lowering does not match up with the amount of benefit achieved.

For example, one of the large statin clinical trials, known as WOSCOPS, found that the people with higher total cholesterol levels benefited less than those with lower cholesterol. This was also the case for LDL 'cholesterol'.

A important thing to say about inflammation and heart disease is that although heart disease is an inflammatory condition we should always keep in mind that the inflammation is not the cause. The cause is whatever caused the initial damage to the arteries and inflammation. In recent years it has become popular for people to talk about reducing inflammation in order to reduce the risk of heart disease / heart attack. Without knowing what causes the inflammation this is the incorrect approach.

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