SPORTSCARDIOLOGYBC

CHOLESTEROL

WHAT IS CARDIOVASCULAR DISEASE (CVD)?

"Cardiovascular disease" refers collectively to a state of disease in the blood vessels. If blood vessels become narrowed (i.e., by the buildup of plaque) or obstructed (i.e., by a blood clot), then blood, and the oxygen and nutrients it carries, cannot be delivered to the vital organs of the body. If blood supply to the brain is impeded, a stroke occurs. If blood flow to the heart muscle is impeded, a heart attack occurs. The terms "coronary heart disease" (CHD) and "coronary artery disease" (CAD) describe specific forms of CVD in which the blood vessels supplying the heart muscle are blocked. In Canada, heart disease is the second leading cause of death, after cancer, and accounted for almost 20% of all deaths in 2012

When there is an obstruction in a coronary vessel, the tissue below the blockage does not get enough oxygen. If the lack of oxygen (this is called ischemia) is too severe, the heart tissue dies (this is called an infarction; a myocardial infarction means death of heart muscle tissue).

Thus, a person who has suffered a myocardial infarction/heart attack has had a portion of the heart tissue destroyed. If the area supplied by the blood vessel is small, the person may recover from the heart attack or may not even know that he or she has suffered a heart attack. However, if the area below the occlusion is too great, the heart cannot continue to function as an effective pump and death results.

Atherosclerosis is one of two primary causes of blockage. It is a disease condition in which plaque builds up in the arterial, which narrows the vessel opening. The other primary cause is thrombus, which is a blood clot. Heart disease is the most common type of heart conditions in Canada and other industrialized countries, accounting for almost half of all heart-disease-related deaths.

It is therefore recommended to regularly check your blood lipid profile through a simple blood test as its levels correlate to the risk of CVD.

CVD RISK FACTORS

Medical Conditions

High Blood pressure
High cholesterol levels
Diabetes
High blood pressure during pregnancy
Sleep Apnea

Lifestyle

Unhealthy diet
Physical inactivity
Unhealthy weight
Smoking
Too much alcohol
Stress
Recreational drug use

Non-modifiable

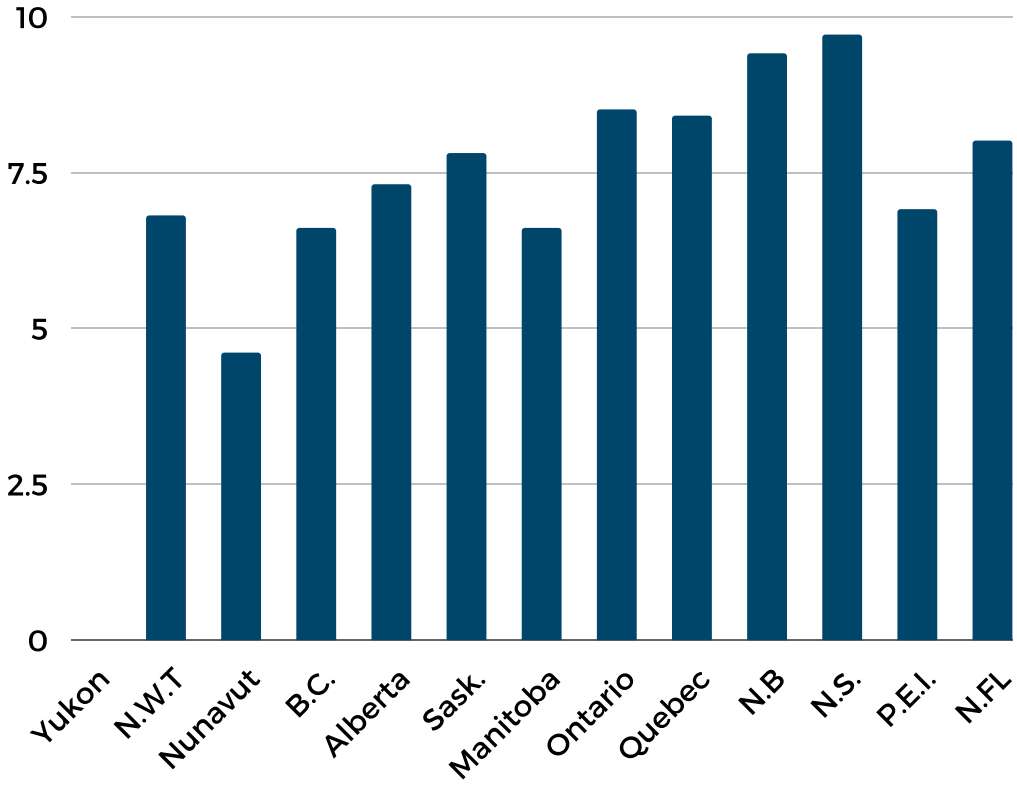
Sex
Age
Family & Medical history
South Asian & African heritage
Indigenous heritage
Personal circumstances -- including access to healthy food, safe drinking water, health services and social services

COUNTRY STATS

#2
Heart disease is the second leading cause of death in Canadians

1 IN 12
Canadians live with diagnosed heart disease

741K
Canadians have experienced a stroke



PREVALENCE OF DIAGNOSED HEART DISEASE IN CANADA FROM 2012 TO 2013 BY PROVINCE

More Canadians are living with cardiovascular disease, which means more of them are developing heart failure. The prevalence of diagnosed heart disease among individuals aged 20 years and older, increased from 7.1% to 8.1% between 2000-2001 and 2004-2005. The number of people living with heart disease continues to increase over time. It is a significant health issue for hundreds of thousands of Canadians and their families. However, with improved diagnostics and better medical management, heart failure patients are living longer with their damaged hearts.

BLOOD LIPIDS & THEIR RELATIONSHIP TO CARDIOVASCULAR DISEASE

Type of Lipid	Description	Relationship to CVD
Triglyceride	Simple fat, found in food	Positive relationship. As LDL levels increase, so does the risk of CVD
Cholesterol	A derived fat that is essential for cell function and hormone production but is detrimental in excessive amounts	Positive relationship. As LDL levels increase, so does the risk of CVD
Low-density lipoprotein (LDL cholesterol)	"Bad cholesterol." These lipoproteins transport concentrated amounts of cholesterol to the arterial wall where it contributes to plaque buildup. These lipoproteins contain a large portion of cholesterol	Positive relationship. As LDL levels increase, so does the risk of CVD
High-density lipoprotein (HDL cholesterol)	"Good cholesterol." These lipoproteins pick up cholesterol in the blood stream and transport it from the arteries to the liver, where it is metabolized. These lipoproteins contain a small portion of cholesterol	Negative relationship. As HDL levels increase, the risk of CVD decreases, making high HDLs a negative risk factor

Blood lipids provides important information regarding an individual's risk for cardiovascular disease. They are comprised primarily of triglycerides and cholesterol. Triglycerides are composed of fatty acids which are ingested in food. When you eat, your body converts any calories it doesn't need to use right away into triglycerides. They are stored in your fat cells. Later, hormones release triglycerides for energy between meals. Cholesterol is also ingested in food, but in much smaller amounts than triglycerides. Cholesterol is important for cell membranes and hormone synthesis, but when there are excessive amounts, it can have negative health outcomes. Cholesterol and triglycerides are carried in the blood by a lipoprotein molecule. Low-density lipoproteins (LDLs), also know as "bad cholesterol", and high-density lipoproteins (HDLs), also known as "good cholesterol", vary in their densities and in the way they transport cholesterol.

As a result, elevated levels of triglycerides, cholesterol, and LDL-cholesterol can increase risk of CVD. However, increased levels of HDL-cholesterol can lower risk of cardiovascular disease. Therefore, elevated levels of HDL are desirable.

CHOLESTEROL

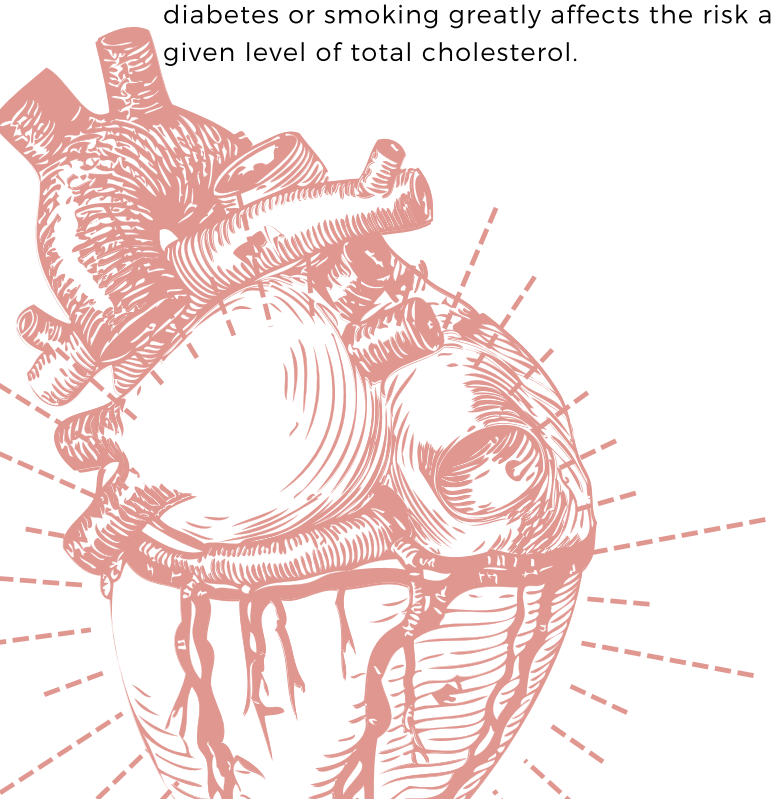
High cholesterol levels (or hypercholesterolemia) increase the risk of CVD. Elevated levels of cholesterol in young adults greatly increase their risk of coronary heart disease later in life. The table on the right illustrates the desirable, borderline, and high levels of cholesterol. When cholesterol increases, it increases the risk of CVD. There is a 20-30% increase in risk for every 10mg/dL increase in cholesterol. Cardiologists use the Framingham Risk Score to determine the 10-year risk of coronary heart disease when viewing these values.

LOW-DENSITY LIPOPROTEINS

LDLs are considered the bad form of cholesterol because elevated levels of LDL are associated with greater risk of CVD. They transport highly concentrated amounts of cholesterol to the arterial wall where it starts to build plque. LDLs are the primary plaque-causing lipoprotein and are the focus of cholesterol/lipid-lowering efforts.

HIGH-DENSITY LIPOPROTEINS

HDLs are considered the "good" form of cholesterol because it carries cholesterol from other parts of the body back to the liver. The liver then removes the cholesterol from the body. HDL is an independent predictor of coronary heart disease. When HDL increases, the incidence of CVD decreases and vice versa. For every 1mg/dL decrease in HDL, there is a 3-4% increase in coronary artery disease. As HDL decreases, the risk for coronary heart disease increases at all levels of total cholesterol. Additionally, the presence of diabetes or smoking greatly affects the risk associated with a given level of total cholesterol.



Classification of Lipid Levels

Lipid (classification)	Value (mg/dL)
Total Cholesterol	
Desirable	<200
Borderline	200-239
High	>240
LDL-cholesterol	
Optimal	<100
Near optimal	100-129
Borderline High	130-159
High	160-189
Very High	>190
HDL-cholesterol	
Low	<40
High	>60
Triglyceride level	
Normal	<150
Borderline High	150-199
High	200-499

WHAT CAN I DO TO IMPROVE MY BLOOD LIPID LEVELS AND DECREASE CVD RISK FACTORS?

DIET

An appropriate diet is an important factor in the prevention and management of dyslipidemia. In general, there are 3 primary objectives of diet modification for attaining healthy lipid profiles:

1. **Attaining ideal body weight**
2. **Obtaining a well-balanced diet high in fruits and vegetables**
3. **Restricting saturated fats and simple, refined carbohydrates (sugar)**

Less than 30% of calories should be from fats (with <10% of calories coming from saturated fats). Cholesterol intake should be less than 300mg/day. Additionally, there is growing evidence that Omega-3 fatty acids protect against cardiovascular disease, and for that reason it is now recommended commonly that individuals try to eat fish one or two times per week.

EXERCISE

Exercise is an important component of any weight loss program and weight loss is associated with positive changes in lipid profiles. Furthermore, regular aerobic exercise is associated with decreased triglyceride levels and increased HDL levels.

DRUG THERAPY

Drug therapy is only necessary for individuals who are at high risk for CVD (where LDL levels is above 160mg/dL and other risk factors). However, drug therapy is not something that is done on its own. Often it must occur in partnership with dietary therapy and increased physical activity. In many instances, drug treatment for cholesterol/lipid levels is a long-term treatment strategy, and it is extremely important that individuals continue to take their medication. More often than not, individuals will not "feel better" when they are taking the medication, however, the cardiovascular system is "working better". Discuss with your family physician to create a diet and exercise guideline that would work best with the medication you are prescribed.

Recommendations for Decreasing CVD Risk Factors

Exercise Moderately

- Decreased blood pressure
- Improved lipid (cholesterol) profile
- Decreased body fat
- Improved glucose tolerance
- Eliminates physical inactivity

Eat a Balanced Diet

- improved lipid (cholesterol) profile
- Decreased body weight
- Improved glucose tolerance
- May decrease blood pressure

Do not Smoke

- Decreased artery blockage
- Increased lung health; capacity