Cholesterol

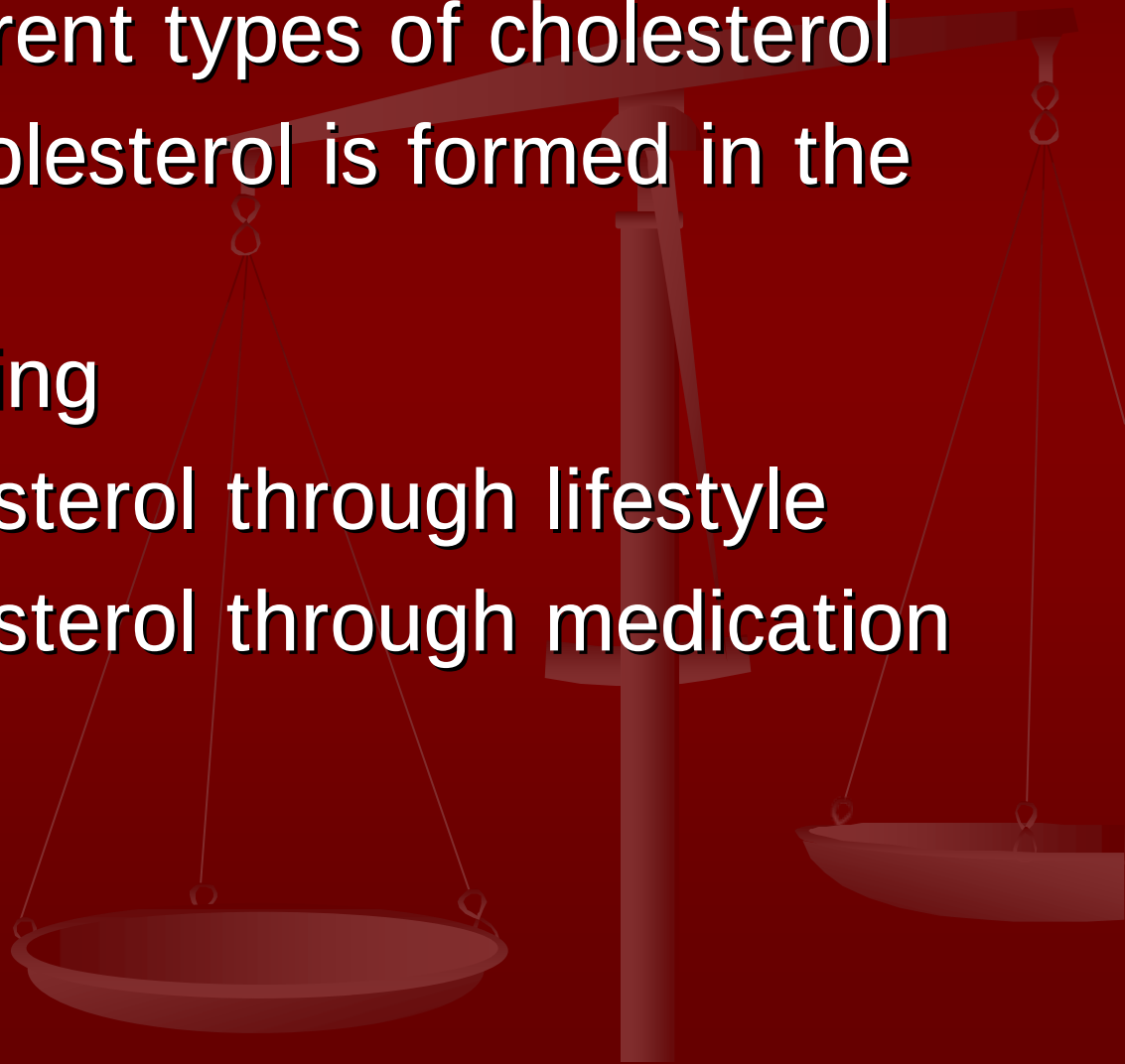
Sheri Milne

Pharmacy Technician Manager Concordia Hospital

Winnipeg Regional Health Authority
Office régional de la santé de Winnipeg

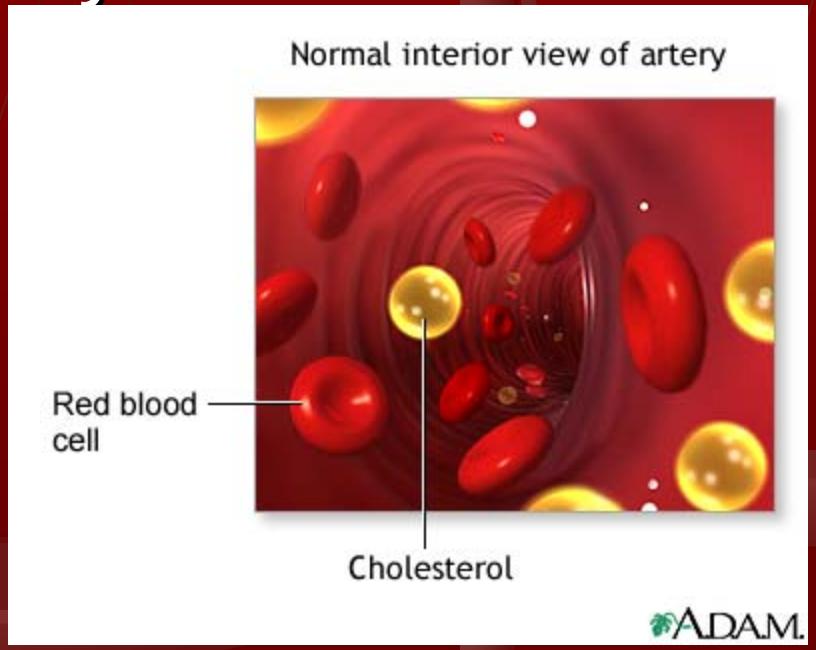
Learning Objectives

- Define the different types of cholesterol
- Discuss how cholesterol is formed in the body
- Cholesterol testing
- Managing cholesterol through lifestyle
- Managing cholesterol through medication



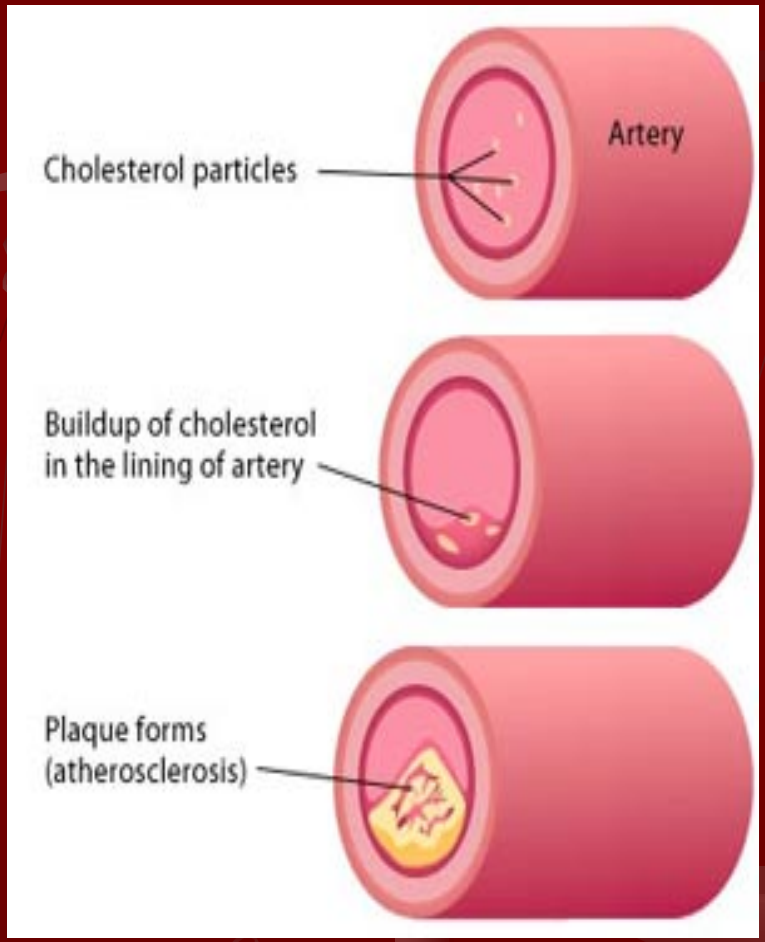
What is Cholesterol??

- Is a soft waxy substance found in foods and made by our bodies. It is one of the lipids (fats) normally found in the blood and every cell of the body.



Why is Cholesterol Bad?

- A sticky substance called plaque builds up on the lining of the arteries (blood vessels that carry blood from the heart to different parts of the body)
- The build up slowly clogs the arteries and damages the lining.
- The major component of the plaque is cholesterol
- As the arteries narrow and become damaged, the risk of circulation problems, angina, heart attacks and stroke increases.



Cholesterol isn’t all bad….

- It’s an essential fat that provides support in the membranes of our bodies' cells.
- It is a vital building block of cell membranes, hormones and vitamin D.
- Without cholesterol our bodies could not function.

Lipoproteins

- Cholesterol travels in the blood in packages called lipoproteins. Just like oil and water, cholesterol, which is fatty, and blood, which is watery, do not mix. In order to be able to travel in the bloodstream, the cholesterol made in the liver is combined with protein, making a lipoprotein. This lipoprotein then carries the cholesterol through the bloodstream.

Two Main Types of “Cholesterol”

- Low-density lipoproteins or LDL cholesterol (BAD)
- High-density lipoproteins or HDL cholesterol (GOOD)

HDL “GOOD” Cholesterol

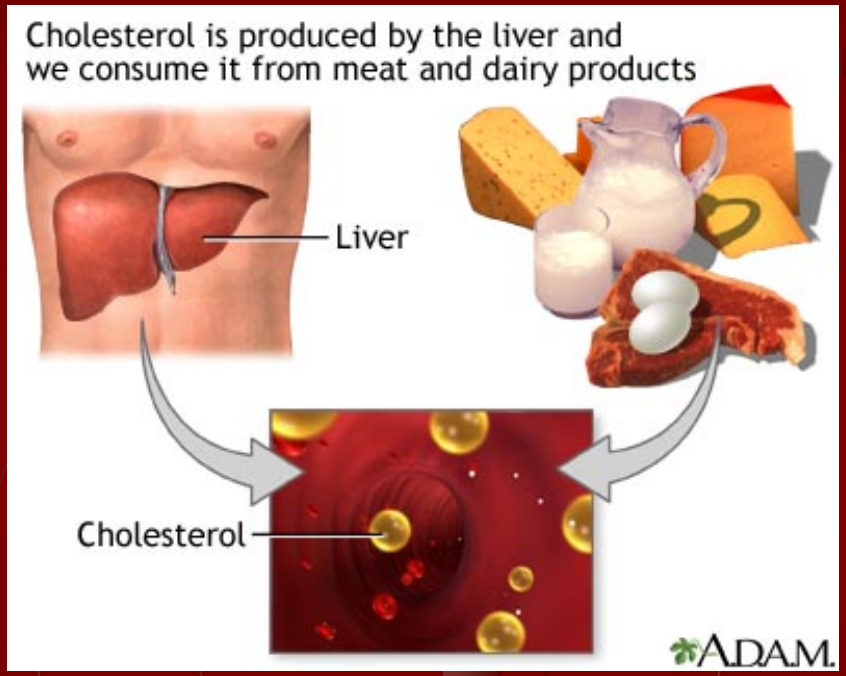
- HDL cholesterol finds and removes LDL -- or "bad" -- cholesterol.
- HDL reduces, reuses, and recycles LDL cholesterol by transporting it to the liver where it can be reprocessed.
- HDL cholesterol acts as a maintenance crew for the inner walls of blood vessels (endothelium). Damage to the endothelium is the first step in the process of atherosclerosis, which causes heart attacks and strokes. HDL chemically scrubs the endothelium clean and keeps it healthy.

LDL the “BAD” Cholesterol

- Some LDL cholesterol circulating through the bloodstream tends to deposit in the walls of arteries. This process starts as early as childhood or adolescence.
- White blood cells swallow and try to digest the LDL, possibly in an attempt to protect the blood vessels.
- In the process, the white blood cells convert the LDL to a toxic (oxidized) form.
- More white blood cells and other cells migrate to the area, creating steady low-grade inflammation in the artery wall.
- Over time, more LDL cholesterol and cells collect in the area. The ongoing process creates a bump in the artery wall called a plaque. The plaque is made of cholesterol, cells, and debris.
- The process tends to continue, growing the plaque and slowly blocking the artery.

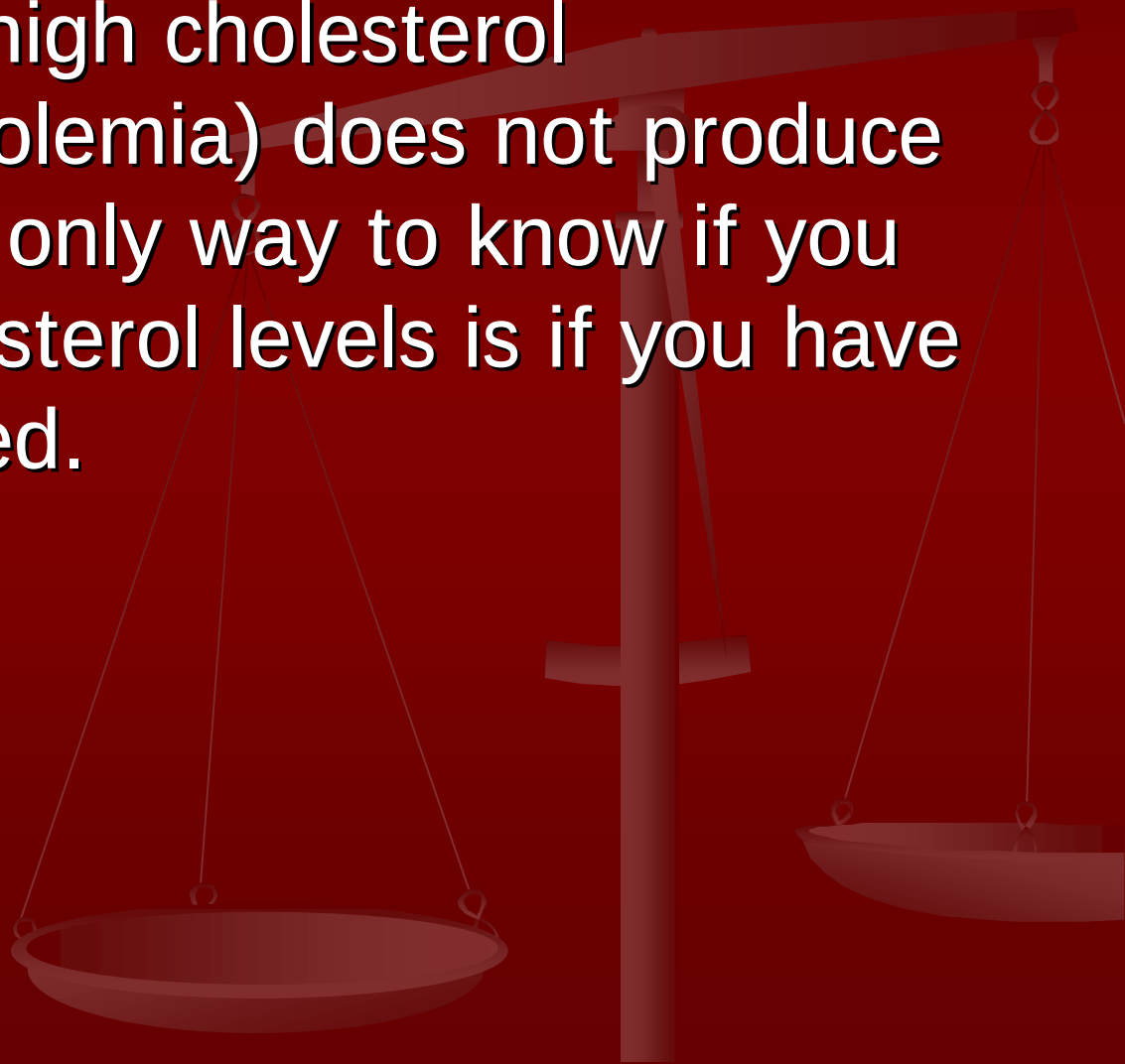
How is cholesterol formed?

- The liver makes about 80% of the cholesterol in your body.
- The other 20% comes from the foods you eat.



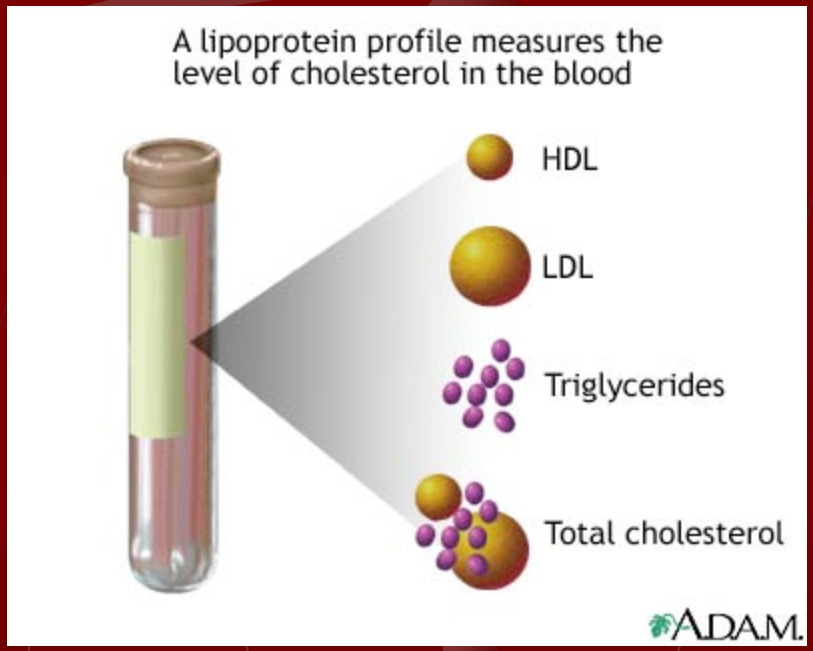
How do I know if I have high cholesterol?

- In most cases, high cholesterol (hypercholesterolemia) does not produce symptoms. The only way to know if you have high cholesterol levels is if you have your blood tested.



A simple blood test is all it takes

- Cholesterol levels can be measured by a simple test involving a blood sample.
- The test analyzes four types of fats in the blood and total cholesterol levels.
  1) Total cholesterol
  2) LDL cholesterol
  3) HDL cholesterol
  4) Triglycerides
  5) Total cholesterol/HDL cholesterol ratio



Canadian guidelines recommend having your cholesterol tested if:

- Male over 40 years of age
- Female over 50 years of age and/or post-menopausal
- Have heart disease, diabetes or high blood pressure
- Have a waste measurement greater than 102cm (40 inches) for men and 88cm (35 inches) for women
- Smoke or have smoked within the year
- Have erectile dysfunction
- Have a family history of heart disease and stroke

Lifestyle and Cholesterol Levels

- Adopting a healthy lifestyle
- Eating a diet that is lower in saturated and trans fats, including plenty of fruit, vegetables and whole grains.
- Being physically active, 30-60 minutes of moderate physical activity most days of the week
- Achieving and maintaining a healthy weight
- Limiting excess alcohol
- Being smoke-free

Foods that increase cholesterol

- The foods that increase your blood cholesterol the most are saturated fat and trans fat such as fatty meat and whole-fat dairy products, snack foods and ready-prepared foods.

Check Labels for Cholesterol Content

- Health Canada now requires nutrition labeling on most packaged foods.
- Always check the nutrition fact tables on boxes, bags, frozen entrées and cans to see exactly what is in the foods you are eating and giving to your families.

Nutrition Facts

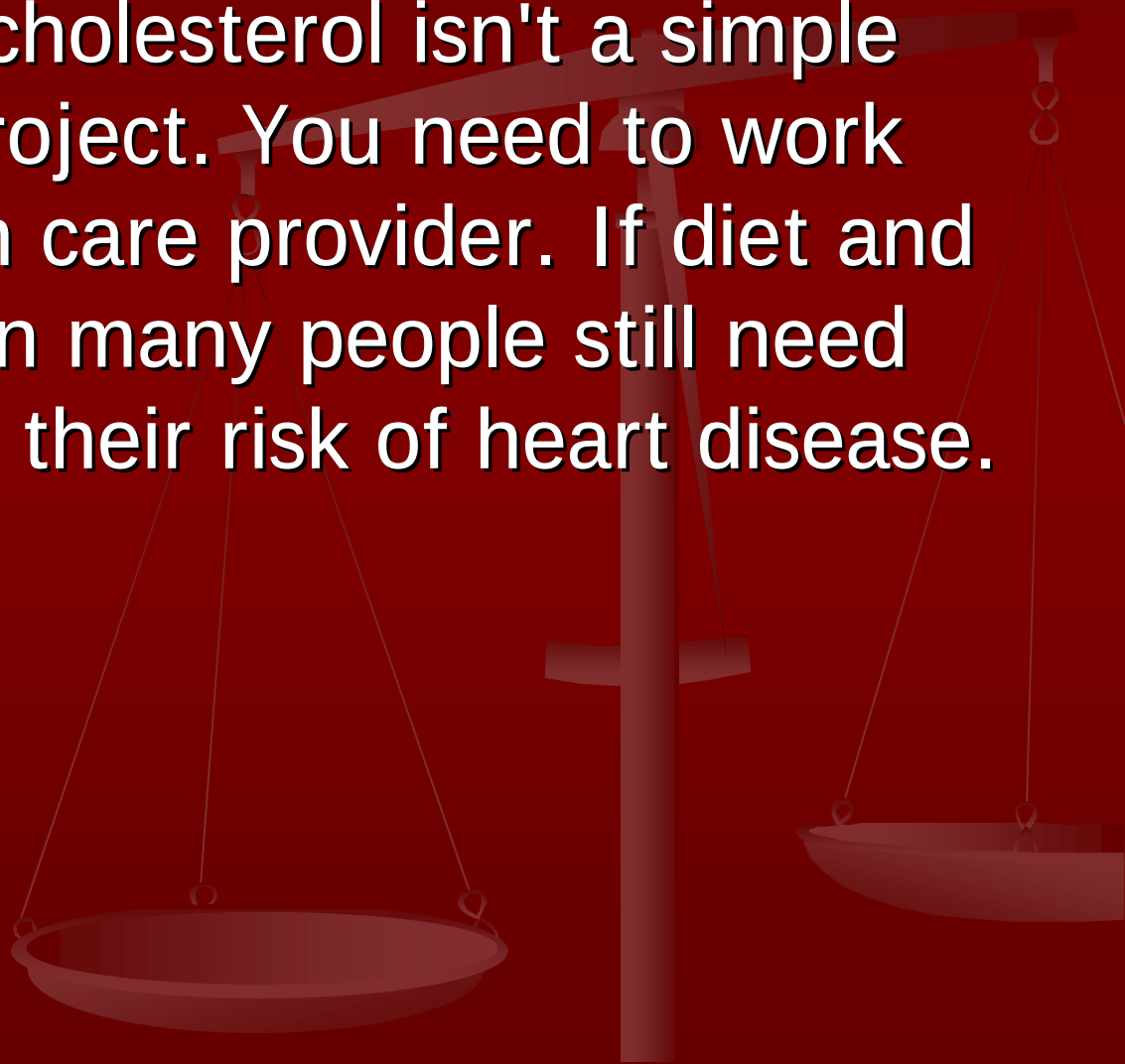
Per 2 slices (64 g)

Amount	% Daily Value
Calories 140	
Fat 1.5 g	**2** %
Saturated 0.3 g + Trans 0.5 g	**4** %
Cholesterol 0 mg	
Sodium 290 mg	**12** %
Carbohydrate 26 g	**9** %
Fibre 3 g	**12** %
Sugars 2 g	
Protein 5 g	

Vitamin A	0 %	Vitamin C	0 %
Calcium	4 %	Iron	10 %

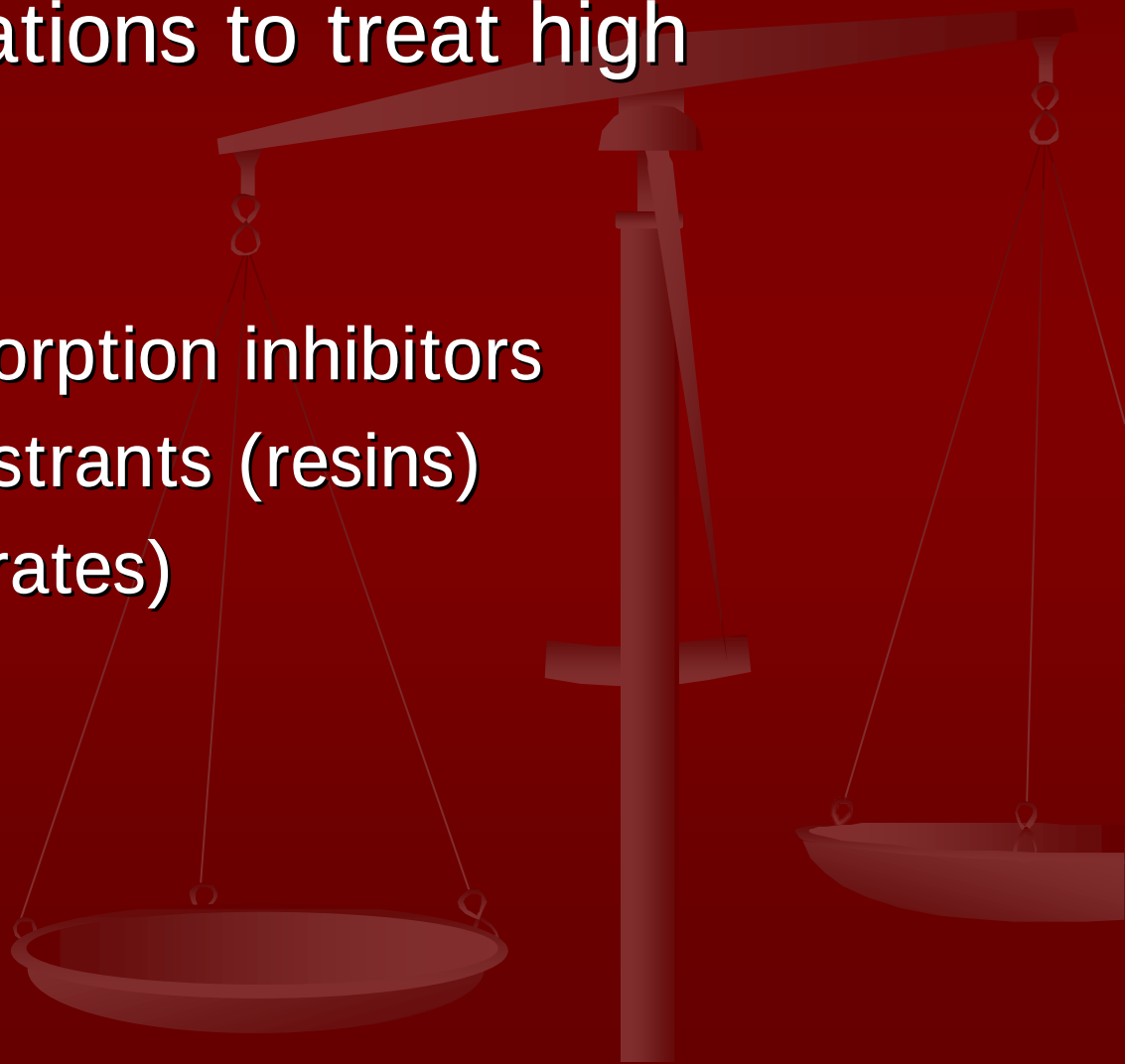
Is Lifestyle Change Enough?

- Managing high cholesterol isn't a simple do-it-yourself project. You need to work with your health care provider. If diet and exercise fail then many people still need drugs to reduce their risk of heart disease.



Taking Medication to Lower Cholesterol

- Types of medications to treat high cholesterol:
  - Statins
  - Cholesterol absorption inhibitors
  - Bile Acid Sequestrants (resins)
  - Fibric acids (fibrates)
  - Niacin



Statins

- These drugs block an enzyme in your liver that is required to make cholesterol.
- As a result the liver makes less cholesterol and picks up LDL “bad” cholesterol from your blood stream.
- These drugs are very effective and lower LDL-cholesterol by up to 55% (most commonly prescribed
- i.e. rosuvastatin, simvastatin and atorvastatin

Cholesterol Absorption Inhibitors

- These drugs work by preventing the body from absorbing and storing cholesterol in the liver and improving the way cholesterol is cleared from the body.
- Help to lower levels of total and LDL-cholesterol in your blood.
- There is currently only one available in Canada and it is ezetimibe.

Bile Acid Sequestrants (Resins)

- The body uses cholesterol to make bile, an acid used in digestion.
- Bile acid sequestrants bind to bile preventing it from being used during digestion. In response your liver makes more bile and the more it makes the more LDL “bad” cholesterol it needs- which means there is less LDL circulating through your body.
- These drugs can reduce total cholesterol by 20%
- i.e. cholestyramine, colestipol

Fibric Acid Derivatives (fibrates)

- These meds slow the production of triglycerides and are used to treat very high triglyceride levels.
- They may cause muscle discomfort or fatigue.
- i.e. fenofibrate, gemfibrozil

Niacin

- Work by inhibiting an enzyme involved in the triglyceride production and decreases the synthesis of LDL “bad” cholesterol.
- It significantly raises HDL “good” cholesterol.
- It is a form of vitamin B
- Side effects may include flushing in the upper body and face.

Statistics

- Almost 40% of Canadian adults have high blood cholesterol levels (Heart and Stroke Foundation of Canada)

Conclusion

- Cholesterol increases risk for atherosclerosis which increases risk of a heart attack.
- LDL is “bad” cholesterol, HDL is “good” cholesterol
- Medications used to treat cholesterol
- Diet & exercise help

References

- *www.heartandstroke.ca*
- Ballington D, Laughlin M "*Pharmacology for Technicians*" 2006