Understanding and Managing LDL-C

Know your number - ask your doctor all about LDL-C and what it should be.

NOVARTIS

Disclaimer: Please consult your doctor on any questions on the management of LDL-C.
LDL-C, low-density lipoprotein cholesterol.

If you have been diagnosed with high cholesterol, it can be a worrying time.
This booklet is a starting point to help you understand the basics of cholesterol, specifically low-density lipoprotein cholesterol (LDL-C).

There is a great deal you can do to lower your cholesterol. Even taking a few tips from this booklet can help you make a positive change.
Please keep in mind that this booklet is not intended to replace conversation with your doctor or other healthcare professionals.
The healthcare professionals involved in your care are a valuable resource for answering questions regarding your condition.

Remember, the more you know about your condition, the better prepared you will be to take part in making decisions about your medical care.

Importance of Being Involved

Your doctor is there to help you reach your health goals, including keeping your LDL-C at a healthy number. Work closely with your doctor to make the best decisions for you, and adhere to your doctor's advice. Making decisions together is the best way to create a treatment plan you'll be more likely to stick to.

> **Take part in making decisions about your health together with your doctor and by asking the right questions. If you don't understand something, ask for further clarification.**

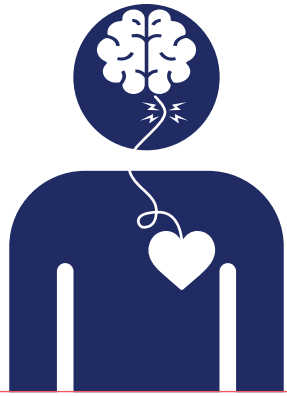
Index

Introduction

Cardiovascular disease in South Africa

Heart disease and stroke
are South Africa's biggest killers after **HIV/AIDs**.[1]

SA has one fo the highest levels of **overweight** and **obesity** in the world which is a contibuting factor for heart disease.[1]



Every hour in South Africa: **5 people** have heart attacks and **10 people** have strokes.[1]

- Majority of patients are unaware of their high cholesterol levels.[1]
- Around 50 % of patients don't reach guideline-recommended target LDL-C levels despite being on treatment.[2]

High LDL-C or bad cholesterol can increase the risk of heart attack and atherosclerotic cardiovascular disease (ASCVD).[3,4]

Find out what leads to high LDL-C levels and how to lower them in this guide!

AIDS, acquired immunodeficiency syndrome; HIV, human immunodeficiency virus; LDL-C, low-density lipoprotein cholesterol.

Understanding the Basics of Cholesterol

Let us understand the basics of cholesterol and its effect on your health.

What are lipids?

Lipids are fatty, waxy, or oily compounds.[5]

What is cholesterol?

Cholesterol is a waxy, fat-like substance.[6] It is a type of lipid and plays an important role in making hormones and digesting fatty foods.[7] Cholesterol travels through the blood on proteins called lipoproteins (lipid + protein).[8]

Two types of lipoproteins carry cholesterol throughout the body:[8]

> Low-density lipoprotein cholesterol (LDL-C)

- A form of bad cholesterol that can increase the risk of heart attack and stroke.[8]
- High LDL-C leads to fat deposits on walls of blood vessels, leading to narrowed blood vessels and reduced blood flow (atherosclerosis).[3,8]

> High-density lipoprotein cholesterol (HDL-C)

- Also known as good cholesterol.[8]
- HDL-C absorbs cholesterol in the blood and carries it back to the liver, where it is removed from the body.[8]
- High levels of HDL-C can lower your risk for heart disease and stroke.[8]

Causes of Elevated LDL-C Levels

Acquired or non-genetic[9,10]		**Diseases**[9] • Low levels of thyroid hormone (hypothyroidism) • Chronic kidney disease • Diabetes
		**Certain medications**[10] • Steroids
		**Lifestyle patterns**[10] • High-fat diet • Smoking/excessive alcohol intake • Lack of exercise • Stress
Genetic[9,10]		**Diseases**[10,11] • Certain genetic diseases cause patients to be more prone to higher LDL-C levels. For example, familial hypercholesterolaemia

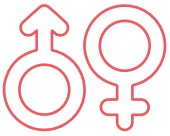
LDL-C, low-density lipoprotein cholesterol.

Risk Factors for Elevated LDL-C

Is high **LDL-C = heart attack?** No! it's not that simple.

High LDL-C is a major risk factor, but not the only one.[12] The more risk factors you accumulate, the higher the risk of developing heart disease.[13]
A role is also played by how long one is exposed to the risk factors. For example, the longer your LDL-C is elevated, the higher the risk of a heart attack or stroke.[14]

Other risk factors for cardiovascular disease



Gender:
Men are at great risk[12]

Smoking[12]

Overweight or obesity[12]

High blood pressure[12]

Diabetes mellitus[12]

Lack of exercise[13]

Family history of high cholesterol and/or heart disease[12,13]

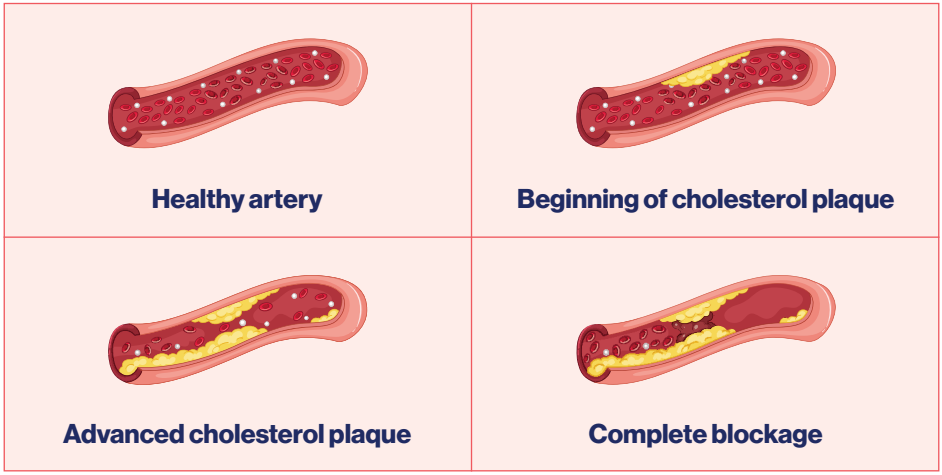
Age[12]

Have any of your family members suffered from a heart attack or stroke? If yes, please inform your doctor.

Atherosclerosis: A Complication of High LDL-C[3]

- LDL-C (bad cholesterol) gets deposited on the walls of blood vessels. These fat deposits (plaques) can lead to a medical condition called **atherosclerotic cardiovascular disease (ASCVD)** which may affect narrowing and hardening of blood vessels around your heart (coronary artery disease), brain (ischaemic stroke) and other parts of your body (peripheral arteries).[3,15,16]
- **Atherosclerosis** develops slowly overtime as cholesterol, fat, blood cells, and other substances in your blood form a plaque in the walls of your arteries.[17]
- As plaque builds up, your arteries narrow. This reduces the supply of oxygen-rich blood to tissues and organs in the body.[17] Plus, the constant force of blood flow can lead to plaque erosion or rupture, causing a blood clot to form.[18]
- The effects on your body depend on where the blood clot forms. For example, blockages in a coronary artery deprive your heart of oxygen-rich blood, leading to a heart attack.[18]

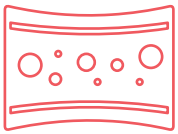
Stages of atherosclerosis[17,18]



- Mild atherosclerosis usually doesn't have a symptom.[15]
- The symptoms of moderate to severe atherosclerosis may depend on which arteries are affected.[15]

LDL-C, low-density lipoprotein cholesterol.

Impact of Atherosclerosis on Your Health



- As the fat deposits become larger, the blood vessels become narrower and blood flow is impaired.[15]

- The affected body tissue may no longer receive adequate oxygen.[17]

- **In your heart arteries**, you may have chest pain or pressure, called **angina** or a **heart attack**.[15,17]

- **In the arteries leading to your brain**, you may have sudden numbness or weakness in your arms or legs, trouble speaking, slurred speech, sudden or temporary loss of vision in one eye, or drooping muscles in your face. These are symptoms of a transient ischaemic attack (TIA). Untreated, a TIA can lead to a **stroke**.[15]

- **In the arteries in your arms and legs**, you may have leg pain when walking, called claudication. This is a symptom of **peripheral artery disease (PAD)**. You also might have lower blood pressure in the affected arm or leg.[15]

- **In the arteries leading to your kidneys**, you may get high blood pressure or **kidney failure**.[15]

Test to Monitor Cholesterol Levels

Did you know?

Majority of people are unaware of their high cholesterol levels as it doesn't have any symptoms.[19]

- The only way for one to know their cholesterol levels is through a simple blood test called a **lipid profile** which evaluates LDL-C, HDL-C, triglycerides and total cholesterol levels.[19]

Total cholesterol = HDL-C + LDL-C + Triglycerides

- The frequency of cholesterol screening test may vary from person to person depending on your age and health condition.[19]

Interpreting the numbers

- Cholesterol levels are measured in millimoles per liter (mmol/L).[27] To interpret your test results, use these general guidelines:

Total cholesterol[27]

Measurement	Results
Below 5.2 mmol/L	Desirable
5.2-6.2 mmol/L	Borderline high
Above 6.2 mmol/L	High

ASCVD, atherosclerotic cardiovascular disease; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol.

LDL-C[27]

Measurement	Results
Below 1.8 mmol/L	Best for people who have coronary artery disease — including a history of heart attacks, angina, stents or coronary bypass.
Below 2.6 mmol/L	Optimal for people at risk of coronary artery disease or who have diabetes. Near optimal for people with uncomplicated coronary artery disease.
2.6-3.3 mmol/L	Near optimal if there is no coronary artery disease. High if there is coronary artery disease.
3.4-4.1 mmol/L	Borderline high if there is no coronary artery disease. High if there is coronary artery disease.
4.1-4.9 mmol/L	High if there is no coronary artery disease. Very high if there is coronary artery disease.
Above 4.9 mmol/L	Very high, likely representing a genetic condition.

HDL-C[27]

Measurement	Results
Men	
Below 1.0 mmol/L	Poor
1.0-1.5 mmol/L	Better
Above 1.5 mmol/L	Best
Women	
Below 1.3 mmol/L	Poor
1.3-1.5 mmol/L	Better
Above 1.5 mmol/L	Best

Triglycerides[27]

Measurement	Results
Below 1.7 mmol/L	Desirable
1.7-2.2 mmol/L	Borderline high
2.3-5.6 mmol/L	High
Above 5.6 mmol/L	Very high

Desirable cholesterol levels

- Normal cholesterol levels vary based on your age, ethnicity and sex.[20]
- Guideline recommended target LDL-C levels depend on an individual's cardiovascular risk.[19,20]

Please consult your doctor about your LDL-C target and cardiovascular risk or if you have any questions or concerns about your condition.

Managing Elevated LDL-C Levels

High LDL-C levels can be lowered, thereby reducing the risk of heart disease and stroke.[21]

The general principles of LDL-C reduction are "**the earlier the better**, **the lower the better, the longer the better**"[22]

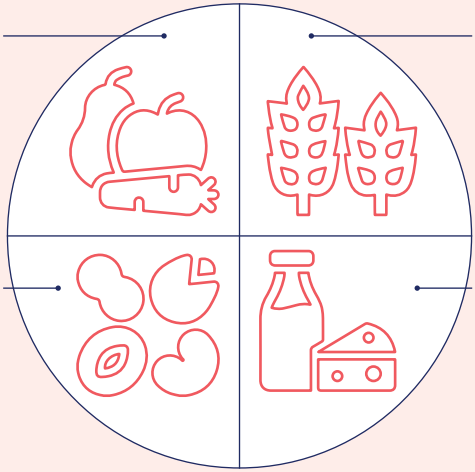
Depending on your health condition, your doctor may suggest some lifestyle changes along with medications to help reduce your LDL-C levels.[21]

A. Heart-healthy diet

- From a dietary standpoint, the best way to lower your cholesterol is to reduce your intake of **saturated fat** and **trans fat** in your diet.[21]

Fruits & vegetables
Good sources of vitamins and minerals. Also low in calories and rich in fibre.[23]

Whole grains
Good sources of fibre and other nutrients that play roles in heart health and controlling blood pressure.[23]



Healthy fats
Limit the amount of saturated and trans fats you eat.[23] Choose healthy fats like olive oil, canola oil, vegetable oils, nut oils, nuts, seeds and avocados.[23]

Low-fat protein sources
Lean meat, poultry and fish; low-fat or fat-free dairy products are some of the best sources of protein.[23] Legumes (beans, peas and lentils)— also are good low-fat sources of protein. They contain no cholesterol, making them good substitutes for meat.[23]

Consult your doctor for individualised cholesterol care, diet and treatment plans.

B. Regular exercise

- Regular exercise is a good way to get fit and healthy and reduce the amount of LDL-C in your body.[24]
- Here are some of the forms of exercises that may help reduce your LDL-C levels.[24]

Get at least 150 minutes/week of moderate-intensity aerobic activity[25]

Benefits of regular physical activity[25]

- Lower risk of heart disease, stroke, type-2 diabetes, high blood pressure.
- Less weight gain, obesity, and related health conditions.
- Better bone health, balance and sleep.
- Better quality of life and sense of overall well-being.

Did you know?

Every **1 mmol/L** reduction in LDL-C leads to ~**15%** reduction in **cardiovascular death**.[26]

Please consult your doctor before starting on any exercise regimens.

Managing Elevated LDL-C Levels

C. Other lifestyle changes

- To help prevent high cholesterol, you can also:[9]

Lose weight[9]

Limit alcohol consumption[9]

Quit smoking[9]

Limit stress[9]

D. Treatment

- Lifestyle changes such as eating a healthy diet and exercising are the first line of defense against high cholesterol.[27]
- But, if you have made these important lifestyle changes and your cholesterol levels remain high, your doctor might recommend medication.[27]

The choice of medication or combination of medications will depend on various factors, such as:[27]

- Your risk factors
- Age
- Health conditions
- Possible drug side effects

Your doctor will work with you to find a solution that fits your life.

LDL-C, low-density lipoprotein cholesterol.

What is Your LDL-C Risk Category?

If you have increased levels of LDL-C, your cardiovascular risk category, can be defined by your doctor for better management of your LDL-C levels and reduction of further risk.[28]

Moderate-risk

High-risk

Very-high-risk

Please ask your doctor about your risk category and target LDL-C goal.

Importance of reaching LDL-C target

- Maintaining doctor recommended target LDL-C level is beneficial for your health.[16,28]
- Lowering LDL-C levels helps reduce the risk of heart disease and stroke.[8,29]

Key Takeaways

Managing LDL-C is crucial for your heart health and stroke prevention.[30] Hence,

Pay attention to exercising and eating a healthy diet[27]

Attend your **check-up** regularly

Speak to your doctor

Take your **medications** as prescribed

You can do a lot yourself. But you don't have to do everything on your own. Your doctor can help and support you on this journey.

They will prescribe medications that are **suitable** to you[27]

They can check whether your therapy is **effective** (e.g., through blood tests)[31]

They can help answer your **questions**

Remember, LDL-C is one of the most important and modifiable risk factors.[26]

Talk to your doctor about your target LDL-C goal and ways to achieve it.

LDL-C, low-density lipoprotein cholesterol.

What questions do you have for your doctor?

- What does my LDL-C number mean?
- What does high cholesterol do to my body?
- How do I know if LDL-C has caused plaque in my arteries?
- Do I have an LDL-C goal?
- How long will it take to lower my LDL-C with lifestyle changes versus medication treatment?
- Are there risks in delaying medication?
- How often should I have my LDL–C number checked?
- Do you think my LDL-C number is due to my lifestyle or to hereditary, or a combination of both?
- Are diet and exercise enough to lower my LDL-C number?
- What cholesterol-lowering medication will you prescribe?
- Are there any side effects I should be aware of?
- How will I know if my medication is working and how long will that take?
- When would you like to see me next?
- When should my next LDL-C test be?

List of other possible questions:

Glossary

- **Atherosclerosis**
  Is a buildup of fats, cholesterol and other substances in and on the artery walls. This build up is called plaque. The plaque can cause arteries to narrow, blocking blood flow. The plaque also can burst, leading to a blood clot. Symptoms depend on which arteries are affected.[15]
- **Atherosclerosis cardiovascular disease (ASCVD)**
  Refers to a variety of diseases caused by the development of plaques in the arteries of the heart.[16]
- **Cholesterol**
  Cholesterol is a waxy, fat like substance in your blood. It is essential for good health. However, too much of the bad kind of cholesterol can put you at a higher risk of heart disease and stroke.[3]
- **Familial hypercholesterolemia (FH)**
  Genetic disorder inducing high levels of LDL-C in the bloodstream and, thereby, increases your risk of heart disease at a younger age than usual.[32]
- **Low-density lipoprotein cholesterol (LDL-C)**
  Is a type of lipoprotein in your blood. Lipoproteins are particles made of lipids (fats) and proteins that carry fats through your bloodstream. Too much LDL-C in your body can raise your risk of heart disease and stroke.[30]
- **Peripheral arterial disease (PAD)**
  A circulatory deficiency caused by reduced blood flow to the arms or legs.[33]
- **Stroke**
  Is a medical emergency that happens when something prevents your brain from getting enough blood flow. A blocked blood vessel or bleeding in your brain can cause strokes.[34]

Notes

Notes

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