Chapter # 8
Your Heart and Heart Disease

Know what happened to your heart

You Will Learn:

1) How the heart works
2) About common heart problems and how to manage them
About Your Heart

Your heart is a muscle that is about the size of your fist. It is slightly to the left of the centre of your chest. Each time your heart beats, it supplies your body with blood and oxygen. Your heart has:

- A pumping system
- An electrical system
- A blood supply

Pumping System

The pumping system of your heart is made up of 4 chambers and 4 valves.

4 chambers:
- Two chambers on the right side of your heart (right atrium and right ventricle)
- Two chambers on the left side of your heart (left atrium and left ventricle)

4 valves:
- Tricuspid, pulmonary, mitral and aortic valves
  - Open and close when your heart beats
  - Keep the blood flowing through your heart in one way

Blood is pumped through these chambers and valves. The left ventricle is the main pump and sends oxygen rich blood to your brain and body. Each time your heart contracts (squeezes), it pumps blood into your arteries. The flow of blood passing through your arteries is what you feel when you take your pulse.
Electrical System

Your heartbeat is controlled by electrical signals. These signals make your heart contract (squeeze) and pump blood out of the heart to the rest of your body. The passage of the electrical signal through the heart can be recorded on an electrocardiogram (see Figure 1).

Figure 1.
A normal electrocardiogram (ECG)

Blood Supply

Since your heart is a muscle, it requires its own blood supply so that it is able to contract (squeeze). Oxygen-filled blood is brought to the heart through the coronary arteries.

There are four main coronary arteries (see Figure 2)

- Right coronary artery (RCA)
- Left main coronary artery (LCA) which splits into two branches:
  - Left anterior descending (LAD) artery
  - Circumflex artery

Figure 2.
Arteries of the heart
Common Heart Problems and How to Manage Them

Heart disease refers to many types of heart problems. These problems can affect the way your heart beats and how blood moves into and out of your heart. Examples of heart disease include:

- Coronary artery disease
- Heart failure
- Valve disorders
- Arrhythmias (problems with the rhythm of your heart)

Coronary Artery Disease

Coronary artery disease is the most common type of heart disease. Coronary artery disease is caused when plaque (a waxy substance made of fat, cholesterol, and calcium) collects over time in your coronary arteries (the blood vessels that bring blood and oxygen to your heart). As plaque collects, it can narrow your coronary arteries and prevent blood and oxygen from getting to your heart. Plaque can start to collect as early as childhood.

Risk factors for coronary artery disease include:

- High blood cholesterol (LDL cholesterol)
- Diabetes
- Smoking
- High blood pressure
- Lack of physical activity
- Stress, depression
- Obesity
- Family history
How Coronary Artery Disease Affects You

Coronary artery disease can lead to angina and heart attacks.

**Angina**

Your heart needs blood and oxygen. When plaque makes your coronary arteries too narrow, not enough blood and oxygen can get to your heart (see Figure 3 below). A lack of blood and oxygen to your heart can cause pain or discomfort in your chest, jaw, arms, upper back, throat, and/or feelings of shortness of breath or fatigue. This is angina. Angina is a warning sign that your heart is under stress. See Chapter 4—Angina to learn more about angina.

![Image of blocked artery and normal artery](image)

**Figure 3A. Blocked Artery:** Part of this coronary artery is blocked by plaque. The heart does not receive enough blood and oxygen.

**Figure 3B. Normal Artery:** Oxygen rich blood flows freely to the heart.

**Heart Attack**

If your coronary artery is fully blocked, you may have a heart attack (also known as a myocardial infarction). A heart attack occurs when part of the heart does not receive any blood or oxygen and becomes damaged (see Figure 4). When your heart is damaged, it may not be able to pump blood as well.

![Image of heart attack](image)

**Figure 4. Heart attack in the front part of the heart**
During a heart attack you may feel some or all of the symptoms listed below:

- Discomfort, squeezing, pressure, burning or a heavy feeling in your chest
- Discomfort in your neck, jaw, back, arms and/or shoulder
- Shortness of breath
- Sweating
- Nausea (feeling queasy)
- Feeling dizzy

It is important to know that the symptoms of a heart attack can vary from person to person and between men and women. Although the symptoms listed above are the most common symptoms during a heart attack, some people may feel many of these symptoms while others may not feel any symptoms at all. Some people deny that they are feeling any symptoms. The symptoms of a heart attack can be like the symptoms of angina but more intense.

**Safety Alert!**

- If your symptoms are not relieved by rest or Nitroglycerin, call 9-1-1 or your local emergency department for help. If you are having a heart attack, it is important to get help from a doctor quickly to try to reduce the amount of damage to your heart.

**How Do I Know If I Have Coronary Artery Disease?**

There are many tests that can detect coronary artery disease. Some of these tests are included on the following pages:
1) **Electrocardiogram (ECG)**

An electrocardiogram (ECG) measures the electrical activity in your heart. By looking at the pattern of electrical activity in your heart, your doctor can:

- Know if your heart rhythm is normal
- See if your heart is damaged from a lack of oxygen or a heart attack

2) **Echocardiogram**

An echocardiogram uses sound waves (ultrasound) to create a picture of your heart. Your doctor will be able to see the shape of your heart, the chambers and valves and how your heart contracts (squeezes).

3) **Holter Monitor**

A holter monitor tracks your heart rate and rhythm over time. Your doctor may send you for this test if you feel like your heart is beating too hard or too fast (heart palpitations) or feel dizzy. For this test, a healthcare professional will place sticky patches (called electrodes) on your skin. These patches are attached to wires that connect to a small machine. You will likely wear this machine for 24 hours. The holter monitor test is painless and you can move around as you would on a normal day.
4) **Exercise Stress Test**

An exercise stress test can show how severe your coronary artery disease is and how much exercise you can do safely. You may complete this test if you have been told you have coronary artery disease. During an exercise stress test, you will walk on a treadmill or cycle on a stationary bike. Your heart rate and rhythm will be tracked by an electrocardiogram (ECG) while you exercise.

5) **Nuclear Stress Test**

A nuclear stress test shows if your heart is getting enough blood and oxygen and where your heart was damaged from a heart attack. For this test, a healthcare professional will add a small amount of a radioactive substance to your blood. The substance travels in your blood to your heart. A special camera that can see the substance will show how much blood is getting to your heart. You may have to do this test before and after you complete an exercise stress test.

**Figure 7. Exercise Stress Test**

8A. A heart before exercise. The white line shows the blood that has travelled to the heart. This picture shows that enough blood and oxygen travelled to all parts of the heart.

8B. A heart after exercise. There is no white line here. This picture shows that there is less blood and oxygen at this part of the heart.

**Figure 8. Nuclear Stress Echo**

Area with less blood flow
6) Stress Echo

A stress echo will show if any parts of your heart do not get enough blood and oxygen while you exercise. For this test, you will complete an echocardiogram at rest and again during an exercise stress test. An echocardiogram uses sound waves (ultrasound) to create a picture of your heart. Your doctor will be able to see the shape of your heart, the chambers and valves and how your heart contracts (squeezes).

7) Angiogram

An angiogram will show how much your coronary arteries have narrowed. For this test, a healthcare worker will insert a thin tube (called a catheter) into a blood vessel in your groin (femoral artery) or wrist (radial artery). The tube is pushed up to the coronary arteries at your heart. Next, a doctor will add a special dye into the tube and watch the dye move into your coronary arteries.

How is Coronary Artery Disease Treated?

There are four ways to treat coronary artery disease:

1) Percutaneous Coronary Intervention (PCI) or Angioplasty

Percutaneous Coronary Intervention (also known as angioplasty) is treatment used to widen your artery that is narrowed or blocked by plaque. For this treatment, a doctor inserts a thin tube (called a catheter) into the narrowed or blocked coronary artery. The doctor inflates a small balloon, found at the end of the catheter. As the balloon gets bigger, it presses the plaque outward into the wall of your artery.
2) **Angioplasty with Stent**

An angioplasty with stent follows the same steps as described in Percutaneous Coronary Intervention (angioplasty), but includes a stent. A stent is a mesh tube that is placed in a narrowed artery to hold it open. In this treatment option, the balloon presses the stent against the wall of your artery. The catheter with the balloon is taken out of your artery and the stent remains to hold your artery open and improve blood flow to your heart.

![Figure 10. Angioplasty with stent](image)

3) **Coronary Artery Bypass Graft Surgery (CABG)**

Coronary artery bypass graft surgery is a treatment that allows more blood and oxygen to get to your heart. In this treatment, a surgeon takes a section of a healthy blood vessel from your leg, arm or chest and connects (grafts) it to your blocked coronary artery. The healthy blood vessel allows blood to take a new path around (bypass) the blockage.

![Figure 11. Coronary artery bypass surgery](image)
4) **Cardiac Medicines**
Many people who have coronary artery disease are prescribed cardiac medicines. Common cardiac medicines include:

- Anti-platelets, aspirin
- Cholesterol lowering agents
- Beta blockers
- ACE inhibitors
- Nitrates

See Chapter 9—Cardiac Medicines for more information.

5) **Exercise**
Doing regular exercise will decrease the chances of your coronary artery disease getting worse. Do aerobic exercise and resistance training as prescribed by your Cardiac Rehab team. See Chapter 3—Aerobic Exercise and Chapter 12—Resistance Training for more information.

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**Other Heart Conditions**

**Heart Failure**

The following is only a small amount of information about heart failure. If you have heart failure it is important that you understand how severe your medical condition is and how to best manage it. Learn what a “normal feeling for you” is and seek medical attention if you are not feeling like “your normal self.” Speak to your doctor and your Cardiac Rehab team for more information.

**What is Heart Failure?**

Heart failure is a type of heart disease that occurs when the chambers of your heart are damaged. When the chambers are damaged:

1) Your heart cannot pump enough blood and oxygen to the rest of your body
• This means your body does not get the blood and oxygen it needs to work well

2) Your heart cannot fully relax to let blood return from the rest of your body to your heart

• This means that fluid collects in your lungs and other parts of your body such as your feet, ankles and legs

**What are the Symptoms of Heart Failure?**

Common symptoms of heart failure include:

• Shortness of breath
• Swollen feet, ankles and legs
• Sudden weight gain

**What are the Treatments for Heart Failure?**

Treatments for heart failure include: medicine, surgery, diet and exercise. Talk to your doctor to understand:

• Your medicines
• How much fluid you can drink
• When you should call your doctor or seek immediate medical attention
• What type of surgery is available to you

Talk to your Cardiac Rehab team to understand:

• How to exercise safely
• How to lower the amount of salt (sodium) in your diet

**Valve Disorders**

There are 4 valves in your heart: tricuspid, pulmonary, mitral and aortic. Working valves are like doors that ensure that blood flows only one way through the chambers of your heart.
If you have a valve disorder, your heart may have to work harder and the valves may not be able to control the flow of blood through your heart. There are 3 types of valve disorders.

1) Stenosis or Narrowing
The valve cannot open in the right way. If your valve has narrowed, your heart has to work harder to pump blood.

2) Prolapse (falls out of place):
If your valve is prolapsed, the flaps of the valve do not close smoothly.

3) Regurgitation
If you have regurgitation, your valve does not seal when it closes.

What are the Symptoms of Valve Disorders?
The most common symptom of valve disorders is shortness of breath. You may also have chest discomfort, palpitations (feels like your heart is beating too hard or too fast), and/or feel faint.

What are the Treatments for Valve Disorders?
If your valve disorder is severe, you may require surgery to repair or replace your valve.

Arrhythmia (Irregular Heartbeat)
A normal heartbeat is steady - one beat after the other. When you take your pulse, you are counting your heart rate and feeling the heart rhythm. Earlier in this chapter you learned about electrical signals that cause the heart to beat. If there is a problem with how the electrical signal starts or moves through your heart, your heart may beat too slowly, too fast or too early. See Chapter 5—Irrregular Heartbeats for more information.

Your Resources
1) Heart & Stroke Foundation: www.heartandstroke.com or Mayo: www.mayoclinic.com