

Atherosclerosis

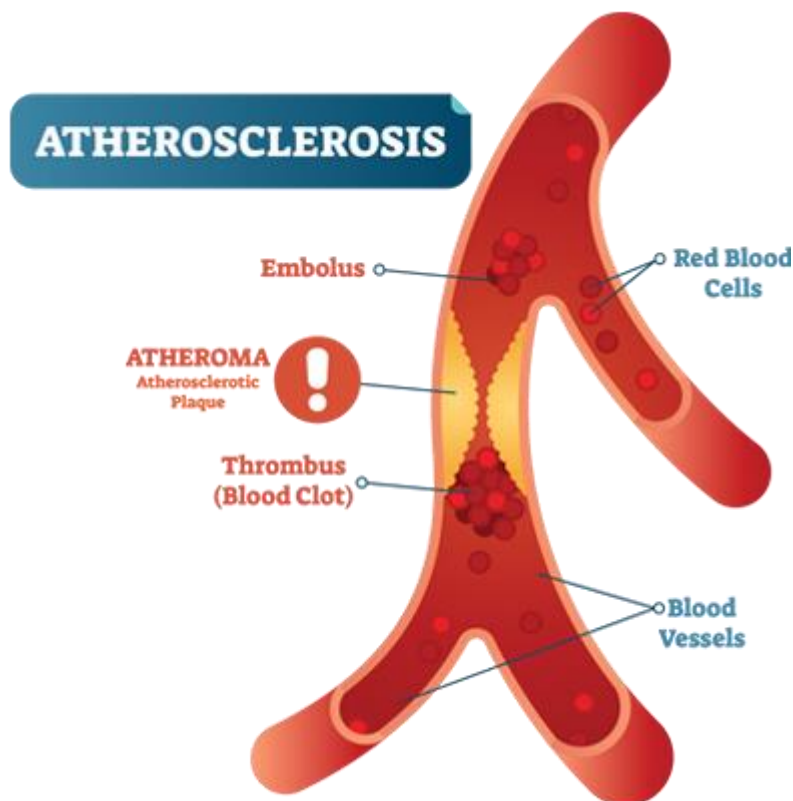
Atherosclerosis

Atherosclerosis is a fatty deposition in the walls of medium-sized and large arteries causing a reduced or blocked blood flow. Atherosclerosis starts in childhood with the formation of fatty streaks. As time goes by, the walls in the arteries can become congested with fat deposits in the process called “atherosclerosis” while the fatty substance is called “atheroma.”

Atherosclerosis is a significant risk factor in the development of cardiovascular disease.

Cardiovascular diseases have caused 43, 477 deaths in Australia last 2017 and claims the life of one Australian in every 12 minutes. Atherosclerosis may lead to dangerous conditions by reducing blood supply to the heart (causing a heart attack) or to the brain (causing stroke).

Although fatal, atherosclerosis can be managed and treated with proper medical interventions and self-initiated lifestyle changes such as increased physical activity, healthy diet, smoking cessation and maintenance of healthy weight.



Causes and Risk Factors

Atherosclerosis first develops during childhood years. Several factors may lead to the progression of the conditions repeated injury to the arterial wall via physical stress, inflammation and chemical imbalances in the bloodstream like high “bad” cholesterol levels. During injury to the arterial wall called “endothelium.”, The “bad” cholesterol accrues while the immune system sends in macrophages, a type of white blood cells to vanish cholesterol. Although it seems helpful, the macrophage gets attached to the affected site leading to plaque build up made up of amalgamation of white blood cells and “bad” cholesterol. The resulting

condition is called “atherosclerosis.” The American Heart Association emphasized the following seven ideal cardiovascular health metrics to avoid the development of cardiovascular diseases related to atherosclerosis .

1. Not smoking
2. Being Physically Active
3. Having a normal blood pressure
4. Having optimal blood glucose level
5. Having a healthy total cholesterol level
6. Being a normal weight
7. Eating a healthy diet

Furthermore, the modifiable risk factors (risk factors that can be prevented) for the development of atherosclerosis are the following:

- Dyslipidemia (elevated bad cholesterol level in the blood)
 - Dyslipidaemia is the rise in bad cholesterol level in the blood called the low-density lipoprotein (LDL) or very low-density lipoprotein (VLDL). LDL and VLDL frequently form in the arterial walls forming atherosclerosis. There is also good cholesterol known as High-density lipoprotein (HDL), it catches the excess cholesterol and stores it in the liver.
- Hypertriglyceridemia (high fat in the blood)
 - Is a higher than normal fasting triglyceride level (circulating lipids in the blood), it is common but varies among individuals that are screened. The higher the triglyceride levels in the blood, the more significant the risk of atherosclerosis.
 - Normal - < 150 mg/dL (1.7 mmol/L)
 - Mild hypertriglyceridemia – 150 to 499 mg/dL (1.7 to 5.6 mmol/L)
 - Moderate hypertriglyceridemia – 500 to 886 mg/dL (5.6 to 10.0 mmol/L)
 - Very high or severe hypertriglyceridemia - > 886 mg/dL (≥ 10.0 mmol/L)
- Hypertension
 - The risk of development of atherosclerotic plaque increases if you have hypertension, or the existence may precipitate hypertension for atherosclerosis. High blood pressure may cause injury to the walls of your arteries enabling the formation of atherosclerosis. The risk of complications from atherosclerosis starts when blood pressure reaches the level above 110/75 mm Hg.
- Smoking
 - Cigarette smoking injures the cells lining walls in your arteries making it possible for clots to form in your blood vessels. Aside from that, smoking also leads to the formation and accumulation of fatty plaques on the lining of the blood vessels or a condition of atherosclerosis.
- Diabetes
 - Diabetes is a significant risk factor for the progression of atherosclerotic lesion and may lead to cardiovascular diseases. Diabetes role in the development of fatty plaques may be related to inflammation that is common in the disease process of Diabetes mellitus.
- Low fiber diet and low consumption of fruits and vegetables

- A little fiber, high fat and high cholesterol diets accelerate the formation of atherosclerosis. The fiber in the diet lessens the absorption and promotes excretion of cholesterol from the body, while some compound in fruits and vegetables known as flavonoids are proven to be protective against the formation of fatty plaques. You may get flavonoids from purple and red grapes, red wine, some forms of green and leafy vegetables, teas, and dark beers).
- Sedentary lifestyle
 - Sedentary lifestyle and lack of physical activity lead to the progression and abnormalities in the level of bad cholesterol in the blood. Irregularly high concentration of these chemicals promotes the formation of atherosclerosis .
- Infection
 - Long term infection can aid in the disease process of atherosclerosis. Some commonly associated infections are Chlamydia pneumoniae, Cytomegalovirus (CMV), Coxsackie B virus infection and Helicobacter pylori (causes ulcer).

Non modifiable risk factors are the following:

- Genetics and Family History
 - Like most of the non communicable and lifestyle-related diseases. Atherosclerosis is a condition which can be inherited.
 - Old age
 - Your heart and blood vessels become fragile, and the arteries become wanes and stiff which make it more vulnerable to develop plaque build-ups.
 - Male sex
 - High levels of C-reactive Protein

Manifestations

Manifestations of atherosclerosis may be dependent on the location of the affected arteries or whether the blockage is gradual or sudden. Some of the most common symptoms are the following

- Chest heaviness and pain (may be a sign of heart attack)
- Excruciating pain in the limbs and in any location that has arteries which may be blocked
- Difficulty in breathing
- Restlessness
- Fatigue
- Drowsiness and confusion (may be a sign of a stroke)
- Muscle weakness in the legs and coldness due to inadequate blood circulation, the pulse may also be irregular
- Sudden changes in vision in one or both eyes
- Sudden pounding headache
- Loss of consciousness

Diagnosis

Several diagnostic tests may be used by your doctors to identify the existence of atherosclerosis; it might be based on your current and previous medical history, family history, physical examinations, and diagnostic test results. Below is the list routine test for atherosclerosis.

- Physical examination
 - Your doctor will inspect your arteries and will snoop into an abnormal sound called “bruit” that may indicate the presence of the blockage. The doctor will also observe the strength of your pulse in your arteries or it may be absent or not.
- Blood test/Blood Chemistry
 - Your physician orders a blood test to see if your blood cholesterol level, fats, sugar, proteins, and chemicals such as sodium and potassium are within the normal range. Abnormal levels of these elements may lead him to suspect atherosclerosis.
- EKG/Electrocardiogram
 - Is a non-invasive test that determines heart’s electrical impulses. It specifies your heart health by showing the speed of your heartbeat and if its rhythm is steady or irregular.
- Electrocardiography
 - Also, a non-invasive test that uses ultrasound to form a dynamic picture of your heart. It demonstrates the size and shape of your heart and how well the heart chambers and valves are functioning.
- Chest X-ray
 - A chest x-ray may reveal signs of cardiac damage. If it uses a minimal amount of radiation to allow visualization of your internal organs
- Ankle/Brachial Index
 - Your doctor will use a blood pressure monitoring device to check if your blood pressure is the same in both of your ankle and your arm. Wide variation indicates peripheral arterial disease commonly caused by atherosclerosis.
- CT Scan
 - A CT Scan is similar to X-ray but it captures more defined images of the brain, heart and other areas of the body where the plaques might have formed. Your radiographer may also use a special dye called “contrast” to enhance the imaging of the organ of interest.
- Stress Testing
 - It is also known as an exercise test that use treadmill to collect information on how your heart functions when put in strenuous physical activity.
- Angiography
 - Angiography is a specialized procedure performed in a cardiac catheterization laboratory. It is accomplished by putting a specific type of dye into the arteries through a hallowed, thin and stretched tube which is inserted in your legs to reach the arteries in the heart. It can show if your coronary arteries are clogged.

Management and Treatment

Management of atherosclerosis starts by addressing the modifiable risk factors that might have lead to the development of fatty plaque in your body such as lack of exercise, poor cholesterol control, unhealthy diets, and smoking. You will be asked by your doctor to

develop healthy lifestyle practices to reverse the fatty deposits and prevent further complications such as stroke, heart attack and peripheral artery disease. Specific steps are the following:

- Exercise and increase physical activity
- Control weight/lose weight if overweight and obese
- Blood pressure control
- Low fat, low sugar diet and moderate intake of fast-foods
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- High fiber food such as vegetables and fruits
- Control of blood glucose level
- Manage stress

Certain medications will also be given by your doctor to make sure that the complications of atherosclerosis are prevented:

- Medicines to lower your cholesterol levels such as fibrates and statins
- Aspirin
- Anti-Hypertensive's such as beta-blockers, ACE inhibitors, and Calcium channel blockers
- Pills to increase your urine output called diuretics
- Drugs to control your diabetes

Some surgeries might be performed if your atherosclerosis is already severe such as

- Angioplasty –long tube is inserted in your arteries and inflated to compress fatty deposits in your arterial wall
- Endarterectomy –surgical removal of plaques from blocked arteries
- Fibrinolytic therapy –surgeons of physicians may use special chemicals to dissolve clots and plaques that clogged the arteries
- Bypass surgery – the surgeons will create graft bypass by using a vessel from other parts of your body of they may use plastic to repair the arteries in your hear.