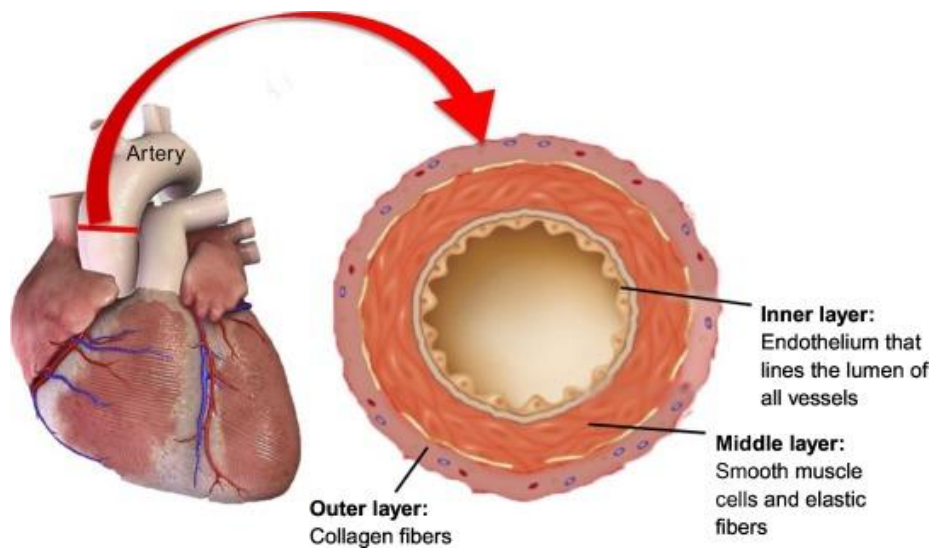# Coronary Artery Disease

INTRODUCTION

Heart beats about 115,000 times a day to pump 2,000 gallons of blood a day to supply oxygen rich blood to rest of the organs of body. Heart is the most hard working muscle of the body. Coronary arteries surrounding the heart keep it well nourished with blood so it can pump adequately. Heart is the only major organ that receives its blood supply during diastole (relaxation phase of cardiac cycle) all other organ get their blood supply during systole (contraction phase of cardiac cycle.
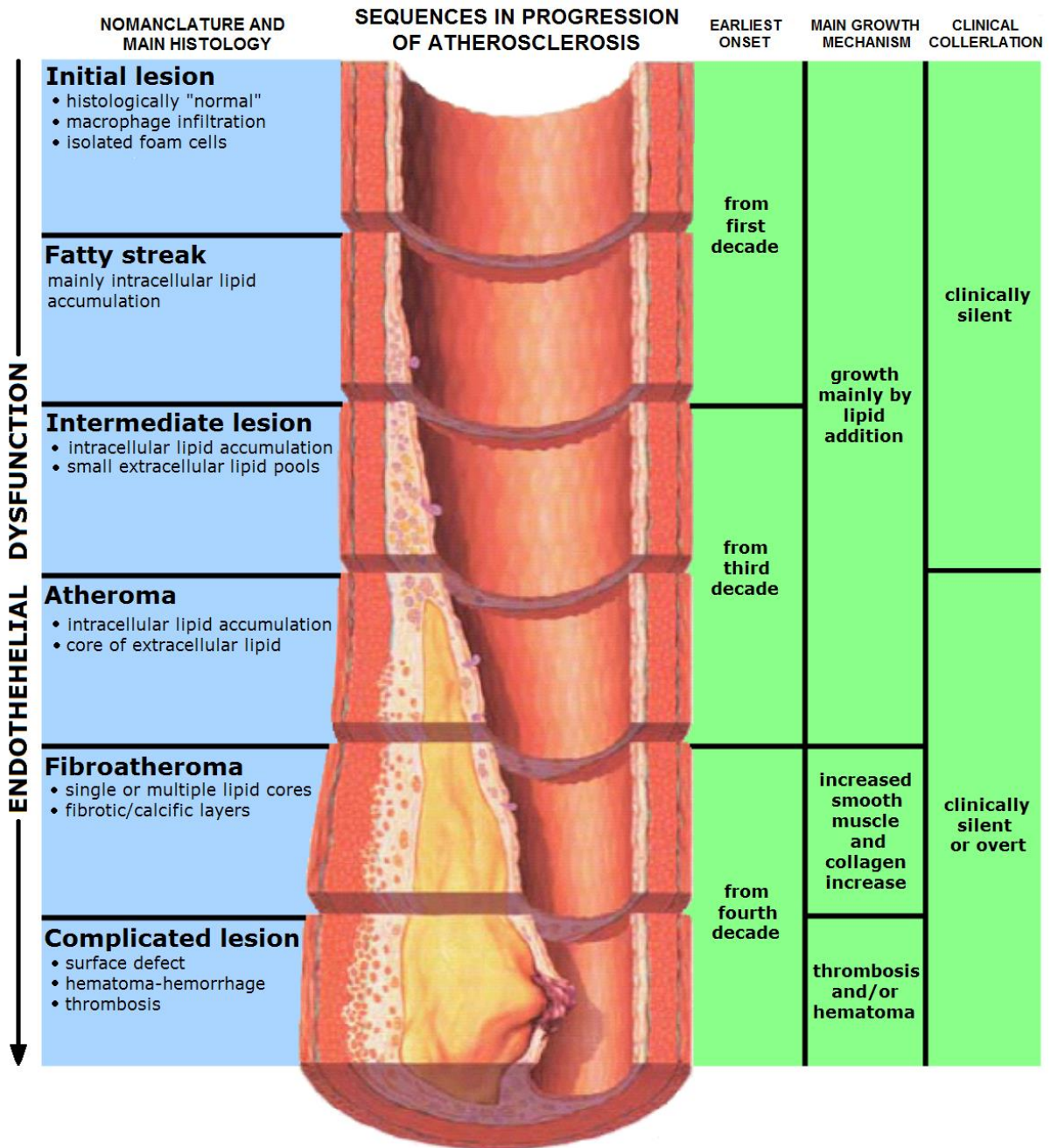
What Is Coronary Artery Disease?

Coronary artery disease, is a condition in which plaque builds up inside the coronary arteries. These arteries supply oxygen-rich blood to your heart muscle.

PATHOLOGY

Plaque is made up of fat, cholesterol, calcium, and other substances found in the blood. When plaque builds up in the arteries, the condition is called atherosclerosis. The build up of plaque occurs over many years.

Artery

Inner layer:
Endothelium that
lines the lumen of
all vessels

Middle layer:
Smooth muscle
cells and elastic
fibers

Outer layer:
Collagen fibers

NOMANCLATURE AND MAIN HISTOLOGY	SEQUENCES IN PROGRESSION OF ATHEROSCLEROSIS	EARLIEST ONSET	MAIN GROWTH MECHANISM	CLINICAL COLLERLATION
Initial lesion • histologically "normal" • macrophage infiltration • isolated foam cells		from first decade	growth mainly by lipid addition	clinically silent
Fatty streak mainly intracellular lipid accumulation				
Intermediate lesion • intracellular lipid accumulation • small extracellular lipid pools		from third decade		
Atheroma • intracellular lipid accumulation • core of extracellular lipid				
Fibroatheroma • single or multiple lipid cores • fibrotic/calcific layers		from fourth decade	increased smooth muscle and collagen increase	clinically silent or overt
Complicated lesion • surface defect • hematoma-hemorrhage • thrombosis			thrombosis and/or hematoma	

ENDOTHEHELIAL DYSFUNCTION
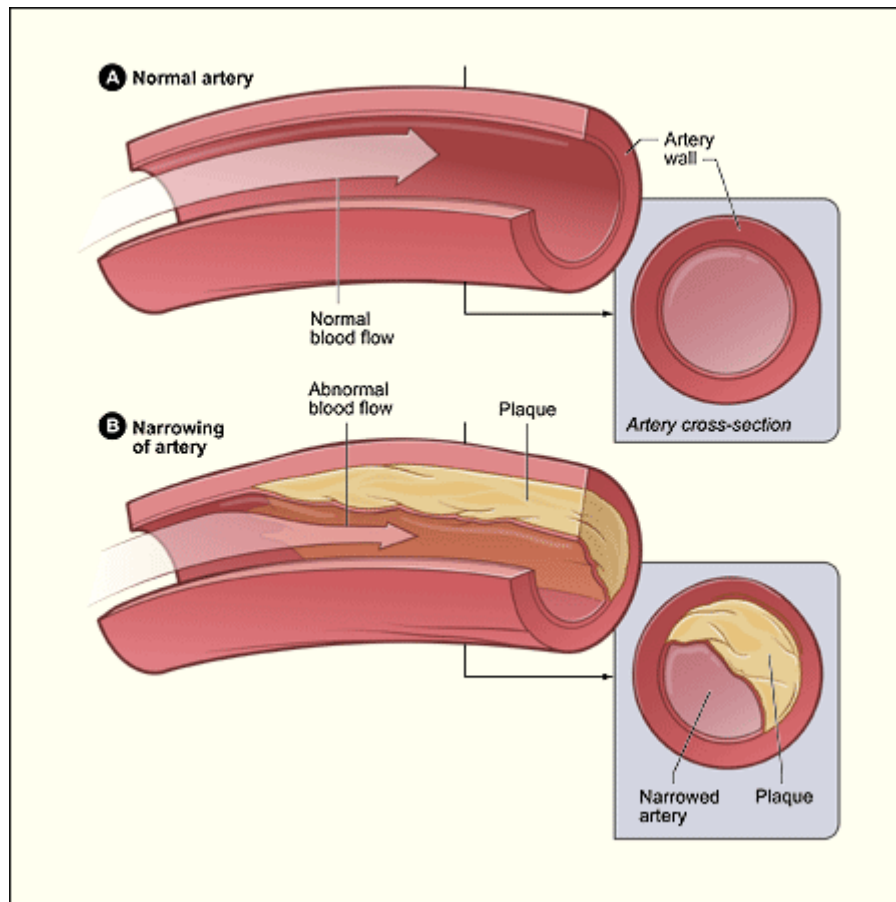
PROCESS OF ATHEROSCLEROSIS

Figure A shows a normal artery with normal blood flow. Figure B shows an artery with plaque buildup.

coronary artery disease (CAD) starts when certain factors damage the inner layers of the coronary arteries. These factors include:

- Smoking
- High levels of certain fats and cholesterol in the blood
- High blood pressure
- High levels of sugar in the blood due to insulin resistance or diabetes

Over time, plaque hardens and narrows your coronary arteries. This limits the flow of oxygen-rich blood to your heart muscle.

Eventually, an area of plaque can rupture (break open). This causes a blood clot to form on the surface of the plaque. If the clot becomes large enough, it can mostly or completely block blood flow through a coronary artery.

If the flow of oxygen-rich blood to your heart muscle is reduced or blocked, angina or a heart attack may occur.

Angina is chest pain or discomfort. It may feel like pressure or squeezing in your chest. The pain also may occur in your shoulders, arms, neck, jaw, or back. Angina pain may even feel like indigestion.

A heart attack occurs if the flow of oxygen-rich blood to a section of heart muscle suddenly becomes blocked. If blood flow isn't restored quickly, the section of heart muscle begins to die. Without quick treatment, a heart attack can lead to serious problems and even death.

Over time, CAD can weaken the heart muscle and lead to heart failure and arrhythmias. Heart failure is a condition in which your heart can't pump enough blood to meet your body's needs. Arrhythmias are problems with the rate or rhythm of the heartbeat.They are common in coronary artery disease, patients & can cause sudden death.

Prevelance

Coronary artery disease is the leading cause of death in the world ,accounting for 30 percent of the total deaths.

Global rise of cardiovascular disease is best described in 5 stages of Epidemiological transition.

Stage of Pestilence and Famine :- malnutrition & infections disease are the leading cause of death in this stage. This stage is characterized by high fertility rate, high infant, child and maternal mortality rates low life expectancy. Cardiovascular deaths account for less than 10% of deaths. Approximately 10% of the world population (sub Saharan Africa) is in this stage.

Stage of receding Pandemic :- per capita income & life expectancy increase. So does nutrition & public health services. This lead to decrease in health services. This leads to decrease in deaths due to malnutrition & infection infant & child mortality decrease. Cardio vascular disease increase and accounts for 10% - 30% of all deaths. Approximately 40% of world population is in this stage.

Stage of degenerative & human made disease :- Caloric intake particularly animal fat increase, along with decrease in physical activity deaths due to non communicable diseases surpass deaths due to infection disease, cardiovascular disease mainly coronary artery disease increase exponentially accounting for 30 – 65% of all deaths. Approximately 35% of world population is at this stage. India is also in this stage.

Stage of delayed degenerative disease :- cardio vascular disease & cancer remain the leading cause of death with cardio vascular death accounting for 40 – 50% deaths. Fewer deaths among those with disease and primary events delayed due to better treatment and preventive efforts. Cardio vascular disease affects older individuals. Approximately 15% of world population is in this stage or exiting to the next stage.

Stage of inactivity & Obesity :- Inactivity & obesity increase so does Hypertension. Diabetes & smoking, leading to reversal of age adjusted decline in mortality due to cardio vascular disease.

INDIAN PARADOX

Indians are more susceptible than any other ethnic group .Incidence of CAD is 3.4 times more than Americans & 20 times more than Japanese. Indians get coronary artery disease 5-10 years earlier than other communities. The disease is also more severe.Three times higher rate of second heart attack and 2 times higher mortality than whites. Exact cause for this is not known, genetic predisposition, poor handling of fats leading to diabetes and obesity & sedentary lifestyles probably contributes.

A. Non reversible risk factors.

Age :- male >45 yrs, female >55 yrs.

Sex :- male predominance.

Race :- certain races like south Asian are more susceptible.

Family history :- families in which CAD occurs at a younger age , siblings & children are more susceptible.

B. Reversible risk factors.

High cholesterol

Smoking

High Blood preasure (Hypertension)

High blood sugar(Diabetes)

Obesity

Sedentary lifestyles

Heavy alcohol consumption
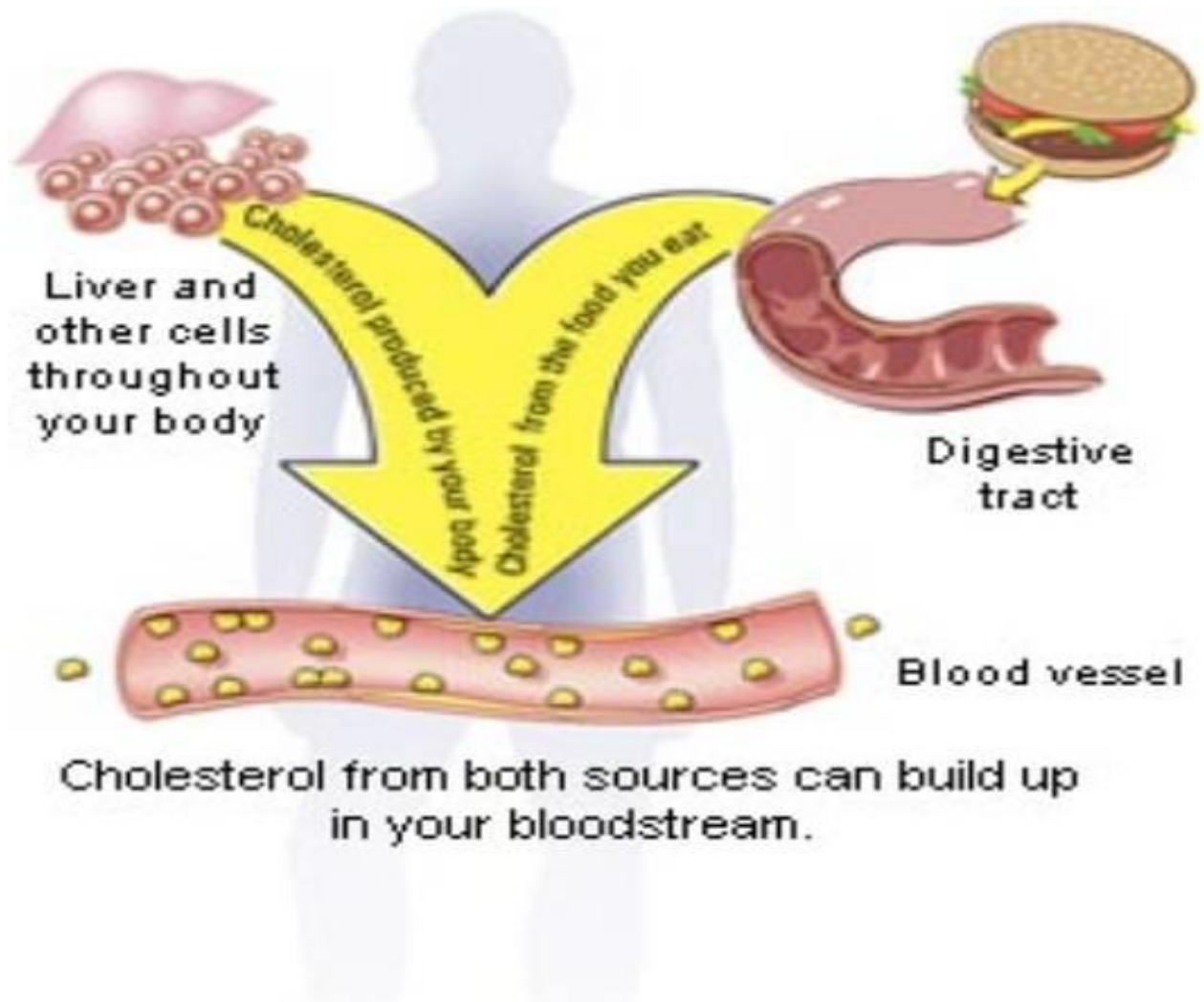
Emerging Risk Factors

High Homocysteine levels

High Fibrinogen levels

High LpA levels

High c-reactive protein levels

High cholesterol- Cholesterol is a type of fat.Everybody needs cholesterol,it serves vital functions of the body. It circulates in the blood.Too much cholesterol gets deposited on walls of blood vessels. All the cholesterol in the body comes from 2 sources-fats that you eat in diet (35 percent) & cholesterol made by liver from metabolism of other food sources.(65percent)

Liver and other cells throughout your body

Cholesterol produced by your body

Cholesterol from the food you eat

Digestive tract

Blood vessel

Cholesterol from both sources can build up in your bloodstream.

LDL cholesterol is known as bad cholesterol. It has tendency to increase risk of heart disease. LDL cholesterol is a major component of the plaque that clogs arteries.

HDL cholesterol is known as the good cholesterol. Higher in women & increases with exercise. HDL cholesterol helps carry some of the bad cholesterol out of arteries. South Asian race is genetically predisposed to have low HDL.

Triglycerides indirectly predispose to CAD by making LDL more lethal. They are very high in diabetics

SMOKING:- increases blood pressure, decreases HDL, damages arteries and blood cells, increases heart attack. Cigarette smoke contains more than 4,000 chemicals, and 200 of these chemicals are poisonous.

HYPERTENSION:- Blood pressure is considered high if it stays at or above 140/90 mmHg over time.

DIABETES:- At any given cholesterol level, diabetic persons have a 2 or 3 times higher risk of heart attack or stroke, diabetics is more likely to die of a heart attack than a non-diabetic, 80% diabetics die from heart disease, risk of sudden death from a heart attack for a diabetic is the same as that of someone who has already had a heart attack.

OBESITY :- people who are overweight (10-30% more than their normal body weight), have 2 to 6 times the risk of developing heart disease, normal waist – Hip ratio <0.85 for women ;<0.95 for men. obesity is two types

Pear-shaped :- store fat on the hips and thighs, just below the surface of the skin. This form of obesity does not significantly increase risk of CAD.

Apple-shaped :- store fat around abdomen and chest, surrounding internal organs. Apple shaped obesity increases risk for CAD

Sedentary lifestyles :- Lack of physical activity predisposes to diabetes, hypertension & obesity, these in turn predispose to CAD.

*Alcohol:-*In small amounts (1-2 drinks) it is found to be beneficial but in large amounts & binge drinking increases your cholesterol & BP, thus predisposing to CAD.

Majority of events arise in individuals with modest elevations of many risk factors than from marked elevation of a single risk factor.

TYPES OF CORONARY ARTERY DISEASE

1. **CHRONIC STABLE ANGINA**
2. **ACUTE CORONARY SYNDROME – HEART ATTACK**
3. **SUDDEN DEATH**

Signs and Symptoms of Heart Problems Related to Coronary Heart Disease

Some people who have CHD have no signs or symptoms, a condition called silent CHD. The disease may not be diagnosed until a person has signs or symptoms of a heart attack, heart failure, or an arrhythmia (an irregular heartbeat).

CHRONIC STABLE ANGINA

A common symptom of coronary heart disease (CHD) is angina. Angina is chest pain or discomfort that occurs if an area of your heart muscle doesn't get enough oxygen-rich blood.

Angina may feel like pressure or squeezing in your chest. You also may feel it in your shoulders, arms, neck, jaw, or back. Angina pain may even feel like indigestion. The pain tends to get worse with activity and go away with rest. Emotional stress also can trigger the pain.

The severity of these symptoms varies. They may get more severe as the buildup of plaque continues to narrow the coronary arteries.

ACUTE CORONARY SYNDROME – HEART ATTACK/MYOCARDIAL INFARCTION

A heart attack occurs if the flow of oxygen-rich blood to a section of heart muscle suddenly becomes blocked. This can happen if an area of plaque in a coronary artery ruptures (breaks open).

Blood cell fragments called platelets stick to the site of the injury and may clump together to form blood clots. If a clot becomes large enough, it can mostly or completely block blood flow through a coronary artery.

If the blockage isn't treated quickly, the portion of heart muscle fed by the artery begins to die. Healthy heart tissue is replaced with scar tissue. This heart damage may not be obvious, or it may cause severe or long-lasting problems.
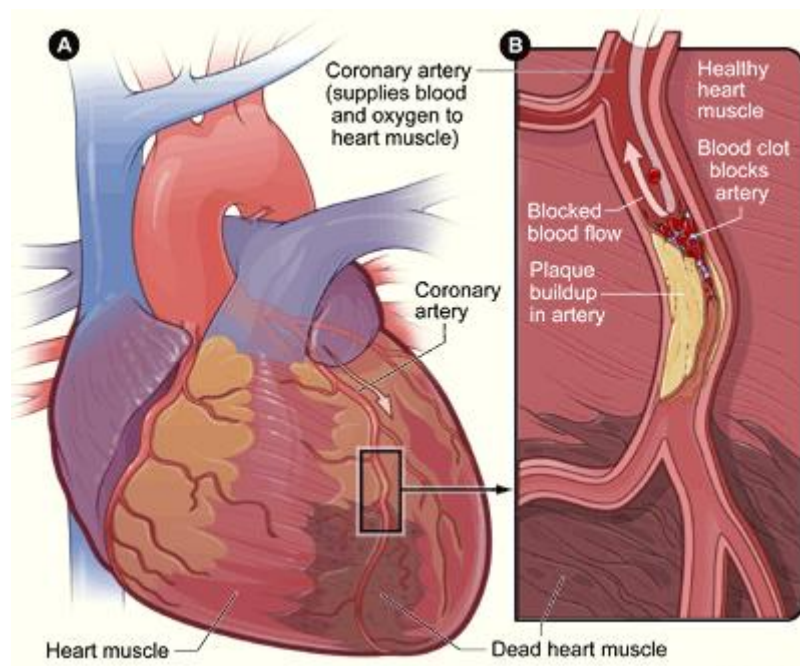
heart with muscle damage and a blocked artery

Figure A is an overview of a heart and coronary artery showing damage (dead heart muscle) caused by a heart attack. Figure B is a cross-section of the coronary artery with plaque buildup and a blood clot.

The most common heart attack symptom is chest pain or discomfort. Most heart attacks involve discomfort in the centre or left side of the chest that often lasts for more than a few minutes or goes away and comes back.

The discomfort can feel like uncomfortable pressure, squeezing, fullness, or pain. The feeling can be mild or severe. Heart attack pain sometimes feels like indigestion or heartburn.

The symptoms of angina can be similar to the symptoms of a heart attack. Angina pain lasting more than15 minutes to half hour at rest leads to heart attack.

Chest pain or discomfort that doesn't go away or changes from its usual pattern (for example, occurs more often or while you're resting) can be a sign of a heart attack.

Other common signs and symptoms of a heart attack include:

- Upper body discomfort in one or both arms, the back, neck, jaw, or upper part of the stomach
- Shortness of breath, which may occur with or before chest discomfort
- Nausea (feeling sick to your stomach), vomiting, light-headedness or fainting, or breaking out in a cold sweat
- Sleep problems, fatigue (tiredness), or lack of energy
- Heart attacks also lead to heart failure and arrhythmias.

Heart Failure

Heart failure is a condition in which your heart can't pump enough blood to meet your body's needs. Heart failure doesn't mean that your heart has stopped or is about to stop working.

The most common signs and symptoms of heart failure are shortness of breath or trouble breathing; fatigue; and swelling in the ankles, feet, legs, stomach, and veins in the neck.

All of these symptoms are the result of fluid buildup in your body. When symptoms start, one may feel tired and short of breath after routine physical effort, like climbing stairs.

Arrhythmia

An arrhythmia is a problem with the rate or rhythm of the heartbeat. When you have an arrhythmia, you may notice that your heart is skipping beats or beating too fast.

Some people describe arrhythmias as a fluttering feeling in the chest. These feelings are called palpitations.

Some arrhythmias can cause your heart to suddenly stop beating. This condition is called sudden cardiac arrest (SCA). SCA usually causes death if it's not treated within minutes.

How Is Coronary Heart Disease Diagnosed?

coronary heart disease (CHD)is diagnosed based on your medical and family histories, your risk factors for CHD, a physical exam, and the results from tests..

EKG (Electrocardiogram)

An EKG is a simple, painless test that detects and records the heart's electrical activity. The test shows how fast the heart is beating and its rhythm (steady or irregular). An EKG also records the strength and timing of electrical signals as they pass through each part of the heart. It is the ST segment changes that are most important in diagnosis of coronary Artery Disease.

An EKG can show signs off a previous or current heart attack.

NORMAL ECG
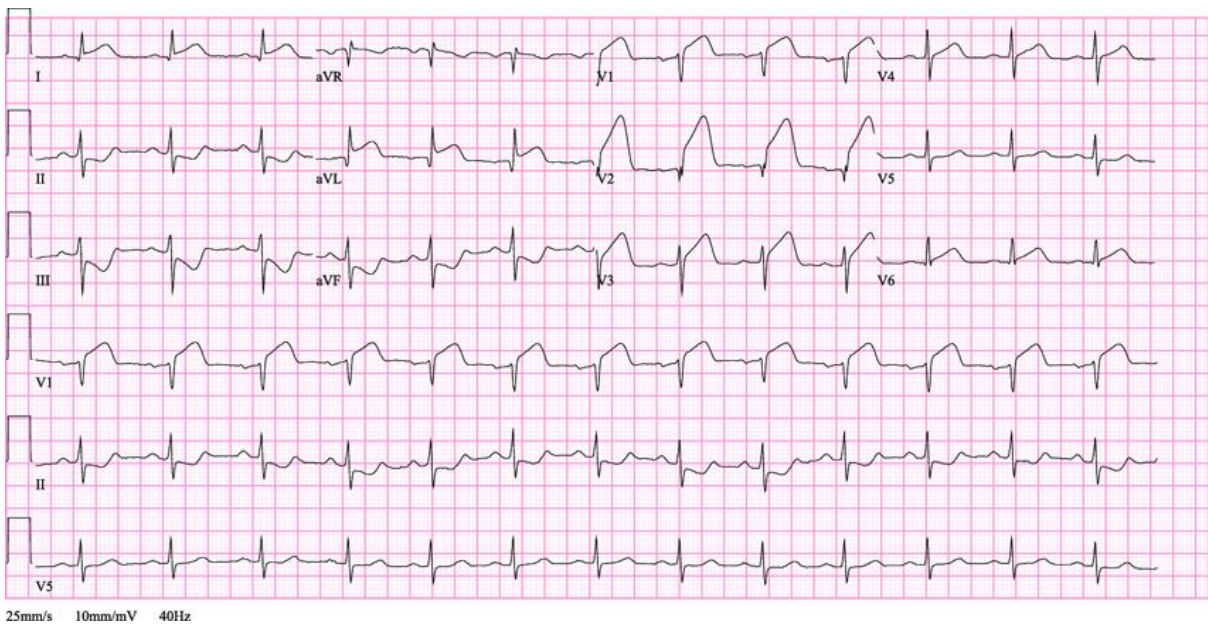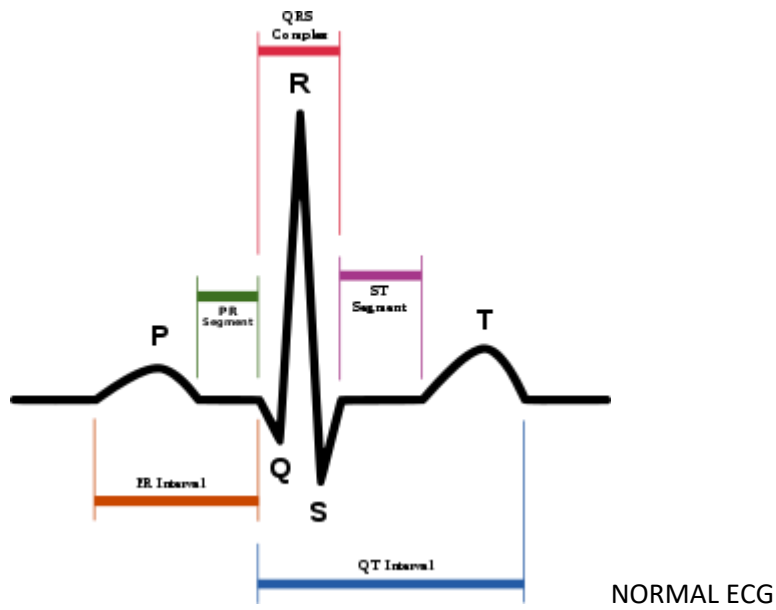
MYOCARDIAL INFARCTION SHOWING ST ELEVATION ↑↑↑

Stress Testing (Treadmill Test/Stress Echocardiography)

During stress testing , you exercise to make your heart work hard and beat fast while

ECG /Echocardiography are done.

We look for ST –T changes on ECG/Decreased movements of walls of heart chambers on Echocardiography during & after excersise.

Echocardiography

Echocardiography (echo) uses ultrasound waves to create a moving picture of your heart. The test provides information about the size and shape of your heart and how well your heart chambers and valves are working.

Echo also can show areas of poor blood flow to the heart, areas of heart muscle that aren't contracting normally, and previous injury to the heart muscle caused by poor blood flow.

Chest X Ray

 chest x ray takes pictures of the organs and structures inside your chest, such as your heart, lungs, and blood vessels.

A chest x ray can reveal signs of heart failure, as well as lung disorders and other causes of symptoms not related to CAD.
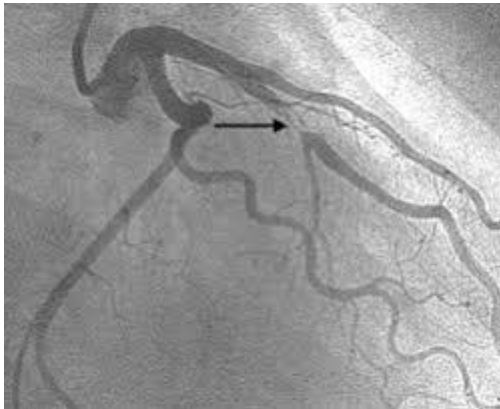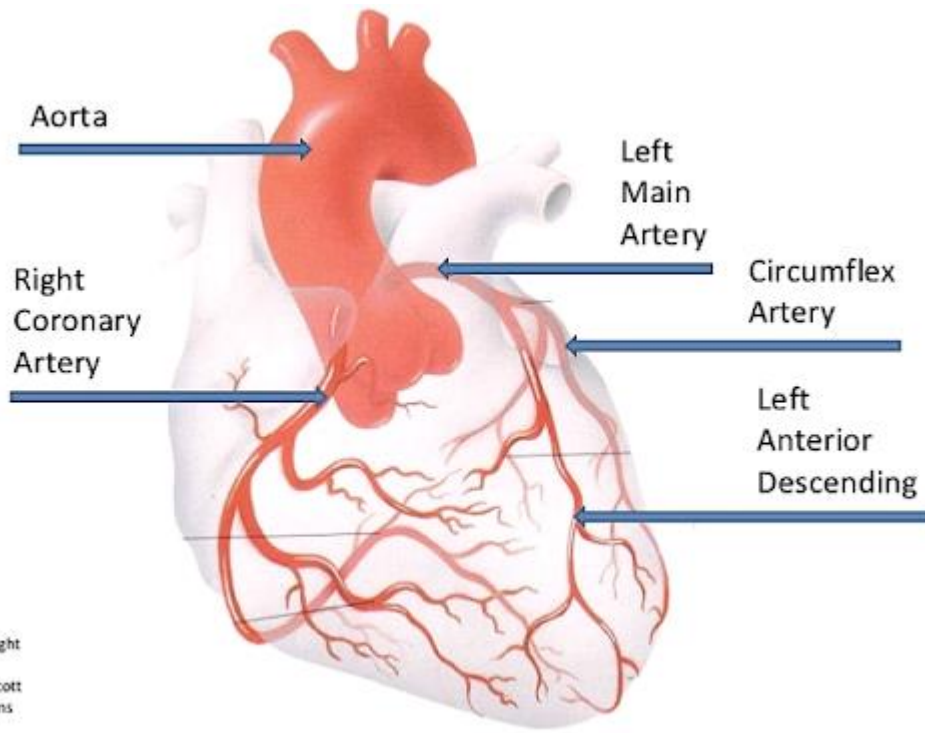
Blood Tests

Blood tests check the levels of certain fats, cholesterol, sugar, and proteins in your blood. Abnormal levels may be a sign of CAD.

Cardiac Enzymes – CPK-MB and Tropnin levels are raised in patients of heart attack. They form an important criteria for the diagnosis of heart attack.

STRESS THALLIUM TEST

This test involves making a person exercise and giving him radioactive dye, thereafter taking images of heart to detect viable heart muscle. This test is important before planning surgery in people with weak heart (reduced pumping).

Coronary Angiography and Cardiac Catheterization

Aorta

Left Main Artery

Right Coronary Artery

Circumflex Artery

Left Anterior Descending

Copyright 2005 Lippincott Williams & Wilkins

Coronary angiography is done if other tests or factors show likelihood of CAD. This test uses dye and special x rays to show inside your coronary arteries.

A thin, flexible tube called a catheter is put into a blood vessel in your arm, groin (upper thigh), or neck. The tube is threaded into your coronary arteries, and the dye is released into your bloodstream.

Special x rays are taken while the dye is flowing through your coronary arteries. The dye gives images of flow of blood through heart and blood vessels

How Is Coronary Heart Disease Treated?

Treatments for coronary heart disease (CHD) may include lifestyle changes, medicines, and medical procedures. The goals of treatments are to:

- Relieve symptoms.
- Reduce risk factors in an effort to slow, stop, or reverse the buildup of plaque.
- Lower the risk of blood clots forming. (Blood clots can cause a heart attack.)
- Widen or bypass clogged arteries.
- Prevent complications of CHD.

Lifestyle Changes

Making lifestyle changes often can help prevent or treat CHD. For some people, these changes may be the only treatment needed.

Therapeutic Lifestyle Changes (TLC). TLC is a three-part program that includes a healthy diet, physical activity, and weight management.

Healthy diet

 Less than 7 percent of daily calories should come from saturated fat. This kind of fat is found in some meats, dairy products, chocolate, baked goods, and deep-fried and processed foods.

No more than 25 to 35 percent of daily calories should come from all fats, including saturated, *trans,*monounsaturated, and polyunsaturated fats.

Less than 200 mg a day of cholesterol. The amounts of cholesterol and the types of fat in prepared foods can be found on the foods' Nutrition Facts labels.

Saturated fats (increase cholesterol) – coconut oil, palm oil, Vanaspati and desi ghee.

Monounsaturated fats (MUFA)- heart healthy- olive oil, canola oil, mustard oil ground nut oil

Polyunsaturated fats (PUFA)- heart healthy- sunflower oil, soybean oil.

Omega- 3- fatty acides- heart healthy – fish oil.

Foods high in soluble fiber also are part of a healthy diet. They help prevent the digestive tract from absorbing cholesterol. These foods include:

- Whole-grain cereals such as oatmeal and oat bran
- Fruits such as apples, bananas, oranges, pears, and prunes
- Legumes such as kidney beans, lentils, chick peas, black-eyed peas, and lima beans

A diet rich in fruits and vegetables can increase important cholesterol-lowering compounds in diet. These compounds, called plant stanols or sterols, work like soluble fiber.

A healthy diet also includes some types of fish, such as salmon, tuna (canned or fresh), and mackerel. These fish are a good source of omega-3 fatty acids. These acids may help protect the heart from blood clots and inflammation and reduce the risk of heart attack. Two fish meals every week is advicable.

10 percent reduction in blood cholesterol decreases 20-30 percent CAD deaths

Limit the amount of sodium (6 gram of salt)in food. This means choosing low-salt and "no added salt" foods and seasonings at the table or while cooking. The Nutrition Facts label on food packaging shows the amount of sodium in the item.

Llimit drinks that contain alcohol. Too much alcohol will blood pressure and triglyceride level. (Triglycerides are a type of fat found in the blood.) Alcohol also adds extra calories, which will cause weight gain.

Men should have no more than two drinks containing alcohol a day. Women should have no more than one drink containing alcohol a day. One drink is a glass of wine, beer, or a small amount of hard liquor.

Dietary Approaches to Stop Hypertension (DASH). doctors recommend the DASH eating plan for high blood pressure. The DASH eating plan focuses on fruits, vegetables, whole grains, and other foods that are heart healthy and low in fat, cholesterol, and sodium.

DASH also focuses on fat-free or low-fat milk and dairy products, fish, poultry, and nuts. The DASH eating plan reduces red meats (including lean red meats), sweets, added sugars, and sugar-containing beverages. It is rich in nutrients, protein, and fiber.

The DASH eating plan is a good healthy eating plan, even for those who don't have high blood pressure.

Excersise

Routine physical activity can lower many CHD risk factors, including LDL ("bad") cholesterol, high blood pressure, and excess weight.

Physical activity also can lower risk for diabetes and raise HDL cholesterol level. HDL is the "good" cholesterol that helps prevent CHD.People gain health benefits from as little as 60 minutes of moderate-intensity aerobic activity per week.4-5 km brisk walk a day is what is required.Heavy weights & exercises are not adviced as they can also lead to plaque rupture & thus acute coronary events

Weight management

Maintaining a healthy weight can lower your risk for CHD. A general goal to aim for is a body mass index (BMI) of less than 25.

BMI measures your weight in relation to your height and gives an estimate of your total body fat. .

A BMI between 25 and 29.9 is considered overweight. A BMI of 30 or more is considered obese. A BMI of less than 25 is the goal for preventing and treating CHD.

 smoking

Risk of heart attack decreases within 24 hr of stopping to smoke,Within 1 year of quitting risk decreases significantly & by 2years it reaches the level of non-smoker.

.

stress

Research shows that the most commonly reported "trigger" for a heart attack is an emotionally upsetting event—particularly one involving anger. Also, some of the ways people cope with stress—such as drinking, smoking, or overeating—aren't healthy.

Learning how to manage stress, relax, and cope with problems can improve emotional and physical health. Having supportive people in your life with whom you can share your feelings or concerns can help relieve stress.

Physical activity, medicine, and relaxation therapy also can help relieve stress.

Medicines

 medicines to treat CAD are needed if lifestyle changes aren't enough. Medicines can:

- Reduce heart's workload and relieve CAD symptoms
- Decrease chance of having a heart attack or dying suddenly
- Lower cholesterol and blood pressure
- Prevent blood clots
- Prevent or delay the need for a procedure or surgery (for example, angioplasty or coronary artery bypass grafting (CABG))

Medicines used to treat CHD include blood thinners; aspirin and other anticlotting medicines; ACE inhibitors; beta blockers; calcium channel blockers; nitroglycerin; & statins.
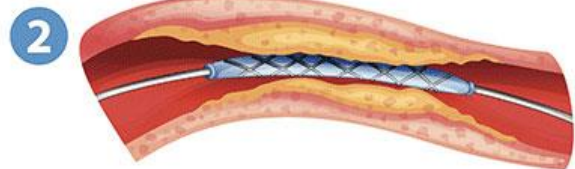
Procedures and Surgery

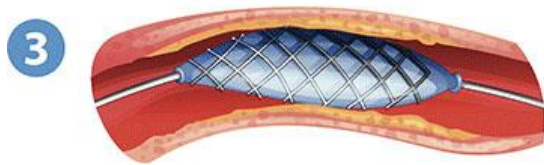 Both angioplasty and CABG are used to treat blocked coronary arteries.

Angioplasty
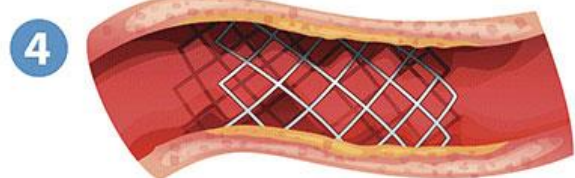
Stent with Balloon Angioplasty
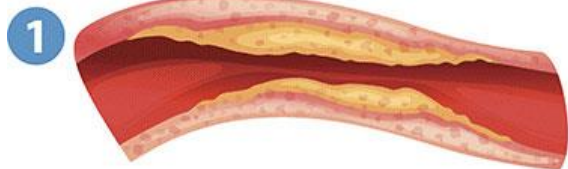
1 Build up of cholesterol partially blocking blood flow through the artery.

2 Stent with balloon inserted into partially blocked artery.

3 Balloon inflated to expand stent.

4 Balloon removed from expanded stent.

Angioplasty is a nonsurgical procedure that opens blocked or narrowed coronary arteries. This procedure also is called percutaneous coronary intervention, or PCI.

A thin, flexible tube with a balloon or other device on the end is threaded through a blood vessel to the narrowed or blocked coronary artery.

Once in place, the balloon is inflated to compress the plaque against the wall of the artery. This restores blood flow through the artery.During the procedure, a small mesh tube called a stent is put in the artery.The stent helps prevent blockages in the artery in the months or years after angioplasty.

Coronary artery bypass grafting(CABG)
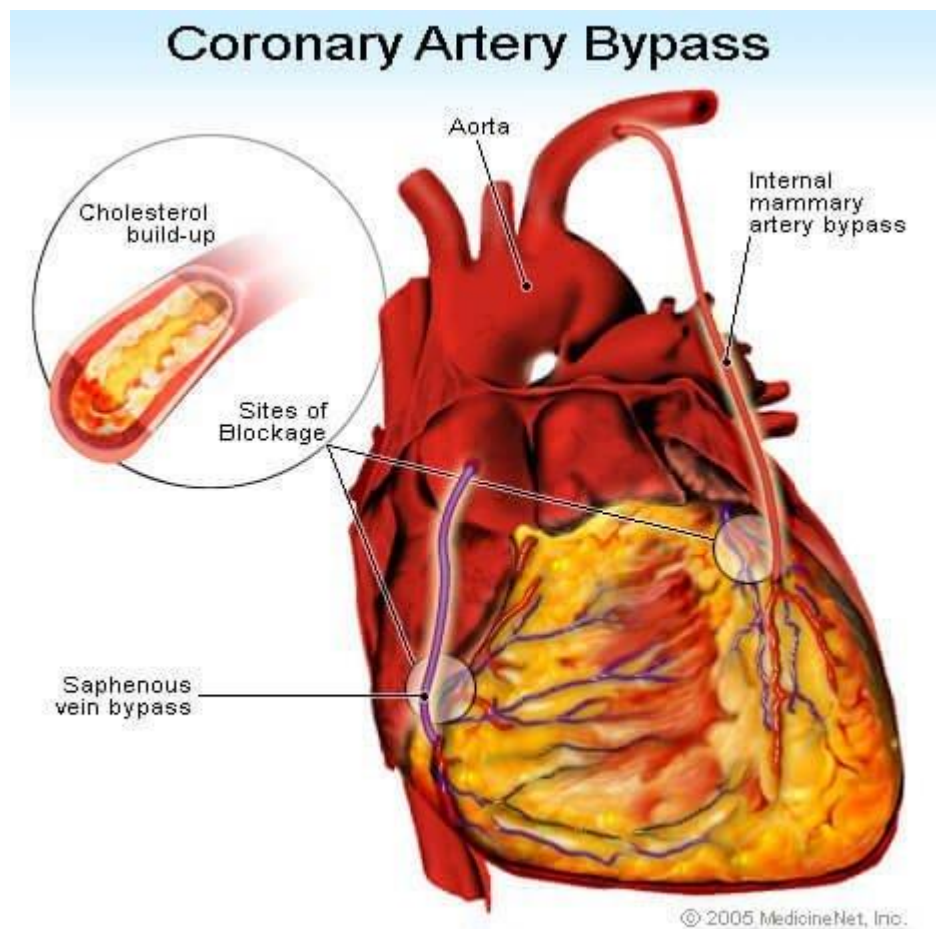
CABG is a type of surgery. In CABG, arteries or veins from other areas in body are used to bypass (that is, go around) narrowed coronary arteries. CABG can improve blood flow to heart, relieve chest pain, and possibly prevent a heart attack.

Cardiac Rehabilitation

Cardiac rehabilitation for angina or after CABG, angioplasty, or a heart attack. Almost everyone who has CAD can benefit from cardiac rehab.

Cardiac rehab is a medically supervised program that may help improve the health and well-being of people who have heart problems.

The cardiac rehab team may include doctors, nurses, exercise specialists, physical and occupational therapists, dietitians or nutritionists, and psychologists or other mental health specialists.

Rehab has two parts:

- Exercise training. This part helps learn how to exercise safely, strengthen muscles, and improve stamina. Exercise plans are based on personal abilities, needs, and interests.
- Psychological Support

How Can Coronary Heart Disease Be Prevented or Delayed?

Taking action to control risk factors can help prevent or delay coronary artery disease (CAD). More the risk factors more the chances of CAD.

One step is healthy lifestyle. Following a healthy diet is an important part of a healthy lifestyle.

A healthy diet includes a variety of fruits, vegetables, and whole grains. It also includes lean meats, poultry, fish, beans, and fat-free or low-fat milk or milk products. A healthy diet is low in saturated fat, *trans* fat, cholesterol, sodium (salt), and added sugar.

If overweight or obese, work a reasonable weight-loss plan. Controlling weight helps control CAD risk factors.

Be physically active and improve fitness level and health.

Quit smoking – as it damages and tighten blood vessels and raise risk for CAD.

Know your family history of health problems related to CAD.

If lifestyle changes aren't enough, need for medicines to control CAD risk factors. Take all medicines as prescribed.

Coronary heart disease (CHD) can cause serious complications. However, if one follows doctor's advice and adopt healthy lifestyle habits, can prevent or reduce the risk of:

- Dying suddenly from heart problems
- Having a heart attack and damaging your heart muscle
- Damaging your heart because of reduced oxygen supply
- Having arrhythmias (irregular heartbeats)

CASE STUDY - 1

AGE : 45YRS

SEX : MALE

RISK FACTORS : SMOKER, HYPERTENSION

SYMPTOMS : SUDDEN ONSET CHEST PAIN WITH PROFUSE SWEATING

TESTS CONDUCTED :

ECG SHOWED HEART ATTACK

CPK-MB/TROPONIN -RAISED

ECHO – SHOWED WEAK HEART

CORONARY ANGIOGRAPHY – SHOWED ONE ARTERY TOTALLY OCCLUDED

DIAGNOSIS – ACUTE MYOCARDIAL INFARCTION

TREATMENT – EMERGENCY ANGIOPLASTY TO OPEN BLOCKED ARTERY WITH STENT.

MEDICATIONS – BLOOD THINNERS, STATINS, MEDICATIONS FOR BLOOD PRESSURE.

DIET AND LIFESTYLE ADVICE – DASH DIET, REGULAR WALK (4KMS/DAY)

OUTCOME – PATIENT DOING WELL.

CASE STUDY - 2

AGE : 55YRS

SEX : FEMALE

RISK FACTORS : HYPERTENSION, OBESITY, DIABETES, FAMILY HISTORY

SYMPTOMS : PROGRESSIVELY INCREASING BREATHLESSNESS AND CHEST PAIN ON EXERTION.

TESTS CONDUCTED :

ECG - SHOWED ST T CHANGES

CPK-MB/TROPONIN -NORMAL

ECHO – SHOWED NORMAL FINDINGS

STRESS TEST – ABNORMAL

CORONARY ANGIOGRAPHY – SHOWED MULTIPLE BLOCKAGES IN ALL ARTERIES

DIAGNOSIS – CHRONIC STABLE ANGINA WITH TRIPLE VESSEL DISEASE

TREATMENT – CORONARY ARTERY BYPASS GRAFTING (CABG)

MEDICATIONS – BLOOD THINNERS, STATINS, MEDICATIONS FOR BLOOD PRESSURE & DIABETES.

DIET AND LIFESTYLE ADVICE – DASH DIET, REGULAR WALK (4KMS/DAY)

OUTCOME – PATIENT DOING WELL.