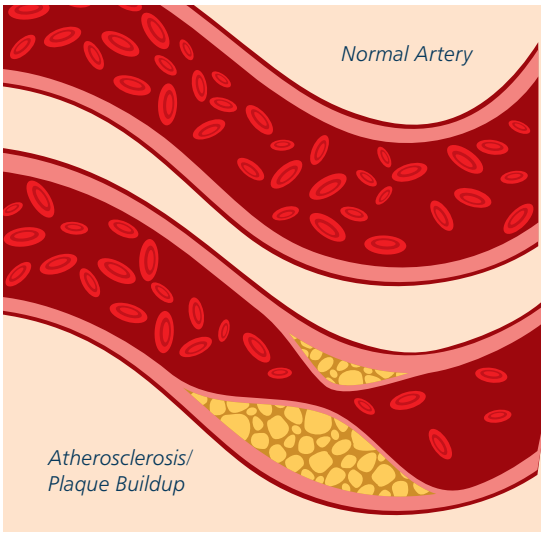
About Coronary Artery Disease (CAD)

What is Coronary Artery Disease (CAD)?[1,2]

CAD develops when there is damage to the arteries that supply the heart with blood, oxygen, and other nutrients. Damage may be caused by factors such as smoking, high cholesterol and/or triglyceride levels, high blood pressure, or diabetes.

Once damaged, the heart's arteries can narrow from buildup of plaque. Plaque is made of cholesterol, fatty deposits, calcium, and blood-clotting material.



Facts about CAD:

- Most common type of heart disease
- Affects more than 16 million Americans[3]
- Most often results from a condition known as atherosclerosis (where arteries narrow due to plaque buildup)

CAD symptoms[1,2]

When plaque accumulates in the coronary arteries, it narrows the arteries and prevents enough oxygen from getting to the heart (due to low blood flow). This restriction of blood can cause symptoms, including:

- Abnormal heartbeat (arrhythmia)
- Chest pain, pressure, or tightness
- Shortness of breath
- Heart attack (myocardial infarction)

However, sometimes there are no symptoms, despite decreased blood and oxygen to the heart.

Treatment for CAD

Lifestyle changes[4]	Medical management[4]	Percutaneous coronary intervention (PCI)[1,2,4]	Bypass surgery[1,4]
• Quitting smoking • Controlling weight, blood pressure, cholesterol, and diabetes • Increasing physical activity • Eating a diet rich in vegetables, fruits, and whole grains • Reducing and managing stress	Various medications may be prescribed, including: • Statins • Blood thinners • Beta blockers • Chest pain and heart medications • Calcium channel blockers	PCI is a minimally invasive treatment for CAD. In this procedure: • A catheter (thin wire-like tube) is inserted into the narrowed area of the artery • A small balloon is inflated inside the artery, compressing the deposits against the artery walls • Often, a stent (tiny medical-grade metal structure) is placed to help keep the artery open	Bypass surgery is generally reserved for patients with multiple narrowed arteries. In this surgery: • A surgeon takes a blood vessel from another part of the body • By grafting the new vessel at points above and below the blockages, this bypasses the blocked heart arteries, allowing blood flow around the blockage

About Coronary Angiograms

If a patient is exhibiting symptoms of CAD, a coronary angiogram may be used to determine if there is a blockage of blood flow going to the heart.

What is a coronary angiogram?[5]

- A diagnostic procedure that uses x-rays to make the coronary blood vessels visible
- The most common type of cardiac catheterization procedure

The coronary angiogram procedure[5]

- Performed in the catheterization (cath) lab of a hospital
- A contrast or dye is injected into the blood vessels in the heart
- An x-ray machine produces a series of images (angiograms) that provide information about the condition of the vessels
- The images produced from an angiogram are 2D, black and white depictions of the blood flow

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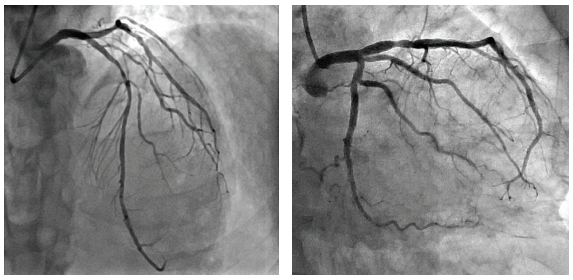
Assessment of the angiograms

After the angiogram images are taken, the physician visually reviews the images to assess the severity of narrowing and/or number of blockages, and then determines the appropriate treatment option — whether it is simply lifestyle changes and medications, or if PCI or surgery is required.[4]

Angiogram images are 2D and black and white, which can make it difficult to decipher just how narrowed an artery is. Angiography is also unable to tell exactly how much blood flow is impacted. A study published in the *New England Journal of Medicine* shows this results in physicians placing stents (one of the CAD treatment options) significantly more often than is needed.[6]



Angiograms

Next-generation technology turns angiograms into objective physiology data[7]

The CathWorks FFRangio™ System is a next-generation, non-invasive diagnostic tool that works with the standard angiogram and creates 3D color-coded model of the coronary arteries. It also estimates the severity of each blockage.

Combining angiography with CathWorks FFRangio™ technology delivers the needed data points (such as flow restriction and degree of narrowing) to help physicians make the best treatment decisions for their patients' CAD.

Reference

1. Texas Heart Institute. Coronary Artery Disease. https://www.texasheart.org/heart-health/heart-information-center/topics/coronary-artery-disease/. Accessed 2/19/2019. **2.**Mayo Clinic. Coronary Artery Disease: Symptoms & Causes. https://www.mayoclinic.org/diseases-conditions/coronary-artery-disease/symptoms-causes/syc-20350613. Accessed 2/19/2019. **3.** American Heart Association. Heart Disease and Stroke Statistics—2018 update. **4.**Mayo Clinic. Coronary Artery Disease: Diagnosis & Treatment. https://www.mayoclinic.org/diseases-conditions/coronary-artery-disease/diagnosis-treatment/drc-20350619. Accessed 2/19/2019. **5.** Mayo Clinic. Coronary angiogram: About. https://www.mayoclinic.org/tests-procedures/coronary-angiogram/about/pac-20384904. Accessed 3/27/2019. **6.** Tonino PAL, et al. Fractional Flow Reserve versus Angiography for Guiding Percutaneous Coronary Intervention. *N Engl J Med*. 2009;360:213-224. **7.** Fearon WF, et al. Accuracy of Fractional Flow Reserve Derived from Coronary Angiography. *Circulation*. 2019;139(4):477-484.

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