**Heart Disease**

Heart disease describes a range of conditions that affect your heart. Diseases under the heart disease umbrella include blood vessel diseases, such as coronary artery disease; heart rhythm problems (arrhythmias); and heart defects you're born with (congenital heart defects), among others.

**age:** age in years

**sex:** sex (1 = male; 0 = female)

**cp:** chest pain type

-- Value 1: **typical angina :** Angina pectoris or typical angina is the discomfort that is noted when the heart does not get enough blood or oxygen. Typically, this is caused by blockage or plaque buildup in the coronary arteries. If one or more of the coronary arteries is partially or completely clogged, the heart will not get enough oxygen.

-- Value 2: **atypical angina :**

The term "atypical chest pain" is a waste-basket term that leads physicians to send any patient with chest pain to coronary angiography. In order to avoid this term, we must learn to distinguish atypical angina from nonanginal chest pain before angiography is considered in order to avoid unnecessary invasive procedures. A chest pain is very likely nonanginal if its duration is over 30 minutes or less than 5 seconds, it increases with inspiration, can be brought on with one movement of the trunk or arm, can be brought on by local fingers pressure, or bending forward, or it can be relieved immediately on lying down. There are also many presumptive signs of nonanginal chest pain such as localization with one finger, radiation to the nuchal area, an inframammary primary site, a pain that reaches maximum at the onset, or relief within a few seconds of swallowing food. Cervical root compression pain and esophageal spasm are the greatest mimics of angina since they can both be relieved by nitroglycerin but they have several features which help to rule out angina

A 64-year-old woman with a history of hypertension and obesity, was admitted in May, 1997, for evaluation of chest pain. The pain was oppressive, located in the precordial region, radiating to the left shoulder and arm. It was accompanied by nausea and sweating and occurred predominantly at night and at rest. It lasted from 15 to 20 min, ending spontaneously. The patient denied dyspnoea, fever, or weight loss. On admission, she was overweight. She had a regular pulse and a blood pressure of 150/95 mm Hg. Heart sounds were normal with no murmurs. The rest of the clinical examination was normal. Baseline laboratory tests including creatinine kinase and arterial blood gas sampling were normal. Chest radiograph showed slight enhancement of the right hilum. Resting electrocardiogram showed sinus rhythm with a rate of 60 beats per min, QRS axis of 0°, and no changes in the ST-T segments. Transthoracic echocardiogram showed normal systolic function. An exercise test was attempted but was discontinued because of poor exercise tolerance. The patient was treated for an unstable coronary syndrome and her symptoms quickly resolved. Since her baseline results were normal, including the electrocardiogram at rest and during pain, she was felt to be at low risk for further events and was discharged taking atenolol 50 mg per day, aspirin 250 mg per day and nitroglycerin as required.

-- Value 3: **non-anginal pain :** A definite nonanginal chest pain category is defended with the possibility of avoiding diagnoses such as "atypical chest pain" or "atypical angina." Confidence in diagnosing chest pains as nonanginal can be attained if attention is paid to new criteria for duration, the effect of respiration, arm or chest movement, local compression, and body position. Because of this novel approach to the diagnosis of chest pain, it has become necessary to point out many of the pitfalls into which the unwary may fall with each nonanginal question.

-- Value 4: **asymptomatic :**

* Lack of chest pain does not exclude ischemic heart disease.
* Asymptomatic ischemia can be induced by physical or mental stress but may occur without any obvious trigger.
* Patients with risk factors should realize the need for early diagnosis even if they have no symptoms.
* Silent ischemia can be detected by ambulatory or exercise ECG, perfusion, or myocardial function tests.
* The clinical significance of silent ischemia is similar to that of symptomatic (painful) ischemia.
* Screening with exercise testing is recommended for healthy asymptomatic subjects with 2 or more risk factors.
* Routine screening with ambulatory monitoring is not indicated.
* The diagnosis of ischemia is confirmed if myocardial perfusion/function studies confirm its presence, with or without pain.
* Because MI may also be silent, awareness is called for when sudden unexplained cardiac symptoms appear.

**Trestbps**: resting blood pressure (in mm Hg on admission to the

hospital)

**chol:** serum cholestoral in mg/dl

## What is Cholesterol?

[Cholesterol](https://www.webmd.com/cholesterol-management/default.htm) helps your body build new cells, insulate nerves, and produce hormones. Normally, the [liver](https://www.webmd.com/digestive-disorders/picture-of-the-liver) makes all the [cholesterol](https://www.webmd.com/cholesterol-management/cholesterol-assessment/default.htm) the body needs. But [cholesterol](https://www.webmd.com/cholesterol-management/video/bernstein-test-cholesterol-levels) also enters your body from food, such as animal-based foods like milk, eggs, and meat. Too much cholesterol in your body is a risk factor for [heart disease](https://www.webmd.com/heart-disease/default.htm).

## How Does High Cholesterol Cause Heart Disease?

When there is too much cholesterol in your [blood](https://www.webmd.com/heart/anatomy-picture-of-blood), it builds up in the walls of your [arteries](https://www.webmd.com/heart/picture-of-the-arteries), causing a process called [atherosclerosis](https://www.webmd.com/heart-disease/what-is-atherosclerosis), a form of [heart disease](https://www.webmd.com/heart-disease/ss/slideshow-visual-guide-to-heart-disease). The arteries become narrowed and [blood](https://www.webmd.com/a-to-z-guides/rm-quiz-blood-basics) flow to the [heart](https://www.webmd.com/heart/picture-of-the-heart) muscle is slowed down or blocked. The blood carries oxygen to the [heart](https://www.webmd.com/heart-disease/rm-quiz-know-heart), and if not enough blood and oxygen reach your heart, you may suffer [chest pain](https://www.webmd.com/pain-management/guide/whats-causing-my-chest-pain). If the blood supply to a portion of the heart is completely cut off by a blockage, the result is a [heart attack](https://www.webmd.com/heart-disease/guide/heart-disease-heart-attacks).

There are two forms of cholesterol that many people are familiar with: Low-density lipoprotein ([LDL](https://www.webmd.com/heart-disease/ldl-cholesterol-the-bad-cholesterol) or "bad" cholesterol) and high-density lipoprotein (HDL or "good" cholesterol.) These are the form in which cholesterol travels in the blood.

[LDL](https://www.webmd.com/cholesterol-management/ss/slideshow-cholesterol-lowering-foods) is the main source of artery-clogging plaque. HDL actually works to clear cholesterol from the blood.

[Triglycerides](https://www.webmd.com/cholesterol-management/lowering-triglyceride-levels) are another fat in our bloodstream. Research is now showing that high levels of [triglycerides](https://www.webmd.com/cholesterol-management/high-triglycerides-treatment-12/slideshow-triglycerides-tips) may also be linked to [heart disease](https://www.webmd.com/heart-disease/video/bernstein-heart-disease-kill).

**restecg:** resting electrocardiographic results

-- Value 0: normal

-- Value 1: having ST-T wave abnormality (T wave inversions and/or ST elevation or depression of > 0.05 mV)

-- Value 2: showing probable or definite left ventricular hypertrophy

by Estes' criteria

For people at low risk of cardiovascular disease, the USPSTF concludes with moderate certainty that the potential harms of screening with resting or exercise ECG equal or exceed the potential benefits. For people at intermediate to high risk, current evidence is insufficient to assess the balance of benefits and harms of screening.

**thalach:** maximum heart rate achieved

The increase in cardiovascular risk, associated with the acceleration of heart rate, was comparable to the increase in risk observed with high blood pressure. It has been shown that an increase in heart rate by 10 beats per minute was associated with an increase in the risk of cardiac death by at least 20%, and this increase in the risk is similar to the one observed with an increase in systolic blood pressure by 10 mm Hg.

**exang:** exercise induced angina (1 = yes; 0 = no)

Exercise-induced angina (AP) is a common complaint of cardiac patients, particularly when exercising in the cold.

The pain or discomfort associated with angina usually feels tight, gripping or squeezing, and can vary from mild to severe. Angina is usually felt in the center of your chest but may spread to either or both of your shoulders, or your back, neck, jaw or arm. It can even be felt in your hands. o Types of Angina a. Stable Angina / Angina Pectoris b. Unstable Angina c. Variant (Prinzmetal) Angina d. Microvascular Angina.

**oldpeak :** ST depression induced by exercise relative to rest

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4958709/>

A treadmill ECG stress test is considered abnormal when there is a horizontal or down-sloping ST-segment depression ≥ 1 mm at 60–80 ms after the J point. Exercise ECGs with up-sloping ST-segment depressions are typically reported as an ‘equivocal’ test. In general, the occurrence of horizontal or down-sloping ST-segment depression at a lower workload (calculated in METs) or heart rate indicates a worse prognosis and higher likelihood of multi-vessel disease. The duration of ST-segment depression is also important, as prolonged recovery after peak stress is consistent with a positive treadmill ECG stress test. Another finding that is highly indicative of significant CAD is the occurrence of ST-segment elevation > 1 mm (often suggesting transmural ischemia); these patients are frequently referred urgently for coronary angiography.

**slope:** the slope of the peak exercise ST segment

-- Value 1: upsloping

-- Value 2: flat

-- Value 3: downsloping

**ca:** number of major vessels (0-3) colored by fluoroscopy

## What Is Fluoroscopy?

The fluoroscopy procedure is an imaging technique that gathers real-time moving images using a fluoroscope of internal structures of patients. A fluoroscope consists of a fluorescent screen and an x-ray beam passing through your body. It mimics an x-ray movie, where continuous images display on a monitor.

Fluoroscopy is extremely helpful to surgeons while they’re performing surgical procedures. It enables doctors to see moving structures of the body and helps with diagnosing diseases. Fluoroscopy offers enormous benefits over invasive surgical procedures since it requires a tiny incision, significantly reducing your risk of infection and recovery time.

A doctor can use fluoroscopy for any of the following reasons:

* **Orthopedic surgery:** Surgery concerned with musculoskeletal system conditions.
* **Catheter insertion:** Inserting a tube into the body.
* **Blood flow studies:** Visualizing the flow of blood to the organs.
* **Enemas:** Inserting a rubber tip into the rectum.
* **Angiography:** x-rays of lymph or blood vessels, including heart, leg and cerebral vessels.
* **Urological surgery:** Surgery of the urinary tract and sex organs.
* **Pacemaker implantation:** Implanting a small electronic device in the chest.

**thal:** 3 = normal; 6 = fixed defect; 7 = reversable defect

Thalassemia (thal-uh-SEE-me-uh) is an inherited blood disorder that causes your body to have less hemoglobin than normal. Hemoglobin enables red blood cells to carry oxygen. Thalassemia can cause anemia, leaving you fatigued.

If you have mild thalassemia, you might not need treatment. But more severe forms might require regular blood transfusions. You can take steps to cope with fatigue, such as choosing a healthy diet and exercising regularly.

**num:** diagnosis of heart disease (angiographic disease status)

-- Value 0: < 50% diameter narrowing

-- Value 1: > 50% diameter narrowing

(in any major vessel: attributes 59 through 68 are vessels)

**Features According to us:**

1. Age

2. Cholestrol

3. Weight

4. Inherited

5. Chain smoker

6. Alcoholic

7. Food habbits

8. Physical Activity

9. Stress

10. Anxiety

11. Blood Pressure

* segregate the numerical and cateorical features
* run a descriptive stats on the numerical features
* for the categorical ones check mainly the distribution across target
* the primary purpose of the EDA is to get the know how of the data and generate insights from the data
* then we can compare the insights with our assumptions
* This would also give us idea which features are having a stronger impact in segregating the ppatients having a aheart disease with the one which are normal
* Also, we would get to know about the %age of null values and outliers in each of the columns