

## Diagnosis of heart failure and its causes

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### Introduction

Heart failure means that the heart is not pumping as it should. It doesn't mean the heart stops, but rather, that over time it loses pumping function, causing fatigue and shortness of breath. It's something nearly 5 million Americans face. Understanding the cellular basis of heart failure before and after it happens, along with genetic mutations and differences in men and women, helps researchers target research and create clinical trials.

The innovative new methods researched ultimately impact patient care. Heart failure is a condition in which the heart can't pump enough oxygenated blood to meet the body's needs. The heart keeps pumping, but not as efficiently as a healthy heart. Heart failure does not mean the heart stops. Rather, it means the heart fails to pump as well as it should. Heart failure generally results from some other underlying condition.

In some cases of heart failure, your heart muscle may become damaged and weakened, and the ventricles stretch (dilate) to the point that the heart can't pump blood efficiently throughout your body. Over time, the heart can no longer keep up with the normal demands placed on it to pump blood to the rest of your body.

Myocardial infarction (MI) remains the most common cause of heart failure (HF) worldwide. For almost 50 years HF has been recognized as a determinant of adverse prognosis after MI, but efforts to promote myocardial repair have failed to translate into clinical therapies. The most common conditions that can lead to heart failure are coronary artery disease, high blood pressure and previous heart attack.

Heart failure begins after an index event produces an initial decline in pumping capacity of the heart. After this initial decline in pumping capacity of the heart, a variety of compensatory mechanisms are activated, including the adrenergic nervous system, the renin-angiotensin system, and the cytokine system. Although many cases of heart failure can't be reversed, treatment can sometimes improve symptoms and help you live longer.

### Diagnosis of Heart Failure

In addition to a complete medical history and physical examination, diagnostic procedures for heart failure may include some combination of the following:

- Chest X-ray: a process that produces pictures of internal tissues, bones and organs

- Echocardiogram (also called echo): an ultrasound of the heart
- Electrocardiogram (ECG or EKG): wires taped to various parts of your body to create a graph of your heart's electrical rhythm
- BNP testing: B-type natriuretic peptide (BNP) is a hormone released from the ventricles in response to increased wall tension (stress) that occurs with heart failure. BNP levels rise as wall stress increases. BNP levels are useful in the rapid evaluation of heart failure. In general, the higher the BNP levels, the worse the heart failure.

### Causes of Heart Failure

Heart failure may result from any or all of the following:

- Previous heart attacks (myocardial infarction) scar tissue from prior damage may interfere with the heart muscle's ability to pump normally.
- Coronary artery disease: narrowing of the arteries that supply blood to the heart muscle
- Heart valve disease caused by past rheumatic fever or other infections
- High blood pressure (hypertension)
- Infections of the heart valves and/or heart muscle
- Cardiomyopathy or other disease of the heart muscle (including genetic or unknown causes)
- Congenital heart disease or defects (present from birth)
- Cardiac arrhythmias (irregular heartbeats)
- Chronic lung disease, such as chronic obstructive pulmonary disease (COPD)
- Pulmonary embolism (blood clot in the lungs) may also cause right heart failure
- Anemia and excessive blood loss

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