

# Shockable vs. Non-Shockable Heart Rhythms

## Look and Learn: Heart Arrhythmias Visualized

Do you know what an irregular heart rhythm looks like? See what medical professionals see on their monitors when assessing and treating a variety of arrhythmias.

### **Normal Heart Rhythm**

#### **Normal Sinus Rhythm**



#### **What is it?**

This is what a healthy heartbeat looks like. If you've ever watched a medical drama and heard the "beep, beep, beep" of an electrocardiogram (or ECG), this rhythm would be flashing onscreen.

#### **Why does it look like that?**

An ECG measures 5 distinct waves, labeled as P, Q, R, S, and T from left to right. Q or S waves don't always appear, so when medical students are first learning to read outputs, they focus on P, R, and T waves.

# Non-Shockable Heart Rhythms

**Pulseless  
Electrical  
Activity (PEA)**



## What is it?

When the heart is not able to pump out blood to create a pulse, but there is still electrical activity within the heart. Hence, pulseless electrical activity.

PEA differs from asystole in that PEA forms wave patterns, and there is electrical activity. It just isn't strong enough to make the heart pump properly. With asystole, there is no detectable pulse or electrical activity.

## Causes

Primary PEA: an issue with the heart itself, usually caused by cardiac arrest.

Secondary PEA: an outside cause that affects the heart.

- Blood loss
- Low oxygen levels
- Dehydration
- Heart attack
- Pulmonary embolism
- Trauma

Toxic effects, like drug intoxication, also contribute to PEA.

## Treatment

If PEA occurs outside of a hospital, immediate CPR is needed.

Inside a hospital, epinephrine can be given to restart the heart. If PEA is being caused by an underlying condition, addressing the underlying condition is necessary.

# Non-Shockable Heart Rhythms (cont.)

## Asystole

### What is it?

Also known as “flat-lining”, asystole occurs when the heart’s electrical system fails completely. The name comes from the seemingly flat line on an electrocardiogram, as shown above.

Asystole is a type of cardiac arrest. Without immediate CPR or emergency medical intervention, asystole becomes deadly, fast.

A heartbeat can be divided into two steps: systole (squeezing) and diastole (releasing). The prefix “a” signifies a lack, so a lack of squeezing.

### Causes

Asystole can be caused by any pre-existing health condition or event that causes cardiac arrest or disruption of the heart’s electrical system.

Common causes include:

- Blood loss
- Low oxygen levels
- Dehydration (or electrolyte imbalance)
- Heart attack
- Trauma
- Electrocutation
- Other arrhythmias listed here (such as V-fib or V-tach)

Drug use and abuse can also contribute to asystole.

### Treatment

If asystole occurs outside of a hospital, immediate CPR is needed.

Inside a hospital, epinephrine can be given to restart the heart. If asystole is being caused by an underlying condition, addressing the underlying condition is necessary.

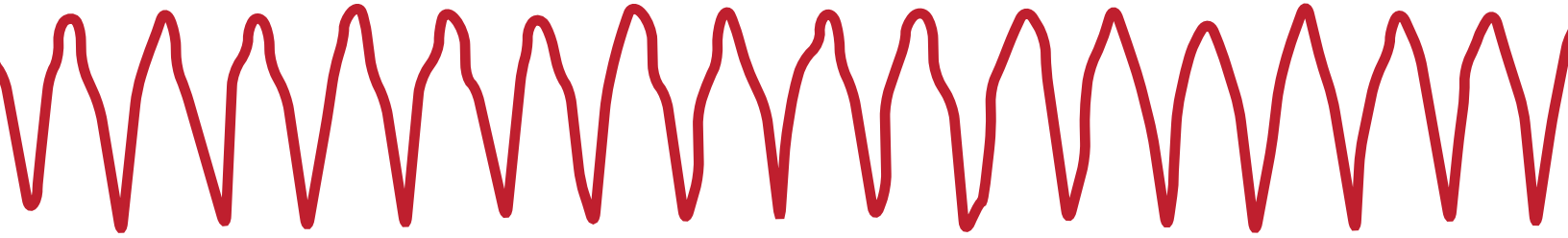
Asystole is not considered a shockable rhythm, as defibrillation may make it more difficult to restart the heart.

#### **Important Note:**

*A non-shockable heart rhythm means that an electrical shock from an AED will not help. **However, an AED can assess a heart rhythm to determine if shock is needed.** An AED will not deliver an electrical shock if it detects a non-shockable heart rhythm. High quality CPR and advanced care are needed for non-shockable heart rhythms.*

# Shockable Heart Rhythms

## Ventricular Tachycardia (V-Tach)



### What is it?

Ventricular tachycardia, also known as V-tach, is distinguished by a pulse rhythm of 100 beats per minute or more. When the lower chamber of the heart beats too fast to pump properly, the body can't receive enough oxygenated blood, and the heart goes into V-tach.

V-tach can lead to ventricular fibrillation, a life-threatening arrhythmia (see below).

### Causes

Usually, V-tach occurs when the heart tissue has been damaged. The resulting scar tissue blocks or reroutes the original electrical pathways.

How does this happen?

- Heart attack
- Cardiomyopathy (heart failure)
- Myocarditis
- Heart valve disease

Sometimes, ventricular tachycardia can develop in people with no known heart disease. This is called idiopathic ventricular tachycardia.

### Treatment

V-tach can be treated medically or surgically.

Options for treatment include:

- Radiofrequency ablation
- Implantable defibrillator
- Antiarrhythmic medication

Lifestyle changes do not usually impact the occurrence of V-tach.

## Shockable Heart Rhythms (cont.)

### Ventricular Fibrillation (V-Fib)



#### What is it?

Ventricular fibrillation, also known as V-fib, happens when the ventricles of the heart can't conduct an effective heartbeat. Normally, the lower chambers of the heart pump in syncopation. During V-fib, the heart chambers contract in a rapid and spastic way.

V-fib is an emergency condition requiring immediate treatment. Ventricular fibrillation is the most frequent cause of sudden cardiac death.

#### Causes

V-fib can have an unknown cause. More frequently, it occurs when the blood supply to the heart or the electrical functioning of the heart is interrupted.

#### Treatment

Unlike arrhythmias that may be treated with medication or surgery, V-fib requires immediate medical attention. Emergency treatment includes CPR and electric shock via AED. Medications or surgery may be used as **preventative** treatment for ventricular fibrillation.

#### **Important Note:**

*A shockable heart rhythm is one that can be treated with an AED. **This does not mean that CPR is not needed.** In cases of V-tach and V-fib, the circulation of blood in the body has been arrested or interrupted. CPR is essential to manually continue circulation.*