**What to know about epinephrine and norepinephrine**

* [What are they?](https://www.medicalnewstoday.com/articles/325485#what-are-epinephrine-and-norepinephrine)
* [Deficiency](https://www.medicalnewstoday.com/articles/325485#deficiency)
* [High levels](https://www.medicalnewstoday.com/articles/325485#high-levels)
* [Medical uses](https://www.medicalnewstoday.com/articles/325485#medical-uses)
* [Summary](https://www.medicalnewstoday.com/articles/325485#summary)

Epinephrine and norepinephrine belong to a group of compounds called catecholamines, and they act as both neurotransmitters and hormones. While these compounds have similar chemical structures, they produce different effects on the body.

Epinephrine is also known as adrenaline, while some people refer to norepinephrine as noradrenaline. Both of these substances play a role in the regulation of the sympathetic nervous system, which is the part of the autonomic nervous system that is responsible for the body’s “fight or flight” response.

In this article, we discuss the similarities and differences between epinephrine and norepinephrine, along with their functions. We also cover their medical uses and the health effects of having too much or too little of either compound in the body.

**What are epinephrine and norepinephrine?**

Epinephrine and norepinephrine both play a role in the body’s “fight-or-flight” response.

Epinephrine and norepinephrine are both hormones and neurotransmitters.

Hormones are chemical messengers that travel through the bloodstream. The endocrine glands and reproductive organs make and secrete a wide range of hormones to regulate the body’s organs, tissues, and cells.

Neurotransmitters are also a type of chemical messenger, but they only occur in nerve cells and travel across synapses, which are junctions where two nerve fibers meet. Nerves cells produce neurotransmitters in response to electrical impulses.

The adrenal medulla, the inner portion of the adrenal gland, regulates and secretes both epinephrine and norepinephrine in response to [stress](https://www.medicalnewstoday.com/articles/145855.php) and other imbalances in the body, such as low [blood pressure](https://www.medicalnewstoday.com/articles/270644.php).

Epinephrine activates both alpha- and beta-adrenoreceptors in cells, whereas norepinephrine mainly stimulates alpha-adrenoreceptors.

We discuss the main functions of epinephrine and norepinephrine below:

**Epinephrine**

When the brain perceives danger, the amygdala triggers the hypothalamus to activate the autonomic nervous system.

Signals from the autonomic nervous system stimulate the adrenal gland to start pumping epinephrine into the bloodstream. People often refer to this surge of epinephrine as an adrenaline rush or the fight or flight response.

Epinephrine affects the heart, lungs, muscles, and blood vessels. Its release into the bloodstream brings about several physiological changes, such as:

* increased heart rate and blood flow
* faster breathing
* raised blood sugar levels
* increased strength and physical performance

**Norepinephrine**

The adrenal medulla produces norepinephrine in response to low blood pressure and stress. Norepinephrine promotes vasoconstriction, which is a narrowing of the blood vessels, and this increases blood pressure.

Like epinephrine, norepinephrine also increases the heart rate and blood sugar levels.

**Effects of deficiency**

Chronic stress, poor [nutrition](https://www.medicalnewstoday.com/articles/160774.php), some medications, and certain health conditions can affect the body’s ability to produce or respond to epinephrine and norepinephrine.

A rare condition called genetic dopamine beta-hydroxylase deficiency prevents the body from converting dopamine into norepinephrine.

According to a [2018 article](https://journals.lww.com/jhypertension/Fulltext/2018/07000/The_norepinephrine_transporter_deserves_more.7.aspx), genetic dopamine beta-hydroxylase deficiency results from a mutation in the norepinephrine transporter gene g237c. The authors concluded that this condition might decrease sympathetic nerve activity and increase the risk of damage to the heart and blood vessels.

Low levels of epinephrine and norepinephrine can result in physical and mental symptoms, such as:

* [anxiety](https://www.medicalnewstoday.com/info/anxiety/)
* [depression](https://www.medicalnewstoday.com/kc/depression-causes-symptoms-treatments-8933)
* changes in blood pressure
* changes in heart rate
* low blood sugar, or [hypoglycemia](https://www.medicalnewstoday.com/articles/166815.php)
* migraine [headaches](https://www.medicalnewstoday.com/articles/73936.php)
* problems sleeping

In addition, norepinephrine plays a role in focus and promotes periods of sustained attention. Low levels of norepinephrine may contribute to the development of attention deficit hyperactivity disorder ([ADHD](https://www.medicalnewstoday.com/info/adhd/)).

The following medications can increase levels of norepinephrine:

* amphetamines, such as methylphenidate (Ritalin) and dextroamphetamine ([Adderall](https://www.medicalnewstoday.com/articles/326219.php))
* serotonin-norepinephrine reuptake inhibitors (SNRIs), such as venlafaxine (Effexor) and [duloxetine](https://www.medicalnewstoday.com/articles/248214.php) (Cymbalta)

**Effects of high levels**

Having high levels of epinephrine or norepinephrine can cause high blood pressure.

Certain medical conditions, such as tumors, chronic stress, and [obesity](https://www.medicalnewstoday.com/info/obesity/how-much-should-i-weigh.php), can affect the adrenal glands and cause excess production of epinephrine and norepinephrine.

Symptoms of high levels of epinephrine or norepinephrine can [include](https://www.hormone.org/diseases-and-conditions/adrenal/adrenal-incidentaloma):

* [excessive sweating](https://www.medicalnewstoday.com/articles/182130.php)
* rapid or irregular heartbeat
* [high blood pressure](https://www.medicalnewstoday.com/articles/159283.php)
* jitteriness or shakiness
* intense headaches
* pale or cold skin

A [2018 research paper](https://journals.lww.com/jhypertension/Fulltext/2018/07000/The_norepinephrine_transporter_deserves_more.7.aspx) states that having high levels of norepinephrine can increase a person’s risk of cardiovascular and kidney damage.

An epinephrine overdose can occur in people who use epinephrine injections to treat certain medical conditions. An overdose of injected epinephrine [can lead to](https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=fee44162-aaf2-4e89-9f83-2d3a8ff76760) dangerously high blood pressure, [stroke](https://www.medicalnewstoday.com/articles/7624.php), or even death.

**Medical uses**

Synthetic forms of epinephrine and norepinephrine have several medical uses, which we discuss below:

**Epinephrine**

Doctors prescribe epinephrine to treat severe medical conditions that affect the heart and airways, such as [anaphylaxis](https://www.medicalnewstoday.com/articles/216062.php).

Anaphylaxis is a severe allergic reaction that can interfere with a person’s ability to breathe, and it requires emergency medical treatment. Epinephrine counters anaphylactic shock by narrowing the blood vessels, relaxing the muscles, and opening up the airways.

It is common for people at risk of anaphylaxis to carry an epinephrine autoinjector with them at all times.

Doctors also use epinephrine to treat severe [asthma](https://www.medicalnewstoday.com/info/asthma/) attacks, cardiac arrest, and serious infections.

**Norepinephrine**

Norepinephrine can help raise systolic blood pressure in people who have had a [heart attack](https://www.medicalnewstoday.com/articles/151444.php).

Doctors also use norepinephrine [to treat](https://pubchem.ncbi.nlm.nih.gov/compound/Norepinephrine#section=Toxicity-Summary):

* septic shock
* neurogenic shock
* pericardial tamponade
* critical [hypotension](https://www.medicalnewstoday.com/articles/159609.php)

**Summary**

Epinephrine and norepinephrine are similar chemicals that act as both neurotransmitters and hormones in the body. Both substances play an important role in the body’s fight or flight response, and their release into the bloodstream causes increased blood pressure, heart rate, and blood sugar levels.

Epinephrine acts on the alpha- and beta-adrenoreceptors in the muscles, lungs, heart, and blood vessels. Norepinephrine is a metabolite of dopamine that primarily acts on the alpha-adrenoreceptors in the blood vessels.

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