HEALTH BASICS

Adrenal glands

The adrenal glands are two small organs that make hormones controlling stress responses, blood pressure, salt balance, and metabolism.

WHAT IT IS
Two small hormone-making organs above the kidneys

WHERE IT COMES UP
Scans, hormone tests, or adrenal-related diagnoses

WHY IT MATTERS
Their hormones regulate stress responses, blood pressure, salt, and metabolism

WHAT IT IS NOT
Not a disease or diagnosis

WHO TO ASK
Primary care clinician or endocrinology service

HOW IT IS CHECKED
Blood, urine, saliva, and imaging tests

Overview

The adrenal glands are two small organs, one above each kidney. They are part of the endocrine system, the network of organs that makes and releases hormones.

Hormones are chemical messengers carried through the bloodstream. Adrenal hormones help control blood pressure, salt and water balance, metabolism, immune activity, and the body's response to physical or emotional stress.

The adrenal glands are not a disease or diagnosis. They may be mentioned because of an abnormal hormone test, a condition affecting hormone production, or a lump found unexpectedly on a scan.

Each gland has two main parts: an outer layer called the adrenal cortex and an inner area called the adrenal medulla . These parts make different hormones and respond to different signals from the brain, nerves, and kidneys.

How it works

The adrenal cortex makes several steroid hormones. "Steroid like prednisone or hydrocortisone " describes their chemical structure. It does not mean the same thing as anabolic steroids used to increase muscle.

Cortisol helps maintain blood pressure and blood glucose. It also affects inflammation, immune activity, and how the body uses protein, fat, and carbohydrate. Cortisol normally follows a daily rhythm, with higher levels around waking and lower levels near bedtime. Illness, injury, surgery, and other forms of stress can increase production.

Cortisol release is controlled through signals between the hypothalamus and pituitary gland in the brain and the adrenal glands. This system is called the hypothalamic-pituitary-adrenal, or HPA, axis.

Aldosterone helps the kidneys balance sodium, potassium, and water. This affects blood volume and blood pressure. Its release is influenced mainly by kidney signals and the amount of potassium in the blood.

The cortex also makes adrenal androgens , which are hormones related to testosterone. They contribute to body hair and sexual development. Their effects differ with age, sex, and the amount produced by other organs.

The adrenal medulla makes epinephrine and norepinephrine , also called adrenaline and noradrenaline. These hormones work with the nervous system during a "fight or flight" response. They can temporarily increase heart rate, blood pressure, alertness, and blood flow to muscles.

The glands do not work independently. Their hormone production is adjusted continuously in response to signals from elsewhere in the body.

Why it matters for your health

Adrenal hormones must stay within useful ranges. Too little or too much of a hormone can affect several body systems at once.

Adrenal glands often come up during investigations for changes in blood pressure, sodium or potassium levels, unusual cortisol results, or concerns about hormone development. They may also be examined when a person has a known pituitary, genetic, autoimmune, or cancer-related condition.

A scan performed for another reason may show an adrenal lump. This is sometimes called an adrenal incidentaloma , meaning an adrenal mass found by chance. It does not describe whether the lump makes hormones or whether it is cancerous.

Many adrenal lumps are noncancerous growths called adenomas. Even so, a clinician may review the lump's size and appearance and check whether it is producing excess hormones. The need for repeat imaging or testing is based on those findings and the person's overall health.

Having an adrenal gland removed does not always cause hormone deficiency. One healthy gland can usually make enough hormones for the body. If both glands are removed or stop working, replacement hormones are generally required.

What can go wrong

Several named conditions can involve the adrenal glands or the systems controlling them.

Adrenal insufficiency means the body does not have enough cortisol. Primary adrenal insufficiency results from damage to the adrenal cortex. Addison's disease is a form of primary adrenal insufficiency. Secondary or tertiary adrenal insufficiency can occur when signals from the pituitary gland or hypothalamus are reduced. It can also follow prolonged use of corticosteroid medicines, especially if they are stopped too quickly.

An adrenal crisis is a severe, urgent shortage of cortisol. It can cause marked weakness, repeated vomiting or diarrhea, low blood pressure, confusion, collapse, or loss of consciousness. The risk is especially important for someone with known adrenal insufficiency or recent long-term corticosteroid use.

Cushing syndrome results from long-term exposure to too much cortisol. An adrenal growth is one possible cause, but excess cortisol can also come from the pituitary gland, another tumour, or corticosteroid medicines.

Primary aldosteronism is excess aldosterone production. It can contribute to high blood pressure and sometimes low potassium. The cause may involve one adrenal gland or both.

A pheochromocytoma is a rare tumour arising from cells that make epinephrine and norepinephrine. A related tumour outside the adrenal gland is called a paraganglioma. These tumours can release hormones in bursts or continuously.

Congenital adrenal hyperplasia is a group of inherited conditions affecting enzymes needed to make adrenal steroid hormones. The hormone effects and severity differ according to the specific enzyme change.

Adrenal masses can also include cysts, bleeding, infections, adrenocortical cancer, or cancer that has spread from another organ. A scan finding alone cannot reliably establish the cause or show whether hormone production is abnormal.

What you can do

There is no routine adrenal screening recommended for everyone. If you feel well and have no relevant test result or medical condition, there is usually nothing specific you need to monitor.

If an adrenal lump appears on a scan, useful questions include:

Hormone testing should match the question being investigated. Tests may include morning cortisol and ACTH blood tests, a stimulation test, saliva or urine cortisol, an overnight dexamethasone suppression test, aldosterone and renin measurements, or blood or urine metanephrines. Metanephrines are breakdown products of epinephrine and norepinephrine.

Keep an up-to-date list of medicines, injections, creams, and inhalers. Corticosteroids can affect adrenal testing and cortisol production. Do not stop a prescribed corticosteroid suddenly unless the prescribing service has given you a safe plan.

Arrange routine follow-up if you have an unexplained adrenal scan finding, an abnormal hormone result, ongoing blood pressure concerns, or questions about long-term corticosteroid use. These findings need interpretation in context and do not establish a diagnosis by themselves.

Seek urgent medical help for severe vomiting, confusion, fainting, collapse, or extreme weakness if you have known adrenal insufficiency or may have recently stopped long-term corticosteroids. Use any emergency plan or injectable medicine already prescribed for adrenal crisis.

Call emergency services for loss of consciousness, severe breathing difficulty, chest pain, signs of shock, or another immediate threat to life.

- Does it have reassuring or concerning imaging features?
- Should I have hormone tests?
- Is repeat imaging needed, and if so, when?
- Does the result need review by an endocrinology service?

Common questions

Are the adrenal glands part of the kidneys?

No. They sit above the kidneys but are separate organs. The kidneys help regulate aldosterone release, so the two systems work closely together.

Can you live with one adrenal gland?

Usually, yes. One healthy adrenal gland can generally produce enough hormones. Follow-up may still be needed if the other gland was removed because of a tumour or hormone disorder.

What is "adrenal fatigue"?

"Adrenal fatigue" is not a recognised medical diagnosis. The idea that everyday stress makes the adrenal glands wear out has not been supported by reliable testing. Tiredness is real and can have many causes, so persistent fatigue deserves an appropriate medical assessment rather than unproven adrenal tests or supplements.

Can stress damage the adrenal glands?

Normal stress responses change hormone levels temporarily but do not usually damage the glands. Physical illness, autoimmune disease, bleeding, infection, certain genetic conditions, and some medicines can affect adrenal function.

Are adrenal supplements safe?

Products marketed for "adrenal support" are not a substitute for medical testing or prescribed hormone replacement. Some may contain active hormone ingredients or interfere with medicines and laboratory results. Ask a pharmacist or clinician before using them.

Can a scan show whether an adrenal gland works normally?

Not by itself. Imaging shows structure, such as the size and appearance of a mass. Blood, urine, or saliva tests are used to assess hormone production.

Sources

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