CONDITION

Cushing syndrome

Cushing syndrome is a collection of health problems caused by too much cortisol in the body over time.

WHAT IT IS
Long-term exposure to too much cortisol

BODY SYSTEM
Hormones and metabolism

MAIN SYMPTOMS
Weight gain, muscle weakness, easy bruising, skin changes

WHAT CAUSES IT
Steroid medicines or excess cortisol production

HOW IT IS DIAGNOSED
Saliva, urine, and dexamethasone cortisol tests

MAIN TREATMENT
Steroid reduction, surgery, radiation, or cortisol-lowering medicines

CAN IT BE CURED?
Sometimes - when the cortisol source is removed

IS IT AN EMERGENCY?
Sometimes - fainting after treatment may signal adrenal crisis

LONG-TERM OUTLOOK
Often improves after treatment; recovery may take years

Overview

Cushing syndrome happens when your body is exposed to too much cortisol for a long time. Cortisol is made by the adrenal glands, which sit above the kidneys. It helps control blood pressure, blood sugar, inflammation, and the response to physical stress.

The most common cause is prolonged treatment with corticosteroid medicines, also called glucocorticoids or steroids like prednisone or hydrocortisone . Cushing syndrome can also occur when the body makes too much cortisol because of a pituitary, adrenal, or other tumour.

It can affect weight, skin, muscles, bones, mood, blood pressure, and blood sugar. Symptoms often develop gradually and resemble more common conditions, so diagnosis may take time.

Cushing syndrome is different from Cushing disease . Cushing disease is a specific type

caused by a usually non-cancerous pituitary tumour that releases too much adrenocorticotropic hormone, or ACTH. ACTH tells the adrenal glands to make cortisol.

Treatment aims to return cortisol to a safe level and address the cause.

Symptoms

Symptoms usually build over months or years. Not everyone develops the same pattern, and many symptoms can have other causes.

Common physical changes include:

Other symptoms include high blood pressure, raised blood sugar or diabetes, tiredness, headaches, and leg swelling. Some people experience depression, anxiety, irritability, poor sleep, or difficulty concentrating.

People who menstruate may have irregular or absent periods and increased facial or body hair. Reduced sexual interest, erection problems, and reduced fertility can occur.

In children, weight gain together with slower-than-expected height growth is an important pattern. Most children who gain weight do not have Cushing syndrome, but reduced growth makes hormonal assessment more relevant.

- Weight gain, especially around the abdomen, chest, neck, and face
- Relatively thin arms and legs because of muscle loss
- A rounded or fuller face
- Fat around the upper back or above the collarbones
- Thin skin that bruises easily
- Wide purple or reddish stretch marks, often on the abdomen
- Slow healing and frequent skin infections
- Weak hips and shoulders, such as difficulty climbing stairs
- Bone loss or fractures after a minor injury

Causes and risk factors

Cushing syndrome has two broad groups of causes.

Medication-related Cushing syndrome results from prolonged exposure to corticosteroids used for conditions such as asthma, inflammatory bowel disease, arthritis, and autoimmune

disorders. Tablets are most likely to cause whole-body effects, but repeated injections or high exposure from inhaled, injected, or skin treatments can contribute.

Risk depends on the dose, treatment length, how the medicine enters the body, and other medicines that affect its breakdown. Never stop a prescribed steroid suddenly. Long-term treatment can reduce natural cortisol production, making abrupt withdrawal unsafe.

Endogenous Cushing syndrome means the body is producing too much cortisol. Causes include:

Most pituitary and adrenal tumours responsible for Cushing syndrome are non-cancerous. Some ACTH-producing tumours elsewhere can be cancerous.

These tumours usually occur without a clear reason. Rare inherited conditions increase the chance of certain hormone-producing tumours, but most cases are not inherited.

- A pituitary tumour producing excess ACTH, called Cushing disease
- A tumour elsewhere producing ACTH, known as ectopic ACTH production
- An adrenal tumour or adrenal gland overgrowth producing cortisol directly

Diagnosis

Diagnosis begins with a review of symptoms, physical changes, and all medicines containing steroids, including tablets, injections, inhalers, nasal sprays, creams, and non-prescription products.

When medicines do not explain the symptoms, tests check whether cortisol production is abnormally high. Common tests include:

Cortisol naturally changes through the day. Stress, disrupted sleep, alcohol, pregnancy, medicines, and other illnesses can affect results, so an abnormal test may need to be repeated or checked another way.

If excess cortisol is confirmed, an ACTH blood test helps locate its source. Low ACTH points toward an adrenal cause. Normal or high ACTH suggests a pituitary or other ACTH-producing source.

MRI or CT scans may examine the pituitary, adrenal glands, chest, or abdomen. Small pituitary abnormalities may not be visible, while harmless abnormalities can appear by chance. If the source remains uncertain, inferior petrosal sinus sampling may compare ACTH in veins near the pituitary with levels elsewhere.

- Late-night salivary cortisol: measures cortisol when it should normally be low

- 24-hour urinary free cortisol: measures cortisol released into urine over a full day
- Dexamethasone suppression test: checks whether a steroid-like medicine lowers cortisol appropriately

Treatment and management

Treatment depends on the cortisol source, the severity of its effects, and your general health.

For medication-related Cushing syndrome, a clinician may gradually reduce the steroid, change how it is given, or consider another treatment for the original condition. This must be carefully planned because natural cortisol production may take months or longer to recover.

For endogenous Cushing syndrome, surgery is often used when a removable tumour is responsible. Pituitary tumours are usually approached through the nose and sphenoid sinus. Treatment may instead involve removing one adrenal gland or an ACTH-producing tumour elsewhere.

Cortisol-lowering medicines may be used before surgery, when surgery is not possible, or if cortisol remains high afterward. They may reduce cortisol production, block its effects, or reduce ACTH. Monitoring is essential because cortisol can fall too low, and some medicines affect the liver, blood pressure, potassium, or other hormones.

Radiation may be considered for a pituitary tumour that remains or returns after surgery. It can take months or years to work, so medicine may be needed during that period.

In difficult cases, both adrenal glands may be removed. Lifelong replacement with adrenal hormones is then essential.

After successful treatment, temporary cortisol replacement is often needed while the body recovers. Care may also address high blood pressure, diabetes, infections, bone loss, blood clots, or mental health symptoms.

Complications

Untreated or poorly controlled Cushing syndrome can increase the risk of:

Treatment can cause cortisol to become too low, called adrenal insufficiency. A sudden severe shortage, known as an adrenal crisis, can cause vomiting, abdominal pain, marked weakness, low blood pressure, confusion, or collapse. It requires emergency treatment.

Tumours and cortisol excess can return, so long-term follow-up remains important after successful treatment.

- High blood pressure, heart disease, stroke, and blood clots
- Type 2 diabetes and abnormal cholesterol
- Osteoporosis and fractures
- Serious or repeated infections
- Loss of muscle strength and mobility
- Depression, anxiety, and memory or concentration problems
- Reduced fertility and menstrual or sexual problems

Prevention

Cushing syndrome caused by a hormone-producing tumour usually cannot be prevented. These tumours are generally not caused by diet, weight, stress, or something you did.

Medication-related Cushing syndrome may sometimes be limited by using steroids only as prescribed and attending monitoring appointments. The aim is to control the condition without unnecessary steroid exposure.

Do not reduce or stop a steroid on your own. Sudden withdrawal after prolonged use can cause adrenal insufficiency and allow the original illness to flare.

Living with it and what to expect

Recovery is often gradual. Cortisol may improve quickly after treatment, but changes in strength, weight, skin, bones, mood, and blood sugar can take months or years. Long-standing bone loss or cardiovascular complications may not fully reverse.

You may initially feel worse because your body has adapted to high cortisol. Tiredness, aching, weakness, nausea, and low mood can occur while natural production recovers. Prescribed replacement steroids may be adjusted based on symptoms and tests.

Physical activity may need to increase slowly because muscle weakness and fragile bones raise the risk of falls or injury. Rehabilitation or physiotherapy can help rebuild strength safely.

Follow-up commonly includes cortisol tests and checks of blood pressure, blood sugar, bone health, and other complications. People treated for pituitary Cushing disease may also need pituitary hormone tests and repeat imaging.

Remission means cortisol excess is controlled, but follow-up should continue because recurrence can happen years later. Discuss returning symptoms with a clinician rather than

assuming they are caused by ageing or weight change.

Many people return to usual activities after effective treatment. Recovery varies according to the cause, complications, and duration of cortisol excess.

When to get medical help

Arrange a routine appointment if you develop progressive features such as easy bruising, wide purple stretch marks, worsening muscle weakness, and weight gain around the trunk and face. Mention all steroid medicines, including injections, inhalers, sprays, and creams.

If you have Cushing syndrome, seek prompt medical advice for a new fever, signs of infection, rapidly worsening swelling, severe mood changes, or signs that blood pressure or blood sugar is poorly controlled.

Get emergency help for chest pain, sudden shortness of breath, coughing up blood, one-sided weakness, or sudden difficulty speaking. These may indicate a heart problem, blood clot, or stroke.

After surgery or while reducing or replacing steroids, get emergency help for repeated vomiting, severe weakness, fainting, confusion, or collapse. These may be signs of adrenal crisis. Follow any emergency steroid plan you have been given.

Common questions

Is Cushing syndrome the same as Cushing disease?

No. Cushing syndrome describes the effects of excess cortisol from any cause. Cushing disease is caused by an ACTH-producing pituitary tumour.

Can stress cause Cushing syndrome?

Everyday stress can temporarily raise cortisol but does not usually cause Cushing syndrome. Severe depression, heavy alcohol use, and some other conditions can cause similar symptoms or test results.

Will I lose weight after treatment?

Some people lose weight as cortisol returns to a safer level, but this is not always immediate or complete. Muscle recovery, medicines, sleep, mobility, and other conditions also affect weight.

Is Cushing syndrome cancer?

Cushing syndrome itself is not cancer. Most pituitary and adrenal tumours that cause it are

non-cancerous, although some tumours producing ACTH or cortisol can be cancerous.

Can Cushing syndrome come back after surgery?

Yes. Recurrence is possible, particularly after pituitary tumour treatment. Ongoing hormone tests and attention to returning symptoms help detect it.

Why can I not stop steroid medicine suddenly?

Prolonged treatment can reduce the adrenal glands' own cortisol production. Stopping suddenly may cause adrenal insufficiency or an adrenal crisis.

Sources

- National Institute of Diabetes and Digestive and Kidney Diseases: Cushing's Syndrome
- NHS: Cushing's syndrome
- Endocrine Society Clinical Practice Guideline: The Diagnosis of Cushing's Syndrome, 2008
- Endocrine Society Clinical Practice Guideline: Treatment of Cushing's Syndrome, 2015
- Pituitary Society Consensus: Diagnosis and Management of Cushing's Disease, 2021 00235-7)