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## Hormones – cortisol and corticosteroids

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### Summary

- Cortisol is a hormone made by the two adrenal glands (one is located on each kidney).
  - Some disorders can be treated with synthetic corticosteroids.
  - One of the main side effects of long-term treatment with corticosteroids is osteoporosis (thinning of the bones).
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Cortisol is a hormone made by the two adrenal glands (one is located on each kidney) and it is essential for life. Cortisol helps to maintain blood pressure, immune function and the body's anti-inflammatory processes. Located inside the brain, the pituitary gland regulates the amount of cortisol released by the adrenal glands.

Specialists sometimes use synthetic cortisol-like compounds known as corticosteroids to treat common cortisol-related disorders. If taken at high doses or for a prolonged period, this treatment can have a number of side effects, including osteoporosis (thinning of the bones) and developing diabetes.

### Role of cortisol in the body

Cortisol can:

- help the body to manage stress
- convert protein into glucose to boost flagging blood sugar levels
- work in tandem with the hormone insulin to maintain constant blood sugar levels
- reduce inflammation
- contribute to the maintenance of constant blood pressure
- contribute to the workings of the immune system.

### Conditions treated with corticosteroids

A number of common conditions respond well when treated with corticosteroids (cortisol-like medications) including:

- skin disorders – such as psoriasis and dermatitis
- inflammatory diseases – such as asthma, ulcerative colitis, lupus and some forms of arthritis
- cancer – particularly cancers related to the immune system, such as leukaemia and lymphoma
- organ transplant – corticosteroids are used to inhibit the body's immune response so that a transplanted organ is not rejected
- **Addison's disease** – an autoimmune disorder that stops the adrenal glands from making sufficient hormones, including cortisol.

Cortisone (manufactured for use as a treatment) is used to manage rather than treat Addison's disease by replacing the cortisol naturally produced by the body. This may also occur in the management of pituitary disease. The dose required is much lower than the other examples above.

### Types of corticosteroids

The type of corticosteroids administered depends on the person's condition. Where specialists use synthetic forms to treat these disorders, treatment forms include:

- creams – applied to the affected areas of the skin
  - tablets – dosage varies, but is generally kept to the lowest dose possible
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- injections – injecting straight into the affected joint, which prevents many of the side effects that occur with oral medication (taken by mouth)
- inhaler – administered to treat inflammation in the lungs or sinuses.

### **Side effects of corticosteroids**

As cortisol acts on so many organs and tissues of the body, people treated with corticosteroids may experience unwanted side effects. Suddenly stopping the medication can be dangerous, so continue taking your regular dose and see your doctor if you are troubled by side effects.

Some of the more common side effects of cortisol-like drugs include:

- thin skin
- susceptibility to bruising
- high or increased blood pressure
- susceptibility to infections
- build-up of fat around the face, chest and abdomen
- thinning of the limbs
- osteoporosis (thinning of the bones) leading to bone fractures, particularly in the spine
- fluid retention (oedema)
- diabetes.

### **Corticosteroid-induced osteoporosis**

Corticosteroids can cause a loss of bone density in men and women, particularly among postmenopausal women. The bones of the spine are the most vulnerable to fracturing in this setting. Corticosteroids interfere with the proper functioning of bone cells and prevent the intestine from properly absorbing calcium, which also affects the bones.

Symptoms of osteoporosis can include:

- bone fractures
- severe back pain
- kyphosis (hunching of the upper back)
- loss of height.

### **Managing the side effects of corticosteroids**

Suggestions to manage the side effects of cortisol treatment include:

- Reduce the daily dose under strict medical supervision.
- Seek immediate treatment for any infection.
- Use vitamin D and calcium supplements.
- Use other medications and do weight-bearing exercise to maintain bone strength.

### **High-dose corticosteroids**

Disruption of the workings of the pituitary and adrenal glands may occur where long periods of high-dose corticosteroids have severely decreased the body's natural cortisol production. When a person stops taking high-dose corticosteroids, they may experience cortisol insufficiency.

Symptoms of cortisol insufficiency can include:

- fatigue
- nausea and vomiting
- low blood pressure, particularly when standing up from a sitting or lying position (orthostatic hypotension)
- low blood sugar
- shock

- coma.

### High levels of cortisol and Cushing's syndrome

Cushing's syndrome is characterised by high levels of the hormone cortisol. Another name for Cushing's syndrome is hypercortisolism.

Some people develop Cushing's syndrome symptoms when they take high levels of oral corticosteroid medication to treat inflammatory conditions such as asthma, lupus or rheumatoid arthritis. Other causes include tumours of the pituitary and adrenal glands, and tumours in other areas of the body. In these cases the body itself is producing too much cortisol.

Symptoms of Cushing's syndrome may include:

- weight gain in the face, abdomen and chest
- wasting of the limbs
- a fatty hump between the shoulders
- flushed face
- high blood pressure
- skin changes – such as thin skin, easily bruised, slow healing and ulcers
- mood swings
- weakened bones
- irregular (or absence of) periods.

For more information visit Better Health Channel's **Cushing's syndrome** fact sheet.

### Where to get help

- Your doctor

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