CONDITION

Multiple endocrine deficiency syndrome

Multiple endocrine deficiency syndrome is a group of conditions in which several hormone-producing glands stop working properly.

WHAT IT IS
Failure of several hormone-producing glands

BODY SYSTEM
Hormone and immune systems

MAIN SYMPTOMS
Fatigue, weakness, weight change, dizziness

WHAT CAUSES IT
Usually autoimmune; sometimes inherited AIRE gene changes

HOW IT IS DIAGNOSED
Hormone blood tests, antibody tests, sometimes genetic testing

MAIN TREATMENT
Hormone replacement and treatment of related autoimmune problems

CAN IT BE CURED?
No - gland damage is often permanent

IS IT AN EMERGENCY?
Sometimes - adrenal crisis or diabetic ketoacidosis

LONG-TERM OUTLOOK
Good with monitoring and consistent hormone replacement

Overview

Multiple endocrine deficiency syndrome describes a group of conditions in which two or more endocrine glands do not make enough hormones. Endocrine glands release hormones that control functions such as energy use, blood pressure, blood sugar, growth, calcium balance, and sexual development.

Clinicians often use the term autoimmune polyglandular syndrome , or APS. "Autoimmune" means the immune system mistakenly attacks the body's own cells. "Polyglandular" means that several glands are involved.

The glands affected differ from one person to another. Common problems include an underactive thyroid, adrenal insufficiency, type 1 diabetes, and underactive parathyroid glands. The parathyroid glands are small glands in the neck that control calcium levels.

There are several patterns:

These conditions matter because hormone shortages can affect many parts of the body. Some shortages develop slowly, while untreated adrenal insufficiency, severe low calcium, or type 1 diabetes can sometimes cause an emergency.

- APS type 1 usually results from inherited changes in the AIRE gene. Its main features include adrenal insufficiency, underactive parathyroid glands, and long-lasting Candida infections of the skin, mouth, or nails.
- APS type 2 includes adrenal insufficiency together with autoimmune thyroid disease, type 1 diabetes, or both.
- Other classifications describe combinations that include thyroid disease but not adrenal insufficiency, or less common mixtures of gland problems.

Symptoms

Symptoms depend on which glands are affected. They may appear months or years apart rather than beginning at the same time.

An underactive thyroid can cause tiredness, feeling cold, dry skin, constipation, slowed thinking, weight gain, or heavy or irregular menstrual periods.

Adrenal insufficiency means the adrenal glands do not make enough cortisol and sometimes aldosterone. Cortisol helps the body respond to physical stress, while aldosterone helps control salt, fluid, and blood pressure. Symptoms can include weakness, weight loss, nausea, abdominal discomfort, salt cravings, dizziness when standing, and darkening of the skin.

Type 1 diabetes occurs when the pancreas makes little or no insulin. Possible symptoms include unusual thirst, frequent urination, blurred vision, tiredness, and weight loss.

Underactive parathyroid glands cause low blood calcium. This may lead to tingling around the mouth or in the fingers, muscle cramps, twitching, or spasms. Very low calcium can cause confusion, an abnormal heartbeat, or seizures.

Other possible features include:

Many of these symptoms have more common causes. Their presence does not by itself mean you have multiple endocrine deficiency syndrome.

- Repeated Candida infections of the mouth, skin, nails, or food pipe
- Delayed puberty, irregular periods, or reduced fertility
- Hair loss in smooth patches

- Pale skin patches caused by loss of pigment
- Digestive symptoms from coeliac disease or autoimmune gastritis
- Numbness or weakness related to vitamin B12 deficiency

Causes and risk factors

Most forms result from autoimmunity. The immune system produces antibodies and immune cells that target one or more endocrine glands. The damaged glands may gradually lose their ability to make hormones.

APS type 1 is different because it is usually caused by harmful changes in both copies of the AIRE gene. This gene helps the immune system learn which cells belong to the body. The condition follows an autosomal recessive inheritance pattern, meaning both parents usually carry one altered copy. Carriers generally do not have the syndrome.

APS type 2 has a more complex cause. Several genes can increase susceptibility, but no single genetic result usually explains it. A family history of autoimmune thyroid disease, type 1 diabetes, adrenal insufficiency, or another autoimmune condition can increase risk.

These syndromes are not caused by diet, stress, or something you did. Stress or illness may reveal an existing hormone shortage because the body needs more cortisol or insulin during these periods, but they do not create the underlying autoimmune condition.

Diagnosis

There is no single test that confirms every form of multiple endocrine deficiency syndrome. Diagnosis involves identifying the hormone deficiencies and establishing whether they form a recognised autoimmune or inherited pattern.

Blood tests may include:

Antibody tests can provide evidence of autoimmune activity. Examples include antibodies linked to Addison disease, autoimmune thyroid disease, or type 1 diabetes. A positive antibody result can show increased risk before a gland fails, but it does not always mean that hormone deficiency is already present.

Genetic testing for AIRE changes may confirm APS type 1. Testing can also help relatives understand their chance of carrying or developing the condition. Genetic counselling explains what a result may mean for an individual and their family.

Because gland problems can appear at different times, diagnosis is not always a one-time

event. Someone with one autoimmune endocrine condition may have periodic checks for related problems, guided by their symptoms, family history, and syndrome type.

- Morning cortisol and adrenocorticotropic hormone, or ACTH, to assess adrenal function
- An ACTH stimulation test to confirm adrenal insufficiency
- Thyroid-stimulating hormone, or TSH, and free thyroxine to assess the thyroid
- Blood glucose and HbA1c to look for diabetes
- Calcium, phosphate, magnesium, vitamin D, and parathyroid hormone levels
- Sex hormones when periods, puberty, sexual function, or fertility are affected

Treatment and management

Treatment replaces the hormones that the affected glands can no longer make. It also addresses infections and other autoimmune conditions. The exact combination is different for each person.

Adrenal insufficiency is treated with replacement steroid hormones. Some people also need replacement of aldosterone's effects. They receive instructions for taking extra steroid like prednisone or hydrocortisone during illness or major physical stress, carrying an emergency injection, and wearing medical identification.

An underactive thyroid is treated with thyroid hormone replacement. When adrenal insufficiency is possible, adrenal function is usually assessed before thyroid treatment begins. Increasing the body's metabolism with thyroid hormone before replacing severely low cortisol can trigger an adrenal crisis.

Type 1 diabetes requires insulin and regular glucose monitoring. Diabetes education includes recognising and treating low blood glucose and checking for ketones when appropriate during illness.

Underactive parathyroid glands are usually managed with calcium and an active form of vitamin D. Blood and sometimes urine tests help keep calcium within a safe range and reduce the risk of kidney complications.

Hormone treatment may also be offered for ovarian or testicular failure, depending on age, symptoms, bone health, fertility goals, and other health factors. Persistent Candida infections are treated with antifungal medicines and may need specialist review, particularly when swallowing is painful or difficult.

Regular follow-up is important because both too little and too much replacement hormone can

cause problems. Monitoring may include symptoms, blood pressure, growth in children, blood tests, bone health, eye or kidney checks for diabetes, and review of emergency plans.

Complications

A major complication of adrenal insufficiency is adrenal crisis , in which cortisol and often blood pressure fall to dangerous levels. Infection, surgery, injury, vomiting, or missed steroid medicine can trigger it.

Untreated type 1 diabetes can lead to diabetic ketoacidosis , or DKA. This happens when severe insulin shortage causes acidic chemicals called ketones to build up in the blood.

Very low calcium can cause severe muscle spasms, seizures, breathing difficulty, or abnormal heart rhythms. Long-term problems can also result if calcium treatment leads to levels that are too high or causes excess calcium in the urine.

Other complications depend on the conditions present. They may include reduced bone strength, fertility problems, nerve damage from vitamin B12 deficiency, kidney or eye complications from diabetes, and liver or intestinal inflammation from associated autoimmune conditions.

Regular monitoring aims to detect these problems early. It also helps identify new gland deficiencies before they become severe.

Prevention

The underlying condition usually cannot be prevented. Autoimmune susceptibility is not caused by personal choices, and inherited AIRE gene changes are present from birth.

Early recognition can prevent some emergencies and long-term complications. This includes keeping scheduled hormone tests, taking replacement medicines consistently, and following an established sick-day plan for adrenal insufficiency or diabetes.

When APS type 1 is present in a family, genetic counselling and testing may clarify whether relatives carry an AIRE change. Testing does not prevent the condition, but it may allow earlier monitoring.

Living with it and what to expect

Multiple endocrine deficiency syndrome often develops in stages. One gland may fail first,

while another problem appears years later. It is not possible to predict exactly which gland will be affected next or when this may happen.

Once an endocrine gland has lost substantial function, the deficiency is usually long term. Replacement hormones control the effects of that loss but do not usually stop the autoimmune process or restore the gland.

Daily life may involve taking several medicines, arranging blood tests, and adjusting care during illness. With a clear routine, many people continue work, education, exercise, relationships, and family life. Carrying an up-to-date medicine list and emergency identification can make travel and unexpected medical care safer.

Children need monitoring of growth, teeth, puberty, and school functioning. Adults may need support with fertility, pregnancy planning, bone health, or the practical demands of managing several conditions. Pregnancy is possible for many people, but hormone replacement and diabetes care may need closer monitoring before and during pregnancy.

New fatigue or weight change should not automatically be blamed on an existing diagnosis. Routine follow-up gives you a chance to discuss new symptoms and check for another hormone deficiency, treatment side effects, or an unrelated cause.

When to get medical help

Call emergency services for symptoms that may indicate adrenal crisis, DKA, or severe low calcium. These include:

If you have an adrenal emergency plan, follow it while emergency help is being arranged. Do not delay emergency care to wait for symptoms to improve.

Seek prompt medical advice for new excessive thirst and urination, unexplained weight loss, frequent low-glucose episodes, increasing dizziness, persistent vomiting, or tingling and muscle cramps.

Routine follow-up is appropriate for gradual symptoms such as increasing tiredness, cold sensitivity, constipation, menstrual changes, hair loss, recurring thrush, or changes in skin colour. Arrange an earlier review if these symptoms are persistent or worsening.

- Fainting, confusion, extreme weakness, or severe dizziness
- Repeated vomiting or inability to keep steroid medicine down
- Severe abdominal pain with known or possible adrenal insufficiency
- Deep or rapid breathing, vomiting, marked drowsiness, or fruity-smelling breath

- A seizure, severe muscle spasms, or difficulty breathing

Common questions

Is multiple endocrine deficiency syndrome the same as multiple endocrine neoplasia?

No. Multiple endocrine deficiency syndrome involves glands that make too little hormone, usually because of autoimmunity. Multiple endocrine neoplasia is a separate inherited condition that causes tumours in certain endocrine glands, sometimes with excess hormone production.

Does having autoimmune thyroid disease mean I will develop this syndrome?

Usually not. Autoimmune thyroid disease is common and often occurs alone. The possibility of a polyglandular syndrome becomes more relevant when thyroid disease occurs with adrenal insufficiency, type 1 diabetes, underactive parathyroid glands, or other specific autoimmune problems.

Can damaged endocrine glands recover?

Substantial autoimmune gland damage is generally permanent. Some hormone levels can fluctuate early in the process, but ongoing deficiency commonly requires long-term replacement. Treatment can control the hormone shortage even when the gland itself does not recover.

Will my children inherit it?

APS type 1 can be inherited through AIRE gene changes, but a child's chance depends on whether each parent carries an altered gene. APS type 2 has a more complex genetic pattern and is not passed down in a simple, predictable way. Genetic counselling can give information based on the specific syndrome and family results.

Why do I need tests when I feel well?

Antibodies and early hormone changes may appear before clear symptoms. Periodic testing can find a developing deficiency before it causes a crisis or begins to interfere with daily life. The tests needed and their timing are based on the conditions and risk pattern present.

Can I exercise and travel with this condition?

Many people can. Planning is especially important with adrenal insufficiency or type 1 diabetes. This may include carrying enough medicine and supplies, keeping emergency treatment accessible, wearing medical identification, and knowing how illness, heat, time-zone changes, or unusual activity affect the existing care plan.

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