CONDITION

Pellagra

Pellagra is a vitamin deficiency that affects the skin, digestive system, and brain.

WHAT IT IS
Severe niacin deficiency affecting several body systems

BODY SYSTEM
Skin, digestive system, and nervous system

MAIN SYMPTOMS
Sun-sensitive rash, diarrhea, mouth soreness, confusion

WHAT CAUSES IT
Too little niacin or tryptophan

HOW IT IS DIAGNOSED
Symptoms, dietary history, and improvement after niacin replacement

MAIN TREATMENT
Vitamin replacement and treatment of the underlying cause

CAN IT BE CURED?
Yes - niacin replacement corrects the deficiency

IS IT AN EMERGENCY?
Sometimes - with severe confusion or dehydration

LONG-TERM OUTLOOK
Usually good when identified and treated early

Overview

Pellagra is a condition caused by having too little niacin, also called vitamin B3. It can also develop when the body does not get or process enough tryptophan, an amino acid used to make niacin.

Niacin helps cells release energy from food and supports healthy skin, digestion, and nervous system function. When the shortage becomes severe, problems can appear in several parts of the body.

Pellagra is often described by the "three Ds": dermatitis, diarrhea, and dementia. Dermatitis means inflamed skin. In pellagra, it usually affects areas exposed to sunlight. Dementia in this phrase refers broadly to changes in thinking, mood, or behavior, not only to permanent dementia seen in older adults. Without treatment, a fourth "D," death, can occur.

The condition is now uncommon in places where people have reliable access to varied or fortified foods. However, it can still occur because of severe food insecurity, alcohol dependence, digestive disorders, inherited conditions, or certain medicines.

Pellagra is treatable. Early recognition matters because some symptoms resemble other skin, digestive, or mental health conditions.

Symptoms

Symptoms may develop gradually and may not all appear at the same time. Early symptoms can be vague, such as tiredness, poor appetite, headache, irritability, or weakness.

The skin changes are usually symmetrical, meaning they affect similar areas on both sides of the body. They often appear after sun exposure. The skin may first look red and feel painful or itchy, similar to sunburn. It can later become darker, thicker, rough, cracked, or scaly.

Commonly affected areas include the backs of the hands, forearms, feet, lower legs, face, and upper chest. A dark, inflamed band around the neck is sometimes called a Casal necklace.

Digestive and mouth symptoms may include:

Nervous system and mental symptoms can include poor concentration, disturbed sleep, low mood, anxiety, irritability, slowed thinking, or confusion. Severe deficiency may cause disorientation, hallucinations, marked weakness, problems with coordination, or reduced awareness.

Not everyone has the classic combination of rash, diarrhea, and confusion. In some people, skin or mouth symptoms are the first obvious sign.

- A sore, swollen, or bright-red tongue
- Cracks or soreness around the mouth
- Nausea, abdominal discomfort, or poor appetite
- Frequent loose stools or diarrhea

Causes and risk factors

The direct cause of pellagra is too little usable niacin in the body. Niacin comes from food, and the body can also make some niacin from tryptophan. Tryptophan is found in protein-containing foods.

A severely restricted or unbalanced diet can cause pellagra. Historically, it was linked to diets

based heavily on untreated maize, or corn, without enough other foods. Although corn contains niacin, much of it is difficult for the body to absorb unless the grain is processed with an alkaline method known as nixtamalization.

Pellagra may also occur when a person eats enough food but cannot absorb or use nutrients properly. Possible underlying factors include:

Some medicines can interfere with niacin or tryptophan metabolism. Isoniazid, used to treat tuberculosis, is one example. Medicine-related pellagra is uncommon, and you should not stop a prescribed medicine without medical advice.

People facing famine, displacement, neglect, or severe food insecurity may also be at risk, especially when diets contain little protein or fortified food.

- Long-term diarrhea or severe intestinal inflammation
- Conditions that reduce nutrient absorption, such as Crohn's disease
- Alcohol dependence, which may combine poor intake with reduced absorption
- Anorexia nervosa or another cause of prolonged food restriction
- Carcinoid syndrome, in which a tumor uses large amounts of tryptophan
- Hartnup disorder, a rare inherited condition affecting amino acid transport

Diagnosis

There is no single routine blood test that reliably confirms every case of pellagra. Diagnosis is usually based on the pattern of symptoms, food intake, health history, medicine use, and possible problems with nutrient absorption.

A clinician may examine the location and appearance of the rash and check your mouth, nervous system, hydration, and general nutritional health. Blood tests may be used to look for anemia, electrolyte problems, liver or kidney concerns, inflammation, or other vitamin deficiencies.

Specialized urine tests can measure substances produced when the body processes niacin. These tests are not widely available and are not always needed.

Improvement after niacin replacement can support the diagnosis. However, testing may still be needed to rule out other causes, such as lupus, medication reactions, porphyria, inflammatory bowel conditions, infections, or another nutritional deficiency.

Finding the reason for the deficiency is important. Otherwise, symptoms may return after vitamin treatment ends.

Treatment and management

Treatment replaces niacin and addresses the reason the deficiency developed. A form called nicotinamide, or niacinamide, is commonly used because it treats the deficiency without usually causing the flushing associated with nicotinic acid.

The amount, route, and length of treatment are chosen according to symptom severity, nutritional status, and whether you can absorb and swallow medicine. Severe illness, dehydration, or an inability to eat may require hospital treatment and replacement through a vein or feeding support.

Because pellagra often occurs with other nutritional deficiencies, treatment may include a broader vitamin and mineral supplement. Food support should provide enough energy and protein, not only niacin.

Foods containing niacin or tryptophan include meat, fish, eggs, milk, legumes, peanuts, nuts, seeds, and fortified grain products. The right plan may be different if you have an allergy, digestive condition, kidney problem, or difficulty accessing food.

Other management may include:

Do not try to treat suspected pellagra with high-dose over-the-counter niacin alone. Different forms of vitamin B3 have different effects, and high amounts may cause flushing, stomach problems, liver injury, or changes in blood sugar. Medical assessment also helps identify the underlying cause.

- Fluids and electrolyte replacement for significant diarrhea
- Gentle skin care and protection from sunlight while the rash heals
- Treatment for an intestinal, liver, eating, or alcohol-related condition
- Review of medicines that may interfere with nutrient use
- Dietitian or social support when food access is limited

Complications

Untreated pellagra can become serious because it affects nutrition, fluid balance, and brain function at the same time.

Persistent diarrhea can cause dehydration and abnormal levels of salts in the blood. Mouth pain and poor appetite may make nutritional deficiency worse. Damaged skin can crack and become infected.

Neurological complications can include worsening confusion, severe agitation, hallucinations, poor coordination, reduced consciousness, or coma. Long-standing deficiency may leave ongoing problems with memory or nerve function, although many symptoms improve with treatment.

Pellagra can be fatal if severe deficiency continues untreated. This outcome is preventable in many cases when the condition is recognized and the person can receive effective vitamin replacement, food, fluids, and care for the cause.

Prevention

Pellagra caused by inadequate food intake can often be prevented through a varied diet that supplies enough niacin, tryptophan, protein, and energy. Fortified grain products also help prevent deficiency in many countries.

When food choices are restricted by cost, availability, illness, or eating difficulties, practical nutrition support may be more useful than general dietary advice. A clinician or dietitian can help identify suitable foods and whether a supplement is appropriate.

Pellagra related to Hartnup disorder cannot be prevented by changing the inherited gene. However, episodes may often be reduced through adequate nutrition, sun protection, and medical management.

Pellagra caused by malabsorption, carcinoid syndrome, or medicine effects may not be fully preventable until the underlying issue is addressed. People at risk may need nutritional monitoring. Do not start high-dose niacin or stop a medicine as a preventive measure without professional guidance.

Living with it and what to expect

Digestive discomfort, mouth soreness, and some mental symptoms may begin improving soon after effective treatment. Skin changes usually take longer. Inflamed areas may peel or fade over several weeks, and darker coloring can remain for a time.

Recovery also depends on how long the deficiency was present and what caused it. If the cause was a short period of poor intake, treatment and restored nutrition may correct the problem completely. Ongoing malabsorption, alcohol dependence, food insecurity, or an inherited condition may require longer follow-up.

Routine follow-up may include checking that symptoms are resolving, reviewing diet and weight, and treating related deficiencies. If there was severe diarrhea or malnutrition, blood

tests may be repeated.

Most people can return to their usual activities after recovery. Sun-sensitive skin may need clothing and sunscreen while it heals. If nerve, memory, or coordination problems were advanced before treatment, recovery may be slower and some effects may persist.

Symptoms can return if the underlying cause remains. New rash, ongoing diarrhea, renewed food restriction, or changes in thinking should be assessed rather than managed only with supplements.

When to get medical help

Arrange a routine medical appointment if you have a persistent sun-sensitive rash together with diarrhea, mouth soreness, poor nutrition, or changes in mood or concentration. Assessment is also important if you have ongoing diarrhea, major weight loss, a very restricted diet, or a condition that interferes with nutrient absorption.

Seek prompt medical advice if symptoms are worsening, you cannot keep food or fluids down, or you develop increasing weakness or confusion.

Get urgent or emergency help for:

These symptoms can have several causes. Emergency assessment is needed to check hydration, blood chemistry, brain function, and other possible conditions.

- Severe confusion, disorientation, hallucinations, or unusual behavior
- Fainting, reduced awareness, a seizure, or difficulty waking
- Signs of severe dehydration, such as very little urine or marked dizziness
- Inability to drink because of vomiting, diarrhea, or reduced alertness
- Rapid worsening in someone who is severely malnourished

Common questions

Is pellagra contagious?

No. Pellagra is caused by a nutritional deficiency or by a problem absorbing or processing nutrients. It cannot spread between people.

Is pellagra the same as a niacin deficiency?

Pellagra is the clinical condition caused by severe niacin deficiency. A mild shortage may cause few or vague symptoms, while pellagra usually involves recognizable skin, digestive, or nervous

system problems.

Can I get pellagra if I eat corn?

Eating corn does not by itself cause pellagra. Risk arises when untreated corn forms most of a limited diet without enough protein or other niacin sources. Traditional alkaline processing makes corn's niacin easier to absorb.

Will a multivitamin cure pellagra?

A standard multivitamin may not provide the type or amount of replacement needed for established pellagra. Treatment should also correct dehydration, other deficiencies, and the reason the deficiency occurred.

Does the skin rash go away?

It often improves after niacin replacement and protection from sunlight. Healing may take weeks, and darker or thicker skin can take longer to return toward its usual appearance.

Can pellagra come back?

Yes. It can return if poor intake, malabsorption, medicine effects, or another underlying cause continues. Follow-up focuses on correcting that cause and maintaining adequate nutrition.

Sources

- National Institutes of Health Office of Dietary Supplements: Niacin - Fact Sheet for Health Professionals
- World Health Organization: Pellagra and its prevention and control in major emergencies
- MSD Manual Professional Edition: Niacin Deficiency
- DermNet: Pellagra
- National Center for Biotechnology Information, StatPearls: Pellagra