CONDITION

Langerhans cell histiocytosis

Langerhans cell histiocytosis is a rare condition in which abnormal immune cells collect in and damage parts of the body.

WHAT IT IS
Abnormal immune-cell growth affecting one or more organs

BODY SYSTEM
Bones, skin, lungs, hormones, blood, and nervous system

MAIN SYMPTOMS
Bone pain, skin rash, excessive thirst, breathing problems

WHAT CAUSES IT
Acquired cell changes disrupting immune growth pathways

HOW IT IS DIAGNOSED
Tissue biopsy, immune stains, and sometimes genetic testing

MAIN TREATMENT
Observation, local treatment, or systemic medicines

CAN IT BE CURED?
Sometimes - limited LCH may fully resolve

IS IT AN EMERGENCY?
Sometimes - severe breathing difficulty or neurological symptoms

LONG-TERM OUTLOOK
Often good when limited; risk-organ involvement is more serious

Overview

Langerhans cell histiocytosis, or LCH, is a rare condition involving cells related to the immune system. It was previously called histiocytosis X.

In LCH, abnormal cells build up in tissues and cause inflammation and damage. These cells resemble Langerhans cells, which normally help the immune system detect threats in the skin. However, research suggests that LCH begins in an earlier type of immune cell.

LCH can affect one area or several organs. The bones and skin are commonly involved. It can also affect the pituitary gland, lungs, lymph nodes, liver, spleen, bone marrow, digestive system, or nervous system.

Specialists classify LCH as a clonal myeloid condition. "Clonal" means that the abnormal cells

developed from one original cell. "Myeloid" refers to the family of blood-forming cells from which they arise. Although this places LCH among blood-cell growth disorders, it can behave very differently from a typical cancer. Some limited cases settle after local treatment, while widespread LCH may require prolonged systemic treatment.

LCH occurs in children and adults. The organs affected, treatment choices, and outlook can differ by age.

Symptoms

Symptoms depend on where the abnormal cells collect. Some people have one symptom, while others have problems involving several parts of the body.

Possible symptoms include:

Bone lesions may occur in the skull, jaw, ribs, spine, pelvis, or long bones. A lesion is an area of damaged or abnormal tissue. A spinal lesion may rarely weaken a vertebra, which is one of the bones in the spine.

Excessive thirst and urination can be signs of diabetes insipidus, now also called arginine vasopressin deficiency. This is not the same as diabetes mellitus. It happens when LCH affects the pituitary gland or nearby brain structures that control the body's water balance.

In adults, LCH limited to the lungs may cause a dry cough or breathlessness. Some people have no symptoms, and lung changes are found on imaging performed for another reason.

- Persistent pain, swelling, or a lump over a bone
- A skin rash, often on the scalp, groin, skin folds, or trunk
- Loose teeth, swollen gums, or jaw pain
- Frequent ear discharge or hearing problems
- Drinking and urinating much more than usual
- Poor growth, delayed puberty, or other hormone-related changes
- Cough, shortness of breath, or chest discomfort
- Ongoing fever, tiredness, poor appetite, or weight loss
- A swollen abdomen caused by an enlarged liver or spleen
- Easy bruising, paleness, or frequent infections from low blood-cell counts

Causes and risk factors

LCH is linked to acquired changes in genes that control cell growth. These changes often affect the MAPK pathway, a signalling system that tells cells when to grow and survive. One well-known change is called BRAF V600E, but other changes can affect the same pathway.

These genetic changes are somatic, meaning they develop in certain cells during a person's lifetime. They are not usually present in egg or sperm cells, so LCH is not generally considered inherited. It is not contagious.

It is not known why these cell changes happen in a particular person. Nothing a parent did during pregnancy is known to cause childhood LCH.

Cigarette smoking has a strong association with LCH that is limited mainly to the lungs in adults. Not everyone with pulmonary LCH smokes, and smoking does not explain most childhood or multisystem cases.

Diagnosis

LCH can resemble infections, eczema, bone tumours, lung conditions, or hormone problems. Diagnosis therefore usually involves both examining the affected area and testing tissue.

A biopsy is the main way to confirm LCH. During a biopsy, a small sample is removed from a skin lesion, bone lesion, lymph node, or another affected site. A pathologist examines the sample under a microscope.

Special stains check the cells for proteins associated with LCH. The abnormal cells typically test positive for CD1a and langerin, also called CD207. Molecular testing may look for BRAF or other MAPK-pathway changes. These results can help guide treatment in some cases.

After LCH is confirmed, tests are used to find out whether one system or several are involved. Depending on the symptoms, these may include:

Doctors pay particular attention to the liver, spleen, and bone marrow. In children, these are called risk organs because their involvement is associated with a more serious course. The stage-like descriptions used for many cancers are not usually applied to LCH. It is instead described as single-system or multisystem LCH, with details about the organs involved.

- Blood and urine tests
- X-rays, MRI, CT, or PET scans
- Lung-function tests
- Hormone tests

- Hearing or dental assessment
- Bone marrow testing when blood counts are abnormal

Treatment and management

Treatment is based on age, symptoms, organ involvement, and how active the condition is. Care may involve specialists in haematology, oncology, endocrinology, respiratory medicine, dermatology, neurology, or bone health.

A single bone or skin lesion may need only observation, a biopsy that also removes much of the lesion, or local treatment. Extensive surgery is not usually needed simply to remove every abnormal cell. Some lesions heal after limited intervention.

People with lung-only LCH are strongly encouraged to stop smoking and avoid tobacco smoke. Lung changes may stabilize or improve after smoking stops, although existing scarring or cysts may not reverse. Medicines are considered when lung involvement is progressing or causing important symptoms.

Multisystem LCH, repeated lesions, or involvement of critical organs usually requires systemic treatment. "Systemic" means that treatment travels through the body rather than treating one spot. Options can include chemotherapy or other medicines that control abnormal immune-cell growth.

Targeted medicines may be used in selected people whose LCH has a change in the BRAF or related MAPK pathway. These medicines block specific growth signals. They can be effective, but LCH may become active again after treatment stops, so specialist monitoring is important.

Treatment may also address lasting effects. Hormone replacement can control pituitary hormone deficiencies, although it does not usually repair the damaged gland. Physiotherapy, pain support, dental care, hearing support, and treatment for liver or lung complications may also be needed.

Complications

The chance of complications is related to which organs are affected and whether LCH responds to treatment.

Possible long-term effects include:

A collapsed lung, called a pneumothorax, happens when air leaks between the lung and chest wall. It can cause sudden chest pain and breathlessness and needs urgent assessment.

A small number of people develop progressive problems involving the brain and nervous system years after the original LCH. Symptoms may include poor balance, tremor, speech changes, or changes in thinking. New neurological symptoms should be assessed rather than assumed to be part of a past episode.

Treatment itself can also have side effects, including infection risk, low blood counts, or effects on fertility and other organs. The specific risks depend on the medicines used.

- Permanent diabetes insipidus or other hormone deficiencies
- Bone weakness, fractures, spinal collapse, or ongoing pain
- Hearing loss or damage to the bones around the ear
- Dental and jaw problems
- Lung cysts, scarring, or a collapsed lung
- Liver scarring and reduced liver function
- Low blood-cell counts from bone marrow involvement
- Learning, coordination, balance, or behavioural difficulties

Prevention

Most LCH cannot currently be prevented. The acquired cell changes that cause childhood or multisystem LCH are not known to result from diet, activity, parenting, or ordinary environmental exposure.

Not smoking can reduce the risk of adult lung-only LCH and is an important part of managing it. Avoiding second-hand smoke and vaping may also protect already affected lungs, although evidence about vaping and LCH is limited.

People who have had LCH cannot always prevent it from returning. Keeping follow-up appointments can help find reactivation or late effects before they cause more serious problems.

Living with it and what to expect

The course of LCH ranges from a single episode to a condition that becomes active more than once. Limited skin or bone involvement often responds well to local care. Multisystem LCH may require months of treatment and longer follow-up.

Reactivation means that LCH becomes active again after improving. It may return in the same

organ or appear elsewhere. Reactivation does not automatically mean that the outlook is poor, but it may lead to further tests and treatment.

Hormone problems, especially diabetes insipidus, may remain even when no active LCH can be found. Lung cysts, liver scarring, hearing loss, and structural bone damage may also persist. Follow-up therefore checks for both active LCH and lasting effects.

Children may need monitoring of growth, puberty, school progress, hearing, and dental development. Adults may need lung testing, hormone assessment, or monitoring of bone and cardiovascular health. Follow-up schedules are individualized and may continue for years.

Many people with limited LCH continue their usual education, work, relationships, and activities. Those with chronic organ damage may need practical adjustments, rehabilitation, hormone replacement, or support with fatigue and pain. The outlook is more guarded when the liver, spleen, or bone marrow is involved, especially if treatment does not control the condition.

When to get medical help

Arrange a routine medical appointment for persistent bone pain or swelling, an unexplained rash, repeated ear discharge, loose teeth without a clear dental cause, or ongoing cough and breathlessness. Drinking and urinating much more than usual also needs prompt assessment, particularly in someone with current or previous LCH.

If you have been treated for LCH, report new symptoms rather than waiting for the next scheduled follow-up. This includes changes in growth, puberty, balance, coordination, hearing, vision, thirst, urination, or breathing.

Seek urgent medical care for:

Call emergency services for severe breathing difficulty, collapse, a seizure, marked confusion, or sudden weakness affecting the face, arm, or leg.

- Sudden chest pain or new shortness of breath
- Repeated vomiting with excessive thirst and urination
- New weakness, loss of balance, confusion, or severe headache
- Rapidly increasing abdominal swelling
- Unusual bleeding, widespread bruising, or signs of serious infection

Common questions

Is Langerhans cell histiocytosis cancer?

LCH has features of both an abnormal cell-growth condition and an inflammatory disorder. Specialists classify it as a clonal myeloid neoplasm, but its behaviour is broad. Some cases need only local care, while others are treated with chemotherapy or targeted medicines.

Can LCH go away completely?

Sometimes. A limited bone or skin lesion may resolve and never return. Multisystem LCH can also enter remission, meaning no active condition is found. However, reactivation can occur, and permanent effects such as hormone deficiencies may remain.

Is LCH inherited?

LCH is not usually inherited. The genetic changes found in LCH cells are generally acquired during life and are not present throughout the body. Family members do not usually need genetic testing solely because one person has LCH.

Can adults get LCH?

Yes. Adults may have LCH in the bones, skin, pituitary gland, lungs, or several organs. Lung-only LCH occurs mainly in adults and has a strong link with cigarette smoking.

Will LCH come back after treatment?

It can. The chance differs according to the organs involved, the molecular changes in the LCH cells, and the response to treatment. Follow-up is important even after symptoms and scans improve.

Can someone with LCH live a normal life?

Many people, especially those with limited involvement, return to usual activities after treatment. Others live with hormone problems, lung changes, pain, fatigue, or repeated episodes. Long-term support is shaped by the organs affected and any lasting damage.

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