HEALTH BASICS

Enzyme

An enzyme is a biological helper that speeds up a specific chemical reaction.

WHAT IT IS
A biological helper that speeds a specific chemical reaction

WHERE IT COMES UP
Blood tests, diagnoses, medicines, digestion, and food labels

WHY IT MATTERS
Makes essential body chemistry happen fast enough

WHAT IT IS NOT
Not a disease or diagnosis

WHO TO ASK
Primary care clinician, pharmacist, or relevant specialist

HOW IT IS CHECKED
Blood, urine, stool, breath, or genetic testing

Overview

An enzyme is a substance that helps a chemical reaction happen faster. Almost all enzymes are proteins, although a few are made from RNA, a molecule involved in how cells use genetic information.

Your body contains thousands of enzymes. They help digest food, release energy, build and repair tissues, copy DNA, make hormones, and break down medicines. Without enzymes, many of these reactions would happen too slowly to support life.

Each enzyme usually works on a limited set of substances. The material an enzyme acts on is called its substrate . For example, lactase acts on lactose, the natural sugar in milk. It breaks lactose into smaller sugars that the body can absorb.

An enzyme is not a disease or a diagnosis. The word may appear in discussions about blood tests, inherited conditions, digestion, medicines, or food production. Its meaning depends on which enzyme is being discussed and why.

How it works

Enzymes have shapes that allow particular molecules to bind to them. This binding brings molecules together or helps chemical bonds break apart. The enzyme can then be used again rather than being used up in the reaction.

Enzymes work best under particular conditions. Temperature and acidity can affect their shape and activity. Digestive enzymes in the stomach, for example, work in a more acidic setting than many enzymes inside cells.

Some enzymes need a helper called a cofactor . A cofactor may be a mineral, such as zinc or magnesium, or a molecule made from a vitamin. This does not mean that taking extra vitamins or minerals will make enzymes work better. More is not necessarily helpful, especially if your body already has enough.

The body controls enzyme activity in several ways. It can make more or less of an enzyme, switch an enzyme on or off, or block its activity. Medicines can also inhibit, or reduce, the action of an enzyme. Some medicines are designed to do exactly this.

Genes provide instructions for making enzymes. A change in a gene may reduce how much of an enzyme is made or alter how well it works. Other enzyme changes are not inherited. They can result from tissue injury, inflammation, nutrition, medicines, or changes in an organ's function.

Why it matters for your health

Enzymes matter because they support nearly every process in the body. In health care, their names often appear in three main settings:

A blood test may measure enzymes that are common in the liver, heart, muscles, pancreas, or other tissues. A higher or lower result may help guide further testing, but it rarely gives a diagnosis by itself.

For example, alanine aminotransferase and aspartate aminotransferase are often called "liver enzymes." Increased levels can occur when liver cells are irritated or injured, but these tests do not directly measure every liver function. Aspartate aminotransferase is also found in muscle and other tissues.

Laboratories may measure either the amount of an enzyme or its activity , meaning how effectively it performs a reaction. Results must be interpreted using that laboratory's reference range. The range can differ according to the testing method, age, sex, pregnancy, and other factors.

Enzymes also affect medicines. Certain liver and intestinal enzymes help process drugs. Another medicine, a supplement, smoking, or some foods may change that processing. This

can alter how much medicine remains active in the body. A pharmacist can check for known interactions.

- Laboratory tests: Enzyme levels or activity can provide clues about particular tissues
- Digestive care: A lack of certain digestive enzymes can affect food breakdown
- Medicines: Enzymes may activate, break down, or be blocked by a medicine

What can go wrong

An enzyme-related finding can point to several different situations. The concern is the underlying condition or exposure, not the enzyme itself.

Cells may release enzymes into the blood when tissue is injured. Increased liver enzymes can be associated with liver inflammation, blocked bile flow, alcohol-related injury, metabolic liver disease, or medicine effects. Muscle injury can raise creatine kinase. Pancreatic conditions can affect amylase or lipase. These results need clinical context because exercise, recent procedures, and some medicines can also influence them.

Some people do not make enough of a digestive enzyme. Lactase deficiency can lead to lactose intolerance, in which milk sugar is not fully digested. Exocrine pancreatic insufficiency means the pancreas does not release enough digestive enzymes into the small intestine. It can interfere with digestion and nutrient absorption.

Inherited conditions can involve one enzyme pathway. In phenylketonuria , reduced activity of an enzyme involved in processing the amino acid phenylalanine allows that substance to build up. G6PD deficiency affects an enzyme that helps protect red blood cells. Certain infections, foods, or medicines may then trigger red blood cell breakdown in some people with the condition.

An abnormal enzyme result is not automatically an emergency. Routine follow-up is usually appropriate when you feel well and your clinician has arranged repeat testing or a non-urgent review.

Seek prompt medical advice if a new abnormal result occurs with yellow skin or eyes, dark urine, ongoing vomiting, marked weakness, or worsening abdominal pain. Use emergency services for severe chest pain, major breathing difficulty, fainting, new confusion, or signs of a stroke. Also follow urgent instructions if a laboratory or clinical service contacts you about a critical result.

What you can do

If an enzyme is mentioned in a test result, ask which enzyme was measured and what tissue it may relate to. Find out whether the result reflects the enzyme's amount or its activity.

Useful questions include:

Keep a current list of prescription medicines, non-prescription medicines, and supplements. Do not stop a prescribed medicine because of an enzyme result unless the prescribing service tells you to do so.

If an inherited enzyme condition is suspected, testing may include blood tests, enzyme activity measurements, or genetic testing. Genetic counselling can help explain what a result may mean for you and your relatives.

Do not start digestive enzyme supplements simply because of bloating or indigestion. Similar digestive problems can have different causes. Prescribed pancreatic enzyme products are used for specific conditions and are not interchangeable with general over-the-counter supplements.

If you only encounter the word "enzyme" on a food label and have no relevant diagnosis or allergy, there may be nothing you need to do.

- Was the result mildly or markedly outside this laboratory's range?
- Could exercise, alcohol, illness, medicines, or supplements affect it?
- Should the test be repeated, or are other tests needed?
- Does the result need routine, prompt, or urgent follow-up?

Common questions

Are enzymes living things?

No. Enzymes are molecules made by living cells, but they are not alive. They do not reproduce or function as organisms.

Are all enzymes proteins?

Almost all are proteins. A small group of RNA molecules can also speed chemical reactions. These are sometimes called ribozymes.

Does a high enzyme level mean an organ is failing?

Not necessarily. A raised level may reflect cell irritation, tissue injury, blocked flow, exercise, medicine effects, or another process. The enzyme, degree of change, other test results, and your health history all matter.

Can food enzymes improve digestion?

Some specific enzymes have clear uses. Lactase products can help some people digest lactose, and prescribed pancreatic enzymes treat pancreatic enzyme insufficiency. Broad claims about general enzyme supplements are not the same as evidence for a diagnosed problem.

Can cooking destroy enzymes?

Heat can change the shape of enzymes and reduce their activity. This matters in food production, but eating active food enzymes is not required for the body to perform most of its enzyme-driven reactions.

Can an enzyme result change over time?

Yes. Results may change as an illness resolves, after exercise, when a medicine changes, or as an underlying condition changes. This is why clinicians sometimes repeat a test before deciding what it means.

Sources

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