HEALTH BASICS

Immune response

An immune response is how the body recognizes and reacts to infection, injury, or unfamiliar substances.

WHAT IT IS
Coordinated body reaction to threats, injury, or unfamiliar substances

WHERE IT COMES UP
Infections, vaccines, allergies, autoimmune conditions, and blood tests

WHY IT MATTERS
Controls threats but can also harm healthy tissue

WHAT IT IS NOT
Not a disease or diagnosis

WHO TO ASK
Primary care clinician, allergist, immunologist, or relevant specialist

HOW IT IS CHECKED
Targeted blood, antibody, allergy, or immune-function tests

Overview

An immune response is a process, not a disease. It is how your immune system recognizes and reacts to something that may be harmful, such as a virus, bacterium, damaged cell, or toxin.

The immune system includes white blood cells, antibodies, lymph nodes, the spleen, bone marrow, and chemical signals. Skin and the moist linings of the nose, lungs, and gut also help by blocking germs from entering the body.

An immune response does not always mean that an infection is present. Vaccines are designed to produce a controlled immune response. Allergies involve responses to usually harmless substances. Autoimmune diseases occur when immune activity is directed against the body's own tissues.

There is no single score that shows how "strong" your immune system is. Different parts of the system perform different jobs, and test results must be interpreted in context.

How it works

The immune system has two closely connected parts: innate immunity and adaptive immunity.

Innate immunity is the body's rapid, general defence. Skin, mucus, stomach acid, certain white blood cells, and proteins called complement are part of it. Innate immune cells can detect common features of germs or damaged cells. They then release chemical signals that attract other immune cells.

Inflammation is part of this early response. It increases blood flow and helps immune cells reach an affected area. This can produce warmth, redness, swelling, or soreness around an injury or infection. Inflammation is useful when controlled, but it can damage tissue if it is excessive or continues unnecessarily.

Adaptive immunity is more targeted. It recognizes an antigen, which is a specific feature of a germ, toxin, cell, or other substance. Two important adaptive immune cells are B cells and T cells.

B cells can develop into cells that make antibodies. Antibodies are proteins that bind to particular antigens. They may block a germ, mark it for removal, or help activate other immune defences.

T cells perform several roles. Some coordinate the response by sending signals. Others destroy infected or abnormal cells. Regulatory T cells help limit immune activity and reduce attacks on healthy tissue.

After some infections or vaccinations, memory B cells and memory T cells remain. If the same antigen appears again, these cells can often respond more quickly. Immune memory may weaken over time, and it is not complete protection in every person or against every infection.

The innate and adaptive systems do not work separately. Innate cells help activate adaptive immunity, while antibodies and T cells help make later responses more precise.

Why it matters for your health

Immune responses help control infections and remove damaged or abnormal cells. They also support healing by clearing damaged tissue and coordinating repair.

Vaccination uses immune memory. A vaccine presents the immune system with an antigen, instructions for making one, or a harmless form of part of a germ. This allows the immune system to practise recognizing the target without causing the disease the vaccine is intended to prevent.

Immune responses also affect medical care. Medicines used for autoimmune disease, cancer treatment, or organ transplantation may reduce or redirect immune activity. This can change

infection risks, vaccine planning, and how clinicians interpret test results.

An antibody result does not measure the whole immune system. Depending on the test, antibodies may show past infection, vaccination, an autoimmune reaction, or a response to an allergen. Some antibodies do not provide reliable protection. A result must be interpreted using the specific test, timing, and reason it was ordered.

Fever is also not a direct measure of immune strength. It can occur during infection or inflammation, but its presence or absence does not show whether the immune system is working well overall.

What can go wrong

An immune response can be too weak, misdirected, excessive, or poorly controlled. These situations are linked to several different conditions.

Immunodeficiency means that part of the immune system does not work adequately. Primary immunodeficiencies are usually related to genetic changes. Secondary immunodeficiency can result from conditions such as HIV infection, undernutrition, some cancers, or medicines that suppress immune activity.

Allergy occurs when the immune system reacts to a substance that is usually harmless, such as pollen, a food, or an insect sting. Anaphylaxis is a rapid, severe allergic reaction that can affect breathing or blood circulation.

Autoimmune disease occurs when immune activity targets the body's own cells or tissues. Examples include rheumatoid arthritis, type 1 diabetes, lupus, and multiple sclerosis. Different autoimmune diseases affect different organs and require different tests.

Autoinflammatory conditions involve problems with the control of innate immune activity. They are distinct from allergies and many autoimmune diseases, although all can involve inflammation.

Transplant rejection happens when the immune system recognizes a transplanted organ or tissue as unfamiliar and attacks it. Anti-rejection medicines reduce this response but can also make some infections more likely.

Sepsis is a life-threatening condition caused by the body's extreme and poorly regulated response to an infection. It can lead to organ damage. Sepsis is not simply a "strong immune system."

What you can do

If you feel well and have no relevant medical condition, there is usually nothing you need to measure or track about your immune response.

Keep a record of vaccines, significant infections, diagnosed allergies, and medicines that affect immunity. Tell clinicians about these before vaccination, surgery, a transplant-related appointment, or a new prescription.

If an immune-related test is offered, ask:

Tests may include a complete blood count, measurements of antibody proteins called immunoglobulins, antibody tests for a specific antigen, complement tests, allergy testing, or tests that count types of immune cells. No single test provides a complete assessment.

Arrange routine medical follow-up if you have repeated, unusually severe, persistent, or difficult-to-treat infections; possible allergic reactions; unexplained inflammatory test results; or concerns about an immune-suppressing medicine. These findings have many possible causes and do not by themselves confirm an immune disorder.

Do not stop steroids like prednisone or hydrocortisone , anti-rejection treatment, chemotherapy, or other immune-modifying medicines without guidance from the prescribing team.

Seek emergency help for trouble breathing, swelling of the tongue or throat, fainting, or a rapidly worsening reaction after possible allergen exposure. Also seek urgent emergency assessment for possible sepsis, particularly when an infection is accompanied by new confusion, severe breathing difficulty, clammy or mottled skin, or extreme weakness.

- What part of the immune system does this test examine?
- What could a positive, negative, high, or low result mean?
- Could recent infection, vaccination, or medicine affect the result?
- Will the result change my care?

Common questions

Can I boost my immune response?

There is no proven way to boost every part of the immune system at once, and more immune activity is not always better. Vaccination can train targeted immune memory. Products marketed as general "immune boosters" may lack good evidence and can interact with medicines.

Does having few infections mean my immune response is strong?

Not necessarily. Exposure, vaccination, age, health conditions, hygiene, and chance all affect how often someone becomes ill. Infection history alone cannot measure overall immune function.

Does a positive antibody test mean I am immune?

Not always. The meaning depends on which antibody was tested, why the test was done, and when exposure or vaccination occurred. Some tests show previous exposure but do not establish current protection.

Is inflammation the same as an immune response?

No. Inflammation is one part of many immune responses. It can also occur after injury or from non-infectious conditions. An immune response includes cells, antibodies, chemical signals, and other processes beyond inflammation.

Can immune memory last for life?

Sometimes, but not always. Memory differs by infection, vaccine, age, health, and the immune system component being measured. Protection can also change when a germ develops new variants.

Sources

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