

**SECTION 7.2.2**

# **Acquired Immunity**

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**Pathogen Specificity, Memory, and  
the Human Defense System**

# The Foundation of Acquired Immunity

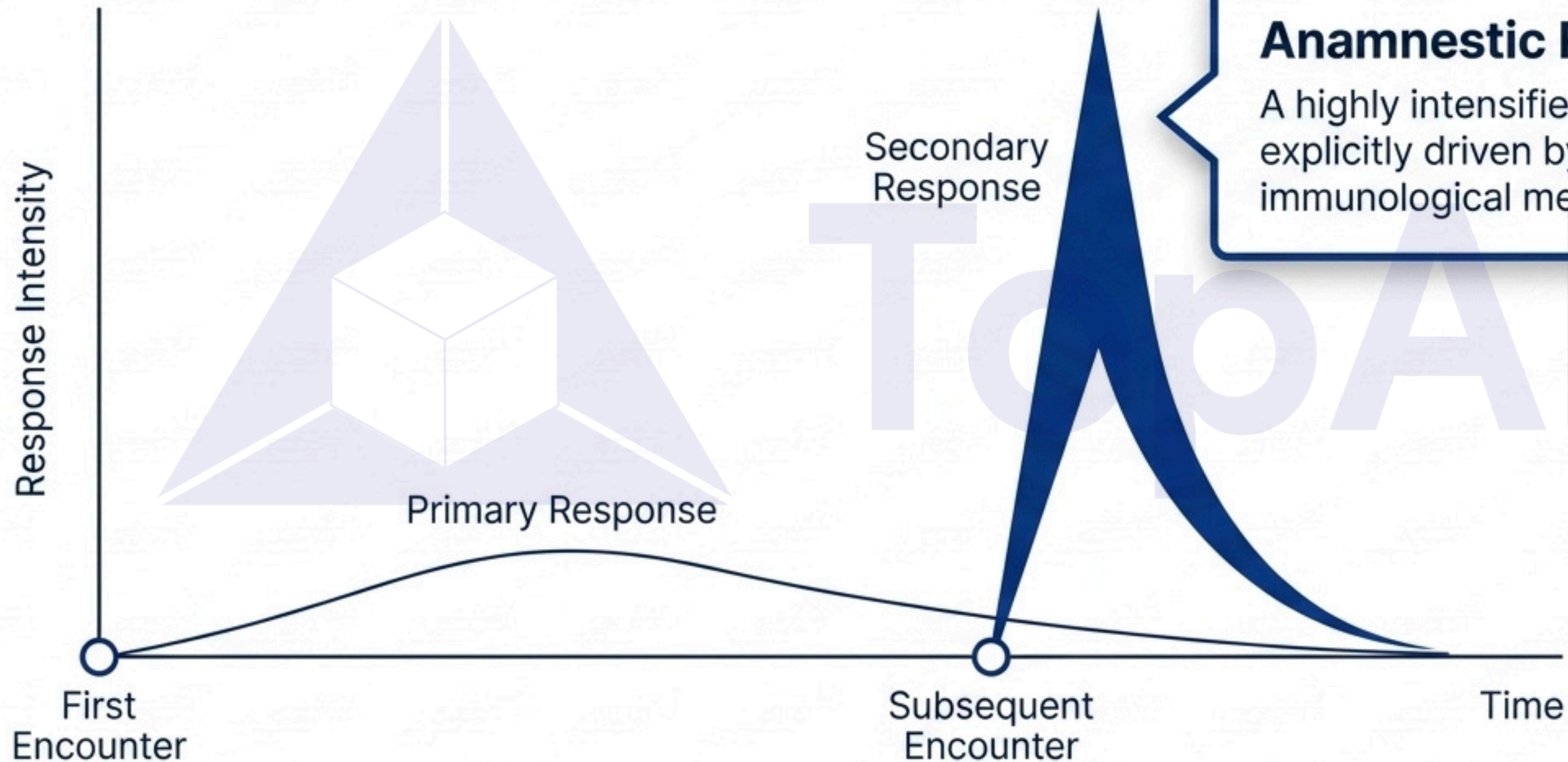
## PATHOGEN SPECIFIC

Unlike innate immunity, the acquired immune system identifies and mounts a defense against precise, specific foreign agents.

## IMMUNOLOGICAL MEMORY

After a first encounter with a pathogen, the body retains a blueprint of it, allowing for a fundamentally different response upon subsequent encounters.

# Primary vs. Secondary Encounters



## Anamnestic Response

A highly intensified reaction explicitly driven by the system's immunological memory.



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# The Cellular Architects of Immunity

The primary and secondary responses are driven by two special types of lymphocytes in the blood.

## B-lymphocytes

Produce an army of proteins (antibodies) into the blood to fight pathogens directly.

**Action:** Secretory (Humoral)

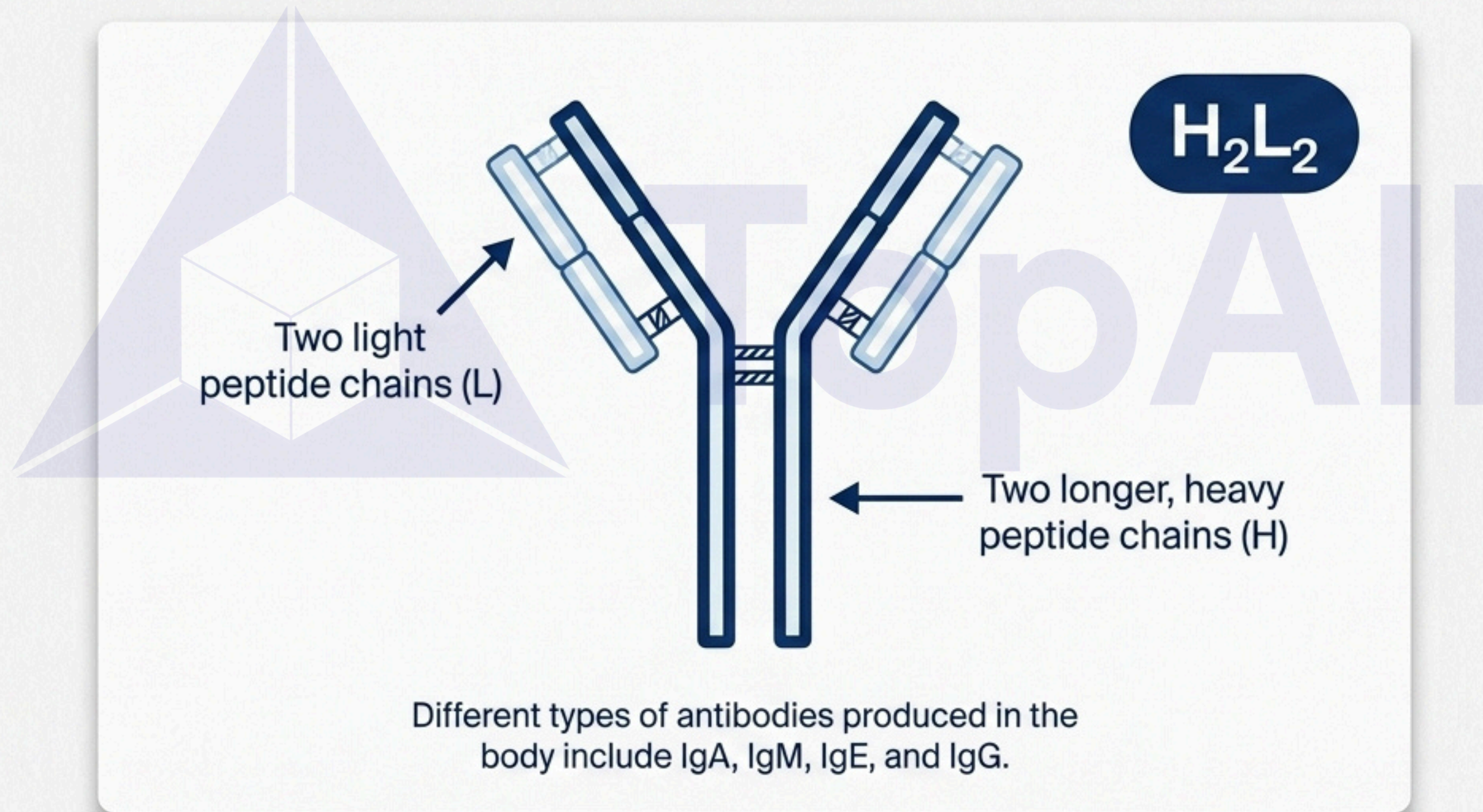
## T-lymphocytes

Do not secrete antibodies themselves. Instead, they help B-cells produce them and mediate direct cellular attacks.

**Action:** Mediatory (Cell-Mediated)

# Humoral Immune Response & Antibody Structure

Because these antibodies are found in the blood, this defense is called the **Humoral Immune Response** (antibody-mediated).



# Cell-Mediated Immunity (CMI)

The second type of acquired immune response, mediated entirely by T-lymphocytes.



## 1.

### Recognition

T-lymphocytes recognize altered, infected, or foreign cells in the body.

## 2.

### Mediation

Rather than relying on circulating antibodies in the blood, T-cells directly mediate the immune response.

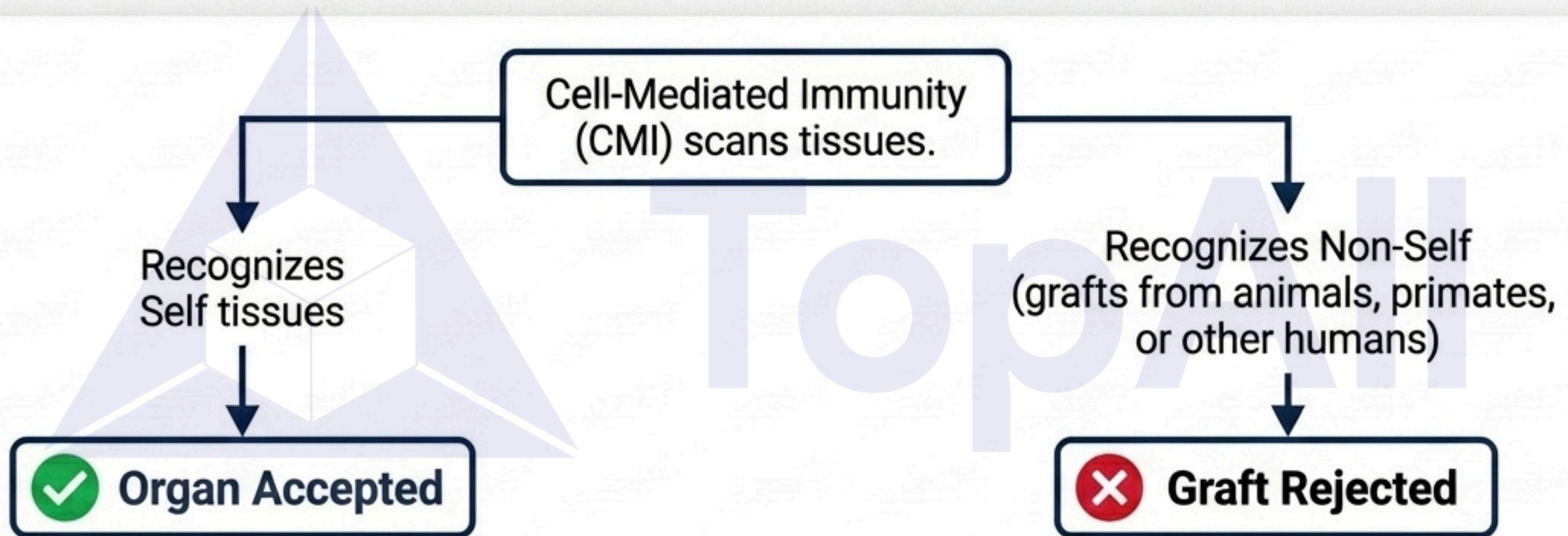
## 3.

### Action

The CMI response targets and destroys these recognized cells.

# Clinical Application: Graft Rejection

Why can't human organs (heart, eye, liver, kidney) be taken from just any source?



## Medical Counter-measures

To prevent CMI from rejecting life-saving grafts, doctors require strict tissue and blood group matching prior to surgery, followed by lifelong immuno-suppressants.

# Key Takeaways

## Mechanism

- Acquired immunity is pathogen-specific and relies on memory.
- First encounter = Primary response (low intensity).
- Subsequent encounter = Secondary / Anamnestic response (high intensity).

## Effectors

- **B-Cells:** Produce  $H_2L_2$  Antibodies. Drives the Humoral (blood-based) response.
- **T-Cells:** Do not produce antibodies; help B-cells. Drives Cell-Mediated Immunity (CMI).

## Application

CMI is responsible for distinguishing Self vs. Non-Self, leading to the rejection of foreign organ grafts.



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