



IgM: The Largest Human Antibody

[Source: BS](#)

A study has discovered that **IgM**, the **largest antibody** in the human body, **does not kill bacteria** but instead **neutralizes their toxins by stiffening them**.

- This new finding could lead to the development of **next-generation therapies** for **tough bacterial infections**.

Immunoglobulin M (IgM)

- **About: IgM** is the **first antibody produced** during infection, crucial for early defense.
 - **Pentameric (five antibody units joined)** in structure, it has high binding capacity and is effective in **neutralization, complement activation, and agglutination**, despite limited tissue penetration.
 - **Immunoglobulins (antibodies)** are **glycoproteins produced by white blood cells (B-lymphocytes and plasma cells)**, which recognize and neutralize pathogens like bacteria, viruses, and toxins.
- **Mechanism: IgM** acts as a **mechanical brace** for bacterial toxins.
 - The study finds **Protein L** from the bacterium ***Fingoldia magna***, which disrupts the immune system.
 - Using single-molecule force spectroscopy, the researchers found that when IgM binds to Protein L, it makes the toxin much more resistant to breaking apart.
 - Its **large size and multiple binding sites** allow IgM to engage several points on the toxin simultaneously, stabilizing it, a feature absent in smaller antibodies.
 - The effect is **concentration-dependent**, with higher IgM levels providing stronger protection.
- **Significance:** This discovery redefines antibodies as **mechanical modulators**, not just **chemical binders**, and opens avenues for **IgM-based therapies** to complement antibiotics, especially against **resistant infections**.

ANTIGEN VERSUS ANTIBODY

An antigen is any substance that triggers an immune response in the body

Also called immunogens

Can be either proteins, carbohydrates, lipids or nucleic acids

Interacting domain with the antibody is called the epitope

Cause either diseases or allergic reactions

The four types include exogenous antigens, endogenous antigens, autoantigens, and neoantigens

An antibody is a blood protein that is produced against a specific antigen

Also called immunoglobulins

Glycoproteins

Variable site can bind to the epitope

Protect the body from antigens either by immobilizing the antigen or lysing the pathogen

The four types include IgM, IgG, IgE, IgD, and IgA

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