

An antibody is an immunological soluble B cell receptor with functions of detecting antigens and carrying out various adaptive humoral immune responses. The responsibility of producing antibodies is the sole role of the B cell. There are six main subfamilies of antibodies: IgM, IgD, IgG, IgA, and IgE. The earliest type of B cell, the primary focus B cells, produce IgM; therefore, the first antibody made during a primary immune response is IgM. IgM effector functions—responsibilities—include activating complement, neutralization, and agglutination. The role of IgM is in part due to its structure for, at the molecular level, structure equals function. IgM is a heterotetrameric pentavalent peptide, thus, has ten total antigen binding sites. Antibodies are similar in structure to transmembrane immunoglobulins yet lack a short transmembrane segment at the carboxy-terminal end. The carboxy-terminal end is lost as a result of the process of mRNA splicing. The secreted form of IgM exists predominantly in a pentameric configuration. The polymeric forms of IgM contains a polypeptide, called the *J chain*, that is linked by two disulfide bonds to the Fc region in two different monomers. IgM is the most common antibody—it is in blood and other body fluids, and protects against bacterial and viral infections, plays an important role in immune regulation, and immunological tolerance.

References

- Su, Q., Chen, M., Shi, Y., Zhang, X., Huang, G., Huang, B., Liu, D., Liu, Z., & Shi, Y. (2022). Cryo-EM structure of the human IgM B cell receptor. *Science (New York, N.Y.)*, 377(6608), 875–880. <https://doi.org/10.1126/science.abo3923>