

Isotype (immunology)

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Antibodies can come in different varieties known as isotypes [2] or classes. In placental [3] mammals there are five antibody isotypes known as IgA, IgD, IgE, IgG and IgM. They are each named with an "Ig" prefix that stands for immunoglobulin, another name for antibody, and differ in their biological properties, functional locations and ability to deal with different antigens, as depicted in the table. [13] [4]

The antibody isotype of a B cell changes during cell development [5] and activation [6]. Immature B cells, which have never been exposed to an antigen, are known as naïve B cells and express only the IgM isotype in a cell surface bound form. B cells begin to express both IgM and IgD when they reach maturity—the co-expression of both these immunoglobulin isotypes renders the B cell 'mature' and ready to respond to antigen. [14] [7] B cell activation follows engagement of the cell bound antibody molecule with an antigen, causing the cell to divide and differentiate [8] into an antibody producing cell called a plasma cell [9]. In this activated form, the B cell starts to produce antibody in a secreted [10] form rather than a membrane [11]-bound form. Some daughter cells [12] of the activated B cells undergo isotype switching [13], a mechanism that causes the production of antibodies to change from IgM or IgD to the other antibody isotypes, IgE, IgA or IgG, that have defined roles in the immune system.

In immunology [14], the "immunoglobulin isotype" refers to the genetic variations or differences in the constant region of the heavy chain of the Ig (immunoglobulins) classes and sub-classes. In humans, there are nine isotypes:

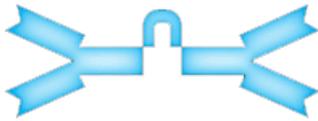
- heavy chain [15]
 - α - IgA [16] 1, 2
 - δ - IgD [17]
 - γ - IgG [18] 1, 2, 3, 4
 - ϵ - IgE [19]
 - μ - IgM [20]
- light chain [21]
 - κ
 - λ

Immunoglobulin class switching [22] can be used to change the class of the heavy chain, but not of the light chain.

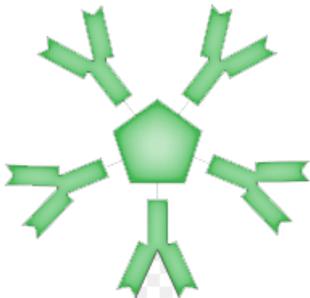
Some antibodies form complexes [23] that bind to multiple antigen molecules.



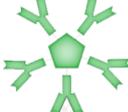
Monomer
IgD, IgE, IgG



Dimer
IgA



Pentamer
IgM

Name	Types	Description	Antibody Complexes
IgA [16]	2	Found in <u>mucosal</u> [24] areas, such as the <u>gut</u> [25], <u>respiratory tract</u> [26] and <u>urogenital tract</u> [27], and prevents colonization by <u>pathogens</u> [28]. [10] [29] Also found in saliva, tears, and breast milk.	
IgD [17]	1	Functions mainly as an antigen receptor on B cells that have not been exposed to antigens. [11] [30] It has been shown to activate basophils and mast cells to produce antimicrobial factors. [12] [31]	 Monomer IgD, IgE, IgG
IgE [19]	1	Binds to <u>allergens</u> [32] and triggers <u>histamine</u> [33] release from <u>mast cells</u> [34] and <u>basophils</u> [35], and is involved in <u>allergy</u> [36]. Also protects against <u>parasitic worms</u> [37]. [6] [38]	 Dimer IgA
IgG [18]	4	In its four forms, provides the majority of antibody-based immunity against invading pathogens. [6] [38] The only antibody capable of crossing the placenta to give passive immunity to fetus.	 Pentamer IgM
IgM [20]	1	Expressed on the surface of B cells and in a secreted form with very high avidity. Eliminates pathogens in the early stages of B cell mediated (humoral) immunity before there is sufficient IgG. [6] [38] [11] [30]	

Website reference:

From Wikipedia, the free encyclopedia [2]

Source URL: http://www.antibodychain.com/wiki/isotype_immunology

Links:

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- [5] http://en.wikipedia.org/wiki/B_cell#Development_of_B_cells
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- [24] <http://en.wikipedia.org/wiki/Mucosal>
- [25] http://en.wikipedia.org/wiki/Gut_%28zoology%29
- [26] http://en.wikipedia.org/wiki/Respiratory_tract
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- [29] http://en.wikipedia.org/wiki/Antibodies#cite_note-9
- [30] http://en.wikipedia.org/wiki/Antibodies#cite_note-Geisberger-10
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- [32] <http://en.wikipedia.org/wiki/Allergens>
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