HURSDAY, NOVEMBER 27, 2008

The B cell receptor and antibodies Part 2

Antibodies

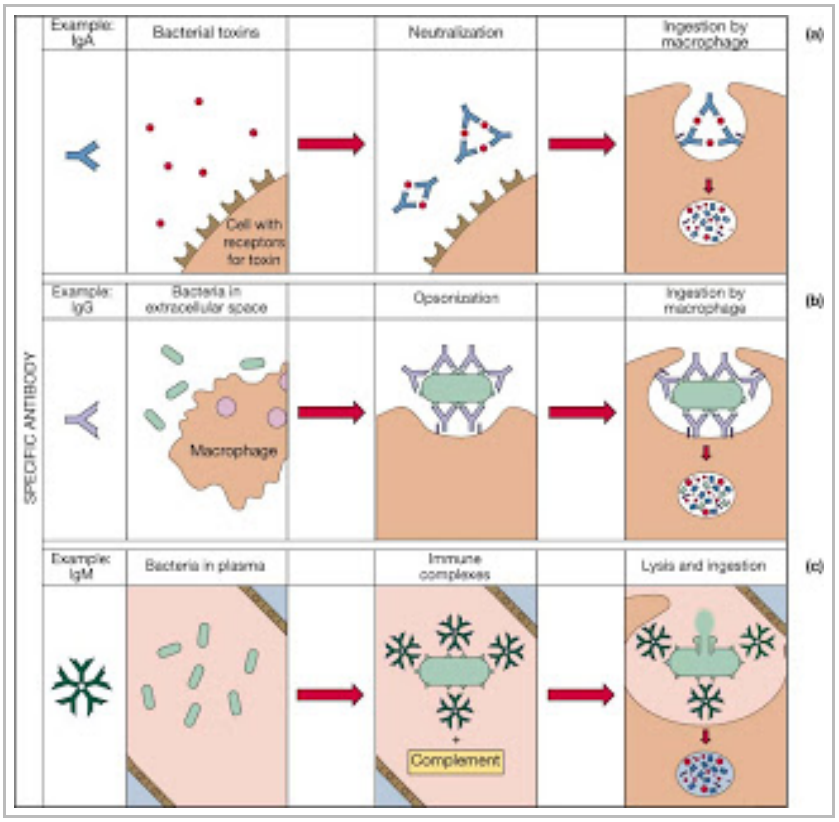
Let's recall what antibodies are. Well, they are proteins that fight infection. Now, let's find out what they can actually do. The functions of antibodies are merely neutralisation of viruses and toxins, complement activation and opsonisation, opsonisation and lastly antibody-dependent cell mediated cytotoxicity (ADCC).

Neutralisation - Antibodies can bind to toxin molecules or pathogens such as viruses. This prevents them from binding to receptors on the host cell and entering it.

Activation of complement – The Antibody-Antigen (Ab-Ag) complexes activate the classical pathway in which the activation of complement will lead to opsonisation of pathogens, clearance of immune complexes from the circulation, local inflammation and lysis of pathogens.

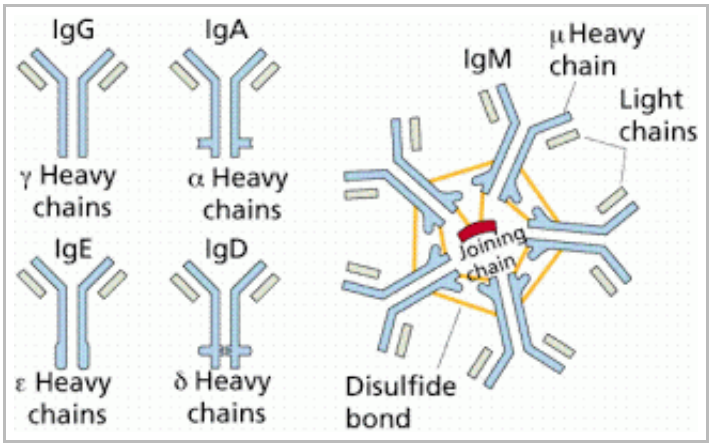
Opsonisation – The pathogens are coated with antibodies. This facilitates recognition and binding by the phagocytes. This means that the antibody will signal the phagocytes to engulf and destroy the organism or cell.

Antibody-dependent cell mediated cytotoxicity (ADCC) – Organisms that are too large to be phagocytosed are killed by toxins released by immune system cells. Cells such as Natural Killer (NK) cells, eosinophils have FcR that can bind to antibody-coated targets.



Immunoglobulin classes

There are five classes or isotypes of immunoglobulins, IgG, IgM, IgD, IgA and IgE.



There are different classes of antibodies because they carry out different functions and are directed to different parts of the body.

IgM – The first antibody that is produced in the immune response and it activates complement. It also has low affinity which means the strength of binding between the antibody and antigen is low. B cell may switch to other Ig classes later that will carry out other functions.

IgG – It is the major class of Ig in the blood and it can cross the placenta to provide passive immunity to the fetus. There are 4

subclasses of IgG. IgG 1-4 are involved in neutralisation. IgG1 is involved in opsonisation and IgG 3 is able to activate complement.

IgA – It protects mucosal surfaces (eg: respiratory tract). It is also most abundant Ig. It is found in tears, mucous, saliva, sweat and breastmilk.

IgE – It has low concentrations in serum and binds to basophils,eosinophils and mast cells through their FcR. When these cells are activated, inflammation will occur. IgE and mast cells are involved in allergic reactions.

IgD – It is found on cell membrane of naive B cells (B cells that have not encountered antigen), co-expressed with IgM. Nevertheless, its function is unknown and barely found in blood.

References

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Posted by FREAKS! at 10:30 PM No comments:

Labels: The B cell receptor and antibodies

The B cell receptor and antibodies Part 1

B cell receptors

What are B cell receptors & how they come about?

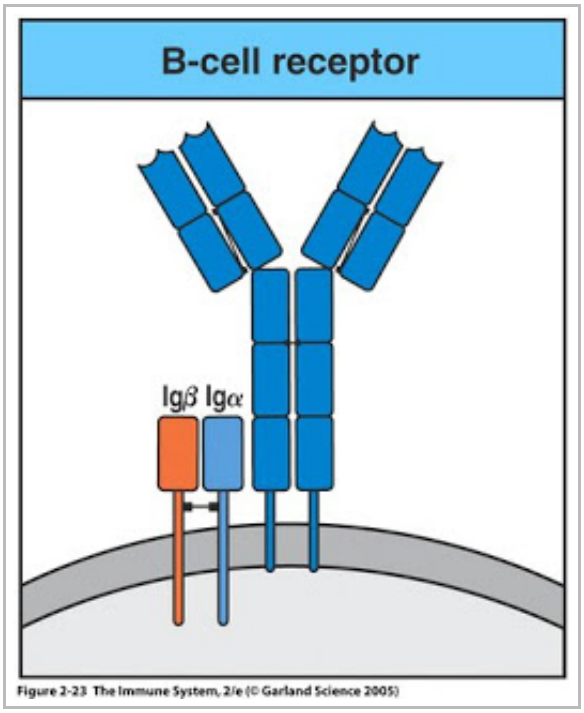
As mentioned before, B cells produce antibodies. However, they do not produce those antibodies until they become fully activated. Each and every B cells has a unique receptor protein called the B cell receptor (BCR) on its surface that will specifically bind to antigen molecules. The BCR is also known as immunoglobulin (Ig) and it differentiates B cells from other types of lymphocytes as well as being the main protein involved in B cell activation. B cell receptors may be bound to the B cell membrane known as surface immunoglobulins or secreted as antibodies (Ab). The secreted antibodies carry out humoral immunity.

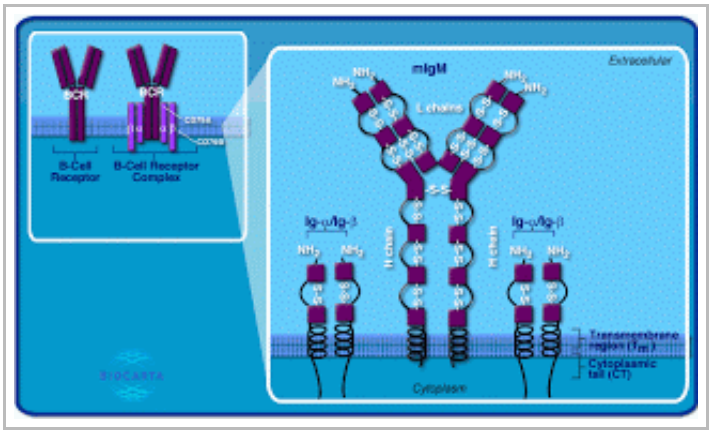
When the B cell receptor binds to antigen, it initiates a signal through two proteins (Ig-alpha and Ig-beta) non-covalently in the B cell receptor complex. The signal initiated by binding of antigen to the B cell receptor complex causes growth and proliferation of the B cell. This will then lead to the creation of an amplified clone of effector cells that secrete the antigen-specific immunoglobulin. In addition, activating the B cell receptor by antigen will also result in the production of memory cells that persist in circulation to produce a

more rapid immune response after future challenges by the same antigen.
In case all of you are wondering how does a B cell receptor looks like.

Here is the structure.

- 4 polypeptide chains
- 2 identical heavy (H) chains and 2 identical light (L) chains
- The polypeptide chains are joined together by interchain disulfide bonds.





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