

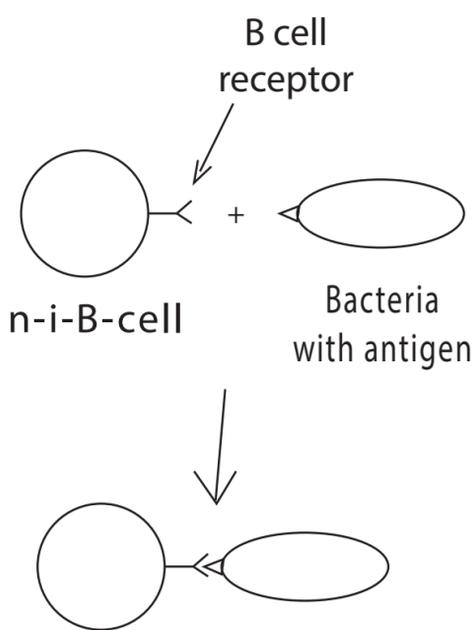
# Adaptive Humoral Immunity

What happens if you are infected by bacteria and the bacteria are in the fluid spaces of your body? How will the immune system eliminate these bacteria and restore your health?

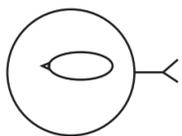
The immune system must use humoral adaptive immunity. This type of immunity will use B-cells. These cells will morph into plasma cells and it is the plasma cells that make antibodies. It's the antibodies that render the humoral bacteria harmless and tag the bacteria for destruction.

The pathway to activate B-cells is different from the pathway used to activate c-T-c. B cells do have receptors matched to the bacteria's antigen but B cells also are antigen presenting cells. So the pathway for B cell activation is different than the cytotoxic T cell activation pathway.

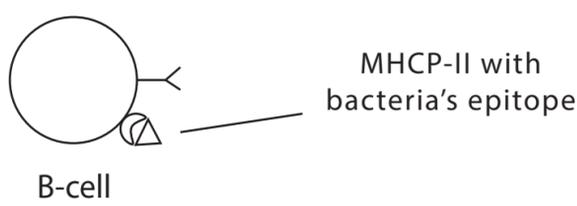
Remember, in humoral immunity, it is the antibodies that render the bacterial harmless and tags the bacteria for destruction. What will cause the lysis of the bacteria? It's complement!



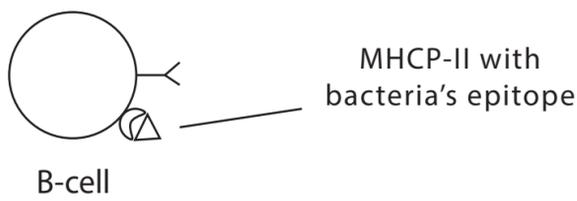
B-cell's receptor is matched to bacteria's antigen. This allows the B-cell to move bacteria into the B cell's cytoplasm. Remember, B-cells are antigen presenting cells that use MHCP-II.



Now with the bacteria inside the B-cell, a phagosome forms (i.e. bacteria plus lysosome) to digest bacteria and isolate the bacteria's epitope. This is used to form the MHCP-II-epitope complex that is placed in the B-cell's plasma membrane. This is the "antigen presentation".



At this point, the B-cell becomes activated but only weakly activated without the cytokines secreted by a h-T-cell. This "partial activation" will result in an immune response with few plasma cells, low circulating antibodies, and no memory B cells. This is called T-cell independent activation.



B-cells may also be activated by another pathway called T-cell dependent. This occurs after the B-cell has processed the bacteria's epitope and an active h-T-c with a similar receptor type interacts with the B-cell. This will cause the h-T-c to secrete cytokines. Cytokines cause the B cell to respond with a stronger immune response (many plasma cells, greater circulating antibodies, and memory B cells).

