Humoral Adaptive Immunity

Humoral adaptive immunity is the immune system's process of producing antibodies in response to specific infections. The main cells involved in humoral immunity are B cells. They wait in lymph nodes until they see free floating antigen and bind to it. They then present the antigen to helper T cells. The T cells bind to the antigen and release cytokines, which help B cells mature and proliferate. Memory B cells live for a long time in lymph nodes and proliferate upon secondary infection from a previous antigen. Plasma B cells are the activated primary response, and secrete large volumes of antibodies to bind to antigens of foreign cells and recruit phagocytic molecules.



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Characteristics

B Cell Binds Free Floating Antigen
Basketball Picking Up Floating Ant-gem
The humoral immunity process begins when a B cell binds to a free floating antigen in the lymph. B cells wait in the lymph node until antigen exposure.

B Cell Presents Antigen to Helper T Cell
Basketball Presenting Ant-gem to Helper Tennis-ball
The B cell presents the antigen to type II helper T cells, so that the helper T cells can stimulate the B cells into proliferation and antibody production.

Helper T Cells Help B Cells Develop Antigen Specificity
Helper Tennis-ball Matching Receptor to Ant-gem for Basketball
Helper T cells express CD4 on the surface rather than CD8, which is expressed by killer T cells. The helper T cell binds to the presented antigen on the B cell receptor through the MHC-II complex. This causes cytokine release that stimulates the B cell to become active and produce antibodies specific to the presented antigen.

Plasma B Cells Secrete Antibodies
Plasma-TV Basketball Shooting out Ant-tie-bodies
Plasma B cells are the active B cells that produce large amount of antibodies upon primary infection. They will eventually die, unlike memory cells which can last for the lifetime of an organism.

Memory B Cells Cause Faster Secondary Response
Brain Basketball Sending Second Basketball Running
Memory B cells stay in the lymph nodes and wait to be re-exposed to the same antigen that previously infected the body. Upon exposure to that antigen, they proliferate rapidly and produce large amounts of antibodies for that antigen.

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