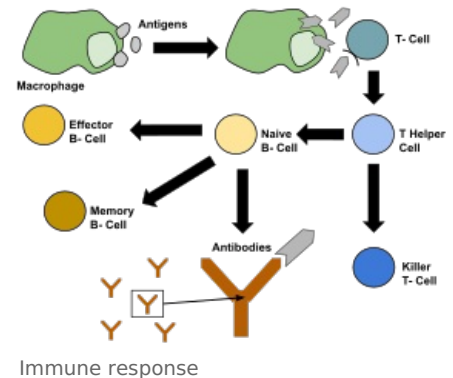


Cooperation of immunocompetent cells in the B immune response

Cooperation of the cells in the *antibody response*: In order for a successful antibody response to occur, the cooperation and interplay of at least 3 types of cells are necessary: **APC (antigen presenting cell)**, **Th (T-helper lymphocyte)** and **B lymphocytes**.



- The antigen that penetrates the organism is captured by the B-lymphocytes, which have the corresponding receptor; at the same time, it is absorbed and processed by an antigen-presenting cell (most often a macrophage or a dendritic cell).
- **Fragments of the antigen** together with the **MHC II molecule** are exposed in a highly immunogenic form **on the surface of the APC**, in this form they are **recognized by the Th lymphocytes** with the corresponding receptors. This binding represents a signal to activate the Th lymphocyte, but is not sufficient by itself.
- Others - so-called **secondary signals** are needed, which consist of binding of several adhesive molecules between the APC and the Th cell - the most important are e.g. **CD28** and **LFA1** on the **Th** and their ligands on the **APC: B7** and **ICAM-1**, for further Th activation cytokines produced by APCs - especially *IL-1* - contribute.
- The result is division of the Th precursors which create **clones of activated Th lymphocytes**. These activated Th lymphocytes then deliver the necessary signals to the B lymphocyte.
- Again, at least 2 signals are needed to activate a **B lymphocyte**: antigen reacting with **mIg** (membrane immunoglobulin) on B cells and **stimulatory signals from Th cells**. The very binding of the antigen to the BCR (B cell receptor) often results in the unresponsiveness of the B lymphocyte and sometimes its death; if activated Th lymphocytes are present, they contact B lymphocytes via the **CD40** receptor on the **B cell** and the **CD40L** ligand on the **Th cell**; Th lymphocyte also produces *IL-2*, *IL-4*, *IL-5* and *IL-6*. Under the influence of these signals, B cells begin to proliferate.
- During this period, variable genes in B cell clones are subject to increased mutation rates. Mutant forms of mIg with different affinity to the antigen appear on the cell surface, only the B lymphocytes that bind to the antigen the strongest survive, the other ones die; at the same time, DNA segments are further rearranged (class switching) and lymphocytes complete their development into **plasma cells**. A portion of the B cells become **memory cells**.
- *The primary response* to the antigen begins more slowly and is characterized by the presence of antibodies of the *IgM class*
- *Repeated encounter* with the same antigen induces a secondary response that starts much faster, is stronger and lasts for a much longer time; mainly *IgG antibodies* are present.

Links

Related articles

- Cooperation of immunocompetent cells in the T immune response

Source

- ŠTEFÁNEK, Jiří. *Medicína, nemoci, studium na 1. LF UK* [online]. [cit. 11. 2. 2010]. <<https://www.stefajir.cz/>>.