Efficient induction of immune cells that remember antigens

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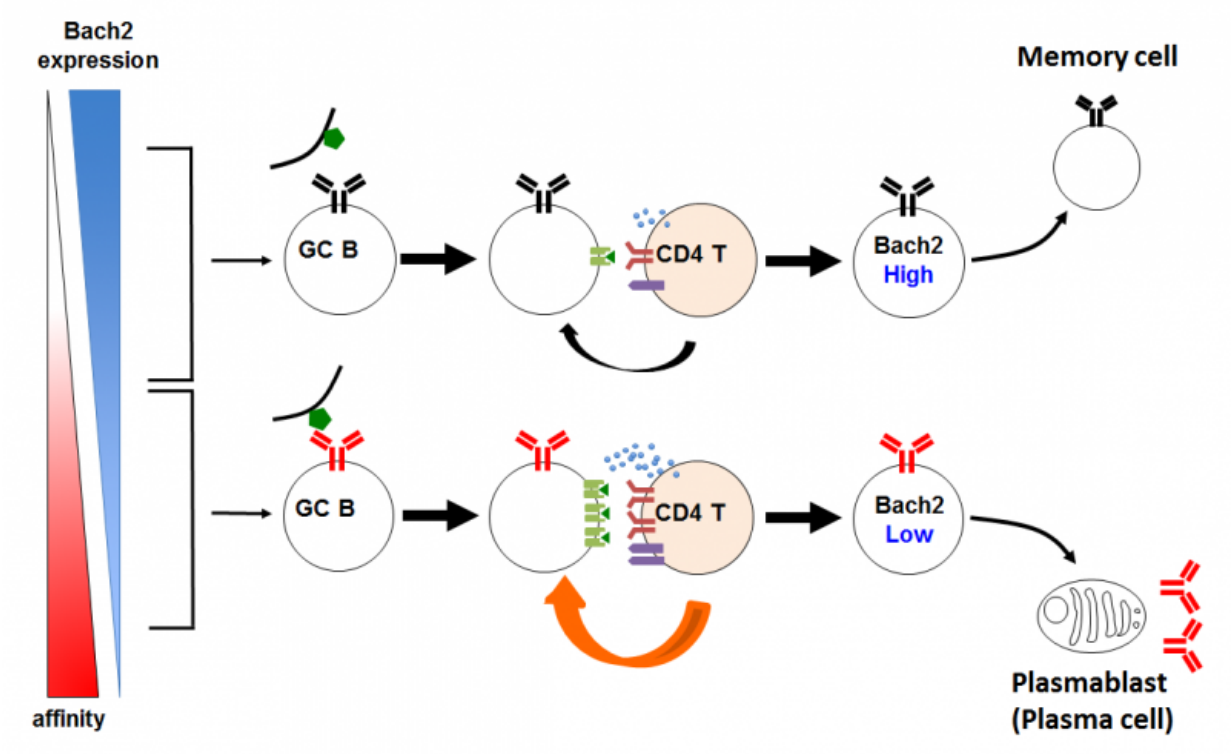

Mechanism of selection of memory B cells and plasma cells from germinal center B cells: The affinity of B cell receptor for antigen and the expression level of Bach2 are inversely correlated in germinal center B cells. Low affinity germinal center B cells, which receive weaker stimulation from antigen and antigen specific CD4 T cells, maintain a relatively high level of Bach2 expression and tend to be induced to form memory B cells in the germinal center. On the other hand, high affinity cells, which receive strong stimulation from antigen and antigen specific CD4 T cells, have difficulty maintaining Bach2 expression at high levels and tend to be induced to form plasmablasts

(plasma cells). Credit: Osaka University

A group of researchers at Immunology Frontier Research Center (IFReC), Osaka University and RIKEN Center for Integrative Medical Sciences jointly clarified the mechanism for inducing germinal-center B cells' differentiation into memory B cells, immune cells that remember antigens, at the molecular level.

When re-exposed to antigens such as bacteria or viruses, our bodies get rid of antigens by producing more antibodies than in the primary response. This is because memory B cells, which remember antigens in the primary immune response, are induced and respond faster in the secondary exposure to bacteria or viruses and differentiate into antibody-producing cells.

Vaccines block virus entry by making good use of such responses. When antigens such as viruses and vaccines enter the human body, germinal centers are produced within secondary lymph nodes and memory B cells are then induced from germinal-center B cells. However, the mechanism behind the induction was not yet understood, and the clarification of this mechanism has been an important research agenda.

A research group led by Ryo Shinnakasu, Assistant Professor and Tomohiro Kurosaki, Professor at IFReC and a group at RIKEN Center for Integrative Medical Sciences jointly clarified that germinal-center B cells with lower affinity maturation of antigens were easily differentiation-induced into memory B cells. The group also found that the expression level of transcription factor Bach2 in germinal-center B cells with lower affinity was significantly high, and that this high expression of Bach2 was important for memory B cell differentiation.

This group's achievement reverses the conventional wisdom that memory B cells are induced by high-affinity cells, possibly greatly influencing vaccine strategies targeting memory B cells. Bach2, an important gene for inducing memory B cells, may become an important target in vaccine strategies.

More information: Ryo Shinnakasu et al. Regulated selection of germinal-center cells into the memory B cell compartment, *Nature Immunology* (2016). DOI: 10.1038/ni.3460

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