

# Mechanism for the establishment of immunological memory

-Memory B cell generation requires metabolic regulation and survival signal -

**Keywords:** immunological memory, B cell, germinal center, metabolism

## Points

- Precursors for memory B cells were identified.
- Differentiation into memory B cells requires hypometabolism and a survival signal.
- Transcription factor Bach2 plays an important role in the metabolic regulation of germinal center B cells and is essential for the production of memory B cells.

## Abstract

A group of researchers with Takeshi Inoue (Associate Professor, IFRc, Osaka University) and Tomohiro Kurosaki (Professor, IFRc, Osaka University and RIKEN Center for Integrative Medical Sciences) has revealed the mechanism how memory B cells, which have central roles for immunological memory, efficiently differentiate from the germinal centers (GCs).

Lymphocytes, such as B cells and T cells, are essential for immune responses against bacterial and viral infections. Especially, memory B cells, which are generated during the first infection, quickly differentiate into plasma cells (antibody-secreting cells) and block or eliminate antigens efficiently upon second infection. Vaccination is a strategy to artificially induce the immunological memory using this mechanism.

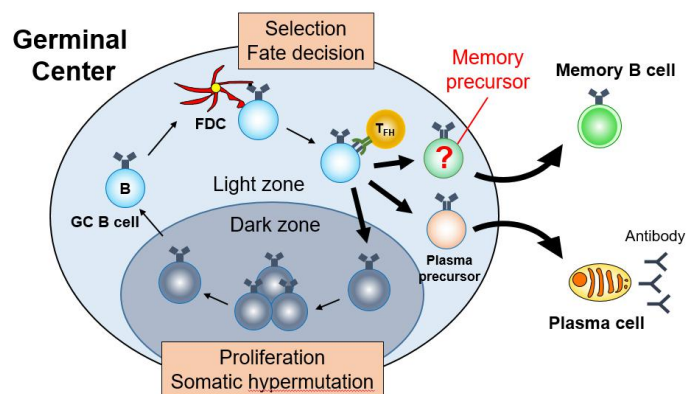


Figure: B cell differentiation in GC

When exposed to antigens, such as viruses or bacteria, “germinal center (GC)” is generated in the secondary lymphoid organs including spleens and lymph nodes. B cell fate decision occurs during GC reaction, but it is still unclear how they are selected to differentiate into plasma cells, memory B cells, or to remain in the GC. In this study, they have identified and characterized a small GC population of precursors for memory B cells. They found that the GC B cells with lower mTORC1 activity and increased survival signal from surface B cell receptors favor a memory B cell fate. Furthermore, this group previously reported that the transcription factor Bach2 is required for memory B cell generation (Shinnakasu et al., *Nat Immunol*, 2016), and in this study, they clarified that Bach2 has an important role for the regulation of metabolism during GC responses.

This group’s achievement provides the underlying mechanism for the establishment of immunological memory, which will help to develop new vaccine strategies.

### **<Article>**

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