

## IMMUNOLOGICAL MEMORY

## Basophils boost B-cell memory

Basophils are a subset of granulocytes that is thought to have an important function in allergic reactions and in host defence against parasite infections. Now, Mack and colleagues have revealed that basophils also have an important role in the generation of optimal B-cell memory responses.

Through the expression of the high-affinity Fc receptor for IgE, basophils can bind antigen-specific IgE that is produced for long periods of time after immunization with an antigen. Following re-exposure, antigen-reactive basophils bind soluble antigen through this bound antigen-specific IgE and produce interleukin-4 (IL-4) and IL-6, which promotes a T helper 2 (T<sub>H</sub>2)-cell response.

In this study, the authors first confirmed the capacity of basophils to bind small amounts of soluble antigen following re-exposure of immunized mice to the antigen, and showed that these antigen-reactive basophils were the primary producers of IL-4 and IL-6 in the spleen and the bone marrow. If basophils were depleted after immunization with a model antigen, a marked reduction in the magnitude of the B-cell memory response was observed following antigen re-exposure, which was indicated by a significant reduction in the number of antigen-specific plasma cells and by lower concentrations of antigen-specific IgG1 and IgG2a in the serum. Furthermore, the adoptive transfer of basophils from immunized mice enhanced antigen-specific B-cell memory responses in recipient mice following exposure to the same antigen.

The capacity of basophils to boost B-cell memory was also shown to be important in the

context of pathogenic infection. Mice depleted of basophils before secondary immunization with pneumococcal surface protein A, which is known to provide protection from *Streptococcus pneumoniae*-induced sepsis, were more susceptible to disease induced by subsequent exposure to the live pathogen.

Clearly, basophils are important in the generation of B-cell memory, but how is this effect mediated? Using *in vitro* assays, the authors showed that this effect relied on cell–cell contact, and that basophil-derived IL-6 was also essential. Furthermore, the presence of activated T cells — which were found to differentiate into T<sub>H</sub>2 cells in the presence of antigen-reactive, activated basophils — were also required for basophil-dependent enhancement of B-cell memory.

So, basophils have an important role in the generation of optimal B-cell memory responses by promoting T<sub>H</sub>2-cell-dependent B-cell help, which could have important implications not only for understanding the role of this granulocyte subset in host defence against invading pathogens, but also for vaccine design in which the generation of B-cell memory is an important aim.

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