

[LATEST PAPERS](#)[SEARCH for PAPERS](#)[Printer-friendly PDF](#)[Comment\(s\)](#)[>Abstract](#) [>References](#)

Cancer Immunity, Vol. 3 Suppl. 2, p. 2 (12 December 2003)

## Vaccination and immunological memory

Antonio Lanzavecchia

Institute for Research in Biomedicine, Bellinzona, Switzerland

## Abstract

Vaccination acts by inducing the clonal expansion and differentiation of antigen specific lymphocytes that persist for a lifetime as memory cells. Memory cells mediate two functions: they confer immediate protection in peripheral tissue and mount recall responses in secondary lymphoid organs. These functions are carried out by distinct cell types. In the B lymphocyte system protective memory is mediated by plasma cells that secrete antibodies, while reactive memory is mediated by memory B cells that are present in lymphoid organs and proliferate and differentiate to plasma cells in response to secondary antigenic stimulation. A similar division of labor has been recently defined for T lymphocytes. Protective memory is mediated by effector memory T cells ( $T_{EM}$ ) that home to inflamed peripheral tissues and display immediate effector function, while reactive memory is mediated by a distinct subset of central memory T cells ( $T_{CM}$ ) that retain lymph node homing receptors and high proliferative capacity in response to antigenic challenge.

I will review the experimental evidence supporting a "stem cell model" of immunological memory. Memory B cells and central memory T cells are intermediates of a progressive differentiation process which have acquired the capacity to proliferate and differentiate in response to polyclonal stimuli such as cytokines, microbial products or bystander T cell help. While self-renewing, memory B cells and central memory T cells continuously spill out plasma cells and effector T cells, thus replenishing those that turn over. Furthermore I will describe in detail the mechanisms that sustain serum antibody levels following vaccination and discuss the implications of these findings for vaccine design.

---

## References

1. Sallusto F, Lenig D, Forster R, Lipp M, Lanzavecchia A. Two subsets of memory T lymphocytes with distinct homing potentials and effector functions. *Nature* 1999; **401**: 708-12. (PMID: 10537110) [[PubMed](#)]
2. Bernasconi NL, Traggiai E, Lanzavecchia A. Maintenance of serological memory by polyclonal activation of human memory B cells. *Science* 2002; **298**: 2199-202. (PMID: 12481138) [[PubMed](#)]