# IN BRIEF

## REGULATORY T CELLS

### Feedback control of regulatory T cell homeostasis by dendritic cells *in vivo*

Darrasse-Jèze, G. *et al. J. Exp. Med.* 10 Aug 2009 (doi:10.1084/jem.20090746)

This study investigates the role of antigen-presenting cells in the homeostatic maintenance of regulatory T ($T_{Reg}$) cells *in vivo*. It shows that there is a regulatory feedback loop between dendritic cells (DCs) and $T_{Reg}$ cells that is required to maintain physiological numbers of both cell types. In both the spleen and lymph nodes the number of $T_{Reg}$ cells was directly proportional to the number of DCs, and this correlation was dependent on MHC class II expression by DCs. Increasing the number of DCs through administration of FLT3 ligand protected against autoimmune disease in mouse models by increasing the number of $T_{Reg}$ cells. The balance between immunity and tolerance can therefore be maintained by this regulatory feedback loop. Loss of $T_{Reg}$ cells is known to result in an increase in the number of DCs through the production of FLT3 ligand by an undetermined source; this study shows that an increased number of DCs would in turn increase the number of $T_{Reg}$ cells and thereby restore immune homeostasis.

## IMMUNE RESPONSES

### CCR6 is required for IL-23-induced psoriasis-like inflammation in mice

Hedrick, M. N. *et al. J. Clin. Invest.* **119**, 2317–2329 (2009)

Psoriasis-like skin lesions can be induced in mice by injection of interleukin-23 (IL-23), through an IL-22-dependent mechanism that has been linked to T helper 17 ($T_H17$) cells. Accordingly, Hedrick ***et al.*** show that mice that lack expression of CC-chemokine receptor 6 (CCR6), which is involved in $T_H17$ cell recruitment to the skin, do not develop disease or show increased IL-22 production following IL-23 injection. Unexpectedly, however, IL-23-injected ears of *Ccr6*$^{-/-}$ and wild-type mice had similar numbers of T cells that could produce IL-22 and IL-17. Moreover, disease still developed in lymphocyte-deficient mice, although it did not persist, indicating a non-T cell source for early IL-22. This and further observations led to the suggestion that IL-23-induced psoriasis-like disease develops in sequential T cell-independent and -dependent phases, with a requirement for CCR6 expression and IL-22 production by non-T cells.

## PHAGOCYTOSIS

### Apoptotic cells promote their own clearance and immune tolerance through activation of the nuclear receptor LXR

A-Gonzalez, N. *et al. Immunity* 30 Jul 2009 (doi:10.1016/j.immuni.2009.06.018)

The failure to clear apoptotic cells is associated with a breakdown of immune tolerance. Because phagocytes gain additional cellular cholesterol following uptake of dead cells, the authors asked whether there is a link between the oxysterol-activated transcription factor liver X receptor (LXR), phagocytosis and immune tolerance. They found that LXR-deficient macrophages were defective in apoptotic cell clearance owing to reduced expression of MER, a receptor tyrosine kinase important for phagocytosis. Furthermore, LXR-deficient macrophages responded to apoptotic cell uptake with an aberrant pro-inflammatory response and LXR-deficient mice developed systemic autoimmune disease. So, activation of LXR by apoptotic cells mediates a positive feedback loop that promotes further uptake through MER upregulation and links apoptotic cell engulfment to the maintenance of immune tolerance.