

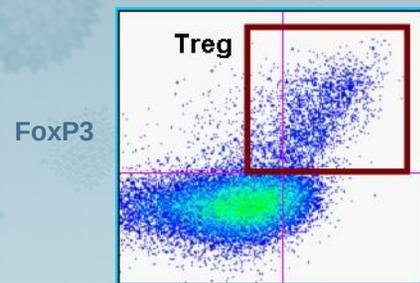
Regulatory T Cells

Halima Moncrieffe, University College London, UK

As the name suggests **regulatory T cells** (also called **Tregs**) are T cells which have a role in regulating or suppressing other cells in the immune system. Tregs control the immune response to self and foreign particles (**antigens**) and help prevent autoimmune disease. Tregs produced by a normal thymus are termed 'natural'. Treg formed by differentiation of naïve T cells outside the thymus, i.e. the periphery, or in cell culture are called 'adaptive'.

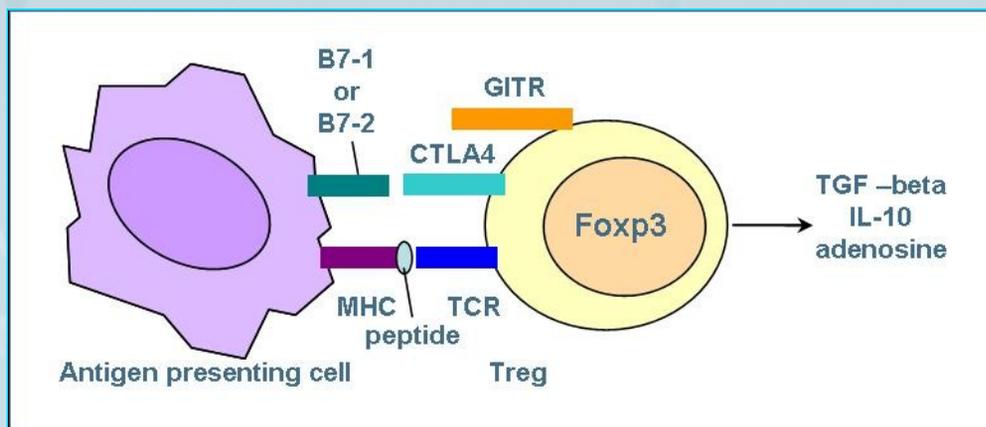
Natural Treg are characterised as expressing both the **CD4 T cell co-receptor** and **CD25**, which is a component of the **IL-2 receptor**. Treg are thus CD4+CD25+. Expression of the nuclear transcription factor **Forkhead box P3 (FoxP3)** is the defining property which determines natural Treg development and function.

FoxP3 is crucial for maintaining suppression of the immune system. Naturally occurring mutations in the **FOXP3** gene can result in self-reactive lymphocytes that cause a rare but severe disease **IPEX** (Immune Dysregulation, **P**olyendocrinopathy, **E**nteropathy, **X**-Linked) in humans and **scurfy** in mice.



Flow cytometry plot gated on human CD4 T cells

© The copyright for this work resides with the author



Tregs suppress activation, proliferation and cytokine production of CD4+ T cells and CD8+ T cells, and are thought to suppress B cells and dendritic cells. Tregs can produce soluble messengers which have a suppressive function, including **TGF-beta**, **IL-10** and **adenosine**. Additional markers of natural Tregs are **CD152** (CTLA-4) and **GITR** (glucocorticoid-induced TNF receptor), although it should be noted that these are also expressed by other T-cell types periodically (e.g. activated T cells) so they are not in themselves unequivocally diagnostic. However, the role of these markers on other T cells is not clearly defined. T cells without a specialised regulatory capacity may also compete for resources such as **growth factors** and **MHC class II stimulation** and thus have a regulatory role via this general mechanism of competition.