ImmunoTools IT-Box-Cy55M-Award 2013

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Generation of thymic epithelial cells from embryonic stem cells.

The thymus is the main site of T-cell maturation, making it a central organ of the immune system. The maturation of T-lymphocytes within the thymus depends on the intricate crosstalk between the lymphocytes and the main component of the thymic stroma, the thymic epithelial cells (TECs). However, since the thymus is one of the first organs to undergo age-related degeneration, there is a significant decrease in the output of naïve T-cells with age. Thus, there have been efforts towards generating thymic epithelial cells from embryonic stem cells (ES) and induced pluripotent stem (iPS) cells.

In mice and human, the thymus is derived from the third pharyngeal pouch endoderm. The cues leading to specification of the thymus are, however, not well characterised. This presents an additional challenge for the generation of TECs from ES and iPS cells. Recent studies have successfully generated anterior foregut endoderm, which gives rise to the third pharyngeal pouch endoderm, from human ES and iPS cells. However, the protocol used in this study did not lead to initiation of Foxn1, a thymus marker, in the derived endodermal cells. Furthermore, the functionality of the cells generated from the current protocols remains an unanswered question.

The focus of my project is to devise a protocol for generation of functional TECs using a novel transgenic ES cell line. The differentiation of ES cells into endoderm, and subsequently into TECs, requires addition of various cytokines to the differentiation media. Some of these cytokines include EGF, FGFs, and interleukins (ILs). The ImmunoTools cytokines will be used in these differentiation assays and the results will be presented at various conferences and workshops.

ImmunoTools IT-Box-Cy55M for Harsh Vaidya
includes 55 recombinant mouse cytokines

rm EGF, rm Eotaxin / CCL11, rm FGF-a / FGF-1, rm FGF-b / FGF-2, rm FGF-8, rm Flt3L / CD135, rm G-CSF, rm GM-CSF, rm GRO-a / CXCL1, rm GRO-b / CXCL2, rm IFNgamma, rm IL-1alpha, rm IL-1beta, rm IL-2, rmIL-3, rm IL-4, rm IL-5, rm IL-6, rm IL-7, rm IL-9, rm IL-10, rm IL-11, rm IL-13, rm IL-15, rm IL-16, rm IL-17A, rm IL-17C, rm IL-17F, rm IL-19, rm IL-20, rm IL-21, rm IL-22, rm IL-25 / IL-17E, rm IL-27, rm IL-31, rm IL-33, rm IP-10 / CXCL10, rm LIF, rm MCP1 / CCL2, rm M-CSF, rm MIP-1α/ CCL3, rm MIP-1β / CCL4, rm MIP3α / CCL20, rm MIP3β / CCL19, rm NGF-beta, rm PDGF-AA, rm PDGF-BB, rm RANTES / CCL5, rm sCD40L / CD154, rm SCF, rm SDF-1α / CXCL12a, rm SDF-1β / CXCL12b, rm TNFα, rm TPO, rm VEGF DETAILS