Type I interferon is critical for the homeostasis and functional maturation of type 3 T cells

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Published in:
Scandinavian Journal of Immunology

Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

A-31311

Th2 cell metabolism

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T helper cells undergo rapid proliferation upon activation and differentiate into cells producing high levels of cytokines. This requires large amounts of energy. Metabolic pathways such as glycolysis are important for the development of functional T helper cell subsets, but molecules in the glycolytic pathway have also been found to have targeted effects on T helper cell effector functions. Type 2 T helper cells are characterized by their production IL-5 and IL-13 and are involved in immune responses to parasites, and in allergies. The role of metabolism for the development and function of Th2 cells is not very well understood. In this study we aim to determine the levels of glycolysis of in vitro generated Th2 cells and to investigate the role of glycolysis for the effector function of Th2 cells.

We used the Seahorse XF Analyzer to measure levels of glycolysis. We used both in vitro differentiated T helper cells and cells from inflamed mice lungs. Expression of cytokines and metabolic markers was assessed by flow cytometry.

We show that in vitro generated Th2 cells require active glycolysis for the production of IL5 and IL13 as addition of 2-DG impaired secretion of these cytokines. Th2 cells were also more glycolytic and possessed greater glycolytic capacity than other in vitro generated T helper cell subsets. We believe that this link between glycolysis and Th2 function and a general better understanding of Th2 metabolism will lead to novel strategies for the treatment of asthma and allergies in the future.

A-31312

Identification and functional characterization of non-human primate myeloid-derived suppressor cells during vaccination

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A number of conditions associated with chronic inflammation, autoimmune disease and cancer leads to accumulation of myeloid-derived suppressor cells (MDSCs) that play a considerable role in regulating T cell responses. Whether MDSCs increase and influence T cell responses in temporary inflammation like after vaccine administration is unknown. Utilizing a nonhuman primate model, we demonstrate that the two main subsets monocytic (M)-MDSCs and polymorphonuclear (PMN)-MDSCs can be detected using several of the markers used in humans. However, while rhesus M-MDSCs lacked expression of CD33, PMN-MDSCs were identified as $CD33^+$ low-density neutrophils. Importantly, both M-MDSCs and PMN- MDSCs showed suppression of T cell proliferation in vitro. The frequency of circulating MDSCs rapidly and transiently increased 24 hrs after vaccine administration. M-MDSCs infiltrated the vaccine injection site but not vaccine-draining lymph nodes. In line with this, the expression of genes relevant to MDSCs such as arginase-1, IDO1, PDL1 and IL-10 was upregulated at the vaccine injection site. MDSCs may therefore play an important role in locally maintaining immune balance to prevent potential excessive immune activation and inflammation caused by vaccine exposure.

Keywords: Myeloid-Derived Suppressor Cells, Low-Density Neutrophils, CD33, Vaccination, Nonhuman Primates

A-31314

Type I interferon is critical for the homeostasis and functional maturation of type 3 $\gamma\delta$ T cells

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Type I IFN (IFN-I) is highly expressed during viral infection and many autoimmune pathologies such as SLE and psoriasis. In addition, IFN-I is important to maintain the homeostasis of a number of different immune populations. Our aim was to identify whether IFN-I regulates type 3 $\gamma\delta$ T ($\gamma\delta$T3) cells. We found that IFN$\alpha\beta$ inhibits the activation of $\gamma\delta$T3 cells following treatment with cytokines such as IL-23 and IL-7 and abrogates their ability to produce IL-17 during viral infection. Despite this inhibitory role, $\gamma\delta$T3 cells that are deficient in type I IFN receptor (IFNAR) signaling display anergic behavior. Such $\gamma\delta$T3 anergy is characterized by failure to induce skin inflammation and unresponsiveness to cytokine stimuli. Moreover, IFNAR deficient mice display deregulated $\gamma\delta$T3 homeostasis due to a neonatal maturation defect. In conclusion, our data show that tonic type I IFN signaling during neonatal and adult life is required for the full maturation and pro-inflammatory function of $\gamma\delta$T3 cells, however acute type I IFN production during viral infection acts as a $\gamma\delta$T3 inhibitor.