ImmunoTools IT-Box-Cy55M-Award 2013

Anne Brieger

PhD Supervisor: Prof. Dr. Hajo Haase

Institute of Immunology, Medical Faculty,
RWTH Aachen University
Pauwelsstrasse 30
52074 Aachen, Germany

The induction of zinc signals in cells of the immune system

Zinc is an essential trace element which is important for immune functions. The impact of zinc is often based on alterations of intracellular zinc ion concentrations following stimulation, so-called zinc signals. The zinc ions can, for example, bind to the catalytic thiol of phosphatases and thereby affect signal transduction. The induction of zinc signals has been measured in response to various stimuli in different cell types, such as MCP-1 and LPS in monocytes, Fcε-Receptor stimulation in mast cells and IL-2 in T cells (Haase & Rink, 2009; Kaltenberg et al., 2010), suggesting that zinc ions have functions as second messengers in the activation of immune cells similar to Ca^{2+}.

The aim of my project is to enhance the knowledge about zinc signals in different cells of the immune system. I am going to stimulate murine cell lines and primary cells with cytokines to evaluate which cytokines induce zinc signals, and which cellular pathways induce the release of zinc signals. The cytokine-activated pathways that are induced by zinc signals will be examined with antibodies specific for protein modifications such as phosphorylation and inhibitors to understand on which level the zinc release is stimulated. Furthermore, I am going to examine if the functions of the cells are impaired when we abrogate the zinc signals with a specific chelator.

The *IT-Box-Cy55M* from ImmunoTools would be a great benefit for my project as it would enable me to stimulate my cells with a comprehensive panel of different cytokines, allowing an overview, which cytokine receptors utilize zinc signals, and which do not. This would help to encircle the pathways/molecular adaptors responsible for the cytoplasmic release of zinc ions. Altogether, we expect that the application of different cytokines will increase the understanding of the impact of zinc signals on immune functions and open several new areas of zinc signaling research.

Haase, H. & Rink, L. (2009). Functional significance of zinc-related signaling pathways in immune cells. *Annu Rev Nutr, 29,* 133-152.

Kaltenberg, J., Plum, L. M., Ober-Blobaum, J. L., Hönscheid, A., Rink, L., & Haase, H. (2010). Zinc signals promote IL-2-dependent proliferation of T cells. *Eur J Immunol, 40,* 1496-1503.

ImmunoTools *IT-Box-Cy55M* for **Anne Brieger**

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