



## CECILIE, EGHOLM

Boyman

Department of Immunology  
University Hospital Zurich  
Haldeliweg 4, 8044 Zürich

Cecilie.egholmrotbol@usz.ch  
<https://www.boymanlab.com/>



**KEYWORDS** – Immunology, Neutrophils, Type 2 immunity

### MAIN FIELDS OF RESEARCH; ABSTRACT

Neutrophil granulocytes (neutrophils) are the first immune cells recruited to sites of tissue damage and infections, which gives them a pivotal role in the first line of defence against pathogens. In allergic diseases like atopic dermatitis, neutrophils are less present in the skin, which makes these patients more susceptible to infections. Recent data from our laboratory has identified interleukin (IL)-4, a key cytokine in allergic diseases, as an important regulator of neutrophil recruitment during bacterial infections and inflammation, partly by antagonizing the role of granulocyte colony stimulating factor (G-CSF), a growth factor responsible for the maturation and mobilization of neutrophils. In line with these findings, depletion of endogenous IL-4 in mice led to a better protection against bacterial infection whereas application of additional IL-4 caused a worse outcome with increased lesion size and bacterial burden. These disease phenotypes also correlated with the number and activity of neutrophils, which highlights the influence of IL-4 on neutrophil recruitment. On a more cellular level, G-CSF stimulates an upregulation of the type 2 IL-4 receptor subunits, IL-4R $\alpha$  and IL-13R $\alpha$ 1. G-CSF is released upon infection and inflammation and does not only influence expression of the IL-4 receptor but also alters the expression of chemokine receptors, upregulating CXCR2 and downregulating CXCR4. CXCR2 activation enables the neutrophils to migrate towards the site of inflammation, while signaling through CXCR4 causes them to remain in the bone marrow. Therefore, by changing the balance between CXCR2 and CXCR4 expression, G-CSF causes increased release of neutrophils into the circulation, but also a sensitization to IL-4 by the upregulation of its type 2 receptor. The aim of this project is to further unravel these complex interactions and thereby help patients with atopic diseases as well as gaining a deeper insight into the functions of our body's first responders: neutrophils.

### SPECIAL TECHNIQUES AND EQUIPMENT

Flow Cytometry, Mouse models, *in vitro* assays