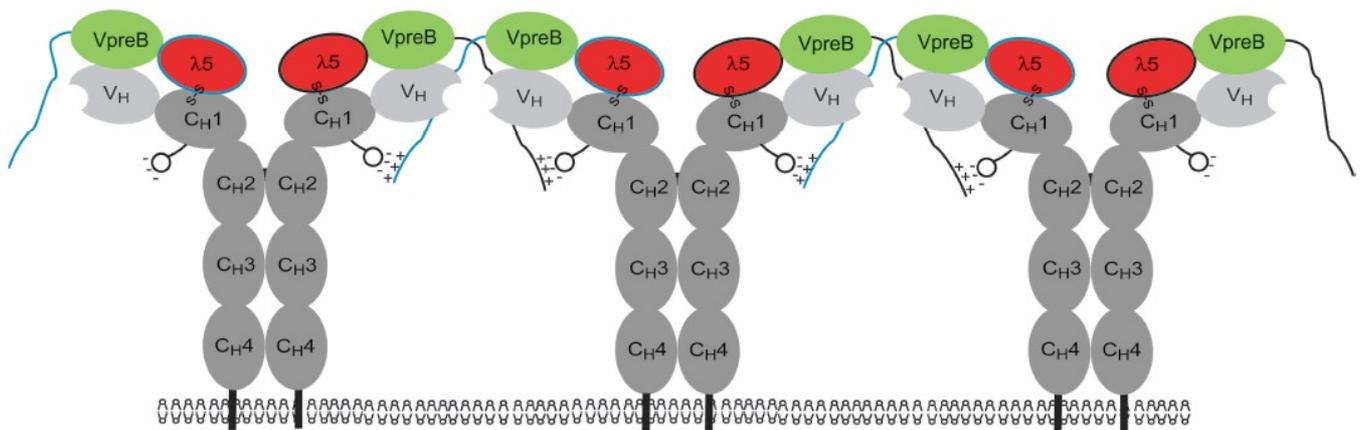


Light into the darkness of the human immune system

Scientists from the Department of Molecular Immunology at the Faculty of Biology and the Centre for Biological Signalling Studies (BIOSS) at the University of Freiburg have discovered a new mechanism that regulates the development of B-lymphocytes in the human bone marrow.

B-lymphocytes, or B-cells for short, are white blood cells that produce antibodies against infectious agents, protecting us from infections. They constitute an important part of the human immune system. Each day, a human body produces one billion new B-cells. Their development starts from haematopoietic stem cells and passes through several stages, including a precursor B-cell stage (pre-B cells) in the bone marrow where early B-cells are expanded and selected. For their proper development, pre-B cells depend on the selection through a special receptor, which is known as the pre-B cell receptor (pre-BCR). Failure to produce functional pre-BCRs results in the arrest of B-cell development and severe immunodeficiency.



It was previously assumed that the pre-B cell receptor required a partner (a so-called ligand) for proper functioning (key-lock principle). Based on the assumption that the receptor is produced by other bone marrow cells, researchers around the world had been looking for this ligand for many years. Now, researchers from Freiburg, led by Dr. Hassan Jumaa, have found a solution to this long-standing puzzle. They discovered that the pre-BCR carries its own ligand in the form of a sugar attached to the heavy chain of the receptor. Specifically, they showed that by genetically removing this particular glyco-group, the pre-BCR loses its continuous signalling behaviour, i.e. the ability to induce the proliferation of pre-B-cells. "The discovery that this ligand was part of the pre-BCR is like finding a treasure in your front garden that everybody else was hunting in remote parts of the world," said Rudolf Übelhart, the first author of the publication and a PhD student funded by the Spemann Graduate School of Biology and Medicine.

The discovery of Dr. Hassan Jumaa's group provides a completely new picture of the function of the pre-B cell receptor and is of great importance for our understanding of immunodeficiency and blood cancer.

The research of Dr. Jumaa's research group is supported by the Excellence Initiative of the German federal and state governments that provides funding to the Centre for Biological Signalling Studies (BIOSS), the Spemann Graduate School of Biology and Medicine, and the DFG-funded collaborative research centres (SFB620/SFB746).

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