NSI Symposium

Immunity and Cancer at High Resolution: from Imaging to Omics Approaches

Monday, January 28, Auditorium 3 (Blått), Rikshospitalet

Session 1

13:15 Ronald N. Germain, Laboratory of Systems Biology National Institute of Allergy and Infectious Disease, National Institutes of Health, USA
Imaging Immunity – Using multiplex 2D and 3D imaging to develop a spatiotemporal understanding of host defense

14:00 Peter Szodoray, Department of Immunology, University of Oslo, Oslo University Hospital, Oslo
Integration of T-helper signals with BCR signaling mediates normal plasma cell differentiation through regulation of CD45 phosphatase activity: implications for multiple myeloma

14:30 Coffee break

Session 2

14:45 Raquel Bartolomé Casado, Department of Pathology, University of Oslo, Oslo University Hospital, Oslo
Frontline defenders: memory CD8 T cells persist for years in the human intestinal mucosa

15:15 Marieke Kuijjer, Centre for Molecular Medicine, Norway, University of Oslo, Oslo
Estimating single-sample networks to model disruption of gene regulation in cancer

We are looking forward to your attendance!

The Norwegian Society for Immunology

Ronald N. Germain
National Institutes of Health
National Institute of Allergy and Infectious Disease
Laboratory of Systems Biology
Bethesda, MD 20892, USA

Imaging Immunity – Using Multiplex 2D and 3D Imaging to Develop a Spatiotemporal Understanding of Host Defense

Background: Immune responses involve cell-cell interactions within lymphoid tissues, trafficking of activated cells to sites of effector function, and the migration of effector cells within peripheral tissues including tumors. To gain insight into the relationships among cell movement, organ architecture, immune function, and the local tissue environment, we have used intravital multiphoton microscopy and novel multiplex immunohistochemical methods we have developed called Histo-cytometry and Ce3D.

Observations: Innate immune responses have been analyzed and the role of cell death as a primary organizing factor in neutrophil swarming, secondary tissue damage, and the recruitment of monocytes that can develop into immunosuppressive (wound healing) macrophages has been studied. An unsuspected role of fixed macrophage-dependent 'Cloaking' that protect tissues from inflammatory reactions to cell injury under normal conditions has been characterized. The role of cell localization in both innate and adaptive immunity has also been addressed using Histo-cytometry in combination with a new clarification method called Ce3D. These techniques allow the use of 8-12 different antibodies not only to surface markers but to phospho-proteins and cytokines in each cycle of imaging. Together with methods for rapid iteration of staining and analysis, these methods permit imaging of >30 target proteins in a single tissue slice or 3D biopsy sample in a quantitative manner. Recent advances include combining RNA FISH with antibody-based staining to take advantage of RNA-seq data. These multiplex imaging technologies facilitate analysis of the phenotype, number, location, signaling state, and function of immune cells and stromal elements in infected, inflamed, or tumor sites.

Conclusion: This talk will illustrate the power of in situ imaging for the acquisition of a more accurate picture of the molecular, cellular, spatial, and temporal aspects of cell function and signaling events in host immune responses and cancer.

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Biography

Ronald N. Germain received his M.D. and Ph.D. from Harvard University in 1976, the Ph.D. for research with B. Benacerraf, recipient of the 1980 Nobel Prize in Physiology and Medicine. Since that time, he has investigated basic immunobiology, first on the faculty of Harvard Medical School and, since 1982, as the Chief, Lymphocyte Biology Section, initially in the Laboratory of Immunology and now as Chief of the Laboratory of Immune System Biology at the National Institute of Allergy and Infectious Diseases, National Institutes of Health. Over the years, he and his colleagues have made key contributions to our understanding of Major Histocompatibility Complex (MHC) class II molecule structure–function relationships, the cell biology of antigen processing, and the molecular basis of T cell recognition. More recently, his laboratory has been focused on the relationship between immune tissue organization and control of adaptive immunity studied by utilizing novel dynamic and static *in situ* microscopic methods that his laboratory helped pioneer. Dr. Germain has published over 400 scholarly research papers and reviews. Among numerous honors, he was elected as an Associate (foreign) member of EMBO (2008), an AAAS Fellow (2012), elected to the National Academy of Medicine, USA (2013), received the Meritorious Career Award from the American Association of Immunologists (2015), was elected to the National Academy of Sciences, USA (2016), and received the William E. Paul Award for Excellence in Immunology and Cell Biology (2017). He has presented numerous named lectureships at major academic institutions in the US and abroad and has been designated an NIH Distinguished Investigator. He serves as an associate or advisory editor of the J Exp Med, eLife, Immunity, Current Biology, Mol Systems Biol, Int Immunol, BMC Biology, and Nature Scientific Reports and has previously served as Deputy Editor of J Immunol and Editor, Immunity. He helped co-found the NIH Immunology Interest Group and Systems Biology Interest Group and served as Associate Director for the trans-NIH Center for Human Immunology (CHI). He has trained more than 70 postdoctoral fellows, several of whom hold senior academic and administrative positions at leading universities and medical schools around the world.