

BSI Summer School report

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The BSI Summer School was a great opportunity to refresh my immunology knowledge and meet senior scientists and their current research. It was also great to get to know fellow PhD students and junior scientists from all over the UK and hear about career options outside academia. The meeting was well organised with many interesting lectures but also time to network. World class speakers presented diverse research projects, allowing an introduction to many fields of immunology. I learned a lot about immunology in general, including about vaccinations, antigens and antibodies, receptors and epitopes, mouse models and clinical studies. Topics highlighted were Rheumatoid Arthritis (RA), Type I diabetes, Asthma, respiratory syncytial virus (RSV) and tuberculosis (TB).

Professor Anne O'Garra started the Summer School off with a general introduction to Th1 and Th2 immunity and how immunity is different in latent and active tuberculosis. She then investigated whether the patients' gene signature can predict whether latent TB patients will develop acute TB. She highlighted the role of interferons, cytokines released in response to pathogens or cancer, in TB. In the absence of IFN- γ , group 1 interferons have been found to be protective and given to a patient with IFN- γ receptor mutation, IFN I therapy was successful in improving TB. Professor Andrea Cooper complemented this picture of TB research with an overview of her work on T cells in TB infection. She investigated whether all activated T cells are the same and how T cell functionality is impacted by vaccination. Professor Rose Zamoyska also investigated T cells, aiming to address why some become activated and cause autoimmunity and others don't. She introduced T cell signalling in autoimmunity and cancer and her current research on ptpn22, a tyrosine phosphatase which is a genetic risk factor for autoimmunity. Dr Susan John introduced the JAK/STAT signalling pathway and gave an overview of the cytokine receptor families. Professor Leonie Taams gave a great overview of inflammation and why we need it. She introduced the Kaede mouse, in which proteins switch from green to red upon exposure to UV light and thereby allow cell tracking from a site of sensitisation. Using this model she introduced her research on rheumatoid arthritis and the phenotypes of T_{regs}, which she found to be more regulatory in synovial fluid, but not dysfunctional in blood in RA patients. Professor Leonie Taams further underlined that inflammation and immune regulation co-exist and showed that it is possible to publish negative data. Professor Irina Udalova showed data that suggested that an increased life standard comes at the cost of autoimmune and inflammatory diseases and presented her work on RA, focusing on the role of myeloid cells. She found that IRF5 drives monocyte polarisation and differentiation into inflammatory macrophages, which then recruit neutrophils. She further showed that blocking neutrophil recruitment improved RA.

Another focus of the BSI Summer School was immunotherapy, which was presented by Professor

David Wraith, who gave an overview about antigens and epitopes and presented his research on immunotherapy for haemophilia, and Professor Mark Peakman, who focused on immunotherapy for Type I diabetes. Professor Peter Openshaw introduced respiratory viral infections and presented his studies on RSV and H1N1. Especially interesting was the finding that people with Asthma show a greater susceptibility to RSV. Following the theme of Asthma, Dr David Cousins presented his work on the Th2 response in Asthma, using IL-17Rb as a marker for Th2 cells. He further introduced innate lymphoid cells (ILCs) and how to culture ILC2s. Dr David Withers also presented his work on ILCs, focusing on ILC3s and how they control the CD4 T cell response. He used conditional knockout mice with Neurophilin 1 as a specific marker for ILC3s.

Another focus of the BSI Summer School was the immune system in aging, which was covered by Professor Janet Lord, Professor Deborah Dunn-Walkers and Dr Donald Palmer. Professor Janet Lord presented data from a birth study on people born in 1920 in Herefordshire, who experienced an increase in IL-6 and TNF- α and a decrease of IL-10 over time. She also found that neutrophils lose the ability of directional movement with age and have decreased phagocytosis potential and NET generation. Professor Jane Lord also presented data showing that active muscles produce IL-10, while inactive muscle produces IL-6. Overall she hypothesised that people live longer nowadays but not healthier. Professor Deborah Dunn-Walkers gave an overview of B cell development, the structure of antibodies, sequencing and the new mass-cytometry technique called cytof. She also presented her research on B cell behaviour in the elderly. Ending the BSI Summer School was Dr Donald Palmer with a talk on ageing, the Hayflick limit of cells and age associated decline in immune function. He presented his research on the thymic involution in age, making a point that the thymus becomes smaller with age in a biphasic manner.

A highlight of the BSI Summer School was the career advice session. A NHS research scientist, BSI event manager, Senior editor at Nature Immunology Reviews and Miltenyi Sales and Marketing advisor each presented their career paths and gave a good overview of options and pre-requisites for jobs outside academia. I found it particularly interesting to hear their stories of how they got where they are today and to explore career options outside academia.

Overall, attending the BSI Summer School was a great opportunity to add to my knowledge of immunology, confidence and integration in the immunological community in the UK. I met senior scientists and fellow PhD students from all over the UK, increased my knowledge of the immune system and learned about alternative career options.