Australasian Society for Immunology Inc.

NEWSLETTER

PP 100000910 ISSN 1442-8725 March 2015

High-dimensional single cell mass cytometry (CyTOF) comes to Australia with the establishment of the Ramaciotti Facility for Human Systems Biology

Thomas Ashhurst, Nicholas King, Adrian Smith and Barbara Fazekas de St Groth

Understanding immunity through measurements of the single cell

Single cell analysis (cytometry) is a critical tool for understanding biological systems composed of heterogeneous cell populations. In such systems, complex interactions between a large number of individual cells define the biological behaviour of the system. Conclusions drawn from bulk measurements that average cellular information – even when they contain many thousands of parameters (e.g. microarray or RNA-seq) – can never provide the degree of mechanistic understanding that is routinely derived from a single cell analysis of the entire population of cells. Important features present in small sub-populations can be obscured or missed completely in a population-based analysis, as can co-variance of multiple characteristics throughout the population. When cancer is involved the situation is even more difficult, as heterogeneity exists at all levels from cancer types to individual patients and even to the point of spatial and/or temporal variation within the one patient. Single cell analysis is therefore a critical technique underpinning the analysis of primary cell populations, and provides data that is both complementary to, and necessary for, understanding the biological context of genomic, proteomic and functional analyses.

The challenges of multi parametric single cell analysis

The task of characterising complex heterogeneous cellular populations and their response to disease is inherently difficult, eluding the capacity of our normal methodologies for investigating the immune system. Using flow cytometry, a wide variety of cells can be identified and characterised by labelling cell surface proteins with fluorescently-tagged antibodies. Currently, high-end cytometers are capable of detecting up to 18 individual fluorescent signals simultaneously (with 27-colours reported on cutting edge fluorescent platforms), but the process to achieve this is very complex. Most users can reasonably detect 8-10 fluorescent signals simultaneously, with advanced expertise required for panels of 15-18 fluorescent signals. A combination of 15 fluorescently tagged antibodies can identify an enormous range of immune cells in a single sample, enabling pan-leukocyte immunophenotyping in various tissues,

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Ramaciotti team (LtoR): Helen McGuire, Thomas Ashhurst, Andrew Mitchell, Barbara Fazekas de St Groth, Nicholas King, Adrian Smith (Photo courtesy Dr Adrian Smith)

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The ASI Website

The ASI web site (www.immunology.org.au) has been fully remodelled and updated. New services include:

- Links providing members with free access to Immunology & Cell Biology, Nature Immunology, Nature Reviews Immunology
- Special offers for ASI members
- Download and upload forms for ASI awards
- Positions vacant page
- Online membership renewal
- Upcoming conference listings
- Women's initiative
- Twitter feed

as well as many links to sites of immunological interest at home and abroad. If you would like to advertise a job or conference, or if you have an immunology news story, or a favourite immunology-related site that you would like to see linked to the ASI website, please email Sarah Fardy at fardy.s@wehi.edu.au

Editorial

It is exciting to be the new editor of the ASI quarterly newsletter. Simon Apte, the past editor, along with Judi Anderson at the ASI Secretariat, have done a brilliant job putting this together through the last few years and on behalf of the Society, I thank them whole heartedly for that. They have also both been tremendously helpful as I take on board the ins and outs of this, and thanks also to Sarah Fardy. I'd like to say a huge thanks in advance to Judi, who continues in the role of co-ordinating and preparing this with me. Her work is much appreciated.

I asked Simon, as his one last editorial job, to determine the 2014 winner of the best submitted article prize for this newsletter ($200). Margaret Baird is the winner for her contribution on Barbara Heslop. Congratulations Margaret.

Australia's first CyToF features widely in this edition of the newsletter (see lead article contributed by Thomas Ashhurst and colleagues, and Limericks on page 18). As a flow nerd, I can barely conceal my excitement. This is a great new toy to have in our back yard with a really strong Shared Resource Laboratory (SRL) behind it to support users.

The Day of Immunology (DOI) is coming up fast (Wednesday April 29th). Be inspired by the article in this edition on the DOI in Victoria and do some great things in your area to promote immunology as well. Then send me a contribution (pictures/words/drawings)

to be published here next quarter. We'd love to hear what you get up to.

I have many ideas about what we can do with this newsletter – all of them brilliant, of course (note tongue in cheek) – and I'd be DELIGHTED to hear from any of you with material or ideas about making this what you want it to be. Send me an email joanna.roberts@gmail.com or give me a call.

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Congratulations to Professor Anne Kelso – new CEO of the NHMRC

A World Health Organisation influenza expert and celebrated ASI member, Professor Anne Kelso has been appointed the new Chief Executive Officer of the National Health and Medical Research Council (NHMRC) and will take up her position in April.

On the announcement, the Minister for Health, Sussan Ley said, "Professor Kelso's distinguished career in medical research and her track record in internationally competitive research in immunology and influenza make her an ideal choice to head up the NMHRC."

Anne obtained a Bachelor of Science (Honours) and PhD from the University of Melbourne and has developed significant global health experience and networks through her work with the World Health Organisation (WHO). In her previous role as Director of the WHO Collaborating Centre on Influenza, Anne worked on surveillance and vaccine policy relating to pandemic viruses and provided technical advice to ministers of health throughout the Asia-Pacific region. She was also the Director of the Co-operative Research Centre for Vaccine Technology from 2000 to 2006.

In 2004, Anne delivered The Burnet Oration at the ASI annual conference entitled 'Chance and necessity in the immune response' and she was also ASI President in 1995/96 and ASI Treasurer, 1988-90.

Ramaciotti Facility (cont)

allowing for an analysis of the state of the immune system. This can be achieved, based on the knowledge of expression profiles for specific proteins on different cell types (e.g. in the mouse, CD3 is expressed on T cells, and NK1.1 is expressed on NK cells, and both are expressed by NKT cells). However, these assumptions do not apply in the same way during complex processes such as bone marrow haematopoiesis. Whether in normal conditions or inflammation, all leukocytes are derived from haematopoietic stem cells. Upon receiving specific signalling triggers, these cells differentiate into a range of downstream lineage-committed progenitor cells, before differentiating into immature forms of specific leukocyte types. Whilst leukocytes exist in discrete mature forms in peripheral blood, bone marrow lineage development results in a spectrum of overlapping cellular states, which correlate with the transient rise and fall of various cell surface proteins and intracellular transcription factors, in accordance with a genome-encoded expression program. The lack of fixed cellular expression, and substantial overlap of cellular states, from long-term haematopoietic stem cells to mature cells, can be studied, but requires the simultaneous analysis of a large number of both extracellular protein and intracellular cytokine or transcription factor targets. This requirement is outside the current capacities of fluorescent flow cytometry. However, a recently developed technology, termed mass cytometry, has been developed to address these problems.

Mass cytometry (CyTOF 2, Fluidigm)

Put simply, mass cytometry replaces the fluorescent protein reporters used in fluorescence flow cytometry, with metal isotopes, detected using cytometry by time-of-flight mass spectrometry (CyTOF). This has expanded the number of parameters that can be detected simultaneously from 18 (which is the current reasonable limit using fluorescent molecules) to approximately 40 (with >100 theoretically achievable), due to the absence of spectral overlap between isotopes. This allows an investigator to measure an enormous number of extracellular and intracellular targets simultaneously (Bendall, Nolan et al. 2012, Bjornson, Nolan et al. 2013). Mass cytometry has, for example, has been used to examine drug responses across a haematopoietic

Advanced Cytometry Facility core laboratory, Charles Perkins Centre (Photo courtesy Dr Adrian Smith)

continuum (Bendall, Simonds et al. 2011). In order to study phosphorylation and cell signalling events, cells must be incubated with stimulatory molecules, which are then fixed and permeabilised using one of a number of permeabilisation buffers, that vary in strength and severity depending on the location of intracellular staining targets (nuclear targets require harsher "perm buffers" than cytoplasmic targets). After permeabilisation, antibodies directed against intracellular targets are incubated with the cells. After washing, cells are analysed on a cytometer. This procedure can be used in combination with surface stains. However, many phosphorylation targets require permeabilisation using methanol, which if fluorescent-labelled cells are used, denatures molecules such as PE, PerCP, and APC. Because of this, cell-signalling assays are limited to only a few fluorescent reporters, and cannot be combined with additional antibodies that define cellular identity, differentiation, or activation state. This severely limits the usefulness of such assays in studying the complex signalling events in bone marrow mobilisation during infection. The stability of metal isotopes means that permeabilisation buffers have no effect on the signal, enabling the multiparametric analysis possible with mass cytometry.

The Ramaciotti Facility for Human Systems Biology

The University of Sydney and Centenary Institute have established the Ramaciotti Facility for Human Systems Biology this year, following the 2013 Ramaciotti Biomedical Research Award made to Professor Barbara Fazekas de St Groth (Centenary Institute), Professor Nicholas King (Discipline of Pathology, University of Sydney), and Dr Adrian Smith (Centenary Institute). This facility is housed in conjunction with the Advanced Cytometry Facility (ACF), which provides cutting edge flow cytometry and cell sorting capabilities to the University and Centenary Institute, including two world first 10-laser flow cytometers. At the heart of this new facility is Australia's first mass cytometer (a CyTOF 2 from Fluidigm), situated in the new Charles Perkins Centre on Sydney University's Camperdown Campus. Funding for the purchase of the CyTOF 2 came from the NSW Cancer Institute (application led by Barbara Fazekas de St Groth) and ARC LIEF (application led by Nicholas King).

The Ramaciotti Facility for Human Systems Biology will provide an accessible, collaborative facility, based on the model of the ACF (Centenary Institute and the University of Sydney). This encourages use by a wide variety of researchers from many institutions. The links between the facility and other CyTOF laboratories worldwide will provide further opportunities for international research collaborations using CyTOF instruments at multiple sites. Facility staff provide vital links between researchers in different fields who might otherwise not make contact. This facilitates multi-user communication, cross-pollination of ideas and results in a novel collaborative inter-disciplinary research environment consonant with the intention of the Charles Perkins Centre. Furthermore, the process of exploring the possibilities for the novel CyTOF technology has identified further potential collaborations, to be followed up in the coming months.

Ramaciotti Facility Bioinformatics pipeline

To support the analysis of CyTOF data, and to integrate the findings with complementary genetic and clinical results, the facility will also provide systems biology expertise as part of a wider network of systems biology researchers in NSW. Our aim is to provide a user-friendly pipeline to complement our world leading clinical, genetic and cytometry expertise in the analysis and treatment of human disease.

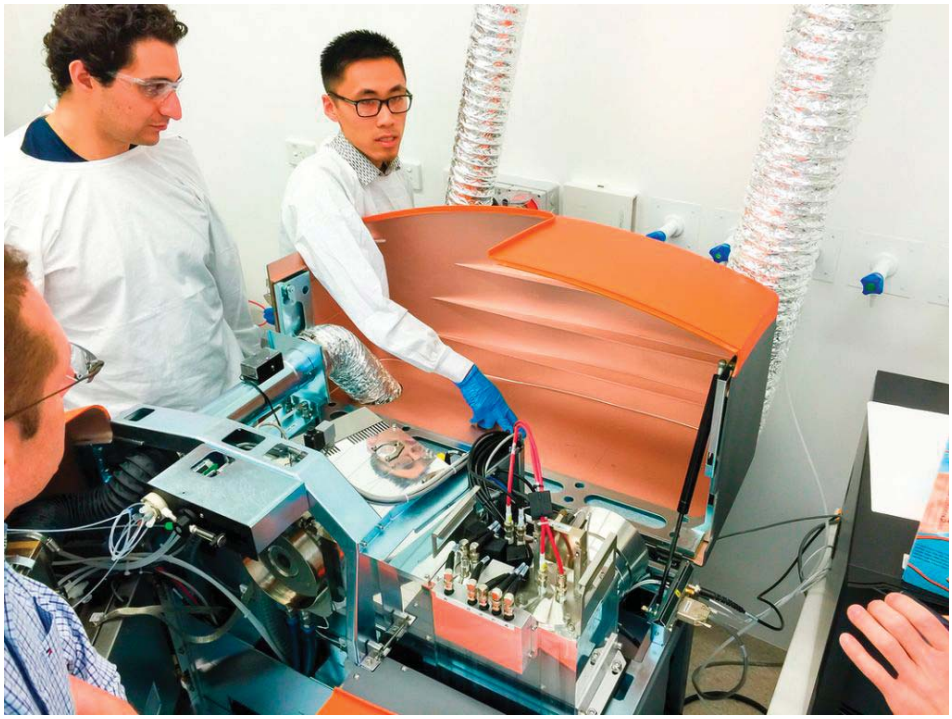
Laboratory and instrument setup

The CyTOF 2 has been installed in the ACF core laboratory in the Charles Perkins Centre at the University of Sydney. The "mass cytometry" methodology relies on the distinct atomic masses of individual metal isotypes, which are conjugated to antibodies specific for surface or intracellular antigens on single cells. Labelled cells are introduced into the machine by generating a liquid aerosol through a nebulizer, which passes sample through an argon-fuelled inductively-coupled plasma (ICP) torch, burning at approximately 7500 K. The ensuing ion cloud is then drawn into a vacuum, where ions of less than atomic mass 80 are removed from the samples, before the samples enter the time-of-flight chamber. This form of mass spectrometry ensures that metal ions with different atomic masses will arrive at the detector at different times, separated by the flight time required to pass through the chamber. Ions with larger atomic mass take longer to arrive than those of lower atomic mass. The resulting data is high-dimensional single-cell data, consisting of clean and distinct metal abundance peaks that correlate with cellular antigen expression.

In addition to the device itself, the CyTOF has been fitted with an autosampler, capable of sampling up to three 96-well plates. The capacity for pre-programmed and automated sample handling increases overall sample throughput, leading to a greater number of samples that can be acquired in a given period of time. Moreover, this automated management and acquisition of samples allows users to control and monitor their experiment remotely, either from the laboratory or the office, giving users the flexibility to attend to other work simultaneously.

Metal-conjugated antibody repository

In order to facilitate the introduction of new users to this technology, the Ramaciotti



CyTOF 2 setup
(Photo courtesy Dr Adrian Smith)

Facility has established a metal-conjugated antibody repository of approximately 200 mouse and human antibodies, ready to be used on the CyTOF. This library consists of existing standardised panels developed by Fluidigm or the facility's advanced users and staff, in addition to a range of additional antibodies that can be incorporated into existing panels. Such standardisation allows new users to bypass the need for pre-optimisation of new panels and the large start-up costs involved in establishing new panels. New users can start with existing panels for their studies, and then further develop their panels by integrating antibodies of specific interest to their project. This situation creates a low risk investment for new investigators interested in using mass cytometry.

Capabilities

The expertise and experience of the facility, its staff and collaborators, mean that samples for a variety of species (e.g. mouse, human) and tissues (e.g. blood, spleen, bone marrow, lymph nodes, brains, liver) can be processed and analysed in a variety of disease situations. The existing panels allow for comprehensive immune profiling, including investigation of cell identities, kinetics, activations states, cytokine production, signalling and cell cycle states of single cells on single samples. Synergistically combining this information with other data sets using a variety of bioinformatics approaches will allow for in-depth investigation of the immune system in a range of diseases with comprehensive detail.

Research examples: King lab

As part of the King lab, our own research focuses on the mobilisation of the bone marrow during viral infection of the brain. We have found that inflammatory monocytes, recruited from the bone marrow to the brain during West Nile virus (WNV) encephalitis, cause immunopathological damage in the brain, leading to seizures and death in mouse models. Recently, we have shown that altering monocyte trafficking using antibody blockade (Getts, Terry et al. 2012) or immune-modifying microparticle (IMP) infusion (Getts, Terry et al. 2014) reduces pathology in the brain and substantially enhances survival in this model. Moreover, IMP infusion is able to enhance favourable outcomes in numerous monocyte-based diseases, such as experimental autoimmune encephalomyelitis (EAE, a model of human multiple sclerosis), and cardiac infarction (heart attack), highlighting the enormous potential of monocyte-targeted therapeutics in several disease models. Although the pathogenic monocytes are recruited from the bone marrow to the brain during infection, little is known about how the infected CNS signals the bone marrow to release monocytes, or how the bone marrow progenitors are mobilised in response. A thorough understanding of the signalling events and differentiation of haematopoietic progenitor cells, will allow us to identify novel targets for immunomodulatory therapy.

In the first comprehensive 30-metal panel acquired on the Ramaciotti CyTOF 2, we were able to profile the full myelopoietic spectrum from mouse bone marrow following CNS infection with WNV: characterising cells from stem (CD117, SCA-1, CD48, CD150) and progenitor (CD16/32) populations, through to mature granulocyte (Ly6C, CD11b, Ly6G, Siglec-F, FcεR1α), monocyte (Ly6C, CD115, CD11b, F4/80, CD11c, MHCII) and lymphoid (B220, CD19, CD3, NK1.1) cell types. This panel allowed us to define the phenotypic and kinetic changes that occur in the mouse myelopoietic compartment, and also allowed us to quantify changes in activation (CD80, CD86, CD62L, MHCII) and cell cycle status (Ki67, Cyclin B1, IdU) of various mature and progenitor populations, in addition to cell signalling pathways (pSTAT1).

One of the most useful insights into cell cycle changes during inflammation has come through the use of bromodeoxyuridine (BrdU). When incubated with live cells *in vivo*, *ex vivo*, or *in vitro*, BrdU readily incorporates into the DNA of dividing cells during S-phase. Subsequently, cells may be incubated with an antibody specific for BrdU, allowing for the detection of cells in S-phase. Staining for BrdU requires permeablisation and DNase digestion of cells, which may affect cell surface staining quality. However, an alternative to BrdU, 5-Iodo-2'-deoxyuridine (IdU) has been used in mass cytometry, as IdU can be detected by the CyTOF in mass channel 127, enabling direct detection of the S-phase without the deleterious cell processing steps (Behbehani, Bendall et al. 2012). Such an approach has allowed us to examine shifts in haematopoiesis and cell division in bone marrow progenitor populations following CNS infection.

Research examples: Fazekas lab

Tregs are essential for prevention of autoimmune disease. They form a highly complex network of cells with individual homing and functional capacities encoded by at least 30 different molecules. For this reason it is not possible to understand any more than a small fraction of the Treg network using flow cytometry. Prof. Fazekas de St Groth discovered the gold-standard human Treg identification technique for flow cytometry in 2005 (>1500 citations for the two primary papers (Liu, Putnam et al. 2006, Seddiki, Santner-Nanan et al. 2006)). She will use the CyTOF platform to extend the understanding of Treg migration and function in human autoimmune disease, using analysis of up to 40 cell surface and intracellular molecules simultaneously to define the Treg phenotype in human immune diseases including systemic lupus erythematosis, psoriasis, multiple sclerosis and inflammatory bowel disease.

Prof Fazekas has already performed some of the first bioinformatic analysis of multiparameter flow data from the cutting-edge 10-laser cytometer within the ACF. These data have indicated that a multiparameter phenotypic analysis of Tregs can distinguish psoriasis patients and healthy controls with very high sensitivity and specificity (>95%). Importantly, many of the changes in psoriasis are independent of disease activity or treatment, indicative of differences between immune set points in patients and controls. These data will define molecular networks that predispose to immune-mediated disease, providing candidates for future diagnostics and therapeutics.

The team

Prof. Barbara Fazekas de St Groth

Barbara Fazekas de St Groth graduated in medicine with first class honours from the University of Sydney in 1981 and worked as a Professorial Intern and RMO at Royal Prince Alfred Hospital, Sydney before completing a PhD with JFAP Miller at the Walter and Eliza Hall Institute in Melbourne. She then undertook postdoctoral training with Mark Davis at Stanford University. She returned to Sydney in 1991 to set up a laboratory at the Centenary Institute of Cancer Medicine and Cell Biology. She was appointed Associate Professor in 2000 and Professor in 2007. Her work is aimed at understanding how the immune system is regulated. In particular, she studies how dendritic cells

and regulatory T cells control the activation and differentiation of CD4 T cells, using T cell receptor preclinical models and multi-parameter flow cytometry. She has recently focused on the role of regulatory T cells in human disease. Together with colleagues at the Centre for Immunology in Sydney, she discovered a novel phenotyping strategy that allows pure populations of human regulatory T cells to be isolated and manipulated for use in the therapy of graft versus host disease and organ graft rejection, in addition to autoimmune disease and allergy.

Prof. Nicholas King

Nicholas King is the Academic Director of the ACF (Centenary Institute/University of Sydney) and Head of Pathology at the University of Sydney. He is immediate past president of the Federation of Immunological Societies of Asia-Oceania (FIMSA) and currently treasurer of the International Union of Immunological Societies (IUIS), the peak body for Immunology. He graduated in Medicine at The University of Cape Town and spent some years in clinical practice before he discovered teaching and research, completing his PhD at the John Curtin School of Medical Research at the ANU in 1986. He melds cell biology, virology, embryology and immunology into world-leading expertise in flavivirus–host interactions in mouse and human models. Flaviviruses are the most ubiquitous arthropod-borne viruses, found on all continents but Antarctica. Although endemic in Africa, Europe and the Subcontinent, West Nile virus (WNV) came to prominence in the West as an emerging neurotropic flavivirus after the 1999 outbreak of encephalitis in New York. From here, WNV spread throughout North America in less than 10 years, incidentally highlighting the importance of other medically important flaviviruses, such as Japanese encephalitis and dengue. His research interests focus on understanding the immunopathological nature of WNV infection, and immunomodulatory approaches to this and similar myeloid lineage-driven diseases. In the last 10 years he and Adrian Smith have been the major driving force in the establishment of the ACF as a stably funded USYD Core Facility, which has become, through the ongoing development, provision and support of cutting edge instrumentation, one of the premier facilities in the Southern Hemisphere.

Dr Adrian Smith

Adrian Smith is the Technical Director of the ACF (Centenary Institute/University of Sydney). He was awarded a PhD from the University of Sydney in 2002. He and Nicholas King have been key collaborators in growing the facility from three flow cytometers housed at the Centenary Institute to a total of six flow cytometric sorters, eight flow cytometry analysers, and two image cytometers, as well as the CyTOF, spread across four physical locations. A highlight of this expansion was the commissioning of Becton Dickinson Biosciences in 2009 to build the first 10-laser analyser and 10-laser sorter in the world, providing cutting edge capabilities for the ACF that continue to be unique. Adrian is the immediate past president of the Australasian Cytometry Society, formerly the Australasian Flow Cytometry Group (AFCG), and a council member for the International Society for the Advancement of Cytometry.

Charles Perkins Centre interior (Photo courtesy Dr Adrian Smith)

Thomas Ashhurst

Thomas Ashhurst is currently a PhD Scholar in the Viral Immunopathology Laboratory (King lab) in the Discipline of Pathology at The University of Sydney. Tom's research involves using advanced cytometry techniques to investigate how bone marrow stem and progenitor cells are mobilized in response to viral infection of the CNS. To do this, he uses a 10-laser BD LSR-II special order research product (SORP) to analyze flow cytometry panels of up to 18-colours, as well as Australia's first mass cytometer (CyTOF 2) for panels of over 30 parameters. Tom is an active member of the Australian Cytometry Society (ACS), Australasian Society for Immunology (ASI), and International Society for the Advancement of Cytometry (ISAC). Tom's focus is on combining the power of high-dimensional cytometry techniques with in depth biological insight, to reveal the mechanisms of immunity and disease.

Dr Andrew Mitchell

Andrew Mitchell has extensive research experience in academic and commercial environments, both within Australia and in Europe. He has been an active member of both the ASI and the Australian Cytometry Society for nearly two decades. His research interests centre on understanding myeloid cell heterogeneity, as well as innate immune responses during bacterial and parasitic infection. To do this he has used a range of advanced cytometric approaches, in particular highly-parametric flow cytometry. From 2015 he has joined the Ramaciotti Facility for Human Systems Biology as the Cytometry/CyTOF specialist and will focus on working with researchers to design, implement and analyse multiparameteric fluorescence and mass cytometry based experiments.

Dr Helen McGuire

Helen McGuire is an NHMRC postdoctoral fellow, recently returned from Stanford University, California. At Stanford, she was under the mentorship of Professor Mark Davis in the Institute for Immunity Transplantation and Infection, a pioneering lab in the use of single cell proteomic CyTOF technology. Helen has combined the use of CyTOF and MHC tetramer technology

to obtain highly detailed, epitope-specific characterization of T cell responses, including vaccination and viral infection in clinical samples. Her expertise in CyTOF has lead to multiple collaborative research projects spanning the Stanford campus, USA and international laboratories. Helen has joined Prof. Barbara Fazekas de St Groth and the Ramaciotti Facility for Human Systems Biology, launching mass cytometry onto the Australian medical research scene.

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An invitation and a request to all ASI members

to contribute copy that they think might be interesting, useful, historical, humorous or thought provoking.

- We invite our student membership to voice their views on issues that interest or directly concern them.
- It's our newsletter, so let's support it and strive to make it even better.
- The ASI newsletter comes out 4 times a year and we welcome your contributions.

AND YOU COULD WIN $200 FOR THE BEST ARTICLE PUBLISHED IN THE NEWSLETTER!

Donald Metcalf (1929–2014)

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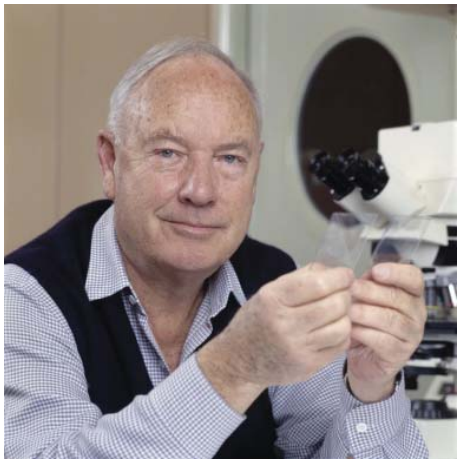
Through a career of 60 years, Don Metcalf was one of the founders of the modern discipline of hematology. He developed many of the tools needed for the research, discovered and ultimately molecularly characterized the key players, the cells and their growth factors, and provided the insights that have led to the worldwide use of these factors in the treatment of cancer. In short, he literally wrote the textbook on hematology.

Don Metcalf died on 15 December 2014. He was born in 1929 in Mittagong, a rural town south of Sydney, and at the age of 16 years he commenced the study of Medicine at the University of Sydney in the immediate post-war period. However, research was his true calling, and he took up a position at the Walter and Eliza Hall Institute as the Cancer Council Victoria Carden Fellow in 1954. Remarkably, both the Carden Fellowship and Don's position at the WEHI continued for the next 60 years, with the exception of a 2-year post-doctoral stint at the Harvard Medical School (1956–1958).

Don's scientific output was remarkable. He published 4750 scientific papers, authored multiple books and held numerous patents. He was a member of the Scientific Academies of Australia, the USA and the Royal Society, and was the recipient of most major prizes for medical research. Despite this, it was the way Don went about his research that was in fact his greatest influence. Don was, above all else, a cancer researcher who believed that by studying the fundamental mechanisms of blood cell formation, a cure for leukemia could be found. Don worked single-mindedly on this theme for his entire career.

Don is synonymous with the colony-forming cell assay. A technique developed in collaboration with Ray Bradley of the University of Melbourne, it allowed the clonogenic potential of hematopoietic stem cells and progenitors to be enumerated. The many variants of the colony assay continue to be used today by thousands of researchers throughout the world. The initial publication of this technique in the *Australian Journal*



of Experimental and Medical Science, the forerunner of ICB, remains one of this journal's most cited papers.[1] Importantly, Don realized that the technique was a tool to identify the factors that regulated blood cell production and to possibly understand what goes awry in leukemia.

Don termed these blood cell regulators colony-stimulating factors (CSFs) and launched a two-decade campaign to identify the cellular sources, purify and ultimately molecular clone the genes for macrophage-CSF, granulocyte-macrophage-CSF, granulocyte (G-CSF) and multi-CSF (interleukin-3). To achieve this feat, Don amassed a multidisciplinary unit that included protein chemists, cellular biologists and gene cloners. It has remained a cohesive team for the last 40 years. Having pure recombinant CSFs in hand revolutionized hematology. It also set up the possibility of the clinical use of the CSFs, particularly in the alleviation of the life-threatening neutropenia that results from chemotherapy. Here Don was also at the forefront, noticing that G-CSF administration resulted in the mobilization of hematopoietic progenitor cells from their bone marrow niche into the blood stream. These mobilized stem cells provided a convenient and superior source of stem cells for transplantation after chemotherapeutic bone marrow ablation to treat leukemia, a procedure that has been used in many millions of patients worldwide.

Don's work ethic was legendary. He arrived at the Institute early and believed that research was a hands-on activity. Afternoons were often spent analysing slides or writing up the data. This was very much Don in his element, a man of action with a keen love of research and discovery. Don was also well known for his questions from the back of the lecture hall. These left many a presenter shaking in their boots. Don's questions were always tough but never unfair.

Collaborating with Don was an experience not to be missed. I was apprehensive before my first meeting with the great man. Although both of us were interested in the regulation of blood cell fates, we came at the problem from positions that were poles apart in the long-standing debate about instructive versus intrinsic regulation. Don was the father figure for the instructive camp, while I had just given a seminar very much from the intrinsic transcription factor-centric view. After fending off several probing questions about the clonality of the cells in my assays, Don suggested we get together and test some of these ideas. That first meeting ultimately lead to many fruitful collaborations.

In this same way, Don was a generous collaborator to hundreds of researchers over the years, sharing his knowledge and performing experiments with an unyielding rigor that stands the test of time.

It seemed that Don would always be with us. He enjoyed relatively good health until August 2014, when he was diagnosed with pancreatic cancer. Wanting to spend his remaining time with Josephine, his wife of more than 60 years, and his extended family, Don retired in September. But in true Metcalf fashion, he had his microscope moved home with him to finish up some experiments.

At Don's memorial service, his daughter Kate reminisced about a family vacation when she was young and how Don described his life's goal: it was like searching through the grains of sand on the beach, to find that special gem that reveals the cure for cancer. Although a cure is still elusive for many types of cancer, Don's immense legacy is that he has made that special grain of sand glow much more

brightly for those that follow.

Stephen Nutt was the inaugural Walter and Eliza Hall Institute Metcalf fellow (2001–2006).

1. Bradley TR, Metcalf D. The growth of mouse bone marrow cells in vitro. Aust J Exp Biol Med Sci 1966; 44: 287–299.

This article was first published in *Immunology and Cell Biology* 2015, **93**(3). Used with permission. http://www.nature.com/icb/journal/vaop/ncurrent/full/icb201511a.html

ICB & CTI Online Manuscript Submission

Online manuscript submission for *Immunology & Cell Biology* and *Clinical & Translational Immunology* now available via:

http://mts-icb.nature.com/
http://mts-cti.nature.com/

All manuscript submissions to ICB and CTI should in future be made online via these websites to speed up the reviewing and acceptance of manuscripts.

Gabrielle Belz, Editor-in-Chief
Immunology & Cell Biology
Clinical & Translational Immunology

Contributions sought for the ASI Newsletter

You could win $200 !

Deadline for the next issue: 1st May 2015

Please email your contributions to the Secretariat by the above date.
asi@21century.com.au

Upcoming Conferences

1st International Convention Immunopharmacology-Vaccipharma 2015
14–19 June 2015
Cuba
http://www.immunovaccipharmacuba.com

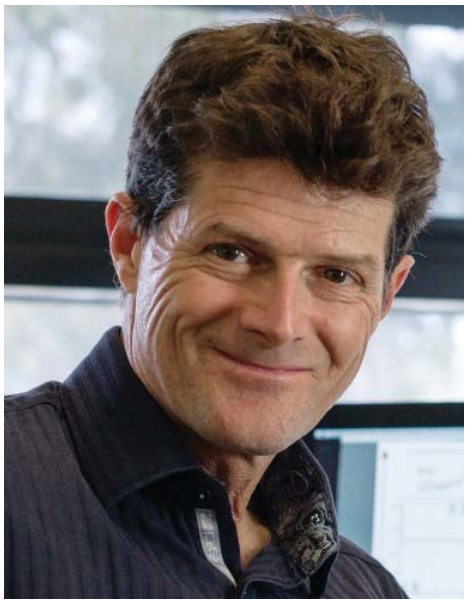
FIMSA2015
30 June–3 July 2015
Singapore
enquiry@sgsi.org.sg
www.sgsi.org.sg

8th Frontiers in Immunology Research 2015 International Conference
1–4 July 2015
Albufeira, Algarve, Portugal
hkan@firnweb.com
http://www.firnweb.com
http://twitter.com/Immunology_Conf
Abstract submission deadline: 30 March 2015

4th European Congress of Immunology
6–9 September 2015
Vienna, Austria
www.eci-vienna2015.org

The Walter and Eliza Hall Institute of Medical Research
WEHI Seminars on the Web:
www.wehi.edu/seminars/

President's Column



Greetings to all of you! I have to admit it's daunting to be taking on the POTASI* role, and this is a good opportunity to say a huge thank you to Dale Godfrey as outgoing President for his extraordinary contributions to the Society for the last two years. Big boots to fill. I won't even pretend to try living up to Dale's median email response rate, which is measured in seconds: sadly, mine is more like weeks.

These are exciting times to be an immunologist. Twenty-five years ago when I convened the immunology course syllabus for Stanford medical students, the recurring complaint was that each lecture introduced more and more players but, from a practical perspective, in the end these went nowhere. Steroids and methotrexate were the therapeutic mainstay for immune disorders, and you didn't need to know about T cell subsets, signalling and cytokines to understand pulling the plug on the whole system.

How much that has changed now. There is no better example than if you're training to treat cancer, where now you'll need to learn not only radiotherapy and chemotherapy but also the new "third pillar" of cancer medicine: immune checkpoint inhibitors. To understand how they work, you'll first need to understand Jacques Miller's discovery of T-cell surveillance of chemically-induced papillomas and sarcomas (1963 *Nature* 199:920; 1965 *Nature* 205:1124), Peter Doherty and Rolf Zinkernagel's concept of "altered self" (1974 *Nature* 251:547), Kevin Lafferty's concept of T cell costimulation (1975 *Aust J Exp Biol Med Sci.* 53:27 – the original name for ICB!), Mark Smyth and Bob Schreiber's demonstration of immune escape of malignant cancers (Smyth MJ, Godfrey DI, Trapani JA. 2001. *Nat Immunol.* 2:293; Smyth MJ, Dunn GP, Schreiber RD. 2006 *Adv Immunol.* 90:1), and the discovery by Linsley, Allison, Golstein, Honjo and others of the CD28, CTLA4 and PD1 lymphocyte receptors and their ligands. Fundamental immunology is now clinical practise, and all those cells and molecules suddenly have a practical purpose.

Ironically, these are tough times to be an immunologist. Funds for salaries and research materials are about as tight as they've ever been – except perhaps for the early 1990s, just after the T cell receptor for altered self was discovered. According to a famous video about *The Last NIH Grant* made in those scientifically bright but financially dark days, it looked like Professor Peter Lipsky might need to get a job driving trucks. Jon Sprent might have spearheaded an American Association of Immunologists' plan to raise research funding through nefarious means (see this on youtube: https://www.youtube.com/watch?v=9WL0xKoTk5E).

Another solution to the research funding crisis was vigorously debated at our annual meeting in Wollongong last December: "Immunologists should be forced to retire at 60". If you weren't there for this, you really missed something extraordinary – six brilliant minds sparring (Anne Kelso, Nick King, Ranjeny Thomas for the affirmative; Elissa Deenick, David Tscharke, Anne La Famme for the negative) – hilarious but compelling graphs, and imaginative new concepts like the Kelso factor for negatively weighting grant scores by the number of years since you first held a pipette. What seemed

cont. next page

* President of the ASI

like just fun on the night might become reality, now that Professor Kelso has taken the helm as CEO of the NHMRC in the last few weeks. Anne giving her wisdom and level-headed judgement is terrific news for Australian science. A huge congratulations and thank you to Anne from all of your immunology colleagues – even from those of us approaching sixty!

I can't leave the subject of Wollongong without saying how wonderful a scientific meeting it was. The breadth and depth of Australian immunology on display in the symposia, workshops and poster sessions took my breath away. And nowhere more than in the young investigators session. A massive thank you to Marcel Batten, Bernadette Saunders and all of the organizing team for putting together a brilliant meeting in a wonderful setting.

One of the things I've been learning in the last year is the critical role, for the success of our Society and our scientific meetings, of commercial sponsors and sustaining members, and of the journals *Immunology and Cell Biology* and *Clinical and Translational Immunology*. We all do a lot but can still do better engaging with the fine companies that sponsor ASI, and with the Society's journals. I urge all our members to think first about these sponsors and journals when considering where to source your research materials or submit your manuscripts. If you've had a good experience with a product and distributor, use the Society to tell your colleagues. If you've read a great paper in ICB or CTI, make sure to cite it in your next paper. The new ASI website is a great place to start all these things, and I want to thank Sarah Fardy for her initiative running the website.

Big things are coming for all our members. For only the second time in its history (the last was 1976 I think), ASI hosts the International Congress of Immunology at the end of August 2016. Don't miss it, and don't let your students and staff miss it – mark it in your calendars now. A big thanks to Jose Villadangos and the organizing team for massive efforts bringing the world's immunologists to our shores. December this year – 2015 – the ASI annual meeting in Canberra will be paired with a joint meeting of ASI and the German Society for Immunology, to be followed in 2017 by a reciprocal meeting in Deutschland. Thank you goes especially to Sammie Bedoui, Anselm Enders, Su Heinzel and Dale Godfrey for bringing the best of German immunology to our nation's capital.

I suppose this first column wouldn't be complete without returning to another highlight of ASI's annual scientific meeting – The Limericks – to acknowledge the dark truth about my laundry habits outed so eloquently by an anonymous author – check it out on page 18.

Chris Goodnow

International Congress of Immunology 2016

Come and say G'day in Melbourne in 2016!

Experience the best that Melbourne has to offer – its beaches, entertainment, heritage, culinary traditions, food and wine, festivals, sporting events, friendly people and much more.

The city's wide range of accommodation options caters to all requirements – from luxury five-star to budget hotels. Its state-of-the-art venues are all within walking distance of the city centre, or you can travel aboard one of Melbourne's famous trams!

It is also the perfect opportunity to discover Australia's famous destinations: the Great Barrier Reef, Twelve Apostles, Ayers Rock, the Sydney Opera House, the iconic MCG Stadium and so much more!

Melbourne is recognised as an R&D centre of excellence in medical science, business and finance. With Australia's most culturally diverse population, and repeatedly voted the world's most liveable city, Melbourne has something to offer for everyone.

www.ici2016.org

Program highlights for ICI 2016

- Innate immunity
- Inflammation
- Acquired immunity
- Vaccines
- Tumour Immunology
- Transplantation
- Life and death decisions in the immune system
- Allergy
- Autoimmunity and the maintenance of tolerance
- Immunoregulatory gene networks
- Immune deficiencies
- Dendritic cells
- T cell differentiation
- B cell immunity
- Metabolic control of immunity
- Regulation of the immune system by commensal flora
- Immunotherapeutic drugs
- Therapeutic antibodies
- Mathematical modeling of immune responses

A message from the Chair of ICI2016

ICI 2016 promises to be an unforgettable event that will bring together delegates from all over the world. We anticipate over 4000 participants, including international leaders at the forefront of the discipline that will present the most recent advances in basic immunology and clinical treatments. The congress will provide a key networking and educational interface for colleagues from industry, university, health providers and independent research organisations to come together.

We look forward to meeting you in Melbourne!

Jose Villadangos
Chair of the International Congress of Immunology 2016

Congress Managed by arinex pty ltd
91 – 97 Islington Street, Collingwood Victoria 3066 Australia
P: +61 3 8888 9510 F: +61 3 9417 0899
E: ici2016@arinex.com.au

Honorary Secretary's News

New ASI Council members
At the end of each year, there is a changing of the guard on ASI Council as newly elected Councillors come on board. The changes for 2014 are as follows:

Chris Goodnow is the ASI President in 2015, replacing Dale Godfrey. The ASI Presidency has a 2-year term, with an additional year spent before and after that term as Vice President to ensure a smooth transition between Presidents. Dale Godfrey is therefore ASI Vice President for 2015.

Mainthan Palendira replaces Marcel Batten as NSW Councillor.

Kim Jacobson becomes the inaugural Treasurer-in-waiting. This is a new position designed to achieve a smooth transition between Treasurers. Kim will work closely with the current Treasurer (John Stambas) for 2015 before becoming Treasurer in her own right in 2016.

Joanna Roberts replaces Simon Apte as Newsletter Editor.

Jo Kirman replaces Alejandro Lopez as co-ordinator of the Visiting Speaker program.

Congratulations to all the incoming councillors and thank you to those they are replacing for their hard work in helping to run ASI and for the ongoing assistance they are providing to new councillors as they settle into their jobs.

Project Manager
Sarah Fardy is the Project Manager for ASI and she is the primary point of contact for updating and improving our website (http://www.immunology.org.au). Please contact Sarah (fardy.s@wehi.edu.au) if you have information you would like posted on the ASI website or if you have ideas for improvements. The website is the ideal forum to contact ASI members about upcoming events, conferences, visiting speakers and branch related activities such as Day of Immunology seminars.

ASI 2014 conference in Wollongong, 1–5 December
The ASI conference in Wollongong was a great success, attracting over 400 participants to the coastal city. Thanks go to Marcel Batten, Bernadette Saunders and the local organising committee for gathering an outstanding line up of local and international presenters and ensuring everyone was well fed and entertained during the conference sessions, workshops and social events. Thanks also to the many sponsors and exhibitors who supported the meeting and who continue to support the Society as Sustaining Members (see ASI website for details).

The 2015 Annual Meeting will be held in Canberra from November 29 – December 3, so please check out the official website (http://www.asi2015.org/) and be ready for the opening of early-bird registrations. Organization for the event is already well advanced, with the following speakers already committed to attending the meeting: Doreen Cantrell (University of Dundee, UK), Chris Goodnow (Garvan Institute, Aust.), Axel Kallies (WEHI, Aust.), Diane Mathis (Harvard Medical School, USA), Michael Nussenzweig (Rockerfeller University, USA), Steve Nutt (WEHI, Aust.), Peter Openshaw (Imperial College London, UK), Jamie Rossjohn (Monash University, Aust), Alexander Rudensky (Memorial Sload-Kettering Cancer Centre, USA), Ton Schumacher (Netherlands Cancer Institute, Netherlands), Louis Stadt (National Cancer Institute, Bethedsa, USA), Andreas Strasser (WEHI, Aust.).

Sponsors of ASI and meetings
The sponsors of ASI are important for funding activities and scholarships, so please make an effort to support (or at least consider) those companies when purchasing items. Sponsors for ASI conferences are listed on conference websites and logos of ASI Sustaining members (corporate sponsors of the Society) can be found on the right hand side of the ASI homepage. You can directly access the company websites by clicking on these logos and will soon be able to enter member-only competitions to win great prizes from these companies.

Travel Awards
The deadline to submit applications for next round of travel awards has not been finalised, but will be mid to late April. ASI members will be advised about this by email and information will also be available on the ASI website.

Day of Immunology
The Day of Immunology 2015 is fast approaching and there will again be great initiatives happening in several branches. The DOI is a great opportunity for ASI members to share their knowledge of the importance of the immune system with the community and can serve as a great reminder to politicians about the value of investing in medical research and the false economy of cutting support. Please support it where you can and encourage friends, family and colleagues to engage with it.

ASI membership
ASI membership is the lifeblood of the Society and provides members with access to scholarships, seminars and reduced registration charges for Immunology conferences. Please encourage your colleagues and lab members to sign up for 2015. They should visit http://www.immunology.org.au/membership/ to sign up for 2015 membership of ASI and to see the list of benefits available to members.

Stuart Berzins

The ASI Visiting Speaker Program

I'd like to introduce myself as your new VSP co-ordinator. I undertook my PhD with Prof. Graham Le Gros at the Malaghan Institute in Wellington, NZ, then did my postdoctoral studies at the Vaccine Research Center at NIH, USA with Dr Bob Seder. I returned to the Malaghan Institute in 2002 to lead the Infectious Diseases group as an HRC Sir Charles Hercus Research Fellow and later as the Wellington Medical Research Foundation Malaghan Haematology Research Fellow. In 2012, I joined the University of Otago in Dunedin, NZ, as a senior lecturer in the Department of Microbiology and Immunology. My current research aims to answer fundamental questions relating to the generation and maintenance of immunological memory to TB. I am passionate about the VSP, and will work hard to encourage its regular use and to develop streamlined nomination procedures. Your ideas for improving the program would be warmly received.

We have an exciting visiting speaker program for 2015. We have Prof. Alejandro Lopez, the VSP co-ordinator from 2004-2014, to thank for putting this coming year's interesting program in place. On behalf of the ASI, I would like to thank Alejandro for the excellent job he has done over the past decade, supporting what is arguably one of the most important resources that the ASI provides to its membership. I personally thank Alejandro for his efforts making the handover process as smooth as possible!

For the first half of 2015 we have the following speakers confirmed:

March:
Alex Shalek (above)
MIT, USA visiting Auckland, Wellington, Melbourne and Brisbane
Research Area: Single cell transcriptomics technologies
http://www.immunology.org.au/assistant-professor-alex-shalek/

Eric Vivier (above)
INSERM, Luminy, France – branches to be visited yet to be confirmed
Research Area: NK cells
http://www.immunology.org.au/professor-eric-vivier/

April:
David Masopust (above)
University of Minnesota, USA visiting Melbourne, Brisbane, Sydney and Wellington (to be confirmed)
Research Area: T cell memory
http://www.immunology.org.au/associate-professor-david-masopust/

Danny Altman (above)
Imperial College, London, UK visiting Sydney, Brisbane and Townsville (to be confirmed)
Research Area: Immunology of autoimmune diseases and bacterial infection
http://www.immunology.org.au/professor-daniel-altmann/

May:
Hai Qi (above)
Tsinghua University, Beijing, China – branches to be visited yet to be confirmed
Research Area: Regulation of the germinal centre reaction
http://www.immunology.org.au/prof-hai-qi/

The seminar schedule and brief bios for each speaker will be updated on the ASI website as they become available.

Although the visiting speakers for 2015 have already been determined, we are very happy to accept nominations for speakers in 2016. If you would like to nominate a speaker, please email me at jo.kirman@otago.ac.nz with a brief (half-page) summary of the contribution of the nominated person to the field with a list of recent major publications and, if possible, a timeframe for the visit.

Remember that nominating a speaker is one way to guarantee a visit to your city!

Jo Kirman

Day of Immunology in Victoria

Immunology has its own day! Every year on the 29th of April, Immunology is celebrated world-wide on the Day of Immunology. We don't hand out ribbons or ask for money; instead, volunteers spread the word to the public about how amazing and useful their immune system and research into immunology is. Here in Victoria, a dedicated group of volunteer scientists, supported by the ASI, has been engaging with the public since 2008. Last year over 600 members of the public, secondary students and teachers in Victoria participated in Day of Immunology events.

VCE students attending the GTAC workshop in Parkville gaining some microscopy experience (Photo: Monash University)

Each year on 29th April, the Victorian Day of Immunology runs a free public lecture where senior scientists speak. The impressive line-up of speakers over the years has included Sir Gustav Nossal, Prof. Peter Doherty, Prof. Sharon Lewin, Prof. Anne Kelso and Prof. Robyn O'Hehir. Each year the lecture has a different theme – covering topics of immunity to infectious disease, autoimmunity, allergy, cancer and vaccination. The theme for 2015 is "Immunology Myth Busters!".

The Victorian Day of Immunology also includes a hugely popular immunology workshop for secondary students. During this full day program, students perform an ELISA, participate in a microscope workshop and use a 3D modelling program to explore IgG structure. They learn about the history of immunology research in Australia from the likes of Gus Nossal and get to talk with early career scientists to find out where a degree in immunology can take them. The workshops are held at GTAC in Parkville, Federation University in Ballarat and, in 2015, will also be held at Deakin University, Geelong.

Each year, members of the general public, nursing, university and secondary students, and teachers also enjoy visiting research labs in Day of Immunology Discovery Tours run in many of Victoria's research institutes, e.g. Walter and Eliza Hall Institute of Medical Research, Peter MacCallum Cancer Centre, Burnet Institute, Ludwig Institute for Cancer Research, Monash Health Translation Precinct, and CSIRO's Australian Animal Health Laboratory. Participants see lab demonstrations and talk with scientists about how immunological research is creating a healthier world. This has always been a very positive experience for participants and researchers alike. In 2015, discovery tours will also be run in the new Doherty Institute.

Our public lecture presenters in 2013, left to right: A/Prof. David Ritchie, Prof. Robyn O'Hehir, Prof. Trevor Kilpatrick, A/Prof. Rosemary Ffrench and Dr Jason Tye-Din (Photo: Monash University)

Primary students have learned about immunology by participating in a competition called "Beating the bugs". The children were asked to depict the battle between the body's defences (immune cells) and a pathogen. The inspirational winning entries included videos showing children acting out the roles of various white blood cells during immune responses. You can view these fantastic videos and other entries at our website: http://www.dayofimmunology.org.au/past_events/primary_school_activities/

In 2014 a "Vaccination Café" was added to the Victorian Day of Immunology activities to coincide with the public lecture vaccination theme. Members of the public came in to receive a discounted influenza vaccine and talk to vaccine researchers. Sonya

Young scientists getting some hands-on experience with the guidance of Dr Meredith O'Keefe, during a Discovery tour of the Burnet Institute (Photo: Monash University)

Pemberton, the 2012 Emmy Award-winning Australian documentary filmmaker, gave a fabulous and passionate talk about her film *Jabbed: Love, Fear and Vaccines.*

To help promote our events we started a social media campaign using Facebook, Twitter and Pinterest. We now have thousands of followers! The success of our social media outreach means that we can engage with the public all year round by sharing the latest research and interesting immunology stories. We are grateful to have been assisted by the *Einstein a GoGo* radio program on 3RRR by broadcasting interviews with our public lecture speakers, and *The Voice* magazine (a supplement of *The Age* newspaper) who have published Immunology-based stories to coincide with the Day of Immunology.

Our committee is very grateful for help with our activities. Our guest speakers volunteer their time to give fantastic talks and engage with the public. We thank GTAC (Gene Technology Access Centre) in Parkville and Federation University for hosting our immunology workshops, and the University of Melbourne for the use of their lecture theatre. We are financially assisted by ASI, Immunology Group of Victoria, Walter and Eliza Hall Institute, University of Melbourne, Monash University, Burnet Institute, Ludwig Cancer Research, CSIRO and the Peter MacCallum Cancer Centre. WEHI also hosts our website and prints flyers for us. We are also grateful to our commercial sponsors, including BioRad, CSL and BD Biosciences.

If you would like to be involved in the Victorian Day of Immunology events, we are happy to have new committee members. You can contact us by emailing info@dayofimmunology.org.au. You can support us and keep up with our activities by Liking us on Facebook (Day of Immunology, Australia) and sharing our posts with your friends, as well as recommending our events to friends outside the immunology field.

In 2015 our theme is "Immunology Myth Busters" and our public lecture will include talks on "super-bugs" and "super-foods". Our presentations will cover the myths and realities surrounding super-foods and their effect on immunity, the use of antibiotics and antibacterial products, and the links between cancer and the immune system. More information can be found on our website at www.dayofimmunology.org.au

Dr Wendy Winnall

Day of Immunology Victoria Committee Member
HIV Vaccines Laboratory
Department of Microbiology and Immunology
The University of Melbourne
at the Peter Doherty Institute for Infection and Immunity
Royal Parade, Parkville, Vic. 3010, Australia
Ph +61 3 8344 9938

The Melbourne Brain Centre auditorium makes an excellent venue for our public lecture. (Photo: Monash University)

AUSTRALASIAN SOCIETY FOR IMMUNOLOGY
WOLLONGONG DEC 1-5 2014

44th Australasian Society for Immunology
Annual Scientific Meeting

Monday 1st - Friday 5th December 2014
Novotel Wollongong Northbeach, New South Wales

Bursa of Fabricius Limerick Competition

In the grand tradition of the Society, at the 44th Australasian Society for Immunology Annual Scientific Meeting in Wollongong, the fiercely contested Bursa of Fabricius Limerick Competition was fought out. Here in the quarterly ASI Newsletter, we have a selection of entries to publish along with the winning entry from Table 18. Thanks to Chris Goodnow and Dale Godfrey for passing on these entries.

Our President's name is Chris
But we thought he was taking the piss
When he told us he might of
Bought us a Cytof
But we decided to give it a miss.
(Attribution not available – apologies)

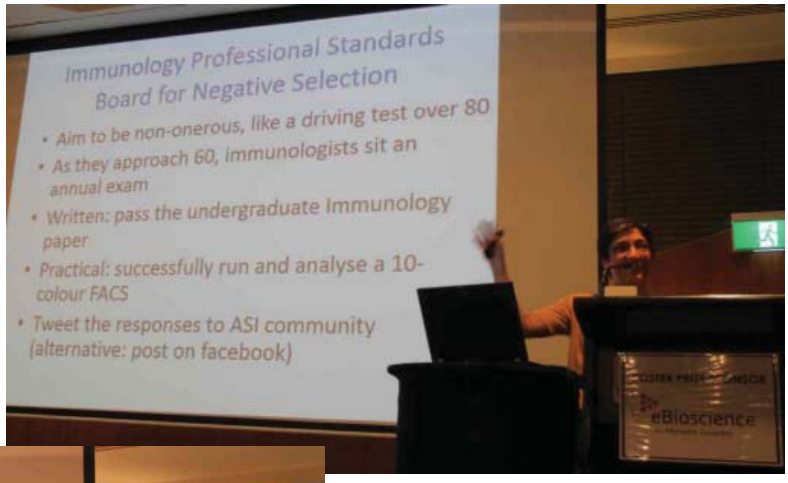
Chris Goodnow this goes out to you
Your shirts give us déjà vu
You wore it today
And again yesterday
Tomorrow's one better be new.
(Attribution not available – apologies)

Winning Limerick from Table 18

… So Barbara has a new toy
that's giving her plenty of Joy
I might tell you later
what she does with her data
Did you wonder why she was coy?

A couple of members from the winning Table 18

Photos from the 2014 Conference – Debate



Top left: Lyn Corcoran
Above: Ranjeny Thomas
Left: Anne La Flamme
Below: Nicholas King

AUSTRALASIAN SOCIETY FOR IMMUNOLOGY
WOLLONGONG DEC 1-5 2014

All photos from the 2014 ASI Conference on pages 19 & 20 supplied by Plinio Hurtado – thank you.

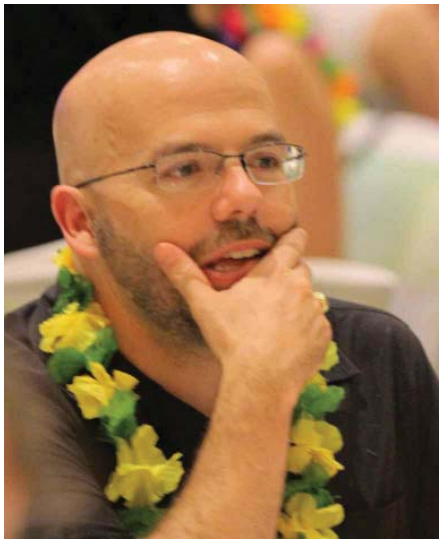
Some of the appreciative audience for the debate

Photos from the 2014 Conference Dinner

Kristen Malatesta

Barbara Fazekas de St Groth & Dale Godfrey

Jessie Spargo



Stuart Tangye

Ernesto Hurtado-Perez

Shamika Moore & Natalie Stevens

Susan Christo

ASI Women's Initiative Mentoring Programme

The availability of suitable mentors for female immunologists is an ongoing problem; in addition, women often miss out on the informal mentoring relationships that develop in the workplace due to a lack of senior women and to commitments outside work. Our mentoring program will pair mentees with appropriate mentors, and will support relationships for those in the same city or via email/Skype for those in other cities. We have established several successful relationships over the last 12 months, supporting students, post-docs and faculty.

We are actively recruiting both male and female **mentors** at all levels. We are also seeking females who wish to be **mentees**. Go to the ASI website (http://www.immunology.org.au/womens-initiative/womens-initiative-mentoring-program/) to download the forms and send to:
Ros Kemp (roslyn.kemp@otago.ac.nz) or
Sarah Fardy (fardy.s@wehi.edu.au)

Visit the ASI YouTube Channel and watch 'A Chemical Imbalance' a short documentary which celebrates female scientists and looks at why women are still so under-represented in STEM (Science, Technology, Engineering & Mathematics).

Dr Chrissie Miller, first female chemist fellow of the Royal Society of Edinburgh.
Photo: University of Edinburgh – A Chemical Imbalance Photograph: guardian.co.uk

ASI Councillors' News

N.Z. News

The New Zealand branch had great success at the recent ASI meeting – nine students from across the country were awarded ASI Travel Bursaries; Cam Field won a poster prize and Alanna Cameron won the Pecha Kucha talk session. See the Malaghan Institute website for more details:
Alanna: http://www.malaghan.org.nz/news-and-events/fast-talking-phd-student-picks-up-prize/
Cam: http://www.malaghan.org.nz/malaghan-scholar-cleans-up-prizes/

The 2015 New Zealand branch meeting will be held in Auckland in early July and will feature three exciting international speakers:
Eric Vivier from the Centre d'Immunologie de Marseille-Luminy, France;
Kathy McCoy, University of Bern, Switzerland, and
Wolfgang Weninger, University of Sydney, Australia.

The committee is co-chaired by Ries Langley (r.langley@auckland.ac.nz) and Fiona Radcliff (f.radcliff@auckland.ac.nz). A website with registration and abstract submission information will be available soon.

Finally, congratulations to Jo Kirman, who has taken over as co-ordinator of the ASI Visiting Speaker Program in 2015.

Roslyn Kemp
Councillor

Victorian News

In December, the ASI Annual Conference in Wollongong capped off a great year in Immunology with a truly excellent meeting. In the beautiful beachside setting of Wollongong, the conference kicked off in memorable fashion with an inspiring Keynote lecture from Laureate Professor Bruce Beutler and a heartfelt Welcome to Country. The following four days showcased exceptional immunology from national and international speakers and poster presenters. Other highlights included Prof. Barbara Fazekas de St Groth's Burnet Oration, the always lively Lafferty Debate and Annual Dinner limerick competition. Congratulations to Marcel Batten and the team of conference organisers for putting together such a successful meeting.

Canberra is the place to be from 29 November to 3 December for the 2015 Annual Conference because it is shaping up to be another cracker. Professors Michel Nussenzweig, Louis Staudt, Diane Mathis, Alexander Rudensky, Ton Schumacher, Doreen Cantrell and Peter Openshaw are just some of the fantastic international speakers lined up. The German/Australian Joint Workshop immediately follows the conference, a new feature that I'm sure will prove fertile ground for further collaboration between immunologists in the two countries. Head to the ASI website for further details and encourage your colleagues to take out or renew their ASI membership – the significant savings on registration for this conference alone warrants taking out membership, in addition to the multitude of other benefits members enjoy.

There was even more world-class immunology on offer in December 2014, when the Victorian/Tasmanian branch hosted the ASI Visiting Speaker, Prof. Peter Ghazal. Peter's visit was co-sponsored by the NHMRC Preterm Infants Centre for Research Excellence and he delivered two excellent seminars at the Murdoch Children's Research Institute and Peter Doherty Institute on systems biology approaches to investigate macrophage inflammatory responses in neonates (among other topics). In 2015, we look forward to a great line-up of Visiting Speakers, so keep your eye out for notifications and advertisements for their seminars.

Daniel Gray
Councillor

S.A./N.T. News

Our next local ASI event will be The World Day of Immunology which is coming up on April 29. Last year we teamed up with the South Australian Health and Medical Research Institute (SAHMRI) to present public lectures and an interactive display which featured posters, a microscope station as well as immunology based educational games and activities for all ages. I will soon be calling for volunteers interested in participating in this year's event, so keep an eye out for my email as I am keen to hear any ideas.

The other big local ASI event for the year will be the 11th Annual Adelaide Immunology Retreat (AIR-11) which will take place in July or August. This event is growing every year, last year we had excellent participation across a broad range of research interests. I am keen to form an organising committee early in the year; participating in this committee is a great chance to get involved in ASI and everyone has the opportunity to contribute ideas for the location, venue and invited speakers. I will send out an email soon calling for volunteers so please get involved and encourage your students to be involved!

Please don't hesitate to contact me at cara.fraser@health.sa.gov.au if you have any questions or suggestions about ASI events.

Cara Fraser
Councillor

Queensland News

The ASI Queensland Branch has an exciting program for 2015. Here is a snapshot and dates to mark in your diaries:

1. Visiting Speaker Program 2015: Alex Shalek will be visiting Brisbane on 25th March with a seminar at TRI. David Masopust will visit Brisbane in April and Daniel Altman will visit Brisbane and Townsville in May. For more information or to book a time with the speakers, please contact the Qld VSP co-ordinator, Dr Sumaira Hasnain, sumaira.hasnain@mater.uq.edu.au
2. World Day of Immunology, 29th April 2015: Public lectures are being planned at TRI in Brisbane on 29th April 2015 and at JCI in Townsville. An exciting new initiative for 2015 is a one day immunology laboratory experience for local high school students that will be held at TRI on Wednesday 29th April and at QIMR on Friday 1st May. We are seeking energetic PhD students and ECRs to help run these events. To get involved and for more information, please contact the Qld DoI co-ordinators: Danielle Stanisic, d.stanisic@griffith.edu.au (Brisbane/Gold Coast) and Tammy Dougan, tammy.dougan@jcu.edu.au (Townsville).
3. BIG2015: The Brisbane (and Gold Coast and Far North Qld) Immunology Group Annual Retreat will be held at Seaworld Resort, Gold Coast on August 20-21. For more information, contact kristen.radford@mater.uq.edu.au
4. The ASI annual meeting will be held in Queensland in 2017 and is in the early planning stages. If you would like to be part of the organising committee, please contact kristen.radford@mater.uq.edu.au

Kristen Radford
Councillor

N.S.W. News

On behalf of the NSW ASI members I would like to take this opportunity to acknowledge the fabulous work of Marcel Batten as NSW Councillor over the past three years. As everyone would agree, Marcel has contributed immensely to the NSW Branch activities and, most importantly, co-ordinated a fantastic annual ASI meeting in Wollongong late last year. Filling her shoes will be a huge challenge for me. Fortunately though, Marcel had set up a group of very talented and fully committed individuals as part of the local committee and they have already set the ball rolling for our annual branch meeting. Due to popular demand, we will hold the NSW/ACT branch meeting once again at Craigieburn Resort and Conference Centre in Bowral. The meeting will take place on 20 & 21 August and will take a similar format to that of last year's meeting. The local committee will no doubt make sure it will be a fun and collegial meeting for everyone. More information will follow.

As part of the ASI Visitor Speaker Program we are delighted to host two eminent researchers – A/Prof. David Masopust and Prof Eric Vivier – in April. Prof. Masopust will be giving a seminar at Centenary Institute on 27 April and Prof. Vivier will give a seminar on the 28th at the same venue.

Please feel free to contact me if you would like to get more information or make suggestions for our branch activities (m.palendira@centenary.org.au). We would like to have representation from all relevant institutions in our local committee. So if you are interested in joining the committee or would like to recommend people, please get in touch with me.

I look forward to working with you all over the next three years. All the best until next time.

Mainthan Palendira
Councillor

Sustaining Membership

ASI Inc acknowledges the support of the following sustaining members:

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TRAVEL AWARD CONFERENCE REPORTS

Keystone Meeting – Biology of B Cell Responses

9–14 February 2014, Keystone, Colorado, USA

Hannes Bergmann
John Curtin School of Medical Research, ANU, Canberra

The sun was burning and there were no clouds in the sky. The thermometer reading had passed 38 degrees Celsius, in the shade. I lifted my feet off the blistering tarmac at Canberra airport to board a small Airbus plane taking me away on a B cell journey across the Pacific Ocean, heading for the United States. About 24 hours later I stepped into snow, 2800m above sea level and surrounded by crisp, thin air at a temperature 50 degrees Celsius below what I had left.

I had reached Keystone in the Rocky Mountains of Colorado. A place renowned for its pristine skiing in winter, and highly regarded amongst B cell immunologists from all over the world for regularly hosting one of the biggest scientific assemblies of its kind: The B cell Keystone Meetings. This year's meeting titled 'Biology of B cell Responses' and the prime goal of my journey, was scheduled from the 9th until the 14th of February.

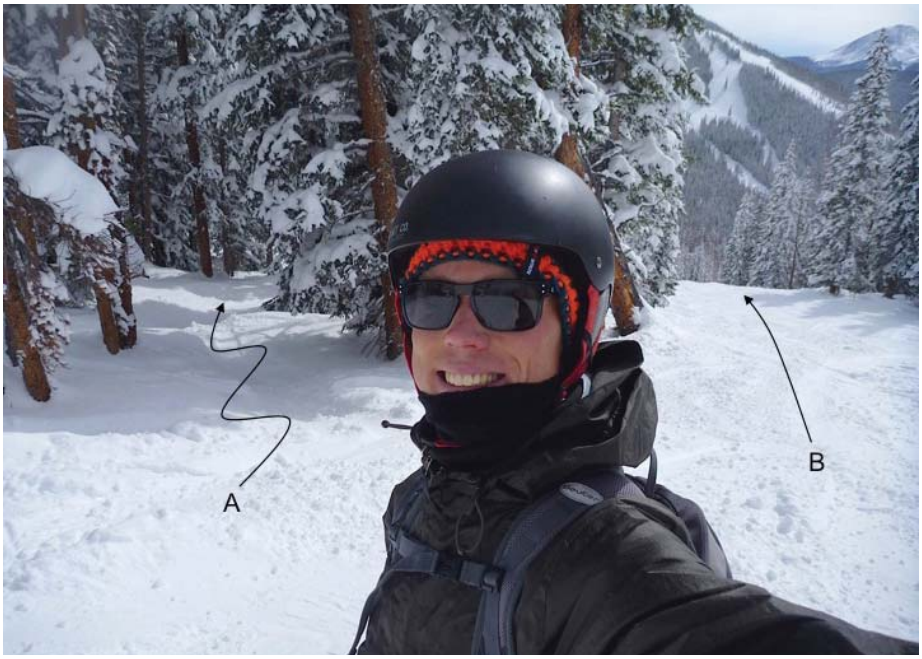
In my PhD studies at the John Curtin School of Medical Research in Canberra, I investigate how genes regulate the development of B lymphocytes and how the MHCII-antigen presentation pathway influences this process – a fascinating field with much to be revealed. Unfortunately, it appears to me that most immunology conferences I have been to only offer a decreasing selection of research presentations about B cells. Thus I was thrilled at the acceptance of my abstract for an oral presentation at the upcoming B cell Keystone Meeting. With support from our Australasian Society for Immunology, a generous ASI Postgraduate International Travel Award enabled me to travel to Colorado and take advantage of a conference program almost exclusively featuring quality presentations on B cell biology. It was amazing; something I had never experienced before.

Personal highlights of the meeting included presentations by Hedda Wardemann on high-throughput single cell immunoglobulin sequencing to follow B cell clonal selection, and Gabriel Victora's showcasing of B cell interactions with T follicular helper (Tfh) cells that re-circulate amongst multiple established germinal centres. He used a photoactivatable mouse strain, similar to Kaede mice known to Australian immunologists at the Garvan Institute, allowing him to optically mark and track with high precision the behaviour of Tfh cells; live and in colour, on a two-photon microscope. Great presentations during the day were followed by very busy and interactive poster sessions in the evening, lightened and sustained, often until quite late, by ample food and fluid supplementation. It was somewhat nerve wracking to give a talk about my PhD project to such a distinguished B cell audience yet later I received very encouraging feedback and even commercial interest, when I took a turn to show my poster at night.

Apart from abandoning oneself to B cell biology, Keystone had to be tried for its non-immunological winter reputation: downhill skiing. The meeting organisers wisely included three-hour lunch breaks into the schedule to achieve a balance between science and (almost) free falling excitement. I just had enough time to take a 'snow-selfie'.

Following the Keystone meeting I ran the gauntlet finding a flight path through winter storms, iced runways and spontaneous flight cancellations, to eventually give a seminar at the Whitehead Institute in Boston and to meet up with Hidde Ploegh and his lab members. Hidde Ploegh's group has a track record for developing new biochemical tools to solve immunological problems. His work on CD74 (invariant chain) and its role in B cell MHCII mediated antigen presentation is particularly relevant to my PhD project. Currently the Ploegh Lab is developing camelid heavy chain-only derived nanobody technology, which I found to be fascinating to potentially follow for ongoing career development.

I have experienced a fabulous B cell conference, dense with excellent talks and opportunities to meet like-minded people; all this garnished with skiing and travelling the winter wonders of the US, I attained memories to last. Thank you ASI for making this possible!



Hannes on Keystone ski slope dealing with de(s)cent selection: Trees (A) or chute (B).

British Society for Immunology Annual Conference

1–4 December 2014, Brighton, UK

Cell Symposium: The Multifaceted Roles of Type 2 Immunity

10–12 December 2014, Bruges, Belgium

Jason Lynch
University of Queensland

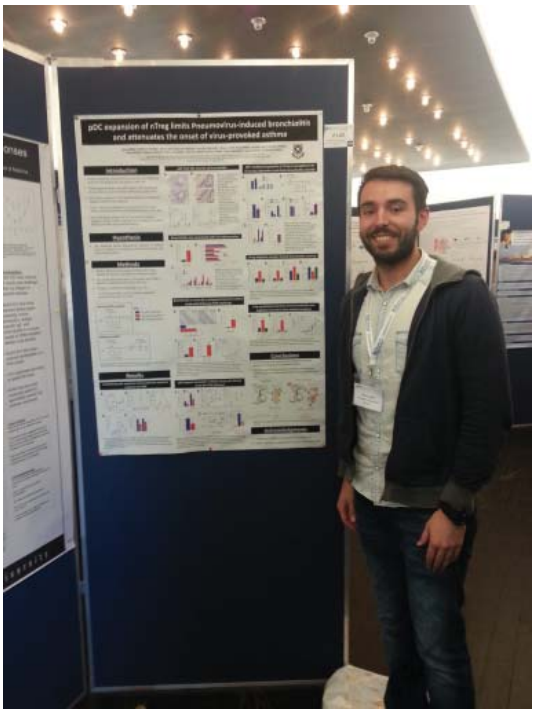
Last November/December I had the privilege of attending both the British Society for Immunology Annual Congress (Brighton, UK) and a Cell Symposium: The Multifaceted Roles of Type 2 Immunity (Bruges, Belgium). I arrived in Brighton to a crisp but refreshing 6 deg. C and shook off my jet lag with a self-guided tour of the bohemian city of Brighton. Later that morning BSI 2014 kicked-off with presentations by PhD students and postdocs who competed in separate categories for BSI awards. The career development session that followed offered in-depth advice for early career researchers transitioning from PhD student into postdoc. However the highlight of the day was the keynote presentation by Professor Richard Flavell. Prof. Flavell described over a decade of research by his laboratory on the role of inflammasomes in health and disease, and a new appreciation for the microbiota in this context.

Over the next few days the Congress was treated to a large volume of unpublished data, with many talks touching on the influence of the microbiota on the immune response and homeostasis. I also had the opportunity to present a poster of my PhD work to the Congress. This was a great opportunity to meet the speakers, including Dr Michael Edwards from the National Heart and Lung Institute, Imperial College, who is a leader in the field of rhinovirus-associated exacerbations of asthma.

After the BSI I visited Dr Edwards at the NHLI and met with Prof. Sebastian Johnston and students and postdocs from his lab.

The Cell Symposium was a star studded line up of the type 2 immunity field. Prof. Alan Sher set the scene for what was to be an outstanding meeting and the direction of the conference was clear – what is the relative contribution of Th2 cells and type 2 innate lymphoid cells (ILC2) to type 2 immunity? How do these cells function and under pathophysiological conditions co-operate to induce allergic disease? Prof. Bart Lambrecht highlighted the contribution of new dendritic cell subsets to the development of allergic sensitisation and Th2 immunity. Prof. Hamida Hammad described an important role for the A20 gene in airway epithelial cells and asthma onset. Prof. Rick Maizels presented work analysing a helminthic parasite product that can block IL-33 release in a mouse model of asthma. Later that evening, the poster session was a whirlwind of discussion and I received a lot of useful feedback on my data.

I thank the ASI sincerely for enabling my travel to both conferences, in particular as an international student studying in Australia. The award has enabled me and my lab to develop new collaborations with Prof. Lambrecht, a world leader in Th2 immunity.



Poster presentation session at the Cell Symposium: The Multifaceted Roles of Type 2 Immunity (Bruges, Belgium)

Feeling festive under the bright lights of London

Keystone Symposium: Host Response in Tuberculosis

22 – 27 January 2015, Santa Fe, New Mexico, USA

Andreas Kupz
Max Planck Institute for Infection Biology, Berlin, Germany
Australian Institute of Tropical Health and Medicine, James Cook University, Cairns, Qld

As a recipient of the ASI Postdoctoral International Travel Award I recently had the privilege to attend the Keystone Symposium on Host Response in Tuberculosis in Santa Fe, New Mexico, USA. With this picturesque township as backdrop, the meeting brought together the worldwide TB community. Santa Fe, sometimes referred to as the 'art capital' is the oldest capital city in the USA and is almost entirely made up of houses built in the traditional 'Pueblo Revival Style'. When I awoke after my journey to ten centimetres of fresh snow and a delicious Mexican-style breakfast in the morning, I quickly forgot the strenuous 25 hours it took to get there.

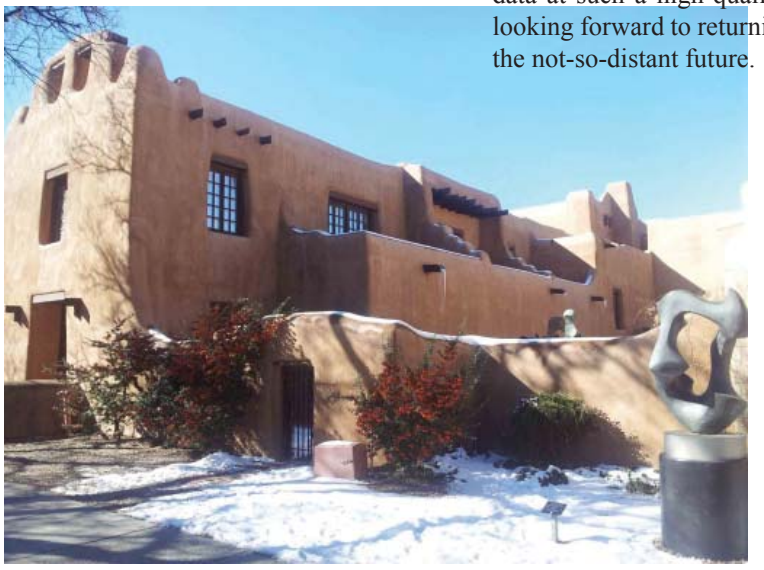
It was the first TB conference I had attended since joining the tuberculosis research community two years ago when I started my CJ Martin Fellowship at the Max Planck Institute for Infection Biology in Berlin. Finally I could put faces to names I only knew from the literature. As expected, the quality of the presentations and the data presented was outstanding and covered not just basic microbiology, host responses and immunology but also translational aspects, vaccine development, treatments, epidemiology and biomarker research. Furthermore, because the meeting was held in conjunction with the Keystone symposium "Granulomas in Infectious and Non-Infectious Diseases", it also covered general aspects of granulomatous disease. To name just a few, presenters included heavy-weights such as Ronald Germain, Jean-Laurent Casanova, Lalita Ramakrishnan, Branch Moody, Christopher Sassetti and Vishva Dixit.

Many of the talks, including the keynote lecture by Clifton E. Barry III, reported on the use of PET/CT imaging technology and/or barcoded bacterial populations as tools to study the dynamics of *Mtb* infection in the lungs of both patients as well as non-human primates over time. Almost all of these studies came to the conclusion that TB is a much more diverse, complex and dynamic disease than previously thought. Within a single patient almost every type of granuloma can exist in parallel, new ones can constantly arise, while other ones may disappear or change and respond very differently to antibiotic treatment. Furthermore, the bacterial populations contained within different lesion types differ extensively both in their capacity to spread as well as their metabolic state. Interestingly, even after supposedly successful six-months antibiotic treatment, live but non-culturable bacteria can be detected. This has dramatic implications not only for treatment options but also for the type of immune readouts that are used to evaluate certain interventions, particularly in the context of HIV co-infection. In light of this information and when combined with data from current large-scale global TB biomarker research projects, it quickly becomes apparent that, as one of the speakers put it, "the average is just not good enough anymore". Hence, future efforts in TB research will need to focus even more on virtual infection models, predictive biomarker discovery, the development of a human challenge model and other personalized medicine approaches.

Apart from very interesting basic science and clinical studies, the meeting also encouraged many lively discussions about how the limited research funding for TB should be spent more efficiently, which vaccine candidates to support, which animal models to use as well as how to best integrate unconventional targets such as MAIT cells, CD1-restricted T cells and 'killing' antibodies into next generation vaccines. Only through a united effort from basic scientists, clinicians and global health experts will we achieve a significant reduction in mortality or even eradication of TB by 2050.

Besides the scientific aspect of the conference, there was plenty of opportunity to engage in skiing, sight-seeing, socialising or just enjoying the fabulous Mexican food. Having been away from Australia for a while now, it was nice to meet some fellow Australian researchers and to share a bit of gossip over a beer (or several beers).

Lastly, I would like to sincerely thank the ASI for giving me the opportunity to take part in this conference, to make connections with other TB researchers and to present my data at such a high-quality meeting. I am looking forward to returning to Australia in the not-so-distant future.



Pueblo architecture in Santa Fe

FIMSA2015

"Frontiers in Immune Modulation"

FIMSA2015 aims to facilitate interactions between members of its societies and to exchange knowledge in basic and clinical immunology to advance the science of immunology in the Asia-Pacific region. The congress will bring together scientists from the region for this purpose.

6th Congress of the FIMSA
(Federation of Immunological Societies of Asia Oceania)

30 June - 3 July 2015
Sands Expo and Convention Centre, Singapore

Keynote Speaker:

Tasuku HONJO, Japan

Confirmed Speakers:

Gabrielle BELZ, Australia
Su BING, China
Xuetao CAO, China
Shubhada CHIPLUNKAR, India
Gennaro DE LIBERO, Singapore
Sidonia FAGARASAN, Japan
Nick GASCOIGNE, Singapore
Florent GINHOUX, Singapore
William (Bill) HEATH, Australia
Stefan KAUFMANN, Germany
Bernard MALISSEN, France
Diane MATHIS, United Kingdom
James McCLUSKEY, Australia
Caetano REIS e SOUSA, United Kingdom
Koyasu SHIGEO, Japan
Charles D SURH, South Korea
Zhigang TIAN, China
Carola VINUESA, Australia

Organised by:

Singaporean Society for Immunology

For more information, please visit
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Publications List

Congratulations to ASI members who have published their following work in the last three months

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