SEALS
ANNUAL REPORT
2015/2016

SEALS
(South-Eastern Area Laboratory Services)
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<td>Contact Information</td>
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INTRODUCTION

The South Eastern Area Laboratory Services (SEALS) is one of the networks of NSW Health Pathology that provides diagnostic services to the hospitals and other health facilities of the South-Eastern Sydney and Illawarra-Shoalhaven Local Health Districts, The Royal Hospital for Women and to Sydney Children’s Hospital. SEALS is not, however, a standalone service and our scientists and pathologists are closely integrated in the clinical, teaching and research activities of our campus partners. SEALS has a strong commitment to leading and collaborating in clinical and laboratory research activities, but we have never had a research report to highlight our research profile.

Under the leadership of Professor Denis Wakefield, and with Wendy Wartho’s assistance, we have formed SEALS Research, with Executive and Scientific Committees. The third SEALS Research Annual Scientific Meeting has just been held and showcased some of the cutting edge research activities in which we are involved.

This first Annual Research report seeks to document some the excellent work being undertaken by our scientists and medical staff. As will be evident from the departmental reports, SEALS includes world class research groups, and this is a great opportunity to showcase some of their work. In addition, SEALS Research is developing a program of postgraduate scholarships that will further build research capacity in our laboratories.

I would like to thank all who have contributed to this report, but am particularly grateful to Denis Wakefield for championing this initiative and to Wendy Wartho for putting this document together.

Robert Lindeman

Network Director
Anatomical Pathology

INTRODUCTION
The Department of Anatomical Pathology, SEALS Randwick provides a comprehensive diagnostic service in adult, paediatric and perinatal pathology. Our department provides specialist diagnostic anatomical pathology services to Prince of Wales Hospital, the Royal Hospital for Women, Sydney Eye Hospital and Prince of Wales Private Hospital and is one of only two sites in NSW co-located with a specialist paediatric tertiary referral hospital, Sydney Children’s Hospital.

Anatomical Pathology SEALS Randwick has a unique diagnostic profile and provides a comprehensive specialist service in the following areas:

1. Comprehensive range of adult histopathology, encompassing all areas of general adult oncology
2. Comprehensive paediatric histopathology
3. Adult and paediatric specialist neuropathology
4. Adult and paediatric specialist muscle pathology
5. Gynaecological oncology
6. General and gynaecological cytology
7. Specialist ocular pathology
8. Diagnostic and transplant renal pathology
9. Adult, paediatric and perinatal autopsy services
10. Tissue banking and provision of services to assist personalised oncology programs in adult and paediatric oncology

Our pathologists work closely with clinicians within the POW campus and also within the SEALS Network, attending Multidisciplinary meetings, providing day to day clinical consultation and supporting collaborative research. Our department also supports teaching of registrars from other clinical disciplines (medical oncology, radiation oncology, dermatology and neurosurgery trainees) through formal lecture programs and tutorials. We are also actively involved in teaching undergraduate medical students at UNSW.
Pathologists, registrars and scientists in our department are also actively involved in research through collaboration with clinical teams, supervision of post graduate PhD and Masters students and supervision of ILP student projects through UNSW. A number of pathologists hold conjoint appointments with the School of Medical Sciences, UNSW and have research links to the Lowy Institute, HSA BioBank and Children’s Cancer Institute, all at UNSW.

**MAJOR RESEARCH COLLABORATIONS:**

The Dept of Anatomical Pathology, SEALS Randwick, is a collaborator and lead site for the HSA BioBank, UNSW.

11/160 (HREC 11/POWH/264)

Principal Investigators: Prof R Ward, A/Prof E Salisbury and Prof P Crowe

The department has also collaborated with clinical groups investigating the following projects:

1. Investigation of infections in intervertebral disc specimens
2. Ovarian cancer
3. Endometrial cancer
4. Referral pathways in patients with Lynch Syndrome
5. Use of cytopathology whole image slides and adaptive virtual image tutorials for teaching medical student and post graduate pathology trainees
6. Establishment of “universal” biobanking
PUBLICATIONS:


Cytopathology whole slide images and adaptive tutorials for postgraduate pathology trainees: a randomized crossover trial. Van Es SL1, Kumar RK2, Pryor WM3, Salisbury EL 4, Velan GM5. Hum Pathol. 2015 Sep;46(9):1297-305


Loo CKC, Pereira TN and Ramm GA: Case report: fetal bilateral diaphragm agenesis, ectopic liver and abnormal pancreas. Fetal and Pediatric Pathology 2015; 34(4) 216-222,


Loo CKC, Pereira TN, Ramsing M, Vogel I, Petersen OB, Ramm GA: Mechanism of pancreatic and liver malformations in human fetuses with short rib polydactyly syndrome. Accepted by Birth Defects Res Part A: Clinical and Molecular Teratology, 11th Feb 2016. Published online 11.3.16 10.1002/bdra.23495


SUPERVISION OF POST-GRADUATE STUDENTS:

Dr C Loo: Co-supervisor for Ph. D. student Qiao Qiao - project ‘Identification and characterization of mesenchymal stem cells during fetal liver development’, University of NSW, 2016.

A/Prof E Salisbury: Co-supervisor for Ph. D. student Dr Simone Van Es – project ‘Cytopathology whole slide images and adaptive tutorials for postgraduate pathology trainees: a randomized crossover trial.’ University of NSW, 2015.

A/Prof E Salisbury: Co-supervisor for Master of Science student, Andrew Harre – Project title: EGFR testing: the reliability and validity of using cytology smears for molecular genetic testing.
GRANTS:

<table>
<thead>
<tr>
<th>Year</th>
<th>Grant source</th>
<th>Grant title</th>
<th>Funds ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016-2021</td>
<td>Cancer Institute NSW</td>
<td>HSA BioBank</td>
<td>6.1M</td>
</tr>
<tr>
<td>2015</td>
<td>POWH Foundation</td>
<td>EGFR Testing: the reliability and validity of using cytology smears for molecular genetic testing</td>
<td>20,000</td>
</tr>
</tbody>
</table>

OTHER ACHIEVEMENTS:

The HSA BioBank was a finalist in SESLHD Innovation and Improvement awards, 2015.

“The HSA Biobank: building a translational research engine in the SESLHD”
Clinical Chemistry & Endocrinology

RESEARCH
The research interest of the Department of Clinical Chemistry and Endocrinology focuses on the following areas and most research activities have been funded by NHMRC:

1/ Evidence-based evaluation of medical tests:
This activity is carried out in collaboration with the Test Evaluation Working Group of the European Federation of Clinical Chemistry and Laboratory Medicine (EFLM). Prof Horvath was chair of this working group between 2011 and 2015 and the group’s work has been supported by an EFLM grant.

2/ Patient safety and management of critical laboratory results:
This work is carried out in collaboration with the Australian Institute of Health Innovation at Macquarie University as part of a 5-year NHMRC grant. Craig Campbell, a part-time PhD student in our department, is heavily involved in this project.

This activity is also carried out as part of a national harmonization project in collaboration with the Australasian Association of Clinical Biochemistry (AACB) and the Royal College of Pathologists of Australasia (RCPA). Prof Horvath and Craig Campbell are founding members of this joint working party and actively too part in developing a national guideline on the management of critical laboratory results.

3/ Overdiagnosis and rational test utilization:
This activity is carried out in collaboration with the University of Sydney and Bond University as part of a 5-year NHMRC partnership grant.
4/ **Applied research related to laboratory testing:**

This activity covers various laboratory testing related smaller projects mostly covered by departmental research funds or an NHMRC grant.

5/ **Bone and calcium metabolism and endocrinology:**

This activity is spearheaded by Prof. Chris White who holds numerous external and internal research grants and manages a broad range of clinical collaborations.

**EDUCATION**

With an emphasis on internal and external education, scientific staff and registrars within the department are provided with the opportunity to attend regular education sessions, in house and within the broader hospital community. Departmental staff regularly attend and present at hospital grand rounds and present lectures and posters at local AACB and RCPA conferences, or internationally at EFLM, IFCC (International Federation of Clinical Chemistry and Laboratory Medicine) and AACC (American Association of Clinical Chemistry) and Endocrinology Society meetings. Members of staff are also engaged in high degrees in both Masters and PhD research programs.

In 2015-2016, Prof Horvath, as one of the 3 senior editors, has been editing the 6th edition of the Tietz Textbook of Clinical Chemistry and Molecular Diagnostics.

**PUBLICATIONS**

*Evidence-based evaluation of medical tests:*


**Patient safety and management of critical laboratory results:**


Lam Q, Ajzner E, Campbell CA, Young A. Critical risk results - an update on international initiatives. eJIFCC 2016;27(1):66-76.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4975218/

**Overdiagnosis and rational test utilization**


**Applied research related to laboratory testing:**


**Bone and calcium metabolism and endocrinology:**


Eisman JA. White CP. Osteoporosis & Bone Failure. What is in a name? Endocrinology Today. 2015


### Research Grants

<table>
<thead>
<tr>
<th>Year</th>
<th>Grant source</th>
<th>Grant title</th>
<th>Funds ($)</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012-2014</td>
<td>NHMRC (APP1030584)</td>
<td>Serial NT-ProBNP monitoring for predicting major cardiovascular events in the dialysis population</td>
<td>281,193</td>
<td>AI: AR Horvath</td>
</tr>
<tr>
<td>2016-2019</td>
<td>NHMRC Partnership Project Shared Grant (APP1111925)</td>
<td>Delivering safe and effective test result communication, management and follow-up</td>
<td>883,358</td>
<td>CI: AR Horvath</td>
</tr>
<tr>
<td>2016-2019</td>
<td>NHMRC (APP1104136)</td>
<td>Creating sustainable health care: ensuring new diagnostics avoid harms, improve outcomes and direct resources wisely.</td>
<td>2,497,658</td>
<td>AI: AR Horvath</td>
</tr>
<tr>
<td>2012-2016</td>
<td>EFLM grant</td>
<td>Test Evaluation Working Group</td>
<td>60,000 p.a.</td>
<td>Chair: AR Horvath</td>
</tr>
<tr>
<td>2015</td>
<td>POWH Foundation Grant</td>
<td>Secondary Fracture Prevention utilising a novel automated knowledge base for the identification of patients at risk</td>
<td>10,000</td>
<td>CI: CP White</td>
</tr>
<tr>
<td>2011-2015</td>
<td>NHMRC</td>
<td>Diabetes Case Detection through Emergency Department Admissions</td>
<td>160,000</td>
<td>AI: CP White</td>
</tr>
</tbody>
</table>

*AI: Associate Investigator; CI: Chief Investigator*
Genetics

INTRODUCTION
The SEALS Genetics Laboratory is one of the major Australian centres for genetic diagnostics, providing a comprehensive genome diagnostic service in a consultative pathology context. We offer testing for over 20 different disorders. The main areas of interest are: the genomic basis of human disease, prenatal diagnosis, inherited neuromuscular disorders, inherited and somatic cancer diagnostics, development delay and intellectual disability, craniofacial disorders, inherited and somatic haematological disorders and community genetics. We draw our expertise from 45 scientific, clinical and research staff in the fields of molecular genetics, cytogenetics, genetic biochemistry, bioinformatics and medical genomics. Services are provided to the major hospitals in the Sydney Children's Hospital Network, the South Eastern Sydney and Illawarra Shoalhaven Local Health Districts as well as to public and private health facilities throughout NSW and State and nationally. In addition, the laboratory provides advanced training for scientific and medical personnel who wish to specialise in laboratory genetics. The laboratory is recognised as a training site by HGSA and RCPA.

SEALS Genetics has been actively engaged in the provision of diagnostic services, consultation, training and research. 2015 has been a busy period of time with the introduction of new tests, refinement and consolidation of other diagnostic tests and procedure and introduction of new equipment and technology.

EDUCATION
There is a major emphasis on education of medical and scientific staff within SEALS and the broader genetics community. The regular seminars for trainees with the HGSA and RCPA training programs.
PUBLICATIONS


Haematology

INTRODUCTION

The SEALS Haematology laboratory located in Prince of Wales Hospital (Randwick) provide diagnostic service for Sydney Children’s Hospital (Randwick), Royal Hospital for Women (Randwick), and to the local Health District Hospitals (all laboratories). The Randwick laboratory also supervises the small SEALS laboratory located within Sydney Hospital. Haemato-pathologists at Randwick, in addition to providing laboratory supervision and diagnostic services, work as Consultant Haematologist providing clinical services to the various clinical services at the Randwick campus.

DIAGNOSTIC SERVICES

In 2015 the diagnostic service continued to seek innovation with the introduction of new tests, refinement and consolidation of other diagnostic tests and procedures, and introduction of new equipment and technology. The validation of 8 colour flow cytometry provided more accurate immunophenotyping with streamlined laboratory processing. The introduction of SEALS-wide autovalidation rules for FBC parameters has seen the film review rate drop from 60% to 25% in the Randwick laboratory. POWH is an Adult Haemophilia Treatment Centre and new equipment (Accustar in Randwick) has enabled more accurate quantitation of vWF:RCoF and provision of results 24/7 assisting the management of patients with von Willebrand’s disease. The introduction of new oral anticoagulant drugs has required establishing new assays to monitor these medications. Platelet electron microscopy has been validated at Randwick laboratory. ADAMTS-13 assays were established at Randwick laboratory to improve the diagnosis of patients with TTP and microangiopathies.
TEACHING AND EDUCATION

All SEALS Haematology laboratories provide training for budding hospital scientists and Haematology Advanced Trainees. In 2015, 3 out of 3 Haematology Registrars sitting the RCPA Part 1 examinations were successful at Randwick. Consultants provide teaching to UNSW medical students, Hospital JMO and Registrar workforce with regular lecture, case-based learning and participation in FRACP training programs. Members of the staff are also engaged in supervising high degrees in both Masters and Ph.D. research programs.

RESEARCH

The Randwick Haematologists engage in sponsored and investigator initiated clinical research. The main focus of these studies has been prevention and treatment of vein thrombosis, cancer associated thrombosis, adverse outcomes of oral anticoagulants, ITP, lymphoproliferative disease (lymphoma, CLL) and myeloma. In addition there is an established collaboration in basic platelet research. A brief summary of active studies recruiting in 2015 is below.

Rare Diseases & Registries

Aplastic Anaemia Registry
International Adult ITP Registry
Paroxysmal Nocturnal Haemoglobinuria Registry

Vein thrombosis and Anticoagulation

ARES Registry (Anticoagulant Events and Reversal Collaborative)

TWISTER Study (Two Weeks of Low Molecular Weight Heparin for Distal Vein Thrombosis)

EINSTEIN CHOICE study (Reduced-dosed rivaroxaban and standard-dosed rivaroxaban versus ASA in the long term prevention of recurrent symptomatic venous thromboembolism in patients with symptomatic deep-vein thrombosis and/or pulmonary embolism)
**REVERSE II Study** (REcurrent VE nous thromboembolism Risk Stratification Evaluation: Validation of the “Men and HERDOO2” - A Clinical Decision Rule to Identify Patients with “Unprovoked” Venous Thromboembolism who can Discontinue Anticoagulants after Six Months of Treatment)

**ITP**

**BMS-ITP Study** (Open Label, Adaptive Design, Ascending, Multiple-Dose Study to Evaluate Safety and Efficacy of BMS-986004 in Adult Subjects with Primary Immune Thrombocytopenia)

**RIGEL ITP** (A Phase 3, Multi-Center, Randomized, Double-Blind, Placebo-Controlled, Study of Fostamatinib Disodium in the Treatment of Persistent/Chronic Immune Thrombocytopenic Purpura, Study 047 and 049)

**SPRITE ITP study** (A Multicentre, single arm, open label study evaluating the efficacy and safety of Eltrombopag (Revolade™) in patients with early refractory Immune Thrombocytopenia within 6 months of diagnosis)

**Malignant Haematology**

**ALL-6** (A Phase II trial of an intensive paediatric protocol incorporating post-induction stratification based on minimal residual disease levels for the treatment of adolescents aged 15 years or above, and young adults aged up to 40 years, with newly diagnosed Acute Lymphoblastic Leukaemia)

**MM-15** (A randomized phase III study to compare Bortezomib, Melphalan, Prednisone (VMP) with High Dose Melphalan followed by Bortezomib, Lenalidomide, Dexamethasone (VRD) consolidation and Lenalidomide maintenance in patients with newly diagnosed multiple myeloma)

**Indolent NHL Gilead 125 study** (A Phase 3, Randomized, Double-Blind, Placebo-Controlled Study Evaluating the Efficacy and Safety of Idelalisib (GS-1101) in Combination with Bendamustine and Rituximab for Previously Treated Indolent Non-Hodgkin Lymphomas)

**Harmony Study** (A Phase Ib/II study evaluating the safety and efficacy of Obinutuzumab in combination with Idasanutlin in patients with relapsed or refractory Follicular Lymphoma or Diffuse Large B-cell Lymphoma)
PUBLICATIONS


Haematology, St George Hospital

INTRODUCTION
Department of Haematology, SEALS Kogarah and St George Hospital, has two sections, namely Laboratory Haematology and Clinical Haematology. The haematology laboratories provide diagnostic services, assisting the diagnosis of blood diseases including leukaemia, lymphoma, multiple myeloma, thrombotic and bleeding disorders as well as providing blood transfusion services through its blood bank. The clinical haematology service provides healthcare to patients with blood diseases; this include in-patient and out-patient care, autologous bone marrow transplantation, consultation services, day-centre chemotherapy and cancer out-reach services at/from St George Hospital and consultation services at the Sutherland Hospital. Our workload in both clinical and laboratory haematology has increased steadily since 2006 and 2015 was a particularly busy year.

RESEARCH
Research in the Haematology Department, Kogarah includes basic science, translational and clinical research. Our basic science research focuses on platelet/megakaryocyte biology and gene regulation of platelet production; translational research concentrates on investigations of pathogenesis of immune platelet disorders such as ITP and heparin-induced thrombocytopenia and thrombosis (HIT) and clinical studies include industry sponsored trials on novel treatments of leukaemia, lymphoma, multiple myeloma, myelo-proliferative neoplasm, ITP and prevention/treatment of venous thrombo-embolism. The research has been funded by NHMRC project and program grants, ARC discovery, NSW Cancer Institute, pharmaceutical industry and others.
EDUCATION
Our staff teach medical students, interns, JMO, basic physician trainees, advanced
trainees in haematology at St George/Sutherland Hospitals, provide lectures to general
practitioners, teach/examine students overseas, supervises PhD students and
postdoctoral fellows from Australia and countries overseas such as Malaysia, Jordan,
China and Japan.

PUBLICATIONS

Chong BH, Chan DK. Alpha-synuclein transmission and mitochondrial toxicity in primary
human foetal enteric neurons in vitro. Neurotox Res. 2014 Feb;25 (2):170-82. PMID:
24026637

2. Carter DR, Buckle AD, Tanaka K, Perdomo J, Chong BH. Art27 Interacts with GATA4, FOG2
and NKX2.5 and Is a Novel Co-Repressor of Cardiac Genes. PLoS One. 2014 Apr 17; 9

3. Jie Yu Ye, En Yu Liang, Yuan Shan Cheng, Godfrey C F Chan, Yue Ding, Fanyi
Meng, Margaret H L Ng, Beng H Chong, Qizhou Lian, Mo Yang. Serotonin
enhances megakaryopoiesis and proplatelet formation via p-Erk1/2 and F-actin

4. GJ Maghzal, S Winter, B Wurzer, BH Chong, R Holmdahl, R Stocker. Tryptophan
514(7523): E16-17. PMID: 25341792

5. K Boonyawat, P Angchaisuksiri, K Aryurachai, S Chaiyaroj, Z Ahmadi3, BH Chong.
Low Prevalence of Heparin- induced Thrombocytopenia after Cardiac Surgery in Thai


## RESEARCH GRANTS/FUNDING

<table>
<thead>
<tr>
<th>TITLE / INVESTIGATORS</th>
<th>SOURCE</th>
<th>PERIOD</th>
<th>FUNDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novel mechanism, molecular targets and therapies in cardiovascular diseases. L Kachigian, R Stocker, C Parish, BH Chong, APP1052616</td>
<td>Program Grant</td>
<td>NHMRC</td>
<td>Jan 2015-Dec 2020</td>
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<tr>
<td>Heparin-induced thrombocytopenia (HIT): Further characterization of disease mechanism BH Chong APP1109745</td>
<td>Project Grant</td>
<td>NHMRC</td>
<td>Jan 2016-Dec 2018</td>
</tr>
<tr>
<td>Heparin-induced thrombocytopenia and thrombosis: Better understanding of pathogenesis and improving diagnosis and treatment. RM09942 APP1028803 BH Chong, C Parish</td>
<td>Project Grant</td>
<td>NHMRC</td>
<td>Jan 2012-Dec 2014</td>
</tr>
<tr>
<td>Development of a novel anti-platelet and anti-anticoagulant bifunctional molecule for targeted treatment of coronary artery disease. Chong BH</td>
<td>St George Sutherland Medical Research Foundation</td>
<td>2014-2015</td>
<td>$50,000.00</td>
</tr>
<tr>
<td><strong>Engagement with Industry</strong></td>
<td></td>
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</tr>
<tr>
<td>A global, observational, non-interventional study collecting effectiveness, safety and quality of life data on patients with Paroxysmal Nocturnal Haemoglobinuria (PNH) Disease, BH Chong</td>
<td>Alexion</td>
<td>2010-2015</td>
<td>Total: $49,590.00</td>
</tr>
<tr>
<td>International ITP Registry: A Multi-centre, prospective disease registry for adults diagnosed with primary immune thrombocytopenia purpura (ITP) Asia-Pacific, Middle Eastern and S American countries, BH Chong</td>
<td>Chong BH: Chair, Steering Committee. Unrestricted grant from GSK</td>
<td>20121-2021</td>
<td>$1,232,697.00</td>
</tr>
</tbody>
</table>
TRC 117146 is a randomised, single blinded, placebo-controlled, dose finding study to assess the PK interaction, safety and efficacy of the oral thrombopoietin receptor agonist, eltrombopag, administered to subjects with Acute Myelogenous Leukaemia (AML) receiving induction chemotherapy.

<table>
<thead>
<tr>
<th>Study Description</th>
<th>Sponsor</th>
<th>Year</th>
<th>Funding</th>
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<tbody>
<tr>
<td>Reduced-dosed rivaroxaban and standard-dosed rivaroxaban versus ASA in the long term prevention of recurrent symptomatic venous thromboembolism in patients with symptomatic deep-vein thrombosis and/or pulmonary embolism The Einstein Choice Study</td>
<td>Bayer</td>
<td>2015-2016</td>
<td>$27,845 plus Additional funding in 2016</td>
</tr>
<tr>
<td>A Randomized, Double-blind, Placebo-controlled Study of the JAK Inhibitor INCB018424 Tablets Administered Orally to Subjects With Primary Myelofibrosis, Post-Polycythemia Vera Myelofibrosis or Post-Essential Thrombocythemia Myelofibrosis, BH Chong</td>
<td>Incyte Corporation</td>
<td>2010-2016</td>
<td>Total: $68,685</td>
</tr>
<tr>
<td>A global, observational, non-interventional study collecting effectiveness, safety and quality of life data on patients with Paroxysmal Nocturnal Haemoglobinuria (PNH) Disease, BH Chong</td>
<td>Alexion</td>
<td>2010-2016</td>
<td>Total: $49,590.00</td>
</tr>
<tr>
<td>A Phase 3, Multi-Center, (i) Randomized, Double-Blind, Placebo-Controlled, Study and (ii) extension trial of Fostamatinib Disodium in the Treatment of Persistent/Chronic Immune Thrombocytopenic Purpura.</td>
<td>Rigel</td>
<td>2015-16</td>
<td>Total: $32,450</td>
</tr>
</tbody>
</table>
An Open-Label, Multiple Simon 2-Stage Study of INCB039110 Administered Orally to Subjects With Primary Myelofibrosis (PMF), Post Polycythemia Vera-Myelofibrosis (PPV-MF) or Post Essential Thrombocythemia-Myelofibrosis (PET-MF)  

| Incyte Corporation | 2015-016 | $9,900.00 |
Immunology

INTRODUCTION
The immune system helps to control and regulate the body’s defence against infections and tumours. Failure of this system leads to diseases such as immune deficiencies, recurrent infections, allergies, autoimmune diseases and tumours. Normal function of the immune system is critical to the control of such diseases. Immunopathology is the branch of pathology that deals with diagnostic tests that aid in the evaluation and diagnosis of a large variety of diseases that affect the immune system including immunodeficiencies, such as those the results of viral infection such as HIV, autoimmune diseases, such as rheumatoid arthritis and SLE, severe infections, such as tuberculosis, and a large variety of tumours. The immunology laboratory provides a diagnostic service that facilitates the diagnosis not only of immune diseases but also a large variety of other diseases that can affect any of the body’s organ systems.

Immunopathologists are usually trained in both internal medicine as physicians and also as a pathologists. They provide both clinical and diagnostic services to the local health District Hospitals. In SEALS the immunopathology service is located at the Sutherland Centre for immunology under the directorship of Professor Denis Wakefield. Senior staff members of the Centre also have University appointments to the University of New South Wales. There is close integration of the diagnostic services research and teaching within SEALS and particularly within the Centre for immunology.

The Centre for immunology has been actively engaged in the provision of diagnostic services, consultation, training and research. 2015 has been a busy period of time with the introduction of new tests, refinement and consolidation of other diagnostic tests and procedure and introduction of new equipment and technology.
RESEARCH
The major research interest of staff within the SCI has been in the immunology and immunopathology of inflammatory eye disease. There is also a major interest in corneal disease, particularly corneal stem cells and in corneal transplantation. Studies from the staff at SCI have led to major clinical advances in our knowledge of the immunopathogenesis and treatment of inflammatory eye disease. This research has been funded by NHMRC and other grants.

EDUCATION
There is a major emphasis on education of medical and scientific staff within SCI and the broader hospital community. The regular lectures to the registrars studying for the RACP and RCPA. Members of the staff are also engaged in high degrees in both Masters and Ph.D. research programs.

GRANTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Grant Source</th>
<th>Grant Title</th>
<th>Funds</th>
</tr>
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<tbody>
<tr>
<td>2012-2015</td>
<td>NH&amp;MRC Project Grant Clinical Investigator APP1024723</td>
<td>A nanomedicine strategy for detecting and modulating protease activity in vivo.</td>
<td>$439,525</td>
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<tr>
<td>2014-2016</td>
<td>NH&amp;MRC Project Grant Clinical Investigator APP1067749</td>
<td>An ocular thin film adhesive with local drug delivery capabilities.</td>
<td>$358,477</td>
</tr>
<tr>
<td>2014-2016</td>
<td>NH&amp;MRC Clinical Investigator RG132923 APP1067749</td>
<td>Development of an ocular adhesive film with local drug delivery to prevent infection and inflammation in corneal wounds.</td>
<td>$52,122</td>
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<tr>
<td>2014</td>
<td>UNSW Goldstar Award</td>
<td>Improved identification and cultivation of human corneal stem cells</td>
<td>$40,000</td>
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<tr>
<td>Year</td>
<td>Grant Source</td>
<td>Grant Title</td>
<td>Funds</td>
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<tr>
<td>2012-2016</td>
<td>Scheme Contract Research Funding Agency JAF UNSW Grant No RG</td>
<td>Uveitis Research</td>
<td>$250,000</td>
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<tr>
<td>2015-2016</td>
<td>Kylaco Pty Ltd UNSW Grant No RG142992</td>
<td>Spondyarthropathies (spas) peptide vaccine</td>
<td>$145,000</td>
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<tr>
<td>2015-2016</td>
<td>Kylaco Pty Ltd UNSW Grant No RG142992</td>
<td>Spondyarthropathies (spas) peptide vaccine.</td>
<td>$145,000</td>
</tr>
<tr>
<td>2016-2019</td>
<td>NHMRC (APP1104136)</td>
<td>Creating sustainable healthcare: ensuring new diagnostics avoid harms, improve outcomes and direct resources wisely.</td>
<td>$2,497,658</td>
</tr>
</tbody>
</table>

**Engagement with Industry**

<table>
<thead>
<tr>
<th>Year</th>
<th>Grant Source</th>
<th>Grant Title</th>
<th>Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015-2016</td>
<td>Kylaco Pty Ltd UNSW Grant No RG142992</td>
<td>Spondyarthropathies (spas) peptide vaccine.</td>
<td>$145,000</td>
</tr>
</tbody>
</table>

**Commercialisation of Patents**

<table>
<thead>
<tr>
<th>#</th>
<th>Patent Number</th>
<th>Description</th>
<th>Organisation</th>
<th>Authors</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2013902435</td>
<td>Diagnosis and treatment of autoimmune diseases</td>
<td>New South Innovations Pty Limited</td>
<td>Wakefield, Denis; Marcal, Helder</td>
<td>2013</td>
</tr>
</tbody>
</table>
PUBLICATIONS


Microbiology

INTRODUCTION
The 2015 World Health Assembly endorsed a Global Action Plan to tackle antimicrobial resistance (AMR) which is identified as global threat to public health security.

The Global Action Plan 5 objectives:

1. improve awareness and understanding of antimicrobial resistance;
2. strengthen surveillance and research;
3. reduce the incidence of infection;
4. optimize the use of antimicrobial medicines;
5. ensure sustainable investment in countering antimicrobial resistance.

By May 2017, a national action plan on antimicrobial resistance that is aligned with the global action plan is to be in place for all Member States which will encompass antibiotic use in animal health, agriculture, and human health.

In Australia the Australian Antibiotic Resistance Standing Committee (AMRSC) produced the National Surveillance and Reporting of Antimicrobial Resistance and Antibiotic Usage for Human Health in Australia, which in line with the WHO GAP, recommendations enhanced surveillance of antimicrobial resistance and antimicrobial usage (AU) be developed as a national priority. In the Microbiology diagnostic laboratory reporting our role includes the provision of diagnostic services; consultation; training and research; provide diagnostic and clinical advice and support to the hospitals and clinics we serve; provide infection control advice, public health liaison; critical antimicrobial resistances alerts (CARAlerts); providing reference level confirmation for resistance in Neisseria gonorrhoeae.
At SEALS Division of Bacteriology and World Health Organisation Collaborating Centre for STD, Sydney we are a CARAlert reporting laboratory, and have been working with the AURA team. We are the coordinating laboratory for the National Neisseria Network Laboratory Surveillance Programmes: The Australian Gonococcal Surveillance Programme and the Australian Meningococcal Surveillance Programmes.

**RESEARCH AND SURVEILLANCE**
The major research interests of staff within the WHO CC is antimicrobial resistance and surveillance coordination in Australia; and the Asia Pacific Regions for the WHO for gonococcal AMR in particular. Through research studies the WHO CC group have worked in collaboration to undertake national and jurisdictional genotypic studies of prevalent NG strains and to develop and implement molecular assays to detect AMR. The WHO CC has provided technical advice to the WHO Geneva on surveillance strategies for AMR. Studies from the staff at WHO CC have led to major clinical advances in the detection of AMR using molecular studies which, in a world first molecular NG AMR Surveillance for penicillin resistance in remote Australia.

There is also a major interest in perinatal infection prevention in South East Asia through evidence based clinical interventions. This research has been funded by NHMRC and other grants.

**EDUCATION**
There is a major emphasis on education of medical and scientific staff within Bacteriology and the WHO CC and the broader hospital community. We provide training and support for diagnostic scientists and our 5 registrars are studying for the RACP and RCPA. Members of the staff are also engaged in higher degrees in M.Sc and Ph.D. research programs.
RESEARCH GRANTS

<table>
<thead>
<tr>
<th>GRANT</th>
<th>DESCRIPTION</th>
<th>FUNDING</th>
</tr>
</thead>
</table>
| 2012-2014 NHMRC PROJECT GRANT (APP1025517) | **NEISSERIA GONORRHOEAE**
|                              | **ANTIMICROBIAL RESISTANCE: DETECTION AND PROPAGATION. GRAND STUDY**          | $ 419 990 |
| 2011-2016 NHMRC Project Grant (APP1004005) | **SEA URCHIN**
|                              | **South East Asia - Using Research for Change in Hospital Acquired Infection in Neonates** | $ 2 179 916 |

PUBLICATIONS


Serology and Virology

NEW STAFF (SENIOR)
Dr Zin Naing, Senior Hospital Scientist

MAJOR RESEARCH ACTIVITIES
• Students – completions

PhD

<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zin Naing</td>
<td>CMV genetic variation &amp; host immune response</td>
</tr>
<tr>
<td>Stuart Hamilton</td>
<td>CMV &amp; adverse outcomes of pregnancy</td>
</tr>
<tr>
<td>Nusrat Homaira</td>
<td>Respiratory Syncytial Virus in neonates</td>
</tr>
</tbody>
</table>

Integrated Learning Projects
Anju Roy, Katerina Papadakis, Jay Zheng
Honours
Monica Majumder
Sonia Isaacs

NEW MAJOR RESEARCH EQUIPMENT
Stratagene Thermal cycler (Innovations Australia Grant)
Synthecon 3D Rotary Cell Culture System (Rebecca Cooper Grant)
Lab Chip (Rebecca Cooper Grant from 2014)

CURRENT GRANTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Grant Source</th>
<th>Grant Title</th>
<th>Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-2016</td>
<td>NHMRC Project Grant</td>
<td>Grant Improved treatment of congenital cytomegalovirus disease through study of placental models of pathogenesis</td>
<td>$700,000</td>
</tr>
<tr>
<td>2014-2016</td>
<td>NHMRC Project Grant</td>
<td>Is lactic acid concentration in amniotic fluid a new predictor of labour dystocia?</td>
<td>$900,000</td>
</tr>
<tr>
<td>2016-2021</td>
<td>NHMRC CRE</td>
<td>Integrated System for Epidemic Response</td>
<td>$2.5M</td>
</tr>
<tr>
<td>2016</td>
<td>UNSW Goldstar for NHMRC Project</td>
<td>Human Cytomegalovirus-Induced Modulation of Wnt Signalling as a Significant Contributor to congenital Disease – novel inhibitors as potential therapies for congenital CMV</td>
<td>$40,000</td>
</tr>
<tr>
<td>2012-2017</td>
<td>Practitioner Fellowship</td>
<td>Translation of viral pathogenesis studies with cytomegalovirus to patient care</td>
<td>$300,000</td>
</tr>
<tr>
<td></td>
<td>JDRF/Helmsley Trust Cooper,</td>
<td>ENDIA Environmental Determinants of Islet Autoimmunity,</td>
<td>$8M</td>
</tr>
</tbody>
</table>
CONFERENCES ORGANISED AND GUEST PRESENTATIONS

Conference Organiser – Viruses in May 2015 (100 attendees)
- 5th International Congenital CMV Conference and 15th International CMV/Betaherpesvirus Workshop at the Brisbane Convention and Exhibition Centre (250 attendees)
- Inaugural Consensus Guidelines Workshop on congenital CMV
- Virology Research Laboratory 10 year celebration (100 attendees)

Plenary speaker – Australian Virology Society Annual meeting
- 5th International Congenital CMV Conference
- Diasorin Annual Teaching Symposium
- National Serology Laboratory Annual Workship
- IPIXITA (International Xenotransplantation Association) Annual International meeting
- NSW Ministry of Health
- Royal Hospital for Women Perinatal Meeting
- St George Hospital Gastroenterology grand rounds

PUBLICATIONS


Contact Information

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Sutherland Centre for Immunology

Email: denis.wakefield@health.nsw.gov.au