

SIGHT MATTERS

Annual Report **FY2016/2017**

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ABOUT US

Established in 1997, the Singapore Eye Research Institute (SERI) is Singapore's national research institute for ophthalmic and vision research. It is the research arm of the Singapore National Eye Centre, and affiliated to the National University of Singapore and the Duke-NUS Medical School. In two decades, SERI has grown from a team of 5 to over 220 staff, encompassing clinician scientists, scientists, fellows, students, support staff, as well as more than 100 distinguished adjunct faculty members to become the largest eye research institute in the Asia-Pacific region. As of Dec 2016, SERI has published 2,782 peer-reviewed papers supported by \$222 million in competitive research grants. SERI has trained more than 150 current and past graduate students; and has been conferred over 408 national & international awards and 120 patents. SERI further undertakes eye research in collaboration with local & international ophthalmic medical centres and research institutions, which has ensured a high level of research competency & skills transfer. Notably, SERI's research has translated to actual patient success stories & significant improvements in eye care delivery. Today, SERI is recognized as a pioneering center for high quality eye research in Asia, with breakthrough discoveries that has translated to significant paradigm shift in eye care delivery.

CHAIRMAN'S MESSAGE



We record another year of remarkable achievements by SERI this year. Our scientific publications has reached historical high, hitting 307 publications. Our faculties have received numerous awards locally and internationally.

This year also marks the end of the SERI's MASTER-2 Centre Grant (CG) under RIE2015. MASTER-2 was designed to develop core research capabilities that support SERI's major research activities. The desired outcome was the development of fundamental knowledge and intellectual property in the field of ophthalmic and vision research, and publication of significant results that will lead to better management of eye diseases. To this end, MASTER-2 had played a critical role in augmenting SERI's Facility Cores/ Core Research Capabilities Platforms, paving the way for capacity and capability building, and directly contributing towards the following list of significant achievements over the last 5 years:

No. of STAR awards	3
No. of CSA awards	4
No. of Transition awards	6
No. of MD-PhD or PhD currently employed	50
No. of PhD students trained and graduated	13
No. of publications in peer-reviewed journals with JIF ≥ 5	162
No. of publications in peer-reviewed journals with $0 < \text{JIF} < 5$	614
No. of technical disclosure	27
No. of patents granted	8
#No. of Individuals (PI) holding peer-reviewed national/international-level grants (Refer to Annex A)	44
Total amount/quantum of competitive research grants as PI	\$79.216Mil
*Amount of Industry Funding (cash)	\$6.783Mil
#Amount of Industry Funding (in-kind)	\$384,475.76
No. of Licenses	7

The achievement by SERI under MASTER-2 centre grant was also affirmed by the Centre Grant Scientific Advisory Board (CG-SAB), who noted that *"Overall good evidence that the cores have contributed significantly as intended. Increased activity as a consequence"* and *"Good case put forward that development and productivity has been enhanced and several international collaborations developed"*.

Our newly proposed INCEPTOR CG will build on the success of our existing and outgoing MASTER 2 CG, and aim to sustain, optimize and further augment the centralized Facility Core/ Core Research Capabilities Platforms and shared resources in the our areas of research . Our aim is to move towards developing an even stronger and robust network of shared resource platforms that will advance transdisciplinary research productivity and translational outcomes, that directly leads to health and economic value creation.

Professor Wong Tien Yin
Chairman

EXECUTIVE DIRECTOR'S MESSAGE



I want to congratulate again our faculty on being recognized for their contribution to the institution and scientific community, and being conferred with notable awards both locally and internationally.

Our genetics team published their 4th paper in prestigious Nature Genetics journal this year, with five new genes for primary Angle Closure Glaucoma (PACG) identified.

Overall, SERI has successfully secured external peer-reviewed competitive grant funding worth approximately S\$6.39 million this year, bringing the cumulative quantum we've succeeded in bringing in for ophthalmic research to approximately S\$227 million.

However, the national funding landscape in Singapore has grown increasingly competitive. The changing perspectives of the healthcare thought leadership in Singapore on the role of research in fueling healthcare innovations has resulted in more research players entering the scene as compared to ten years ago. To an extent, this has made it even more imperative for SERI to review and identify alternate sources of funding to ensure its continued financial sustainability, with key conduit identified: philanthropy.

The VisionSave campaign was conceptualized to aid us in this quest. All donations made to the fund will go towards supporting the following five causes that serve as integral drivers in our efforts to achieve positive life-changing outcomes for our patients: Financial assistance for complex, cutting-edge & novel therapies/surgeries for sight-threatening eye diseases; Public Education/ Community Outreach/ Humanitarian; Future-Focused Education; Research & Innovation; and Infrastructure/ Capacity Building.

We further recognize that our people are our biggest assets, hence have launched a new initiative "Staff Engagement in Philanthropy". The intent of this campaign is to leverage on our people, who are the bedrock of SERI's success, and galvanize all towards the propagation of a holistic and concerted fundraising initiative.

On behalf of SERI, I would like to extend our sincere appreciation for your current and future generosity towards supporting our philanthropic initiatives. With your support, we will continuously strive to innovate and translate medicine in the most cost-effective and impactful manner to ensure the best and optimal outcome for every patient.


Prof Aung Tin
Executive Director

INSTITUTIONAL REPORT

BACKGROUND

The Singapore Eye Research Institute (SERI), affiliated to the Singapore National Eye Centre, the National University of Singapore, and the Duke-NUS Medical School is a non-profit charitable organization tasked to lead and conduct research into vision and eye diseases based in Singapore and focused on Asia. It further works in collaboration with Ophthalmology departments of the various public healthcare entities and biomedical research institutions, as well as major eye centers and research institutes throughout the world. SERI has developed a world-leading reputation in broad-based clinical translational research and epidemiological programs for many eye diseases, specifically eye diseases endemic to Asia, such as myopia, angle closure glaucoma, and corneal diseases.

KEY PERFORMANCE INDICATORS

- SERI is one of the largest research institutes in Singapore and the largest eye research institute in the Asia-Pacific, with a faculty of 220, encompassing clinician scientists, scientists, fellows, students, and support staff.
- SERI has successfully secured external peer-reviewed competitive grant funding worth approximately S\$ 6.39 million this year, and a cumulative quantum of approximately S\$227 million.
- SERI continues its leading performance in publication, with 307 scientific papers published this year, and with a cumulative publication quantum of 2,782 scientific papers.
- As of December 2016, the SERI faculty has received 427 national and international awards, with 126 patent applications being filed during the same period.
- Since 1997, SERI has conducted over 1500 studies, encompassing the entire spectrum of eye research, from basic laboratory research, pre-clinical animal research, translational clinical research, and population health research. There are currently over 450 ongoing research projects at SERI, of which approximately 70% cover clinical/translational research, 12 % basic research and 18% epidemiology, imaging and health service research.
- SERI has further contributed to the training of research manpower, including over 170 Masters, PhD and post-doctoral students, many of whom are now working in hospitals, biomedical sciences industry, academic institutions and research institutes locally and overseas.

ACHIEVEMENTS & INNOVATIONS

- **Asia-Pacific Professors of Ophthalmology (AAPPO)**

The prestigious Academy of Asia-Pacific Professors of Ophthalmology (AAPPO) was founded in 2012 with the objective to assist in the academic development of ophthalmology in the Asia-Pacific region and beyond. Members are inducted into the Academy based on their eminent global standing and key thought leadership role.

SERI is very proud to announce that three of SERI's senior faculty have now been inducted as part of the Academy of Asia-Pacific Professors of Ophthalmology i.e.

- a) Prof Wong Tien Yin, Chairman, SERI
- b) Prof Aung Tin, Executive Director, SERI
- c) Prof Donald Tan, Arthur Lim Professor of Ophthalmology

- **Glaucoma Paper in Prestigious Nature Genetics Journal**

A team of SERI researchers, namely, Prof Aung Tin, Dr CC Khor and Assoc Prof Eranga Vithana published a paper on the April issue of the prestigious Nature Genetics journal. This paper spearheaded by the team was a genome-wide association study (GWAS), followed by replication in a combined total of 1 10,503 PACG cases and 29,567 controls drawn from 24 countries across Asia, Australia, Europe, North America, and South America. Five new genes for Primary Angle Closure Glaucoma (PACG) were identified, thus bringing the total number of replicated loci to eight. This would be the fourth paper to be published in Nature Genetics for this prolific team.

- **SERI Chairman Conferred The American Academy Of Ophthalmology Senior Achievement Award 2016**

The American Academy of Ophthalmology (AAO) Senior Achievement Award, symbolizes an individual's commitment to advancing the profession and positively impacting patients' eye health.

SERI Chairman, Prof Wong Tien Yin was conferred the AAO Senior Achievement Award 2016, in recognition of his eminent contributions made to the Academy, its scientific and educational programs and to global ophthalmology.

- **SERI Executive Director Conferred The NUS Outstanding Researcher Award 2016**

The Outstanding Researcher Award is bestowed on researchers based on their overall impact and strong research track record. The award recipient(s) must have consistently achieved research excellence over a period of time and should be recognized by the relevant academic community as having made significant breakthroughs or outstanding accomplishments.

Prof Aung Tin was conferred the Outstanding Researcher Award 2016 for his outstanding contributions to glaucoma research and treatment, and for giving hope to the thousands of people battling this "silent thief of sight".

- **SERI Faculty Wins SingHealth Excellence 2016 Awards**

The 6th SingHealth Excellence Awards was held on 20 May 2016 at the Singapore Marriott Tang Plaza Hotel. The SingHealth Excellence Awards is the highest honour for SingHealth employees who have made outstanding contributions at the Cluster level.

Prof Tin Aung was conferred the Distinguished Visionary Leader Award 2016 for his visionary efforts to elevate ophthalmic and vision research in Singapore and globally to the highest level.

Assoc Prof Jod Mehta was conferred the Distinguished Researcher Award 2016 for playing an integral role in ensuring that SERI prevailed as the top eye research institute in Asia Pacific, underpinned by the ground-breaking research being conducted by the institution.

- **Optimization Of Core Platform Technologies For Ocular Research (Inceptor)**

SERI would be submitting the renewal of its \$18 million Centre Grant application this year, as part of our efforts to further augment and sustain existing core research capabilities at SERI. This fund will facilitate the optimal utilization of SERI's core platform technologies across the research groups, as a shared resource; as well as to develop new research capabilities or core infrastructure that is relevant in supporting the central aims of the institute.

The INCEPTOR application aims to identify, augment and develop novel and innovative intervention and strategies to detect, treat and cure ocular diseases, thereby reducing the overall burden of vision loss and blindness.

INCEPTOR is designed to strategically tackle major eye diseases leveraging on multiple core Platform technologies that serve to support the entire spectrum of research ("from bedside to bench to bedside to population"). These Platforms will interact and support the 8 pre-identified Research Themes of the Centre Grant.

These themes will collectively test key hypotheses, answer major clinical questions and generate knowledge that will lead to direct and substantial beneficial impact on the management and treatment strategies for all the major eye diseases, with particular relevance to Singapore and Asia, including the following 5 major disease groups:

- 1) Glaucoma, particularly Asian glaucoma phenotypes (e.g. angle closure glaucoma).
- 2) Myopia and other refractive error.
- 3) Corneal and ocular surface disease.
- 4) Diabetic retinopathy and other retinal vascular diseases.
- 5) AMD and other degenerative ocular conditions.

PERFORMANCE OVER THE YEARS

- SERI has amassed an impressive array of publications over the years, increasing both in quantity and quality over the past several years.

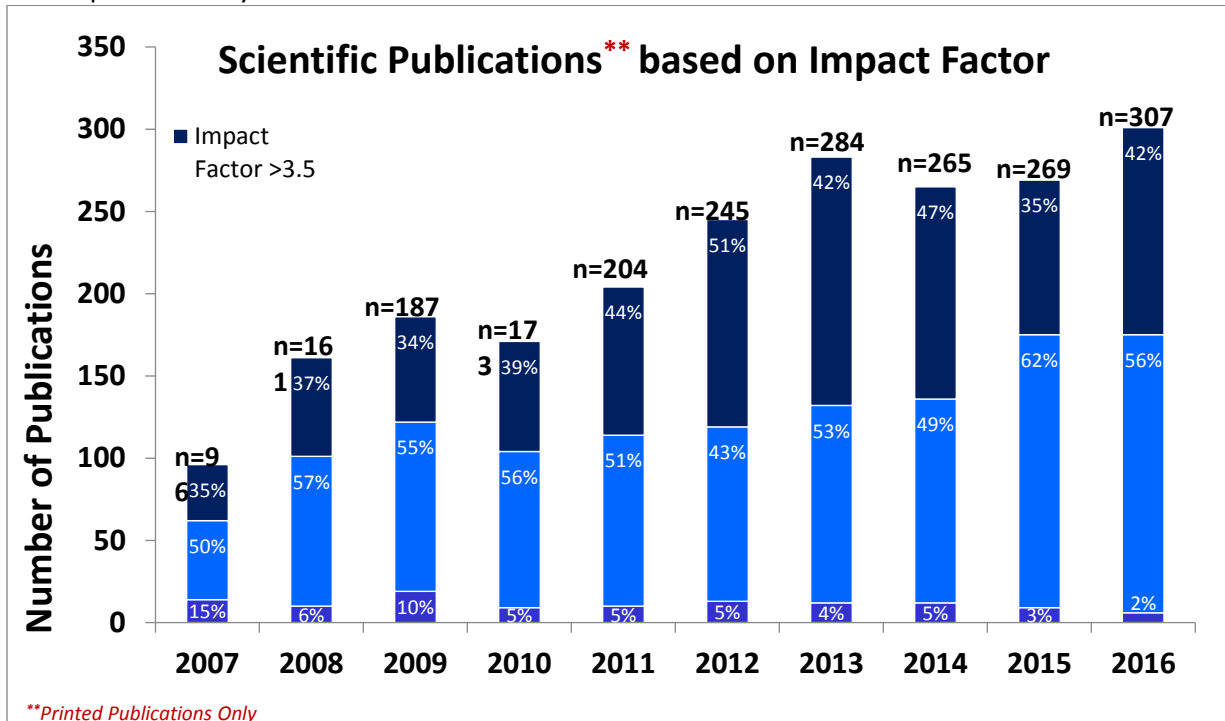


Figure 1: Number of yearly publications published at SERI

- SERI stands out as one of the most productive institutions and well holds up against global heavyweights in the field.

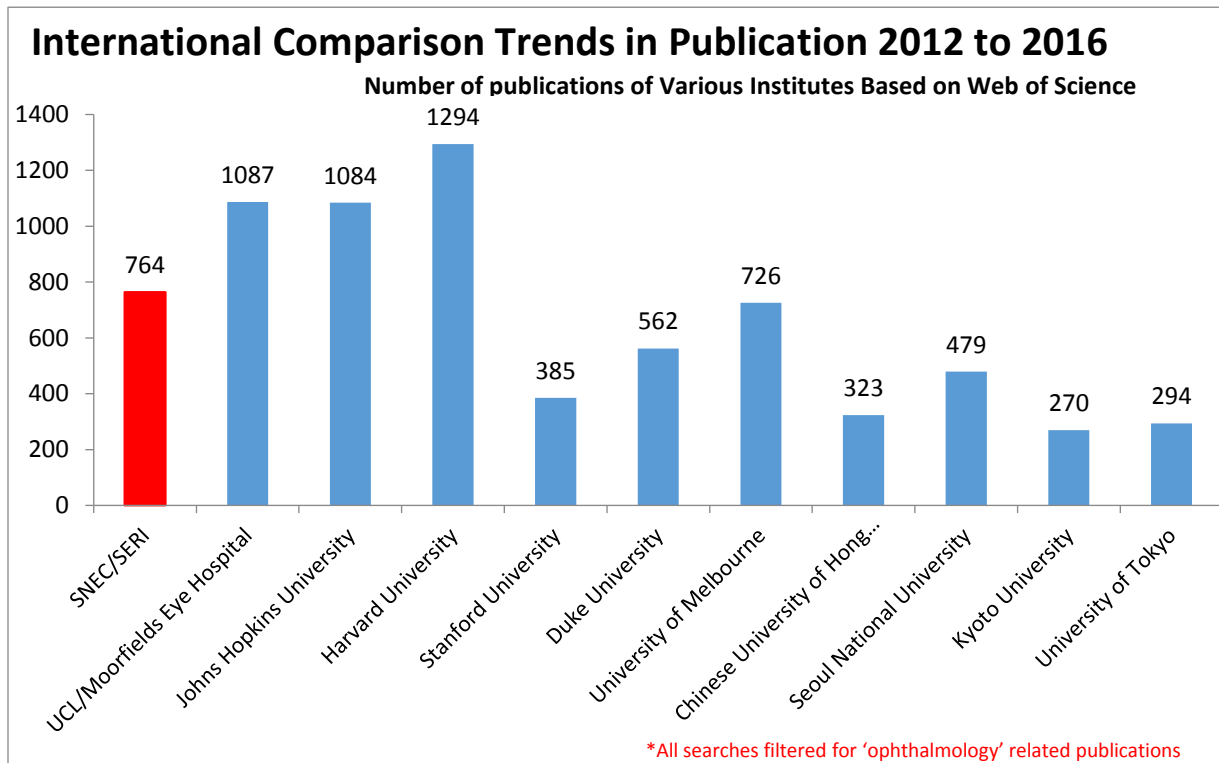


Figure 2: Number of publications by SERI and other institutions around the world, during the period of 2012 - 2016

- SERI's staff strength over the years.

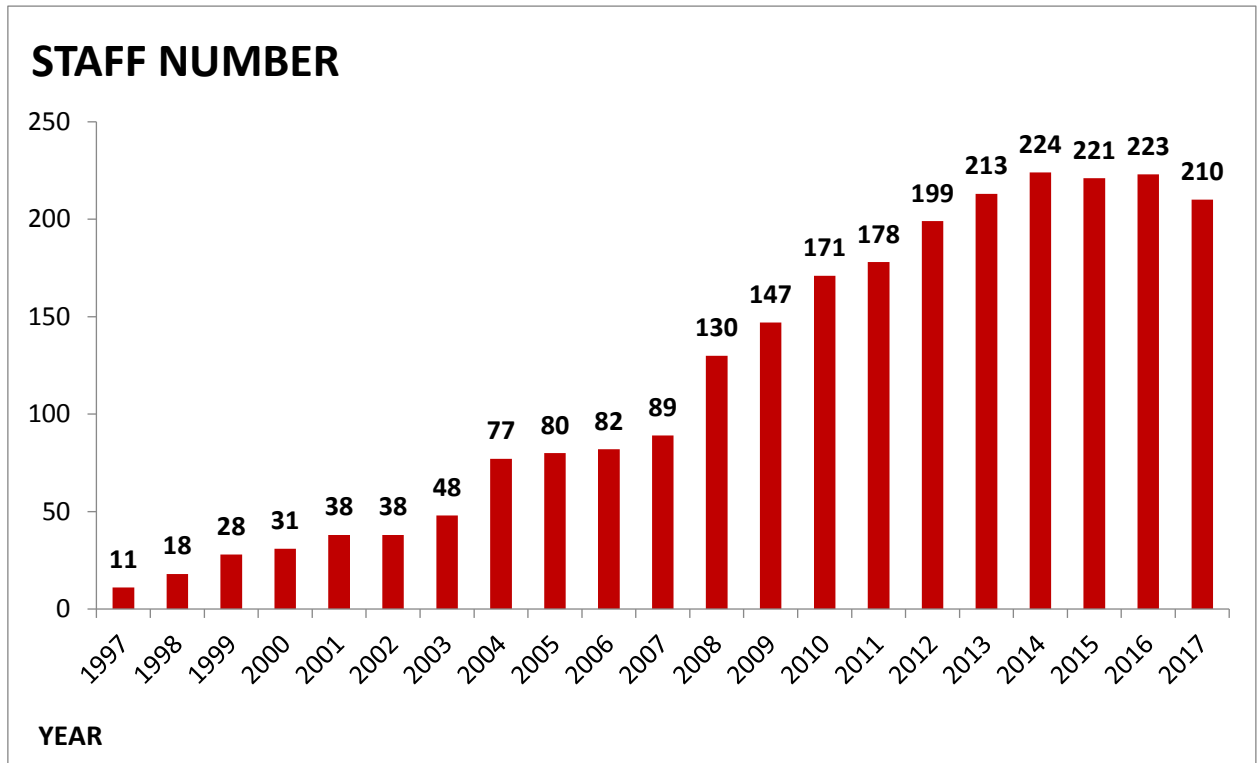


Figure 3: Number of staff members at SERI

- SERI benefits from a diverse and global faculty that serves as melting pot of ideas that propels innovation.

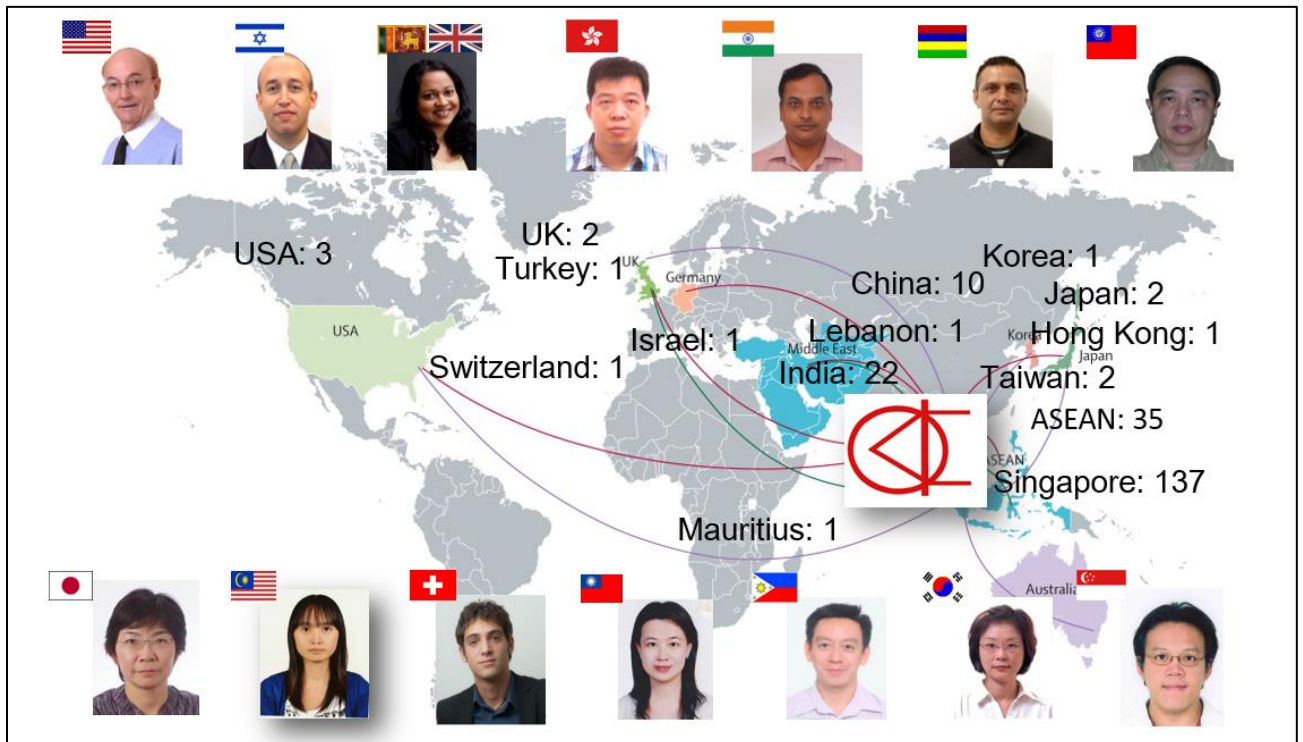


Figure 4: Nationalities of staff members at SERI

- The stellar achievements of SERI have been well endorsed with numerous international and local awards.

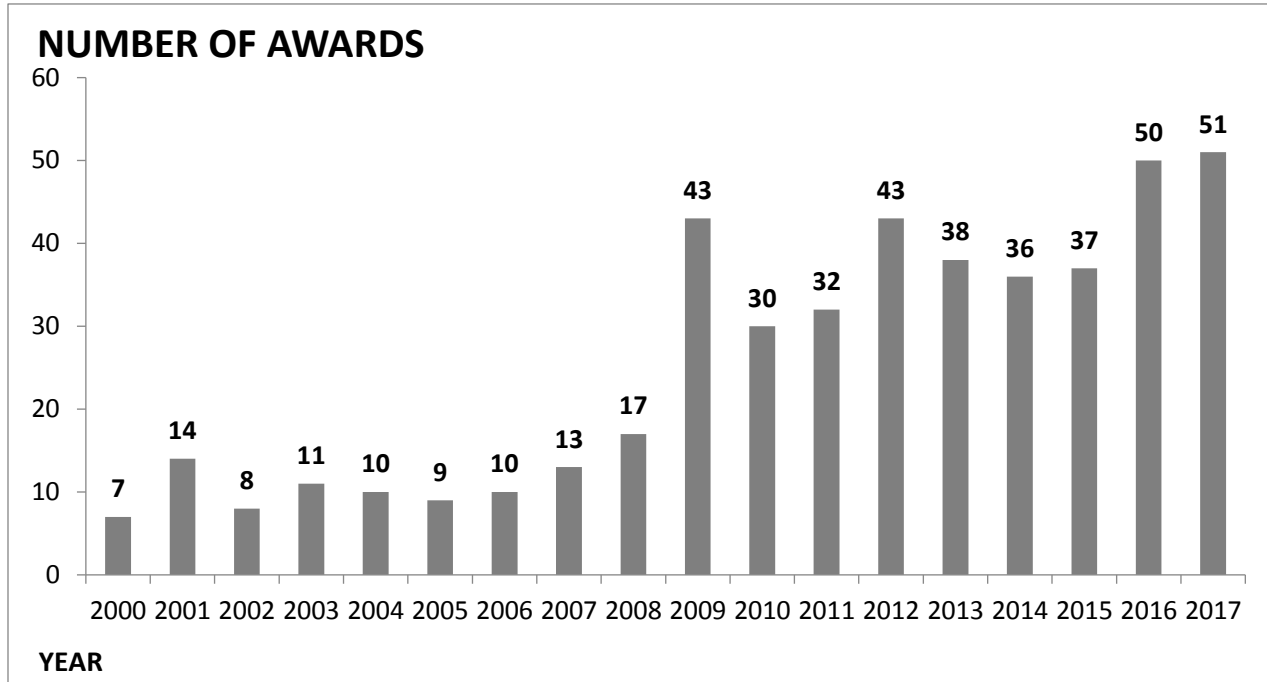


Figure 5: Number of awards received by SERI and its staff (Data from 1997-1999 are not available)

APPRECIATION & ACKNOWLEDGEMENT

SERI owes its success to its people – the honorable SERI Board of Directors, our eminent academic collaborators, the senior management, and clinicians of the Singapore National Eye Centre (SNEC), as well as, very importantly, the SERI faculty and staff members.

However, our greatest gratitude is reserved for our patients and their families. They are the driving force behind all that we do. Indeed, their journey and courage spur us on in our research endeavors and make us determined to make a positive difference to their vision and their lives.

SERI would also like to extend our appreciation to the National Medical Research Council, the Biomedical Research Council, the National Research Foundation, as well as our industry collaborators for their generous funding and support. It enables us to continue in our pursuit of impactful research with the ultimate aim to alleviate vision loss and blinding eye diseases.

OUR PEOPLE

SERI's BOARD OF DIRECTORS

SERI's Memorandum and Articles of Association stipulates that the SERI Board of Directors shall have at least one representative each from the Ministry of Health, the National University of Singapore and the Singapore National Eye Centre. Today, besides representation from the above three organizations, SERI's Board additionally has Directors from the Duke-NUS Graduate Medical School, Lee Kong Chian School of Medicine, SingHealth, National Healthcare Group as well as M C Tong Cardiothoracic Surgery Pte Ltd.



Prof Wong Tien Yin

*Medical Director,
Singapore National Eye Centre*

*Chairman,
Singapore Eye Research Institute*



Dr Lim Eng Kok

*Director, Performance & Technology Assessment,
Ministry of Health*



Prof Ang Chong Lye

*Deputy Group CEO
(Clinical Services & Informatics), SingHealth*

*CEO,
Singapore General Hospital*



Prof Soo Khee Chee

*Deputy Group CEO (Research & Education),
SingHealth*

*Director,
National Cancer Centre Singapore*



Assoc Prof Yeoh Khay Guan

*Dean, Yong Loo Lin School of Medicine,
National University of Singapore*



Ms Ooi Chee Kar

Chartered Accountant (Singapore)



Dr Geh Min

*Consultant Eye Surgeon,
M C Tong Cardiothoracic Surgery Pte Ltd*



Prof Thomas Coffman

*Dean
Duke-NUS Medical School*



Prof Wang Linfa

*Program Director,
Emerging Infectious Diseases
Duke-NUS Medical School*



Prof James Best

*Dean,
Lee Kong Chian School of Medicine*



Prof Lim Tock Han

*Deputy Group CEO (Education & Research),
National Healthcare Group*

*Senior Consultant,
NHG Institute,
Tan Tock Seng Hospital*

SERI's DIRECTORS / STRATEGIC PLANNING COMMITTEE

The SERI Directors/ Strategic Planning Committee serves as the highest governing body at SERI, working closely with the Executive Director, SERI to ensure the overall stewardship of the Institute; leading and promoting research within the Institute; ensuring sufficient funding to ensure its future viability; safeguarding overall governance and integrity of the Institute; and proactively increasing the visibility and broadening of research collaborations with national and international agencies.



Prof Aung Tin
Executive Director



Assoc Prof Jodhbir Mehta
Director, Clinical Translational Research



Prof Roger Beuerman
Senior Scientific Director



Prof Ecosse Lamoureux
Director, Population Health



Ms Sharmila Kannan
*Director, Administration,
Research Affairs & Support Services*



Dr Danny Belkin
*Director, Technology Development
& Commercialization*



Assoc Prof Eranga Vithana
Director, Laboratory Translational Research

SERI'S MANAGEMENT COMMITTEE

The SERI Management Committee serves as a principle body actively engaged in the review and implementation of SERI's research policies and strategies. It further plays an integral role in conceptualizing SERI's research framework, in consultation with the SERI Senior Leadership, as the Institute moves onwards to face new challenges in its strive for continued research excellence.



Prof Aung Tin
Executive Director



Prof Wong Tien Yin
*Medical Director,
Singapore National Eye Centre*

*Chairman,
Singapore Eye Research Institute*



Prof Roger Beuerman
Senior Scientific Director



Sis Peck Chye Fong
Deputy Director, Research Clinic



Ms Sharmila Kannan
*Director, Administration,
Research Affairs & Support Services*



Ms Charity Wai
*Chief Operating Officer,
SNEC*



Assoc Prof Eranga Vithana
Director, Laboratory Translational Research



Assoc Prof Tina Wong
*Head, Ocular Therapeutics and
Drug Delivery Research Group*



Assoc Prof Jodhbir Mehta
Director, Clinical Translational Research



Assoc Prof Louis Tong
Head, Ocular Surface Research Group



Prof Ecosse Lamoureux
Director, Population Health



Prof Saw Seang Mei
Co-Head, Myopia Research Group

SERI's MANAGEMENT COMMITTEE *(continued)*



Dr Danny Belkin
*Director, Technology Development
& Commercialization*



Adj Assoc Prof Audrey Chia
Co-Head, Myopia Research Group



Assoc Prof Cheng Ching-Yu
Head, Ocular Epidemiology Research Group



Dr Amutha Barathi
*Head, Translational Pre-Clinical Model
Platform*



Assoc Prof Gemmy Cheung
Head, Retina Research Group



Dr Zhou Lei
Head, Proteomics Research Platform



Dr Michael Girard
*Co-Head, Bioengineering & Devices Research
Group*



Dr Rajkumar Patil
Principal Research Scientist



Prof Dan Milea
Head, Visual Neuroscience Research Group



Dr Seet Li Fong
*Assistant Director, Laboratory
Translational Research*



Prof Chee Soon Phaik
Head, Cataract Research Group



Dr Gary Yam
*Head, Experimental Microscopy
Platform*



Prof Leopold Schmetterer
Head, Ocular Imaging Research Group

SNEC's RESEARCH COMMITTEE

Terms of reference:

- Plays a pivotal role in the review of research budgets, as well as the evaluation and endorsement of the appropriateness of research projects, including the scientific merit of such projects.
- Oversight over the review/ approval of the SNEC HREF grants for research projects.
- Provides directions for the development of SERI's translational and clinical research capabilities.



Prof Aung Tin
Executive Director
SERI

Deputy Medical Director (Research), SNEC
Senior Consultant, Glaucoma Dept, SNEC



Assoc Prof Tina Wong
Head & Senior Consultant, Glaucoma Dept,
SNEC

Head, Ocular Therapeutics and Drug Delivery
Research Group, SERI



Adj Assoc Prof Lee Shu Yen
Deputy Head & Senior Consultant,
Surgical Retina Dept, SNEC



Assoc Prof Jodhbir Mehta
Head & Senior Consultant (Research), Cornea &
External Eye Disease Dept, SNEC

Director, Clinical Translational Research, SERI



Adj Assoc Prof Sharon Tow
Head and Senior Consultant,
Neuro-Ophthalmology Dept, SNEC



Assoc Prof Gemmy Cheung
Deputy Head & Senior Consultant, Medical
Retina Dept, SNEC

Head, Retina Research Group, SERI



Adj Assoc Prof Audrey Chia
Head and Senior Consultant, Paediatric
Ophthalmology & Strabismus Dept, SNEC



Prof Dan Milea
Senior Clinician, Neuro-Ophthalmology Dept,
SNEC

Head, Visual Neuroscience Research Group,
SERI



Adj Assoc Prof Shamira Perera
Senior Consultant, Glaucoma Dept, SNEC

Co-Head, Bioengineering & Devices Research
Group, SERI



Dr Sunny Shen
Head & Senior Consultant, Oculoplastic Dept,
SNEC



Assoc Prof Louis Tong
Senior Consultant, Cornea & External Eye Disease
Dept, SNEC



Dr Desmond Quek
Consultant, Glaucoma Dept, SNEC

Head, Ocular Surface Research Group, , SERI

TEACHING & TRAINING

SERI has been actively hosting research seminars, courses and talks which serve as a platform for information transfer and idea sharing, as well as networking conduit between the internal and external research communities. Besides serving as a fertile platform for the incubation of research ideas and generation of collaborative initiatives between the SERI faculty and external academics/ researchers, these activities further promote research-related talent development within SERI that is high value-added and knowledge-based.

The talks presented via these channels at SERI offer discourse on scientific ideas and discoveries in ophthalmology and vision research, as well as in other biomedical disciplines, including bioengineering, genomics, tissue engineering, stem cell therapy and therapeutics, etc.; blending clinical, epidemiological, translational and basic approaches within specific disciplines. These seminars have certainly led to the launch of many new projects and successful collaborative partnership between SERI and local as well as international academic/ research entities.

This initiative serves as an ideal teaching platform for our junior faculty, paving the way for immense synergies as they work together to tackle emerging challenges in the field of ophthalmology.

DATE	TOPIC	SPEAKER
18 May 2016	Do Ethnic Differences In Dietary Consumption Link To Ethnic Differences In Age-Related Macular Degeneration Prevalence?	Prof Jie Jin Wang <i>Duke NUS</i>
1 July 2016	Use Of Next-Generation Sequencing In The Investigation And Diagnosis Of Mendelian Inherited Diseases	Dr Richard Allcock <i>Pathwest/UWA Translational Cancer Pathology Laboratory, University of Western Australia, Perth</i>
24 Aug 2016	Intellectual Property Protection & Commercialization: Putting Patents To Work	<i>Dr Andrew Serafini Kilpatrick Townsend & Stockton LLP</i>
28 Sep 2016	A public health approach to the prevention of myopia	Professor Kathryn Rose <i>Graduate School of Health, University of Technology Sydney</i>
28 Sep 2016	An integrated approach to preventing pathological myopia	Dr Ian Morgan <i>Australian National University</i>
5 Oct 2016	Anti-vascular endothelial growth factor therapy	Dr. Thomas Hohman <i>Translational Medicine and Retinal Drug Discovery Research at Allergan</i>
14 Oct 2016	Rethinking Diagnostics: NGS of immune repertoire for Biomarker Discoveries	Dr. Jian Han <i>HudsonAlpha Institute for Biotechnology</i>
2 Nov 2016	Application of SRCD in lifescience research	Dr Rohanah Hussain <i>Circular Dichroism Beamline</i>
14 Dec 2016	Licensing Patents and Trade Secrets: Legal Issues and Recent Developments	Dr Andrew Serafini <i>Kilpatrick Townsend & Stockton LLP</i>

20 Jan 2017	NGM282, candidate for NASH(non-alcoholic steatohepatitis) and cholestatic liver diseases	Dr. Luo Jian <i>NGM biopharmaceuticals, South San Francisco</i>
8 Mar 2017	Seeing Isn't Believing: Spatial Accuracy in OCT	Dr Anthony Kuo <i>Ophthalmology and Biomedical Engineering, Duke University</i>
13 Mar 2017	The Essence of Entrepreneurship	Mr Ramgopal Rao <i>LensGen & 2CTech</i>
23 Mar 2017	Artificial Intelligence in Ophthalmology	Prof He Mingguang <i>University of Melbourne and Centre for Eye Research Australia</i>

OUR COLLABORATIONS

Local Institution

- Bioinformatics Institute
- Biomedical Sciences Institutes (BMSI)
- Bioprocessing Technology Institute
- Changi General Hospital (Department of Ophthalmology)
- Citymed Health Associates Pte Ltd
- Community Eye Clinic
- Defense Medical & Environmental Research Institute
- DSO National Laboratories
- Duke-NUS Medical School
- Experimental Therapeutics Centre
- Genome Institute of Singapore (GIS)
- Institute for Infocomm Research
- Institute of Bio-Nanotechnology
- Institute of High Performance Computing
- Institute of Materials Research and Engineering
- Institute of Medical Biology (IMB)
- Institute of Microelectronics (IME)
- Institute of Molecular and Cell Biology (IMCB)
- Khoo Teck Puat Hospital
- KK Women's and Children's Hospital (Department of Ophthalmology)
- Lions Home for the Elders
- Ministry of Health Holdings (MOHH)
- Nanyang Polytechnic
- Nanyang Technological University
- National Cancer Centre (NCC)
- National Healthcare Group Polyclinics
- National Heart Centre (NHC)
- National Neuroscience Institute (NNI)
- National University Health Systems
- National University Hospital
- National University Singapore
- Ng Teng Fong Hospital
- Ngee Ann Polytechnic
- Novena Heart Centre
- Singapore Arm Forces
- Singapore Bioimaging Consortium (SBIC)
- Singapore Centre on Environmental Life Sciences Engineering (SCELSE)
- Singapore Chung Hwa Medical Institute
- Singapore General Hospital
- Singapore Immunology Network (SIgN)
- Singapore Institute for Clinical Sciences (SICS)
- Singapore Institute of Manufacturing Technology
- Singapore National Eye Centre
- Singapore Stem Cell Consortium
- Singapore-Stanford Biodesign
- SingHealth Polyclinics
- Tan Tock Seng Hospital

Overseas Institutions (Academic)

- Aston University, UK
- Beijing Tongren Hospital, China
- Centre for Eye Research Australia, University of Melbourne, Australia
- Centre for Vision Research, University of Sydney, Australia
- Chongqing Medical University, China
- Duke University, USA
- Erasmus University, Netherlands
- Erasmus Medical Centre, Netherlands
- Indiana University, School of Medicine and Rehabilitation Hospital, USA
- Institute for Aviation Psychology, Netherlands
- Jakarta Eye Center
- Johns Hopkins University, USA
- Lions Eye Institute, Australia
- Max Planck Institute for Evolutionary Anthropology, Germany
- Moorfields Eye Hospital, UK
- Murdoch Children's Research Institute
- Oregon Health and Science University, USA
- Rotterdam Eye Hospital, Netherlands
- Save Sight Institute, Australia
- Seoul National University Bundang Hospital, South Korea
- Siriraj Hospital, Mahidol University, Thailand
- The Chinese University of Hong Kong, Hong Kong
- The Institute of Endocrinology and Diabetes (IED), Australia
- Tri-Service General Hospital
- University College London, UK
- University of Amsterdam, Netherlands
- University of British Columbia, Canada
- University of California, USA
- University of Melbourne, Australia
- University of Miyazaki, Japan
- University of New South Wales, Australia
- University of Sydney, Australia
- University of York, UK
- Vietnam National Institute of Ophthalmology, Vietnam
- Wenzhou Medical University, China
- West Virginia University Eye Institute (School of Public Health), USA
- Wilmer Eye Institute, USA
- Zhongshan Ophthalmic Center, Sun Yat-Sen University, China

Industry Collaborations

- A. Menarini Biomarkers Singapore Pte Ltd
- AcuFocus
- Aerie Pharmaceuticals Inc
- Alcon Research Ltd
- Allergan
- Angioblast Systems Inc
- AqueSys, Inc
- Astonix Life Science (S) Pte Ltd
- AYOXXA Living Health Technologies Pte Ltd
- Bausch & Lomb
- Bayer Healthcare
- Canon
- Carl Zeiss Pte Ltd
- Ceepto Pte Ltd
- Chugai Pharmabody Research Pte Ltd
- Essilor
- Excellens
- GlaxoSmithKline
- Histoindex Pte Ltd
- HOYA Medical Singapore Pte Ltd
- I3 Precision Pte Ltd
- IMS Health Asia Pte Ltd
- INC Research UK Limited
- i-Optics
- Ivantis Inc
- KEIO-NUS CUTE Centre
- Kendle Pte Ltd
- Novartis
- Ocular Therapeutix, Inc
- Project Orbis
- Quark Pharmaceuticals Inc
- Revision Optics Inc
- Roche
- Santen Pharmaceutical
- Samsung Medical Center
- Technolas Perfect Vision
- TNR Diagnostics Pte Ltd
- Utrecht University Enceladus Pharmaceuticals
- Welch Allyn

EVENTS

INTERNATIONAL & LOCAL ACTIVITIES

SERI staff and associates participated actively in both overseas and local conferences during the year to establish links with overseas institutes, meet up with overseas collaborators and to promote and enhance SERI's presence in the international scene. Conferences / meetings participated includes:

INTERNATIONAL ACTIVITIES		
TOPIC	DATE	VENUE
The 120th Annual Meeting of the Japanese Ophthalmological Society	7-10 April 2016	Miyagi, Japan
American Society of Cataract and Refractive Surgery (ASCRS)	6-10 May 2016	New Orleans, USA
The Association for Research in Vision and Ophthalmology (ARVO)	1-5 May 2016	Seattle, USA
Filatov Memorial Lectures-2016	19-20 May 2016	Ukraine
12th European Glaucoma Society (EGS) Congress	19-22 June 2016	Prague, Czech Republic
4th International Thyroid Eye Disease (ITED) Symposium	23 June 2016	London, United Kingdom
XV International Congress of the Italian Society of Stem Cells and Ocular Surface (SICSSO)	23-25 June 2016	Caserta, Italy
Vision China	29 June - 1 July 2016	Shenzhen, China
100th Oxford Ophthalmological Congress	3-6 July 2016	Oxford, United Kingdom
International Ocular Surface Society (IOSS)	14-16 July 2016	Chiang Mai, Thailand
29th Asia-Pacific Association of Cataract and Refractive Surgeons (APACRS)	27-30 July 2016	Indonesia
2nd Chinese Myopia conference	28-31 July 2016	China
International Conference and Expo on Cataract and Optometrists Meeting	4-5 August 2016	Manchester, United Kingdom
64th Annual Conference of The Tamil Nadu Ophthalmic Association Vellore	5-7 August 2016	Chennai, India
Canberra Health Annual Research Meeting	9-12 August 2016	Australia
XII Adenovirus International Meeting	16-20 August 2016	Germany
9th International Symposium on Uveitis	18-21 August 2016	Ireland
Glaucoma Research Society 2016	31 August - 3 September 2016	Seoul, Korea
60th Brazilian Congress of Ophthalmology	3-6 September 2016	Brazil
16th EURETINA Congress	8-11 September 2016	Copenhagen, Denmark
The XXXIV Congress of the European Society of Cataract and Refractive Surgeons (ESCRS)	10-14 September 2016	Copenhagen, Denmark
49th Retina Society Meeting	14-17 September 2016	San Diego, USA
HYPERTENSION SEOUL 2016 (26th Scientific Meeting of the ISH)	24-29 September 2016	Seoul, South Korea
XXII Biennial Meeting of the International Society for Eye Research (ISER)	25-29 September 2016	Tokyo, Japan
American Academy of Ophthalmology (AAO) 2016	15-18 October 2016	Chicago, USA
The American Society of Human Genetics (ASHG) Annual Meeting	18-22 October 2016	Vancouver, Canada

11 International Diabetes Federation Western Pacific Region (IDF-WFR) Congress 2016 & 8th Scientific Meeting of the Asian Association for the Study of Diabetes (AASD)	28-30 October 2016	Taiwan
World Retina Summit 2016	3 November 2016	Kyoto, Japan
2016 Asian Forum on Modern Research of Traditional Chinese Medicines	13-15 November 2016	Nanjing, China
16th Annual Uveitis Society of India (USI) Meeting 2016	25-27 November 2016	Sri Lanka, Colombo
10th Congress of Asia Pacific Vitreo Retina Society	8-10 December 2016	Bangkok, Thailand
The 5th Asia Cornea Society Biennial Scientific Meeting	9-11 December 2016	Seoul, South Korea
5th Indo-China Ocular Inflammation Study Group (ICOISG)	11-12 December 2016	Laos
Zermatt Winter Meeting	19-22 January 2017	Switzerland
Asia-ARVO 2017	5-8 February 2017	Brisbane, Australia
3rd Asia-Australia Congress on Controversies in Ophthalmology (COPHy AA)	9-12 February 2017	Seoul, South Korea
RPC Golden Jubilee Ophthalmology Congress	10-12 March 2017	New Delhi, India
Congress of the Romanian Society of Glaucoma	23-25 March 2017	Romania
LOCAL ACTIVITIES		
TOPIC	DATE	VENUE
Singapore Health and Biomedical Congress 2016	23-24 September 2016	Singapore
NUH Eye International Congress 2016	3-6 November 2016	Singapore
9th Singapore International Chemistry Conference (SICC9)	11-14 December 2016	Singapore
32nd Asia Pacific Academy of Ophthalmology Congress (APAO)	1-5 March 2017	Singapore
The 4th International Conference on Cellular & Molecular Bioengineering (ICCMB4)	4-6 January 2017	Singapore

ACHIEVEMENTS

OUR AWARDS

Local Awards

- **NUHS Awards Ceremony : Outstanding Researcher Award** [Apr 2016]
Prof Aung Tin, SERI
- **SingHealth Excellence Awards 2016 : Distinguished Visionary Leader Award** [May 2016]
Prof Aung Tin, SERI
- **SingHealth Excellence Awards 2016 : Distinguished Researcher Award** [May 2016]
A/Prof Jod Mehta, SNEC
- **National Health IT Excellence Award 2015: IT Excellence in Providing Quality of Care** [May 2016]
"Singapore Integrated Diabetic Retinopathy Programme"
SNEC/SERI
- **SingHealth Research Grand Round: SingHealth Publish! Award (Medical Research)** [Jul 2016]
"Modification of PMMA to Improve Adhesion to Corneal Substitutes in a Synthetic Core-Skirt Keratoprosthesis"
Dr Andri Kartasasmita Riau, SERI
- **Singapore Chief Residency Programme (SCRP) : SCR P Mentoring Excellence Award** [Sep 2016]
Prof Wong Tien Yin, SNEC
- **AM•EI Golden Apple Awards 2016: Programme Innovation Award (Medical)** [Sep 2016]
"Touch Surgery Cataract Surgery Module"
Dr Shamira Perera, SNEC
- **Singhealth DUKE-NUS Scientific congress 2016: Best Poster Award- Health Services & Services Research** [Sep 2016]
Ms Amudha Aravindhan, SERI
- **Joint Research Day on Clinical Tissue Engineering and Regenerative Medicine: Young Investigator Award- 3rd Prize** [Sep 2016]
"Polyphenol Coatings - The Swiss Army Knife for the Development of Anti-Infective Films, Advanced Wound Dressings and Tissue Engineering Scaffolds"
Dr Chetna Dhand, SERI
- **PS21 ExCEL Awards 2016 : Silver award, most innovative project/policy** [Nov 2016]
SIDRP
- **2016 Asian Forum on Modern Research of Traditional Chinese Medicines (TCMs): Outstanding Oral Presentation** [Nov 2016]
"Recent advances of natural and synthetic lipopeptides as anti-infective agents"
Dr Koh Jun Jie, SERI
- **INC Research: Clinical Research Site Award** [Nov 2016]
"Safety and Efficacy of Abicipar Pegol (AGN-150998) in Patients With Neovascular Age-related Macular Degeneration"
SNEC / SERI

International Awards

- **The Association for Research in Vision and Ophthalmology 2016: ARVO Silver Fellow Award** [May 2016]
Prof Aung Tin, SERI
- **The Association for Research in Vision and Ophthalmology 2016: ARVO Travel Award** [May 2016]
Dr Tin Aung Tun, SERI
- **The Association for Research in Vision and Ophthalmology 2016: ARVO Travel Award** [May 2016]
Dr Baskaran Mani, SERI
- **The Association for Research in Vision and Ophthalmology 2016: ARVO Travel Award** [May 2016]
Dr Shi Yuan, SERI
- **ASCRS 2016 - Presbyopic Inlay Section: Best Paper Presentation of Session** [May 2016]
A/Prof Jodhbir Mehta, SNEC
- **10th World Biomaterials Congress : Trainee Award** [May 2016]
Dr Andri Kartasasmita Riau, SERI
- **3rd International Conference of Pathologic Myopia : Poster Session Award** [Oct 2016]
“Association between choroidal thickness and scleral thickness and severity of myopic macular degeneration”
Dr Wong Chee Wai, SNEC
- **American Academy of Ophthalmology 2015: Senior Achievement Award** [Oct 2016]
Prof Wong Tien Yin, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers’ Society (AAO/OPS) Meeting 2016: 1st Place, Slit lamp Photography, Keratoconus** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers’ Society (AAO/OPS) Meeting 2016: 3rd Place, Fluorescein Angiography, Polypoidal Choroidal Vasculopathy** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers’ Society (AAO/OPS) Meeting 2016: 3rd Place, Fundus Photography, Morning Glory Syndrome** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers’ Society (AAO/OPS) Meeting 2016: 1st Place, ICG Angiography, Polypoidal Choroidal Vasculopathy** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers’ Society (AAO/OPS) Meeting 2016: 2nd place, ICG Angiography, Choroidal Melanoma** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers’ Society (AAO/OPS) Meeting 2016: 2nd Place, ICG Angiography, Subretinal Fluid** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers’ Society (AAO/OPS) Meeting 2016: 2nd Place, Monochromatic Photography, Choroidal Melanoma** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers’ Society (AAO/OPS) Meeting 2016: 3rd Place, Fundus Photography, Coloboma With Retinal Detachment** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC

- **American Academy of Ophthalmology / Ophthalmic Photographers' Society (AAO/OPS) Meeting 2016: 1st Place, Corneal Endothelial Photography, Acanthamoeba Keratitis** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers' Society (AAO/OPS) Meeting 2016: 1st Place, Fundus Photography, Swollen Disc** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers' Society (AAO/OPS) Meeting 2016: Honorable Mention, Ultra-Widefield, Dislocated IOL** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers' Society (AAO/OPS) Meeting 2016: 2nd Place, External Photography, External Prosthesis** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers' Society (AAO/OPS) Meeting 2016: 3rd Place, Cross Categories, Filtration Tube** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers' Society (AAO/OPS) Meeting 2016: 2nd Place, Corneal Endothelial Photography, Keratic Precipitate** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers' Society (AAO/OPS) Meeting 2016: Honorable Mention, Fundus Photography, Bilateral Macular Coloboma** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **American Academy of Ophthalmology / Ophthalmic Photographers' Society (AAO/OPS) Meeting 2016: 1st Place, Monochromatic Photography, Optic Disc Mass** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **University of Otago: 2016 Research Group Award** [Mar 2017]
"Member of Dunedin Multidisciplinary Health and Development Research Unit (DMHDRU)"
Prof Wong Tien Yin, SNEC
- **32nd Asia-Pacific Academy of Ophthalmology (APAO) 2017: Senior Achievement Award** [Mar 2017]
Prof Wong Tien Yin, SNEC
- **32nd Asia-Pacific Academy of Ophthalmology (APAO) 2017: Jose Rizal Medal** [Mar 2017]
Prof Donald Tan, SNEC
- **32nd Asia-Pacific Academy of Ophthalmology (APAO) 2017: Achievement Award** [Mar 2017]
Prof Ecosse Lamoureux, SERI
- **32nd Asia-Pacific Academy of Ophthalmology (APAO) 2017: Achievement Award** [Mar 2017]
A/Prof Gemmy Cheung, SNEC
- **32nd Asia-Pacific Academy of Ophthalmology (APAO) 2017: Achievement Award** [Mar 2017]
Adj A/Prof Audrey Chia, SNEC
- **32nd Asia-Pacific Academy of Ophthalmology (APAO) 2017: Achievement Award** [Mar 2017]
Adj A/Prof Audrey Looi, SNEC
- **32nd Asia-Pacific Academy of Ophthalmology (APAO) 2017: Achievement Award** [Mar 2017]
Adj A/Prof Sharon Tow, SNEC
- **32nd Asia-Pacific Academy of Ophthalmology (APAO) 2017: Achievement Award** [Mar 2017]
A/Prof Ian Yeo, SNEC
- **32nd Asia-Pacific Academy of Ophthalmology (APAO) 2017: Distinguished Service Award** [Mar 2017]
Adj A/Prof Audrey Chia, SNEC
- **32nd Asia-Pacific Academy of Ophthalmology (APAO) 2017: Outstanding Service In Prevention of Blindness Award** [Mar 2017]
A/Prof Jod Mehta, SNEC

- **American Academy of Ophthalmology / Ophthalmic Photographers' Society (AAO/OPS) Meeting 2016: 1st Place, The Eye As Art, Radial Iris** [Oct 2016]
SNEC Ophthalmic Imaging Service Team, SNEC
- **Netherlands Ophthalmological Society : Donders Medal** [Mar 2017]
Prof Donald Tan, SNEC

OUR GRANTS

NMRC

- **“Antenatal Risk Factors and Offspring Cardio-Metabolic Health in Mid-Childhood”**.
Dr Queenie Li; S\$43,105.00
- **“Vitreoretinal Interface Abnormalities as detected on Optical Coherence Tomography: Epidemiology and association with Distance Vision and Health Related Quality of Life”**.
Dr Kelvin Teo; S\$184,415.00
- **“The Singapore Diabetes complications study: Closing the screening –referral uptake loop for Diabetic Retinopathy, Nephropathy, and Foot Complications”**.
Prof Ecosse Lamoureux; S\$1,471,495.36
- **“Randomized Controlled Trial of Lutein as a Novel Neuroprotective Adjunctive Therapy to Improve Visual Outcome of Rhegmatogenous Retinal Detachment (LUNAR Trial)”**.
Dr Cheung Ning; S\$375,000.00
- **“An Innovative and Patient-Centric Research Program Targeting the Ageing Singaporeans: The PREvention Of and interVentlon for eye Diseases in the Elderly [PROVIDE] programme”**.
Prof Ecosse Lamoureux; S\$1,744,274.88

A*Star/ Duke-NUS/ MOH/ Others

- **“Development of a posterior-capsule shield using robotic technology for cataract surgery (PROTECTS) device”.**
Dr Marcus Ang; S\$50,000.00
- **“A Novel Pupillometry-Based Device for Evaluating Visual Function in Ophthalmic Diseases”.**
Prof Dan Milea; S\$50,000.00
- **“To develop and validate imaging biomarkers to predict morphological and functional outcome in Asian patients with neovascular age-related macular degeneration, and to evaluate the impact of genetic polymorphisms on these imaging parameters”.**
A/Prof Gemmy Cheung; S\$100,000.00
- **“Ocular Markers of Alzheimer’s Disease: OMEGA Study”.**
Prof Wong Tien Yin; S\$100,000.00
- **“High Resolution Imaging of Irido-corneal Angle and Aqueous Outflow system in the Eye Using Bessel-Beam Light Sheet with fluorescence overlay”.**
A/Prof Baskaran Mani; S\$82,184.00
- **“Miniaturised probe for irido-corneal imaging integrated to a slit lamp”.**
A/Prof Baskaran Mani; S\$241,533.00
- **“An Empowering Smart Device App Solution for Childhood Myopia – PLANO”.**
Prof Wong Tien Yin; S\$208,000.00
- **“Development of a Intravitreal Extraction Injection Device: A Novel Diagnostic-Therapeutic Device for the Eye”.**
Dr Marcus Ang; S\$208,333.00
- **“Development of A Novel Utility Measure Using Discrete Choice Experiments to Assess the Impact of Glaucoma Treatments from the Patient’s Perspective”.**
Prof Ecosse Lamoureux; S\$448,978.00
- **“Rapid in vivo identification of corneal pathogens using a non-invasive scanner”.**
Prof Roger Beuerman; S\$250,000
- **“An advanced and empowering application solution to better monitor and manage children’s use of smart devices, with an eye health focus to prevent or reduce the progression of myopia in children worldwide”.**
Prof Wong Tien Yin; S\$30,000.00

SingHealth

- **“Optical Coherence Tomography Angiography: Evaluation of a Novel Imaging Modality in the Assessment of Corneal Vascularization”**.
Dr Marcus Ang; S\$148,414.80
- **“The use of portable Terahertz system in characterizing corneal components and in analyzing hydration profiles in different corneal conditions”**.
Dr Liu Yu Chi; S\$149,939.50
- **“An integrative framework for analysing functional genetic variants for polypoidal choroidal vasculopathy in Chinese from next generation sequencing”**.
A/Prof Yasuo Yanagi; S\$156,830.00
- **“Characterization the role of the Choroidal Vasculature in Pathologic Myopia”**.
Dr Wong Chee Wai; S\$49,976.40
- **“Ocular Biomechanics in patients with pseudoexfoliation”**.
Dr Henrietta Ho; S\$47,668.04
- **“Singapore Eye Lesion Analyzer (SELENA): A Novel Automated Imaging Technology for Diabetic Retinopathy Screening”**.
Dr Daniel Ting; S\$47,500.00
- **“Surgical removal of mechanical barriers to AAV vector delivery in a Non-Human Primate model”**.
Dr Kelvin Teo; S\$48,270.85
- **“Evaluation of a nanoparticle siSPARC delivery system as a treatment for dermal fibrosis”**.
A/Prof Tina Wong; S\$150,000.00

Commercial

- **“A randomized clinical study to evaluate CALLISTO Eye 3.5 application by comparison of standard axis centration vs. CALLISTO Eye 3.5 guided centration in subject eyes indicated for standard toric cataract surgery”**.
Prof Chee Soon Phaik; S\$53,897.20
- **“A Phase I, Single-Center, Evaluation of the Safety of Epithelium-on Corneal Collagen Cross-linking with Supplemental Oxygen”**.
A/Prof Jodhbir Mehta; S\$78,666.83
- **“Early Feasibility Study of UV-Femtosecond Laser Assisted Lenticular Extraction”**.
A/Prof Edmund Wong; S\$56,457.08
- **“A Prospective, Randomized, Controlled, First-In-Man Clinical Study for Vivinex® Gemetric® Diffractive Trifocal Toric IOL: MT2 in Cataract Patients”**.
Prof Chee Soon Phaik; S\$499,488.91
- **“A Phase III, Randomized, Observer-Masked, Active-Controlled, Parallel-Group, Multinational and Multicenter Study Assessing the Safety and Efficacy of DE-117 Ophthalmic Solution 0.002% Compared with Latanoprost Ophthalmic Solution 0.005% in Subjects with Open-Angle Glaucoma or Ocular Hypertension- PEONY Study”**.
Prof Aung Tin; S\$63,945.16
- **“Clinical Evaluation Following Use of SYSTANE® BALANCE in Subjects with Lipid-Deficient Dry Eye”**.
A/Prof Louis Tong; S\$86,055.71
- **“An open label-study to compare the efficacy of Aflibercept monotherapy for Polypoidal Choroidal Vasculopathy using a modified intensive treat and extend regime to a fixed dosing regimen”**.
A/Prof Gemmy Cheung; S\$714,748.33

OUR PUBLICATIONS

- Wang X, Cheng CY, Liao J, Sim X, Liu J, Chia KS, Tai ES, Little P, Khor CC, Aung T, Wong TY, Teo YY. **Evaluation of transethnic fine mapping with population-specific and cosmopolitan imputation reference panels in diverse Asian populations.** *Eur J Hum Genet.* 2016 Apr;24(4):592-9
- Cheng C, Teo K, Tan CS, Lee SY, Loh BK, Wong E, Wong D, Wong TY, Cheung CM. **Myopic Retinoschisis in Asians: Structural features and determinants of visual acuity and prognostic factors for progression.** *Retina.* 2016 Apr;36(4):717-26
- Sng CC, Aquino MC, Liao J, Zheng C, Ang M, Chew PT. **Anterior segment morphology after acute primary angle closure treatment: a randomised study comparing iridoplasty and medical therapy.** *Br J Ophthalmol.* 2016 Apr;100(4):542-8.
- de Leon JM, Quek DT, Htoon HM, Tun TA, Perera SA, Lamoureux EL, Aung T. **Persistence of glaucoma therapy and visual field progression.** *J Glaucoma.* 2016 Apr;25(4):e336-9
- Ting DS, Ng WY, Ng SR, Tan SP, Yeo IY, Mathur R, Chan CM, Tan AC, Tan GS, Wong TY, Cheung CM. **Choroidal thickness changes in age-related macular degeneration and polypoidal choroidal vasculopathy: A 12-month prospective study.** *Am J Ophthalmol.* 2016 Apr;164:128-136.e1
- Angmo D, Nongpiur ME, Sharma R, Sidhu T, Sihota R, Dada T. **Clinical utility of anterior segment swept-source optical coherence tomography in glaucoma.** *Oman J Ophthalmol.* 2016 Jan-Apr;9(1):3-10
- Kim DW, Jeoung JW, Kim YW, Girard MJ, Mari JM, Kim YK, Park KH, Kim DM. **Prelamina and lamina cribrosa in glaucoma patients with unilateral visual field loss.** *Invest Ophthalmol Vis Sci.* 2016 Apr 1;57(4):1662-70
- Koh V, Tan C, Tan PT, Tan M, Balla V, Nah G, Cheng CY, Ohno-Matsui K, Tan MM, Yang A, Zhao P, Wong TY, Saw SM. **Myopic maculopathy and optic disc changes in highly myopic young Asian eyes and impact on visual acuity.** *Am J Ophthalmol.* 2016 Apr;164:69-79
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- Chan BQ, Low ZW, Heng SJ, Chan SY, Owh C, Loh XJ. **Recent advances in shape memory soft materials for biomedical applications.** *ACS Appl Mater Interfaces.* 2016 Apr 27;8(16):10070-87
- Williams GP, George BL, Wong YR, Seah XY, Ang HP, Loke MK, Tay SC, Mehta JS. **The effects of a low-energy, high frequency liquid optic interface femtosecond laser system on lens capsulotomy.** *Sci Rep.* 2016 Apr 19;6:24352
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- Schwartz SD, Tan GS, Hosseini H, Nagiel A. **Subretinal Transplantation of Embryonic Stem Cell-Derived Retinal Pigment Epithelium for the Treatment of Macular Degeneration: An Assessment at 4 Years.** *Invest Ophthalmol Vis Sci.* 2016 Apr 1;57(5):ORSFc1-9
- NCD Risk Factor Collaboration (NCD-RisC). **Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19.2 million participants.** *Lancet.* 2016 Apr 2;387(10026):1377-96. doi: 10.1016/S0140-6736(16)30054-X
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- Li LJ, Ikram MK, Wong TY. **Retinal vascular imaging in early life: insights into processes and risk of cardiovascular disease.** *J Physiol.* 2016 Apr 15;594(8):2175-203
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FINANCIAL REPORT

DIRECTORS' REPORT

We are pleased to submit this annual report to the member of the Company together with the audited financial statements for the financial year ended 31 March 2017.

Directors

The directors (who are also the charity trustees) in office at the date of this report are as follows:

Associate Professor Yeoh Khay Guan

Doctor Geh Min

Professor Ang Chong Lye

Professor Wang Linfa

Doctor Lim Eng Kok

Professor Soo Kee Chee

Ms Ooi Chee Kar

Professor Wong Tien Yin

Associate Professor Lim Tock Han

Professor James D Best

Professor Thomas M Coffman

Directors' Interests

The Company has no share capital and its members' liability is limited by guarantee.

Neither at the end of, nor at any time during the financial year, was the Company a party to any arrangement whose objects are, or one of whose objects is, to enable the directors of the Company to acquire benefits by means of the acquisition of shares in or debentures of the Company or any other body corporate.

Share options

The Company does not have any share capital and accordingly has not issued any share options.

Auditors

The auditors, KPMG LLP, have indicated their willingness to accept re-appointment.

On behalf of the Board of Directors



Professor Wong Tien Yin
Director



Ms Ooi Chee Kar
Director

STATEMENT BY DIRECTORS

In our opinion:

- (a) the financial statements set out on pages FS1 to FS23 are drawn up so as to give a true and fair view of the financial position of the Company as at 31 March 2017 and the financial performance and cash flows of the Company for the year ended on that date in accordance with the provisions of the Singapore Companies Act, Chapter 50, the Singapore Charities Act, Chapter 37 and Singapore Financial Reporting Standards; and
- (b) at the date of this statement, there are reasonable grounds to believe that the Company will be able to pay its debts as and when they fall due.

The Board of Directors has, on the date of this statement, authorised these financial statements for issue.

On behalf of the Board of Directors



Professor Wong Tien Yin
Director



Ms Ooi Chee Kar
Director

INDEPENDENT AUDITORS' REPORT

Member of the Company
Singapore Eye Research Institute

Report on the audit of the financial statements

Opinion

We have audited the financial statements of Singapore Eye Research Institute ('the Company'), which comprise the balance sheet as at 31 March 2017, the statement of comprehensive income and statement of cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies, as set out on pages FS1 to FS23.

In our opinion, the accompanying financial statements are properly drawn up in accordance with the provisions of the Companies Act, Chapter 50 ('the Companies Act'), the Charities Act, Chapter 37 and other relevant regulations ('the Charities Act and Regulations'), and Financial Reporting Standards in Singapore ('FRSs') so as to give a true and fair view of the financial position of the Company as at 31 March 2017 and of the financial performance, and cash flows of the Company for the year ended on that date.

Basis for opinion

We conducted our audit in accordance with Singapore Standards on Auditing ('SSAs'). Our responsibilities under those standards are further described in the '*Auditors' responsibilities for the audit of the financial statements*' section of our report. We are independent of the Company in accordance with the Accounting and Corporate Regulatory Authority *Code of Professional Conduct and Ethics for Public Accountants and Accounting Entities* ('ACRA Code') together with the ethical requirements that are relevant to our audit of the financial statements in Singapore, and we have fulfilled our other ethical responsibilities in accordance with these requirements and the ACRA Code. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Other information

Management is responsible for the other information contained in the annual report. Other information is defined as all information in the annual report other than the financial statements and our auditors' report thereon.

We have obtained the Directors' statement prior to the date of this auditors' report.

Our opinion on the financial statements does not cover the other information and we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit or otherwise appears to be materially misstated. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of management and those charged with governance for the financial statements

Management is responsible for the preparation of financial statements that give a true and fair view in accordance with the provisions of the Companies Act, the Charities Act and Regulations and FRSs and for devising and maintaining a system of internal accounting controls sufficient to provide a reasonable assurance that assets are safeguarded against loss from unauthorised use or disposition; and transactions are properly authorised and that they are recorded as necessary to permit the preparation of true and fair financial statements and to maintain accountability of assets.

In preparing the financial statements, management is responsible for assessing the Company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Company or to cease operations, or has no realistic alternative but to do so.

Those charged with governance comprises the directors. Their responsibilities include overseeing the Company's financial reporting process.

Auditors' responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SSAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with SSAs, we exercise professional judgement and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal controls.
- Obtain an understanding of internal controls relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Charity's internal controls.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditors' report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditors' report. However, future events or conditions may cause the Company to cease to continue as a going concern.

- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with the directors regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal controls that we identify during our audit.

Report on other legal and regulatory requirements

In our opinion, the accounting and other records required to be kept by the Company have been properly kept in accordance with the provisions of the Companies Act, and the Charities Act and Regulations.

During the course of our audit, nothing has come to our attention that causes us to believe that during the year:

- (a) the Company has not used the donation moneys in accordance with its objectives as required under Regulation 11 of the Charities (Institutions of a Public Character) Regulations; and
- (b) the Company has not complied with the requirements of Regulation 15 of the Charities (Institutions of a Public Character) Regulations.

KPMG LLP
*Public Accountants and
Chartered Accountants*

Singapore

FINANCIAL STATEMENTS

Balance sheet

As at 31 March 2017

	Note	2017 \$	2016 \$
Assets			
Property, plant and equipment	4	5,962,464	6,333,389
Intangible assets	5	392,914	497,385
		<u>6,355,378</u>	<u>6,830,774</u>
Non-current assets			
Trade and other receivables	6	15,336,242	20,208,974
Prepayments		51,856	42,326
Cash and cash equivalents	8	6,908,578	8,165,271
		<u>22,296,676</u>	<u>28,416,571</u>
Current assets		<u>28,652,054</u>	<u>35,247,345</u>
Total assets		<u><u>28,652,054</u></u>	<u><u>35,247,345</u></u>
Accumulated fund			
	9	<u>1,184,500</u>	<u>3,075,144</u>
Non-current liability			
Deferred income	10	4,055,622	4,387,425
		<u>4,055,622</u>	<u>4,387,425</u>
Current liabilities			
Trade payables	11	4,410,017	2,551,928
Other payables	12	16,221,093	22,621,077
Deferred income	10	2,044,822	1,931,771
Employee benefits	13	736,000	680,000
		<u>23,411,932</u>	<u>27,784,776</u>
Total liabilities		<u>27,467,554</u>	<u>32,172,201</u>
Total accumulated fund and liabilities		<u><u>28,652,054</u></u>	<u><u>35,247,345</u></u>

Statement of comprehensive income

Year ended 31 March 2017

	Note	2017 \$	2016 \$
Operating expenditure grants	14	25,274,424	27,010,926
Amortisation of capital grants	18	1,799,684	1,703,939
Other income	15	3,343,081	3,222,247
		<u>30,417,189</u>	<u>31,937,112</u>
Staff costs		(17,176,591)	(16,678,837)
Supplies and consumables		(4,203,556)	(4,314,466)
Depreciation of property, plant and equipment	4	(1,750,146)	(1,698,143)
Amortisation of intangible assets	5	(305,200)	(232,618)
Rental and utilities		(1,476,951)	(3,766,297)
Purchased and contracted services		(5,489,394)	(4,034,890)
Repairs and maintenance		(526,980)	(928,146)
Other operating expenses		(1,376,521)	(4,695,592)
Results from operating activities		<u>(1,888,150)</u>	<u>(4,411,877)</u>
Finance costs	16	(2,494)	(18,428)
(Deficit)/surplus before tax		(1,890,644)	(4,430,305)
Tax expense	17	–	–
(Deficit)/surplus for the year	18	(1,890,644)	(4,430,305)
Other comprehensive income for the year, net of tax		–	–
Total comprehensive income for the year		<u>(1,890,644)</u>	<u>(4,430,305)</u>
Accumulated fund brought forward		3,075,144	7,505,449
Accumulated fund carried forward		<u>1,184,500</u>	<u>3,075,144</u>

The Company had no other changes in accumulated fund except for deficit for the year of \$1,890,644 (2016: \$4,430,305) for the financial year ended 31 March 2017.

Statement of Cash Flows

Year ended 31 March 2017

	Note	2017 \$	2016 \$
Cash flows from operating activities			
(Deficit)/surplus for the year		(1,890,644)	(4,430,305)
Adjustments for:			
Depreciation of property, plant and equipment	4	1,750,146	1,698,143
Loss on disposal of property, plant and equipment	18	29,364	2,470
Amortisation of intangible assets	5	305,200	232,618
Amortisation of deferred income	18	(1,799,684)	(1,703,939)
		<u>(1,605,618)</u>	<u>(4,201,013)</u>
Changes in working capital:			
Trade and other receivables		4,872,732	(5,741,557)
Prepayments		(9,530)	35,971
Trade and other payables		(4,541,895)	9,218,958
Employee benefits		56,000	(15,354)
Net cash (used in)/from operating activities		<u>(1,228,311)</u>	<u>(702,995)</u>
Cash flows from investing activities			
Purchase of property, plant and equipment		(1,408,586)	(1,300,701)
Purchase of intangible assets		(200,729)	(269,495)
Proceeds from disposal of property, plant and equipment		1	212
Grants for capital expenditure		1,580,932	1,288,482
Net cash used in investing activities		<u>(28,382)</u>	<u>(281,502)</u>
Net decrease in cash and cash equivalents		(1,256,693)	(984,497)
Cash and cash equivalents at beginning of the year		<u>8,165,271</u>	<u>9,149,768</u>
Cash and cash equivalents at end of the year	8	<u><u>6,908,578</u></u>	<u><u>8,165,271</u></u>

During the year, the Company acquired property, plant and equipment and intangible assets with an aggregate cost of \$1,609,315 (2016: \$1,570,196), of which \$1,580,932 (2016: \$1,288,482) was acquired using grants received.

NOTES TO THE FINANCIAL STATEMENTS

These notes form an integral part of the financial statements.

The financial statements were authorised for issue by the Board of Directors on

1. Domicile and activities

Singapore Eye Research Institute (the Company) is incorporated in the Republic of Singapore. The address of the Company's registered office is 31 Third Hospital Avenue, #03-03 Bowyer Block, Singapore 168753.

The principal activities of the Company are to carry out eye-related medical research projects.

The immediate, intermediate holding companies and ultimate holding party during the financial year are Singapore National Eye Centre Pte Ltd, Singapore Health Services Pte Ltd and MOH Holdings Pte Ltd, and Minister for Finance respectively. These companies were incorporated in the Republic of Singapore.

The Company, limited by guarantee, has been registered as a Charity, under the Charities Act, Cap. 37 with effect from 27 November 2002.

2. Basis of preparation

2.1 Statement of compliance

The financial statements have been prepared in accordance with Singapore Financial Reporting Standards (FRS).

2.2 Basis of measurement

The financial statements have been prepared on the historical cost basis except for certain financial assets and financial liabilities which are measured at fair values.

2.3 Functional and presentation currency

The financial statements are presented in Singapore dollars, which is the Company's functional currency.

2.4 Use of estimates and judgements

The preparation of financial statements in conformity with FRSs requires management to make judgements, estimates and assumptions that affect the application of accounting policies and the reported amounts of assets, liabilities, income and expenses. Actual results may differ from these estimates.

Estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognised in the period in which the estimates are revised and in any future periods affected.

There are no critical judgements in applying accounting policies that have significant effect on the amount recognised in the financial statements and no assumptions and estimation uncertainties that have a significant risk of resulting in a material adjustment within the next financial year.

Measurement of fair values

A few of the Company's accounting policies and disclosures require the measurement of fair values, for both financial and non-financial assets and liabilities.

When measuring the fair value of an asset or a liability, the Company uses market observable data as far as possible. Fair values are categorised into different levels in a fair value hierarchy based on the inputs used in the valuation techniques as follows:

- Level 1: quoted prices (unadjusted) in active markets for identical assets or liabilities.
- Level 2: inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly (i.e., as prices) or indirectly (i.e., derived from prices).
- Level 3: inputs for the asset or liability that are not based on observable market data (unobservable inputs).

If the inputs used to measure the fair value of an asset or a liability might be categorised in different levels of the fair value hierarchy, then the fair value measurement is categorised in its entirety in the same level of the fair value hierarchy as the lowest level input that is significant to the entire measurement (with Level 3 being the lowest).

The Company recognises transfers between levels of the fair value hierarchy as of the end of the reporting period during which the change has occurred.

Further information about the assumptions made in measuring fair values is included in note 19.

3. Significant accounting policies

The accounting policies set out below have been applied consistently to all periods presented in these financial statements, and have been applied consistently by the Company.

3.1 Foreign currency

Foreign currency transactions

Transactions in foreign currencies are translated to the functional currency of the Company at exchange rates at the dates of the transactions. Monetary assets and liabilities denominated in foreign currencies at the reporting date are retranslated to the functional currency at the exchange rate at that date. The foreign currency gain or loss on monetary items is the difference between amortised cost in the functional currency at the beginning of the year, adjusted for effective interest and payments during the year, and the amortised cost in foreign currency translated at the exchange rate at the end of the year.

Non-monetary assets and liabilities denominated in foreign currencies that are measured at fair value are retranslated to the functional currency at the exchange rate at the date that the fair value was determined. Non-monetary items in a foreign currency that are measured in terms of historical cost are translated using the exchange rate at the date of the transaction. Foreign currency differences arising on retranslation are recognised in surplus or deficit.

3.2 Financial instruments

Non-derivative financial assets

The Company initially recognises loans and receivables on the date that they are originated. All other financial assets (including assets designated at fair value through profit or loss) are recognised initially on the trade date, which is the date that the Company becomes a party to the contractual provisions of the instrument.

The Company derecognises a financial asset when the contractual rights to the cash flows from the asset expire, or it transfers the rights to receive the contractual cash flows on the financial asset in a transaction in which substantially all the risks and rewards of ownership of the financial asset are transferred, or it neither transfers nor retains substantially all of the risk and rewards of ownership and does not retain control over the transferred asset. Any interest in transferred financial assets that is created or retained by the Company is recognised as a separate asset or liability.

Financial assets and liabilities are offset and the net amount presented in the balance sheet when, and only when, the Company has a legal right to offset the amounts and intends either to settle on a net basis or to realise the asset and settle the liability simultaneously.

The Company classifies non-derivative financial assets into the following categories: loans and receivables.

Loans and receivables

Loans and receivables are financial assets with fixed or determinable payments that are not quoted in an active market. Such assets are recognised initially at fair value plus any directly attributable transaction costs. Subsequent to initial recognition, loans and receivables are measured at amortised cost using the effective interest method, less any impairment losses.

Loans and receivables comprise trade and other receivables, and cash and cash equivalents.

Cash and cash equivalents comprise cash and bank balances.

Non-derivative financial liabilities

The Company initially recognises all financial liabilities on the trade date, which is the date that the Company becomes a party to the contractual provisions of the instrument.

The Company derecognises a financial liability when its contractual obligations are discharged, cancelled or expire.

Financial assets and liabilities are offset and the net amount presented in the balance sheet when, and only when, the Company has a legal right to offset the amounts and intends either to settle on a net basis or to realise the asset and settle the liability simultaneously.

The Company classifies non-derivative financial liabilities into other financial liabilities category. Such financial liabilities are recognised initially at fair value plus any directly attributable transaction costs. Subsequent to initial recognition, these financial liabilities are measured at amortised cost using the effective interest method.

Other financial liabilities comprise employee benefits, trade payables and other payables.

The Company do not have any financial assets and financial liabilities that:

- are offset in the balance sheet; or
- are subject to an enforceable master netting arrangement, irrespective of whether they are offset in the balance sheet.

3.3 Property, plant and equipment

Recognition and measurement

Items of property, plant and equipment are measured at cost less accumulated depreciation and accumulated impairment losses.

Cost includes expenditure that is directly attributable to the acquisition of the asset. The cost of self-constructed assets includes:

- the cost of materials and direct labour;
- any other costs directly attributable to bringing the asset to a working condition for its intended use;
- when the Company has an obligation to remove the asset or restore the site, an estimate of the costs of dismantling and removing the items and restoring the site on which they are located; and
- capitalised borrowing costs.

Purchased software that is integral to the functionality of the related equipment is capitalised as part of that equipment.

Low value assets costing less than \$1,000 individually are written off in the period of outlay.

When parts of an item of property, plant and equipment have different useful lives, they are accounted for as separate items (major components) of property, plant and equipment.

The gain or loss on disposal of an item of property, plant and equipment (calculated as the difference between the net proceeds from disposal and the carrying amount of the item) is recognised in surplus or deficit.

Subsequent costs

The cost of replacing a component of an item of property, plant and equipment is recognised in the carrying amount of the item if it is probable that the future economic benefits embodied within the component will flow to the Company, and its cost can be measured reliably. The carrying amount of the replaced component is derecognised. The costs of the day-to-day servicing of property, plant and equipment are recognised in surplus or deficit as incurred.

Depreciation

Depreciation is calculated based on the cost of an asset, less its residual value. Significant components of individual assets are assessed and if a component has a useful life that is different from the remainder of that asset, that component is depreciated separately.

Depreciation is recognised as an expense in surplus or deficit on a straight-line basis over the estimated useful lives of each component of an item of property, plant and equipment, unless it is included in the carrying amount of another asset.

Depreciation is recognised from the date that the property, plant and equipment are installed and are ready for use, or in respect of internally constructed assets, from the date that the asset is completed and ready for use.

The estimated useful lives for the current and comparative years are as follows:

Building improvements	10 years
Medical and laboratory equipment	8 years
Computers	3 years
Office equipment	5 years
Furniture and fittings	8 years

Depreciation methods, useful lives and residual values are reviewed at each financial year-end and adjusted if appropriate.

3.4 Intangible assets

Computer software, which is not an integral part of the related hardware, is accounted for as an intangible asset and is stated at cost less accumulated amortisation and accumulated impairment losses.

Subsequent expenditure

Subsequent expenditure is capitalised only when it increases the future economic benefits embodied in the specific asset to which it relates. All other expenditure, including expenditure on internally generated goodwill and brands, is recognised in surplus or deficit as incurred.

Amortisation

Amortisation is calculated based on the cost of asset, less its residual value.

Amortisation of computer software is recognised in surplus or deficit on a straight-line basis over its estimated useful life of 3 to 5 years, from the date that they are available for use.

Amortisation methods, useful lives and residual values are reviewed at each financial year-end and adjusted if appropriate.

3.5 Impairment

i. Non-derivative financial assets

A financial asset not carried at fair value through profit or loss is assessed at the end of each reporting period to determine whether there is objective evidence that it is impaired. A financial asset is impaired if objective evidence indicates that a loss event(s) has occurred after the initial recognition of the asset, and that the loss event(s) had a negative effect on the estimated future cash flows of that asset that can be estimated reliably.

Objective evidence that financial assets are impaired can include default or delinquency by a debtor, restructuring of an amount due to the Company on terms that the Company would not consider otherwise, indications that a debtor or issuer will enter bankruptcy, adverse changes in the payment status of borrowers or issuers in the group, economic conditions that correlate with defaults or the disappearance of an active market for a security.

Loans and receivables

The Company considers evidence of impairment for loans and receivables at both specific asset and collective level. All individually significant loans and receivables are assessed for specific impairment. All individually significant loans and receivables found not to be specifically impaired are then collectively assessed for any impairment that has been incurred but not yet identified. Loans and receivables that are not individually significant are collectively assessed for impairment by grouping together loans and receivables with similar risk characteristics.

In assessing collective impairment, the Company uses historical trends of the probability of default, timing of recoveries and the amount of loss incurred, adjusted for management's judgement as to whether current economic and credit conditions are such that the actual losses are likely to be greater or less than suggested by historical trends.

An impairment loss in respect of a financial asset measured at amortised cost is calculated as the difference between its carrying amount and the present value of the estimated future cash flows discounted at the asset's original effective interest rate. Losses are recognised in surplus or deficit and reflected in an allowance account against loans and receivables. Interest on the impaired asset continues to be recognised. When the Company considers that there are no realistic prospects of recovery of the asset, the relevant amounts are written off. If the amount of impairment loss subsequently decreases and the decrease can be related objectively to an event occurring after the impairment was recognised, then the previously recognised impairment loss is reversed through surplus or deficit.

ii. Non-financial assets

The carrying amounts of the Company's non-financial assets are reviewed at each reporting date to determine whether there is any indication of impairment. If any such indication exists, then the asset's recoverable amount is estimated. An impairment loss is recognised if the carrying amount of an asset or its related cash-generating unit (CGU) exceeds its estimated recoverable amount.

The recoverable amount of an asset or CGU is the greater of its value in use and its fair value less costs to sell. In assessing value in use, the estimated future cash flows are discounted to their present value using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset or CGU. For the purpose of impairment testing, assets that cannot be tested individually are grouped together into the smallest group of assets that generates cash inflows from continuing use that are largely independent of the cash inflows of other assets or CGU.

Impairment losses are recognised in surplus or deficit. Impairment losses recognised in respect of CGUs are allocated to reduce the carrying amounts of the other assets in the CGU (group of CGUs) on a *pro rata* basis.

Impairment loss recognised in prior periods is assessed at each reporting date for any indications that the loss has decreased or no longer exists. An impairment loss is reversed if there has been a change in the estimates used to determine the recoverable amount. An impairment loss is reversed only to the extent that the asset's carrying amount does not exceed the carrying amount that would have been determined, net of depreciation or amortisation, if no impairment loss had been recognised.

3.6 Employee benefits

Defined contribution plans

A defined contribution plan is a post-employment benefit plan under which an entity pays fixed contributions into a separate entity and will have no legal or constructive obligation to pay further amounts. Obligations for contributions to defined contribution pension plans are recognised as an employee benefit expense in surplus or deficit in the periods during which related services are rendered by employees.

Short-term employee benefits

Short-term employee benefit obligations are measured on an undiscounted basis and are expensed as the related service is provided. A liability is recognised for the amount expected to be paid under short-term cash bonus or profit-sharing plans if the Company has a present legal or constructive obligation to pay this amount as a result of past service provided by the employee and the obligation can be estimated reliably.

3.7 Income recognition

Grant income

Grant income designated for research purposes is recognised in surplus or deficit when the relevant qualifying costs are incurred.

Grants which are designated for property, plant and equipment, and intangible assets purchases whose individual value of more than \$1,000 is taken to deferred income in the period of receipt. The deferred income is amortised over the useful life of the property, plant and equipment and intangible assets by crediting to the surplus or deficit an amount so as to match the related depreciation and amortisation expense.

Programme fees

Programme fees relate to fees or income which the Company receives when it carries out activities through direct service provision to undertake the work that contributes to its objectives. Programme fees are recognised in surplus or deficit when the relevant milestone is achieved.

3.8 Research

Expenditure on research activities, undertaken with the prospect of gaining new scientific or technical knowledge and understanding, is recognised in surplus or deficit as incurred.

3.9 Lease payments

Payments made under operating leases are recognised in surplus or deficit on a straight-line basis over the term of the lease. Lease incentives received are recognised as an integral part of the total lease expense, over the term of the lease.

3.10 Finance income and finance cost

Finance income comprises interest income on funds invested and net foreign currency gains that are recognised in surplus or deficit. Interest income is recognised as it accrues in surplus or deficit, using the effective interest method.

Finance costs comprise net foreign currency losses that are recognised in surplus or deficit.

Foreign currency gains and losses on financial assets and financial liabilities are reported on a net basis as either finance income or finance cost depending on whether foreign currency movements are in a net gain or net loss position.

3.11 Tax

The Company has been registered as a Charity, under Charities Act, Cap. 37 with effect from 27 November 2002. No provision for taxation has been made in the financial statements as the Company is a registered charity with income tax exemption.

3.12 New standards and interpretations not adopted

A number of new standards, amendments to standards are effective for annual periods beginning after 1 April 2016, and earlier application is permitted; however, the Company has not early applied the following new or amended standards in preparing these statements. For those new standards and amendments to standards that are expected to have an effect on the financial statements of the Company in future financial periods, the Company is assessing the transition options and the potential impact on its financial statements, and to implement these standards. The Company does not plan to adopt these standards early.

Applicable to 2018 financial statements

FRS109 Financial Instruments

FRS 109 replaces most of the existing guidance in FRS 39 *Financial Instruments: Recognition and Measurement*. It includes revised guidance on classification and measurement of financial instruments, a new expected credit loss model for calculating impairment on financial assets, and new general hedge accounting requirements. It also carries forward the guidance on recognition and derecognition of financial instruments from FRS 39.

The Company has performed preliminary assessment of the impact of FRS 109 on its financial statements. Overall, the Company does not expect a significant change to the classification and measurement basis arising from adopting FRS 109.

The Company is currently gathering data to quantify the potential impact of FRS109 on impairment loss of trade receivables and plans to adopt the new standard on the required effective date in 2018 without restating comparative information.

Applicable to 2019 financial statements

FRS116 Leases

FRS 116 eliminates the lessee's classification of leases as either operating leases or finance leases and introduces a single lessee accounting model. In applying the new model, a lessee is required to recognise right-of-use (ROU) assets and lease liabilities for all leases with a term of more than 12 months, unless the underlying asset is of low value. It also substantially carries forward the lessor accounting requirements in FRS 17 *Leases*. Accordingly, a lessor continues to classify its leases as operating leases or finance leases, and to account for these two types of leases using the FRS 17 operating lease and finance lease accounting models respectively. However, FRS 116 requires more extensive disclosures to be provided by a lessor. When effective, FRS 116 replaces existing lease accounting guidance, including FRS 17, INT FRS 104 *Determining whether an Arrangement contains a Lease*, INT FRS 15 *Operating Leases – Incentives*, and INT FRS 27 *Evaluating the Substance of Transactions Involving the Legal Form of a Lease*.

The Company has performed preliminary assessment of the impact of FRS 116 on its existing operating lease arrangements as a lessee. Based on the preliminary assessment, the Company expects these operating leases to be recognised as ROU assets with corresponding lease liabilities under the new standard. Such operating lease commitments on an undiscounted basis amount to approximately \$4,222,440 as at 31 March 2017 (note 20).

The Company plans to adopt the standard when it becomes effective in 2019.

4. Property, plant and equipment

	Building Improvements	Medical and laboratory equipment	Computers	Office Equipment	Furniture and fittings	Total
	\$	\$	\$	\$	\$	\$
Cost						
At 1 April 2015	1,047,102	14,876,528	1,253,304	117,846	277,445	17,572,225
Additions	–	1,242,555	56,746	–	1,400	1,300,701
Disposals	–	(125,781)	–	–	–	(\$125,781)
At 31 March 2016	1,047,102	15,933,302	1,310,050	117,846	278,845	18,747,145
Additions	–	1,231,743	129,709	2,675	44,459	1,408,586
Disposals	–	(378,756)	(59,951)	–	–	(438,707)
At 31 March 2017	1,047,102	16,846,289	1,379,808	120,521	323,304	19,717,024
Accumulated depreciation						
At 1 April 2015	1,025,666	8,598,525	950,813	106,905	156,803	10,838,712
Depreciation charge for the year	5,261	1,500,250	161,657	5,081	25,894	1,698,143
Disposals	–	(123,099)	–	–	–	(123,099)
At 31 March 2016	1,030,927	9,975,676	1,112,470	111,986	182,697	12,413,756
Depreciation charge for the year	5,261	1,560,773	153,178	4,194	26,740	1,750,146
Disposals	–	(349,391)	(59,951)	–	–	(409,342)
At 31 March 2017	1,036,188	11,187,058	1,205,697	116,180	209,437	13,754,560
Carrying amounts						
At 1 April 2015	21,436	6,278,003	302,491	10,941	120,642	6,733,513
At 31 March 2016	16,175	6,017,626	197,580	5,860	96,148	6,333,389
At 31 March 2017	10,914	5,659,231	174,111	4,341	113,867	5,962,464

5. Intangible assets

	Computer software \$
Cost	
At 1 April 2015	1,245,184
Additions	269,495
At 31 March 2016	<u>1,514,679</u>
Additions	200,729
At 31 March 2017	<u><u>1,715,408</u></u>
Accumulated amortisation	
At 1 April 2015	784,676
Amortisation charge for the year	232,618
At 31 March 2016	<u>1,017,294</u>
Amortisation charge for the year	305,200
At 31 March 2017	<u><u>1,322,494</u></u>
Carrying amounts	
At 1 April 2015	<u>460,508</u>
At 31 March 2016	<u>497,385</u>
At 31 March 2017	<u><u>392,914</u></u>

6. Trade and other receivables

	Note	2017 \$	2016 \$
Deposits and other receivables	7	14,666,356	19,264,842
Trade amounts due from:			
- Immediate holding company		215,602	325,778
- Intermediate holding company		392,486	581,502
- Related corporations		61,798	36,852
		<u>15,336,242</u>	<u>20,208,974</u>

Outstanding balances with related parties are unsecured. There are no allowance for doubtful debts arising from these outstanding balances.

The Company's exposure to credit and currency risks is disclosed in note 19.

7. Deposits and other receivables

	Note	2017 \$	2016 \$
Deposits		15,568	15,568
Receivables from funding bodies		13,984,661	18,328,717
Grant receivables from third parties		622,127	875,122
Sundry receivables		44,000	45,435
	6	<u>14,666,356</u>	<u>19,264,842</u>

Receivables from funding bodies are non-interest bearing and have no credit terms.

8. Cash and cash equivalents

	2017 \$	2016 \$
Cash at bank and in hand	<u>6,908,578</u>	<u>8,165,271</u>

9. Accumulated fund

The Company is limited by guarantee and has no share capital. In the event of a winding up of the Company, the liability of each member of the Company is limited to such amount as may be required, but not exceeding the sum of one hundred dollars (\$100). The accumulated fund represents the cumulative surplus of the Company.

The Company's reserve policy is to maintain funds at a minimum sufficient to cover budgeted operating and capital cost for the current fiscal year.

Capital management

Capital comprises the accumulated fund of the Company. The Company's operation is funded primarily from grants from various funding bodies and loan from immediate holding company. There was no change in the Company's approach to capital management during the year. The Company is not subject to externally imposed capital requirements.

10. Deferred income

	2017	2016
	\$	\$
At cost	20,492,413	19,211,228
Less: Accumulated amortisation:		
At 1 April	12,892,032	11,311,192
Amortisation for the year	1,799,684	1,703,939
Disposal of assets funded by grants	(299,747)	(123,099)
At 31 March	14,391,969	12,892,032
	<u>6,100,444</u>	<u>6,319,196</u>
Non-current	4,055,622	4,387,425
Current	2,044,822	1,931,771
	<u>6,100,444</u>	<u>6,319,196</u>

Deferred income relates to capital expenditure grants (note 14) received for the purchase of property, plant and equipment ("PPE") and intangible assets ("IA"). Deferred income is amortised over the periods necessary to match the depreciation of the PPE and amortisation of the IA purchased with the related grants.

11. Trade payables

	2017	2016
	\$	\$
Trade payables	2,435,440	1,650,257
Amounts due to:		
- Immediate holding company (trade)	520,744	382,058
- Intermediate holding company (trade)	1,324,822	435,258
- Related corporations (trade)	129,011	84,355
	<u>4,410,017</u>	<u>2,551,928</u>

The Company's exposure to currency and liquidity risks related to trade payables is disclosed in note 19.

12. Other payables

	2017	2016
	\$	\$
Pledged donations	–	3,000,000
Accrued operating expenses	2,895,097	9,885,146
Loans from immediate holding company	6,000,000	6,000,000
Research grants received in advance from government	211,787	1,161,613
Research grants received in advance from third parties	4,893,576	2,573,378
Research grants received in advance from related corporation	2,219,693	–
Refundable deposits	940	940
	<u>16,221,093</u>	<u>22,621,077</u>

Pledged donations relate to donations by the Company to Duke-NUS Medical School. The amount had been paid during the financial year.

Loans from immediate holding company are unsecured, interest-free and repayable on demand.

The Company's exposure to currency and liquidity risks related to other payables is disclosed in note 19.

13. Employee benefits

	2017	2016
	\$	\$
Liability for short-term accumulating compensated absences	<u>736,000</u>	<u>680,000</u>

14. Operating / Capital expenditure grants

These grants are received mainly from National Medical Research Council, Biomedical Research Council, Singhealth Foundation, Singapore Health Services Pte Ltd, Singapore National Eye Centre Pte Ltd and SNEC Health Research Endowment Fund for research projects.

15. Other income

	2017	2016
	\$	\$
Other research grant and programme fees	2,896,584	2,953,904
Other miscellaneous income	446,497	268,343
	<u>3,343,081</u>	<u>3,222,247</u>

16. Finance costs

	2017	2016
	\$	\$
Exchange loss (net)	(2,494)	(18,428)

17. Tax expense

The Company is a non-profit organisation registered with the Commissioner of Charities under the Singapore Charities Act. With effect from Year of Assessment 2008, all registered and exempt charities will enjoy automatic income tax exemption. Thus, no provision for taxation was made in the financial statements.

18. Surplus for the year

The following items have been included in arriving at surplus for the year:

	Note	2017	2016
		\$	\$
Amortisation of deferred income	10	(1,799,684)	(1,703,939)
Temporary occupation licence ("TOL") and other operating lease expense		2,149,782	2,970,957
Contributions to defined contribution plan included in staff costs		1,683,330	1,707,359
Loss on disposal of property, plant and equipment		29,364	2,470
Donation expense		–	3,000,000

19. Financial Instruments

Overview

The Company has exposure to the following risks from its use of financial instruments:

- credit risk
- liquidity risk
- market risk

This note presents information about the Company's exposure to each of the above risks, the Company's objectives, policies and processes for measuring and managing risk.

Risk management framework

Risk management is integral to the whole business of the Company. The Company has a system of controls in place to create an acceptable balance between cost of risks and the cost of managing the risks. The management continually monitors the Company's risk management process to ensure that an appropriate balance between risk and control is achieved. Risk management policies and systems are reviewed regularly to reflect changes in market conditions and the Company's activities.

Credit risk

Credit risk is the risk of financial loss to the Company if a customer or counterparty to a financial instrument fails to meet its contractual obligations, arises principally from the funding bodies and related parties, as and when they fall due.

The carrying amount of financial assets in the balance sheet represents the Company's respective maximum exposure to credit risk, before taking into account any collateral held. The Company does not hold any collateral in respect of its financial assets.

Cash is placed with financial institutions which are regulated.

At the reporting date, there is no significant concentration of credit risk.

	2017	2016
	\$	\$
Funding bodies	13,984,661	18,328,717
Corporations	1,351,581	1,880,257
	<u>15,336,242</u>	<u>20,208,974</u>

The funding bodies and corporations are established and reputable institutions which management regarded the associated credit risk to be minimum.

Impairment losses

The ageing of trade and other receivables that were not impaired at the reporting date was:

	2017	2016
	\$	\$
Not past due	8,965,320	19,839,770
Past due 1 – 30 days	311,440	18,628
Past due 31 – 150 days	4,590,213	116,729
Past due over 150 days	1,469,269	233,847
	<u>15,336,242</u>	<u>20,208,974</u>

Liquidity risk

Liquidity risk is the risk that the Company will encounter difficulty in meeting the obligations associated with its financial liabilities that are settled by delivering cash or another financial asset. The Company's approach to managing liquidity is to ensure, as far as possible, that it will always have sufficient liquidity to meet its liabilities when due under normal and stressed conditions without incurring unacceptable losses or risking damage to the Company's reputation.

The Company's operation is funded primarily from grants from National Medical Research Council and loans from immediate holding company. As such, the Company's exposure to liquidity risk is minimised.

The Company monitors its liquidity risk and maintains a level of cash and cash equivalents deemed adequate by management to finance the Company's operations and to mitigate the effects of fluctuations in cash flows.

The following are the contractual maturities of financial liabilities, including estimated interest payments and excluding the impact of netting agreements:

	Note	Carrying amount \$	Total contractual cash flows \$	Within 1 year \$
2017				
Non-derivative financial liabilities				
Trade payables	11	4,410,017	(4,410,017)	(4,410,017)
Other payables*	12	8,896,037	(8,896,037)	(8,896,037)
Employee benefits	13	736,000	(736,000)	(736,000)
		<u>14,042,054</u>	<u>(14,042,054)</u>	<u>(14,042,054)</u>
2016				
Non-derivative financial liabilities				
Trade payables	11	2,551,928	(2,551,928)	(2,551,928)
Other payables*	12	18,886,086	(18,886,086)	(18,886,086)
Employee benefits	13	680,000	(680,000)	(680,000)
		<u>22,118,014</u>	<u>(22,118,014)</u>	<u>(22,118,014)</u>

*Excludes research grants received in advance from government, third parties and corporation

Market risk

Market risk is the risk that changes in market prices, such as interest rates, foreign exchange rates and equity prices will affect the Company's income or the value of its holdings of financial instruments. The objective of market risk management is to manage and control market risk exposures within acceptable parameters, while optimising the return.

Interest rate risk

The Company has no significant exposure to interest rate risk.

Foreign currency risk

The financial assets and liabilities of the Company are primarily denominated in Singapore dollars.

The Company has no significant exposure to foreign currency risk.

Accounting classifications and fair values

The carrying amounts of recognized financial assets and liabilities which are not measured at fair value as shown in the balance sheet are as follows. It does not include fair value information for financial assets and financial liabilities not measured at fair value if the carrying amount is a reasonable approximation of fair value.

The carrying amounts of financial assets and liabilities with a maturity of less than one year (including trade and other receivables, cash and cash equivalents, trade payables, other payables and employee benefits) approximate their fair values because of the short period to maturity.

	Note	Loans and receivables \$	Other financial liabilities \$	Total carrying amount \$
31 March 2017				
Financial assets not measured at fair value				
Cash and cash equivalents	8	6,908,578	–	6,908,578
Trade and other receivables	6	15,336,242	–	15,336,242
		<u>22,244,820</u>	<u>–</u>	<u>22,244,820</u>
Financial liabilities not measured at fair value				
Trade payables	11	–	(4,410,017)	(4,410,017)
Other payables	12	–	(16,221,093)	(16,221,093)
Employee benefits	13	–	(736,000)	(736,000)
		<u>–</u>	<u>(21,367,110)</u>	<u>(21,367,110)</u>
31 March 2016				
Financial assets not measured at fair value				
Cash and cash equivalents	8	8,165,271	–	8,165,271
Trade and other receivables	6	20,208,974	–	20,208,974
		<u>28,374,245</u>	<u>–</u>	<u>28,374,245</u>
Financial liabilities not measured at fair value				
Trade payables	11	–	(2,551,928)	(2,551,928)
Other payables	12	–	(22,621,077)	(22,621,077)
Employee benefits	13	–	(680,000)	(680,000)
		<u>–</u>	<u>(25,853,005)</u>	<u>(25,853,005)</u>

20. Commitments

At 31 March 2017, the Company has commitments for future minimum lease payments under non-cancellable operating leases (including those under Temporary Occupation License) as follows:

	2017 \$	2016 \$
Within 1 year	2,101,208	2,735,810
After 1 year but within 5 years	2,173,015	10,876,774
	<u>4,274,223</u>	<u>13,612,584</u>

The operating lease commitments mainly relate to the lease of space and office equipment. The leases run for a period of one to five years with an option to renew the lease after that date.

21. Related parties

Collectively, but not individually significant transactions

The Company charges its immediate holding company for manpower services provided and purchases services from its intermediate holding company, immediate holding company and related corporations.

Other related party transactions

Other than disclosed elsewhere in the financial statements, the transactions with related parties are as follows:

	2017	2016
	\$	\$
Other income received/receivable		
Immediate holding company	(1,009,848)	(893,625)
Related corporation	(898,077)	–
Sale of other services		
Intermediate holding company	(548,046)	(839,847)
Immediate holding company	(67,755)	(318)
Related corporation	(6,806)	(1,334)
Purchase of manpower services		
Immediate holding company	664,333	404,192
Related corporation	39,394	19,240
Purchase of other services		
Intermediate holding company	981,040	11,308
Immediate holding company	606,455	213,926
Related corporations	542,745	268,709

	2017	2016
	\$	\$
Purchase of supplies and consumables		
Intermediate holding company	606,326	1,224,051
Immediate holding company	13,888	8,762
Other expenses paid/payable		
Intermediate holding company	1,307,567	3,646,854
Immediate holding company	209,920	183,241
Related corporations	65,464	43,351

The Company occupies space at the premises of its intermediate and immediate holding companies. The current year rental of \$225,646 (2016: \$225,855) is waived by the immediate holding company.

Key management personnel remuneration

Key management personnel of the Company are those persons having the authority and responsibility for planning, directing and controlling the activities of the Company. The senior management are considered as key management personnel of the Company.

Key management personnel remuneration recognised in the statement of comprehensive income is as follows:

	2017	2016
	\$	\$
Key management personnel		
- short-term employee benefits	1,534,978	1,334,675
- contribution to defined contribution plan	47,473	49,213
	<u>1,582,451</u>	<u>1,383,888</u>

In compliance with the Code of Corporate Governance for Charities and Institutions of a Public Character - Guideline 8.3, the annual remuneration of the Company's three highest paid staff who each received remuneration exceeding \$100,000, in the following bands in the year are as follows:

	2017	2016
Number of personnel in bands:		
- \$200,001 to \$300,000	1	2
- \$300,001 to \$400,000	1	-
- \$400,001 to \$500,000	1	1
	<u>1</u>	<u>1</u>

22. Comparative Information

Change in classification

During 2017, the Company reclassified purchased manpower services and maintenance services from staff costs and supplies and consumables respectively to purchased and contract services to reflect more appropriately the nature of the expenses.

Certain comparative information has been reclassified as follows to be consistent with the current year presentation:

	As previously reported 2016 \$	Reclassifications 2016 \$	As currently reported 2016 \$
<u>Statement of comprehensive income</u>			
Staff costs	(17,230,143)	551,306	(16,678,837)
Supplies and consumables	(5,058,010)	743,544	(4,314,466)
Purchased and contracted services	(2,740,040)	(1,294,850)	(4,034,890)

There is no impact to surplus or deficit in the current and comparative period as a result of the reclassification.