

||
**EVERY FIVE SECONDS ONE PERSON IN OUR
WORLD GOES BLIND. EVERY MINUTE A CHILD
GOES BLIND. FOR THE VAST MAJORITY OF
THOSE PEOPLE, THEIR BLINDNESS WAS
PREVENTABLE.**



**INDUSTRIAL
COLLABORATION
WITH THE
SINGAPORE EYE
RESEARCH INSTITUTE**



A WORLD-LEADING OPHTHALMIC RESEARCH INSTITUTE**BEST IN ASIA
SECOND IN WORLDWIDE**

Singapore has been ranked second globally and first in Asia Pacific for both the quantity and quality of their eye research.



Set up with a founding team of five in 1997, SERI was established to promote research on vision disorders of particular significance to Singapore and Asia. Today, it is home to over 200 researchers, doctors and support staff, and is the largest eye research institute in the Asia-Pacific region.

A global leader in eye research, SERI ranks ahead of its counterparts in the US, UK and Japan in terms of ophthalmology publications per capita. Tapping on its close affiliation to the Singapore National Eye Centre, SERI is in the unique position to translate basic research into cutting edge clinical care by enabling the development of new treatments for a variety of eye diseases. Within SERI there are a number of platforms and capabilities which attract much industrial attention, and these are described herein.

SERI RESEARCH GROUPS**Bioengineering & Devices**

Co-Heads:

Dr Michael Girard
Dr Sharmira Perera

Myopia

Co-Heads:

Dr Audrey Chia
Prof Saw Seang Mei

Anti-Infectives

Head:

Prof Roger
Beuerman

Visual Neuroscience

Head:

Prof Dan Milea

**Ocular Inflammation
& Immunology**

Co-Head:

A/Prof Chee Soon Phiak
A/Prof Louis Tong

Glaucoma

Head:

Prof Aung Tin

Clinical & Ocular Imaging

Co Heads:

Prof Aung Tin
Prof Wong Tien Yin

Ocular Epidemiology

Head:

A/Prof Cheng Ching-Yu

Retina

Co-Heads:

Prof Wong Tien Yin
Dr Gemmy Cheung

**Ocular Therapeutics
& Drug Delivery**

Head:

A/Prof Tina Wong

Health Services Research

Head:

Prof Ecosse
Lamoureux

Ocular Genetics

Head:

A/Prof Eranga Vithana

Ocular surface

Head:

A/Prof Louis Tong

Tissue Engineering & Stem Cell

Head:

A/Prof Jod Mehta

Cataract

Head:

A/Prof Chee Soon Phiak

Biomarkers

Head:

Prof Roger Beuerman

FOCUSING ON THE FIGURES**2,705**

SCIENTIFIC PAPERS PUBLISHED

**1,411**

STUDIES ON ALL ASPECTS OF EYE RESEARCH

**S\$227**

MILLION IN GRANT FUNDING SECURED

**407**

NATIONAL AND INTERNATIONAL AWARDS

ANNUAL BUDGET **\$35M**/YEAR**85%** COMPETITIVE PEER-REVIEWED GRANTS**119**

PATENT APPLICATIONS FILED

17

RESEARCH GROUPS

223RESEARCHERS, DOCTORS, CLINICIANS,
CLINICAL SCIENTISTS AND ADMINISTRATORS**180**

MASTERS, PhD, POST-DOCTORAL STUDENTS

47

PRINCIPAL INVESTIGATORS

24

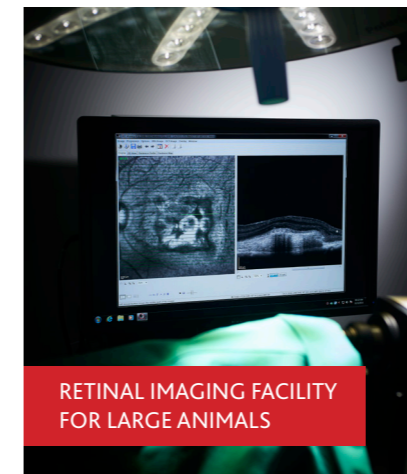
PhD SCIENTISTS

17

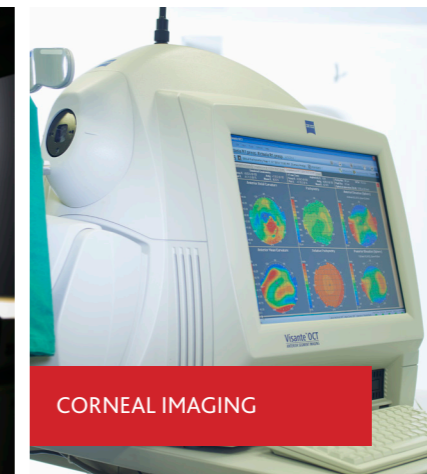
MD-PhDs

TRANSLATIONAL PRE-CLINICAL PLATFORM

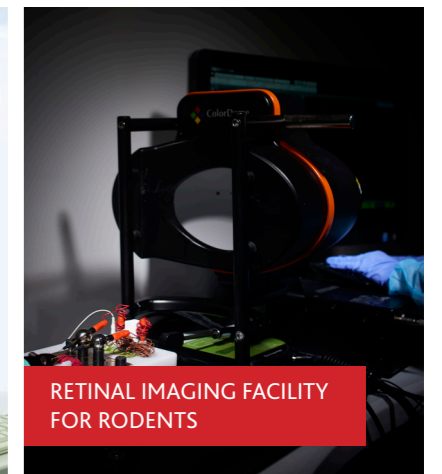
Animal models of ocular diseases continue to be an important experimental tool for SERI and its collaborators, both academic and industrial. The preclinical facility at the Singapore Experimental Medicine Centre (SEMC) is well-equipped with instrumentation necessary for ocular research. The platform involves a multidisciplinary team that provides expertise and instrumentation, facilitating translational and basic ocular disease research using animal models. The group provide technical support, as well as expert guidance on the selection of the appropriate animal to be utilized as experimental models for human ocular disease study.

PRECLINICAL FACILITY WHICH IS EQUIPPED WITH FEMTO-SECOND LASER & TECHNOLAS EXCIMER LASER SYSTEM FOR CORNEAL SURGERY.

RETINAL IMAGING FACILITY FOR LARGE ANIMALS



CORNEAL IMAGING



RETINAL IMAGING FACILITY FOR RODENTS

AVAILABLE EQUIPMENT

- Carl Zeiss Femtosecond Laser Suite
- Bausch & Lomb Technolas Excimer Laser Suite
- Heidelberg HRT in-vivo Confocal Microscope
- Righton Slit-lamp microscopy with video captures function
- Specular Microscope for in-vivo endothelial cell count
- Autorefractor
- Real-Time IOP device
- Tonopen/Tonovet/Pneumotonometer
- Carl Zeiss Anterior Segment OCT
- Fluorotron Master System
- Topcon Purepoint Laser Slit lamp Delivery System
- Micron IV comprehensive suite for rodents
- Topcon Fundus Microscope
- Heidelberg HRT Spectralis Anterior and Posterior Segment OCT
- Dissecting/Surgical Microscope
- Retinoscopy
- A-Scan Ultrasound for Biometry measurements
- Carl Zeiss OLCI AC-Master for mouse biometry measurements
- Automated Infrared Photorefractor Set-up for mouse and chicken
- Indirect Ophthalmoscope
- ESPION ERG set-up for small and large animals
- OcuScience Ex-vivo ERG set up
- Roland mfERG system for small and large animals
- Laser Speckle Flowgraphy for small and large animals



Houses several consultation rooms with specialist "state-of-the-art" equipment and "cutting-edge" tools to conduct comprehensive clinical trials and research studies.

The SERI Research Clinic is a research facility that houses several consultation rooms with specialist "state-of-the-art" equipment and "cutting-edge" tools to conduct comprehensive clinical trials and research studies. This is further supported by a network of research personnel, including a dedicated team of research fellows, optometrists, coordinators, nurses, imaging technicians, data entry personnel and statisticians, as well as ophthalmologists from the various public eye hospitals in Singapore. This research team is able to conduct a wide range of long and short term studies, encompassing the entire spectrum of First-In-Man phase I to phase IV clinical trials for drugs, implants and devices.

Since its inception in 1997, the SERI Research Clinic has performed more than 500 clinical and epidemiology studies (including more than 100 random controlled trials) and evaluating visual impairment in the community. Today, the SERI Research Clinic typically has more than 125 on-going studies (encompassing clinical trials and research studies, epidemiology studies, ocular imaging studies, Health Services Research studies and others) at any one time.

SERI has the expertise and experience to conduct all forms of ophthalmic and vision research clinical trials/ studies, involving both drugs- and/or medical devices, in all ophthalmic sub-specialties. The centralised location and the easy accessibility to the eye clinics at the Singapore National Eye Centre, as well as Singapore's multi-ethnic (Chinese, Malay, Indian and Caucasian) population, makes the SERI Research Clinic one of the most ideal and conducive hub to conduct impactful and successful clinical trials and research studies.

MANPOWER RESOURCES

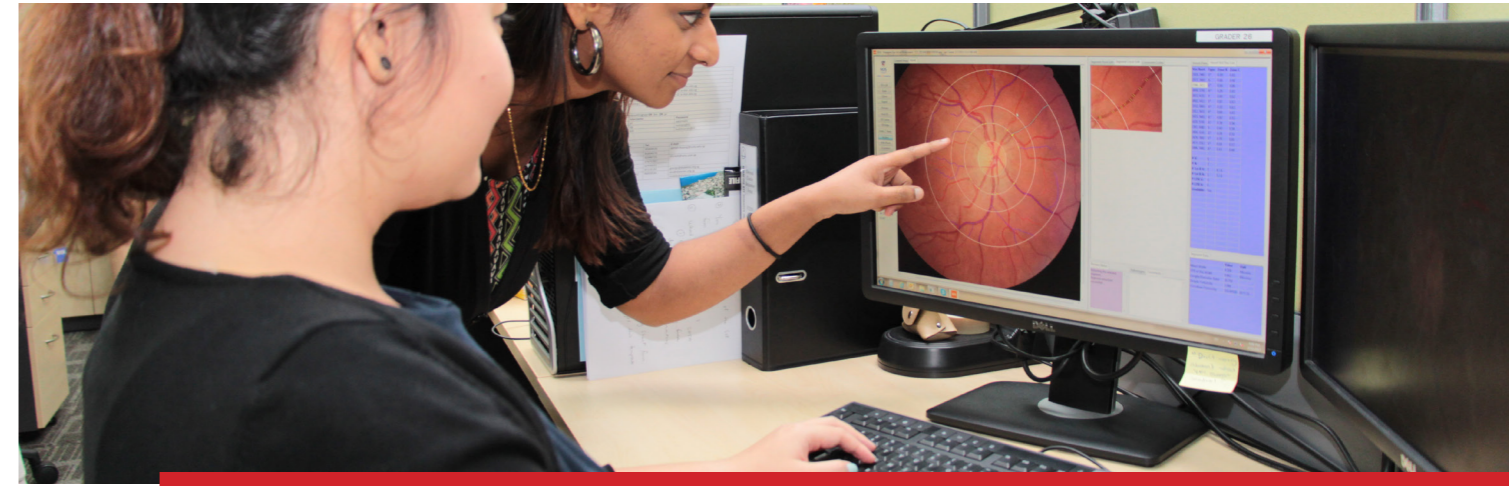
Committed to ensuring a high standard of research excellence, our more than 50 study personnel, includes clinical research fellows, optometrists, coordinators, nurses, data management and statistical support teams, are CITI-certified and GCP-trained. In most instances, a clinical trial conducted at the SERI Research Clinic will be assigned a team comprising of the following personnel:

- Principal Investigator
- Project Manager
- Co-Investigators
- Clinical Research Coordinator
- Research Optometrist
- Clinical Trial Coordinator
- Data management and statistical support expertise, as and when required

CLINICAL TRIALS CAPABILITIES

SERI has the expertise and experience to conduct all forms of ophthalmic and vision research clinical trials/ studies, involving both drug-related and/or medical devices, in all of the sub-specialties including:

- Corneal Diseases & Refractive Surgery
- Ocular Inflammation / Uveitis
- Pediatric-Ophthalmology
- Health Service Research
- Cataract
- Neuro-Ophthalmology
- Retinal Diseases
- Epidemiology studies
- Glaucoma
- Oculoplastic
- Optometry
- Dry Eyes



SORC provides evaluation and interpretation (grading) services of ocular pathology from fundus photographs, fluorescein angiograms, optical coherence tomography scans or other imaging modalities. SORC serves as a Tele-Ophthalmic Ocular Reading Centre, a hub that ensures effective and prompt service delivery by streamlining and automating the entire process, from image capture on site to the electronic transfer of the image via a dedicated conduit to the reading centre.

WHAT SORC DOES:

1. Provide clinical trial standard reading services for industry partners and collaborators on different eye diseases such as diabetic retinopathy, age-related macular degeneration, glaucoma and cataract with strict quality assurance.
2. Provide accurate measurement of vascular structure from retinal images using computer-aided programmes such as SIVA (Singapore "I" Vessel Assessment).
3. Provide certification of equipment and photographers according to industry standards and maintain high quality imaging throughout the duration of trials.
4. Perform centralized grading for the national diabetic screening programme in Singapore – Singapore Integrated Diabetic Retinopathy Programme (SiDRP)
5. Conduct training workshops, mentoring sessions and accreditation for a spectrum of ocular imaging techniques.



SORC's DR screening programme is a comprehensive, quality-assured and cost-efficient solution to the DR problem in countries throughout Asia and globally. This system has demonstrated effectiveness in early detection of DR and resulting in better clinical management of this eye disease.

The Ocular Proteomics Laboratory is a core platform in SERI and provides expertise and instrumentation in cutting-edge proteomics and metabolomics research. Established in 2004, the Ocular Proteomics Laboratory has focused on application of proteomics to clinical samples from the eye to find new biomarkers and understand the disease.

Additionally, the laboratory collaborates with other research groups within SERI/SNEC as well as external academic and industrial partners, offering a broad range of proteomics/metabolomics and biological mass spectrometry (MS) services, including protein identification, quantitative proteomics (iTRAQ, high resolution - MRM, SWATH, etc.), characterization of post-translational modifications (PTMs), MS-based non-targeted and targeted metabolomics, and drug analysis.

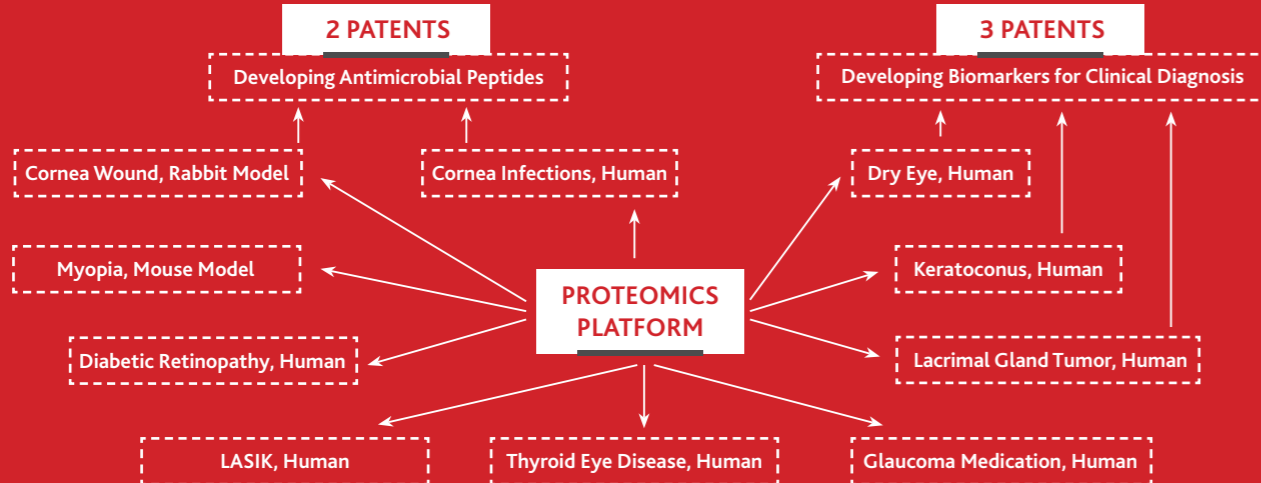
FACILITY

- AB SCIEX TripleTOF 5600 Mass Spectrometer
- Dionex UltiMate 3000 RSLCnano system
- AB SCIEX API 2000 MS/MS System
- Waters 2695 HPLC system
- Waters Acquity UPLC I-Class system

CAPABILITY

- Protein identification (identify proteins from a gel band, or whole proteome)
- Quantitative proteomics and proteomic profiling (iTRAQ, mTRAQ, high-resolution MRM, SWATH, etc.)
- Post-translational modification discovery (glycosylation, phosphorylation, acetylation, methylation, etc.)
- MS-based metabolomics
- Small molecule quantitation (drug level, targeted metabolomics, etc.)

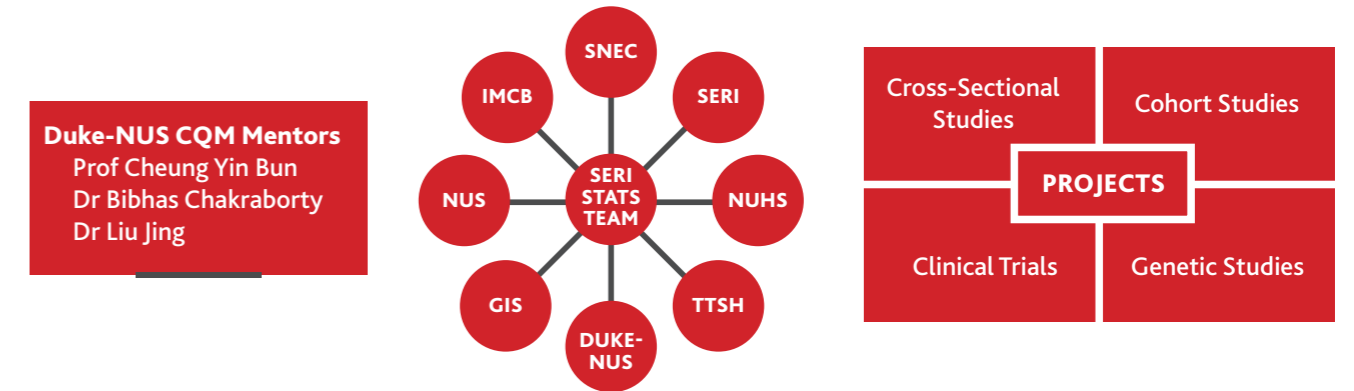
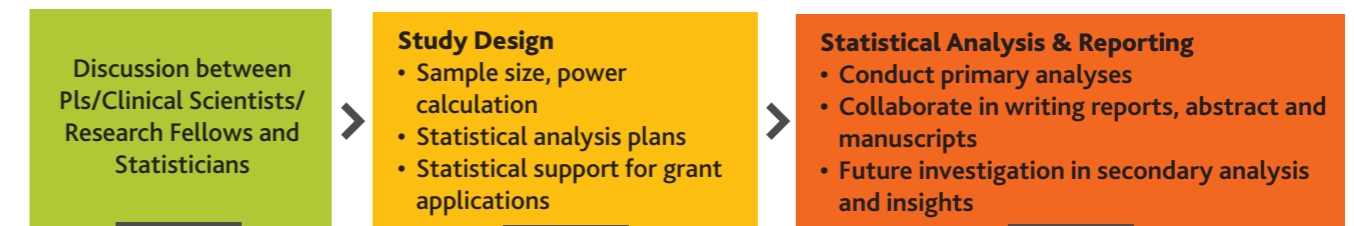
OCULAR PROTEOMICS IN SERI



The statistics team in SERI consists of a group of experienced statisticians with background in epidemiology, clinical trials and genetics analysis. The statistics team operates to support research across SERI, and with collaborators, that require planning and analysis of experiments.

Principal investigators and collaborators are able to tap onto the statistics expertise of the team:

1. Study design and planning: Discussion to understand research aims and assist in the planning and design of research studies; sample size and power calculations; statistical analysis plans and statistical sections for grant applications and publications.
2. Statistical analysis and reporting: Primary and secondary analysis to investigate research aims; writing support; further insights and sub-group analysis.
3. Statistical consulting: an avenue to discuss and resolve ad-hoc statistical questions or post-hoc analysis for researchers in all themes.
4. Statistics workshop: Introductory statistics sessions for researchers to learn statistical software to perform their own analysis.



The TD&C team is the nexus for all commercialisation, technology transfer and business development activities at SERI, bringing together wide ranging and comprehensive expertise required to support development of diverse medical technologies and bring them to market. We seek to engage any party, industrial or academic, which has an interest in collaborating with SERI on commercially-oriented ophthalmology research projects.

Since we were established in 2012, we have assisted in the filing of over 40 patents applications, signed 11 licenses, forged 21 industry collaborations and spun off 2 companies with one further upcoming in 2017 and several more expected in the next couple of years.

INDUSTRY COLLABORATIONS

SERI has had close routine working relationship with many industry leaders such as Santen, Roche, Bayer, Alcon, Merck, Hoya and more since 2007.

We are highly experienced in all stages of industrial collaborations, with our administrative, finance, business development, and of course clinical and scientific staff well versed in managing partnership setup, maintenance and development.

THE SNEC OPHTHALMIC TECHNOLOGIES INCUBATOR

The SNEC ophthalmic technologies incubator is dedicated to supporting and nurturing commercially highly promising technologies from SERI to help them reach the market as soon as possible via spinning off startup companies. We provide a comprehensive range of support services, including support on regulatory matters, market research, business planning, legal and IP support, as well as links to potential industry and funding partners.

GET IN TOUCH

The SERI TD&C office seeks to engage any party, industrial or academic, which has an interest in collaborating with SERI on commercially-oriented ophthalmology research projects.

We can provide information regarding SERI's research interests, licensable IP, the commercializable research currently underway, our common models of collaboration, as well as arrange for more in-depth contacts with SERI researchers and clinicians from the Singapore National Eye Centre.

If you have an interest in working with SERI to bring promising ophthalmic technology to the market, please email bdcontact@seri.com.sg.