

# Annex 9. Overview of Singapore's Biomedical Sciences Initiative



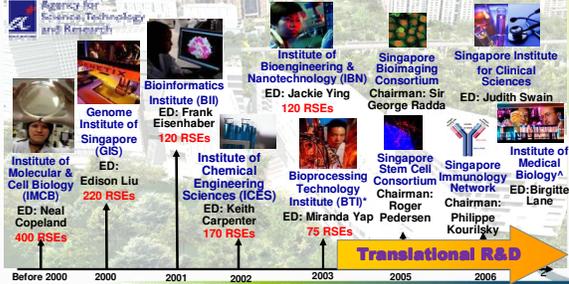
**Overview of Singapore's Biomedical Sciences Initiative**

Dr Loke Wai Chiong  
Director  
Health & Wellness Programme Office  
Ministry of Health

## From Basic Sciences to Translational R&D

**2000-2005: Phase I of the Biomedical Sciences Initiative**  
 • Focused on building a firm foundation for basic biomedical research

**From 2006: Phase II of the BMS Initiative**  
 • Focuses on building strong capabilities in **Translational and Clinical Research (TCR)**  
 • Biomedical Sciences Review Committee identified 5 key disease areas to focus on  
 • \$1.55B from MTI (A\*STAR), NRF and



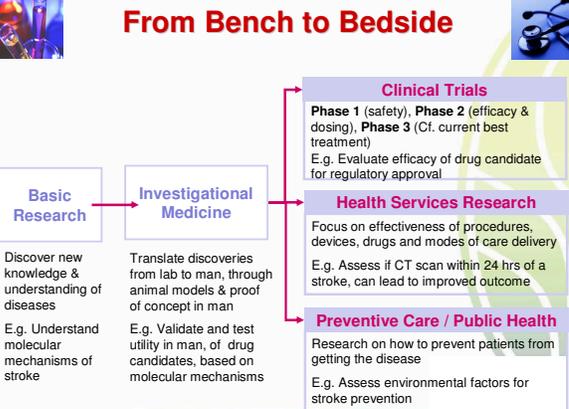
**Timeline of Institutes:**

- Before 2000:** Institute of Molecular & Cell Biology (IMCB) - ED: Neal Copeland (400 RSEs)
- 2000:** Genome Institute of Singapore (GIS) - ED: Edison Liu (220 RSEs)
- 2001:** Bioinformatics Institute (BII) - ED: Frank Eisenhaber (120 RSEs)
- 2002:** Institute of Chemical Engineering Sciences (ICES) - ED: Keith Carpenter (170 RSEs)
- 2003:** Bioprocessing Technology Institute (BTI) - ED: Miranda Yap (75 RSEs)
- 2005:** Institute of Bioengineering & Nanotechnology (IBN) - ED: Jackie Ying (120 RSEs)
- 2006:** Singapore Biomimetic Consortium - Chairman: Sir George Radda; Singapore Stem Cell Consortium - Chairman: Roger Pedersen; Singapore Institute for Clinical Sciences - ED: Judith Swain; Singapore Immunology Network - Chairman: Philippe Kourilsky; Institute of Medical Biology - ED: Birgitte Lane

**Translational R&D** (indicated by a large orange arrow pointing right)

## Promoting Translational and Clinical Research

## From Bench to Bedside



**Basic Research**  
 Discover new knowledge & understanding of diseases  
 E.g. Understand molecular mechanisms of stroke

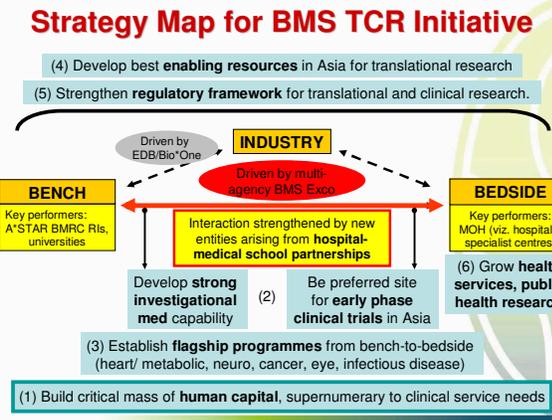
**Investigational Medicine**  
 Translate discoveries from lab to man, through animal models & proof of concept in man  
 E.g. Validate and test utility in man, of drug candidates, based on molecular mechanisms

**Clinical Trials**  
 Phase 1 (safety), Phase 2 (efficacy & dosing), Phase 3 (Cf. current best treatment)  
 E.g. Evaluate efficacy of drug candidate for regulatory approval

**Health Services Research**  
 Focus on effectiveness of procedures, devices, drugs and modes of care delivery  
 E.g. Assess if CT scan within 24 hrs of a stroke, can lead to improved outcome

**Preventive Care / Public Health**  
 Research on how to prevent patients from getting the disease  
 E.g. Assess environmental factors for stroke prevention

## Strategy Map for BMS TCR Initiative



**INDUSTRY** (Driven by EDB/BioOne, Driven by multi-agency BMS Exco)

**BENCH** (Key performers: A\*STAR BMRC RIs, universities)

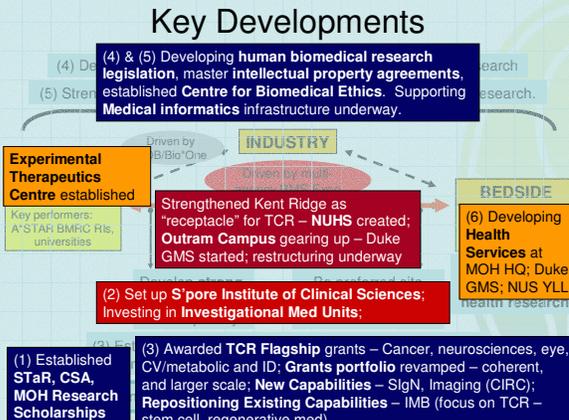
**BEDSIDE** (Key performers: MOH (viz. hospitals, specialist centres))

**Interaction strengthened by new entities arising from hospital-medical school partnerships**

**Goals:**

- Build critical mass of human capital, supernumerary to clinical service needs
- Develop strong investigational med capability (2) Be preferred site for early phase clinical trials in Asia
- Establish flagship programmes from bench-to-bedside (heart/ metabolic, neuro, cancer, eye, infectious disease)
- Develop best enabling resources in Asia for translational research
- Strengthen regulatory framework for translational and clinical research.
- Grow health services, public health research

## Key Developments



**INDUSTRY** (Driven by B/BioOne, Driven by multi-agency BMS Exco)

**Experimental Therapeutics Centre established** (Key performers: A\*STAR BMRC RIs, universities)

**Strengthened Kent Ridge as "receptacle" for TCR - NUHS created; Outram Campus gearing up - Duke GMS started; restructuring underway**

**Set up S'pore Institute of Clinical Sciences; Investing in Investigational Med Units;**

**Developing Health Services at MOH HQ; Duke GMS; NUS YLL health research**

**Established STaR, CSA, MOH Research Scholarships**

**Awarded TCR Flagship grants - Cancer, neurosciences, eye, CV/metabolic and ID; Grants portfolio revamped - coherent, and larger scale; New Capabilities - SigN, Imaging (CIRC); Repositioning Existing Capabilities - IMB (focus on TCR - stem cell, regenerative med)**

## Talent Development

- Build a critical mass of human capital for TCR which is supernumerary to clinical service needs of hospitals
  - Attract outstanding clinician-scientists from overseas
  - Encourage local clinicians to engage in clinical research
  - Develop strong pipeline of clinician-scientists and clinician-investigators

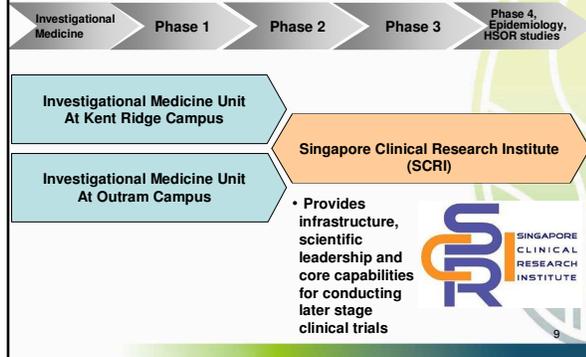
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## Support for Talent Development

- Singapore Translational Research (STaR) Investigatorship:-
  - Most prestigious clinician-scientists award
  - Modeled after the Howard Hughes Medical Institute Award
- Clinician-Scientist Award (protected time for research, 100% salary support)
- Healthcare Research Scholarship
- Establishment of Duke Graduate Medical School

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## Clinical Research Infrastructure in Singapore



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## Marshalling Singapore's Translational Landscape

### Translational Clinical Research (TCR) Flagship Programs

► Total of S\$125M awarded over 5-years

 Gastric Cancer Genomics and biomarker trials	 Ocular Surgery Glaucoma & corneal disorders	 Neurosciences Schizophrenia & related psychoses	 Metabolic Diseases Developmental pathways	 Infectious Disease Dengue treatment & prevention
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## Fostering Academic Medicine in Singapore

## Development of Academic Medicine

Developing Kent Ridge and Outram Campuses to serve as:-

- Receptacles that allow clinical service, medical education and research to be undertaken in an integrated way
- Environments where clinicians work closely with researchers and educators
- Platforms to translate basic science discoveries into new applications for patients

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### AMC Development at Kent Ridge Campus

- National University Hospital (NUH) and National University of Singapore (NUS) departments integrated to function as single National University Health System (NUHS) departments across clinical service, education and research activities
- Integrated NUHS-wide processes, e.g. strategic planning, HR, procurement, budgeting



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### AMC Development at Outram Campus

- Joint decision-making (cross-institutional representation on governing boards/committees)
- Joint human capital development (clear career tracks for clinician-scientists/educators; joint academic appointments)
- Shared research facilities



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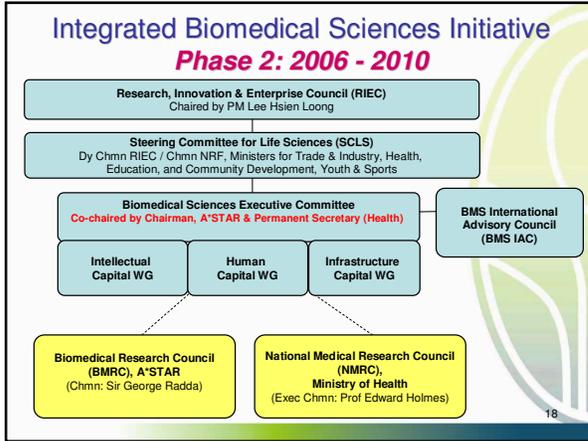
Back-up slides

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### Background

- 2000-2005 – Phase I of the Biomedical Sciences Initiative
- June 2006 – Singapore Government decided that translational & clinical research (TCR) will be a key focus of BMS Phase II development
  - Biomedical Sciences Review Committee identified 5 key disease areas to focus on
  - \$1.55B from MTI (A\*STAR), NRF and MOH
- Clinical research was included as part of MOH's mandate
  - Key outcome: Better healthcare delivery for the public

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# Annex 9. Overview of Singapore's Biomedical Sciences Initiative

## Research Grants

**STRATEGIC/PROGRAMMATIC:**

- Translational & Clinical Research Flagship Programs (S\$25 m each)
- Programmatic Project Grants
- Centre Grants

<b>Gastric Cancer</b> (Genomics and biomarkers trials)
<b>Neuroscience</b> (Schizophrenia & related psychoses)
<b>Eye Diseases</b> (Glaucoma and corneal disorders)
<b>Infectious Disease</b> (Dengue treatment and prevention)
<b>Metabolic Diseases</b> (Developmental pathways)

**INVESTIGATOR-LED RESEARCH:**

- Individual Research Grants
- Exploratory / Developmental Grants
- New Investigator Grants

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## Investigational Medicine Unit (IMU) – Kent Ridge Campus

**Facilities**  
18 beds

**Core Capabilities**

- > **Cardiovascular Imaging Core Laboratory:** Cutting-edge echocardiographic and vascular imaging
- > **Genomics Core Laboratory:** Analysis of DNA, RNA and protein-based biomarkers in body fluids, frozen / archival tissues, and culture and environment isolates
- > **Clinical Pharmacology Group:** Provides expertise and consultation for both pharmaceutical industry and investigator-initiated translational and clinical projects
- > **Clinical Biostatistics and Pharmacometric Unit:** Provides biostatistical, data management and computing capabilities to support clinical trials
- > **Pharmacokinetics & Pharmacodynamics Analytical Laboratory:** Provides quality bioanalytical service to quantify the active drug and / or its metabolite(s) in different biological matrices according to FDA Guidance

**NUHS**  
National University Health System

**A/Prof Goh Boon Cher**  
Director, Investigational Medicine Unit




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## Investigational Medicine Unit (IMU) – Outram Campus

**Facilities**  
30-bed, and a 2-bed Chronobiology Lab

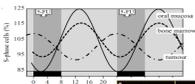
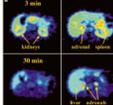
**Core Capabilities**

- Phase 0 / Microdosing
- Chronobiology: Investigate the effect of circadian rhythm on drug metabolism e.g. Circadian-Based Delivery of 5-FU

**International Collaboration**

- Access to network of experts through strategic partners
- E.g. Duke University Medical Center in the US, Duke Clinical Research Unit (DCRU), Clinical Research Institute (University of Kansas)
- Biometrics support in study design, implementation, analysis, interpretation and reporting of clinical trials

**SingHealth**  
A/Prof Tal Burt  
Director, Investigational Medicine Unit

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## Private Translational and Clinical Investments

**Translational Labs**

- Schering-Plough:** 100 FTEs at steady state, Biomarker research lab, In-house Ph 1 pharmacological unit
- Abbott:** First in human Phase 1 trials, Conducted in partnership with local investigators and hospitals, ABT 869 trial: Study completed in 12 mths to highest data standards, before patient recruitment completed in other 2 sites; new indication identified
- S+BIO:** US\$550 mil license agreement with Onyx for JAK2 inhibitor, US\$112.5 mil license agreement with Tragara for multi-kinase inhibitor SB1317
- Lilly:** 21 FTEs, Focus on tissue analysis, biomarker discovery and cancer research, Chunal-Biostar (Mitsui/CIEA) JV
- Lilly:** Phase 1 Unit, 50-man team, 31 beds, 15 studies/yr, Only unit in outside US
- Pfizer:** Phase 1 Unit, 70-man team, 54 beds, 40 studies/yr, Only unit in Asia

**Clinical Activities**

- Novartis:** 150 FTEs, Oncology biomarker research & genomic data analysis, Drug Hunting Teams for cancer and metabolic diseases
- Novartis:** Clinical Trial Coordination
- Novartis:** Public Sector Services available to companies: Biological Resource Centre, 10,000 sqm Animal facility with breeding and husbandry services, at SPF and non-SPF standards, Translational Research Interface: Sample collection, tissue preparation and biomarker analysis, Tissue Repositories at public hospitals

**Supporting Sites**

- Quintiles:** 50 FTEs, NHP and mouse CRO, Partnerships with major pharma on efficacy models, Small and large animal imaging capability
- Covance:** maccine
- PPD:** maccine
- CMIC:** maccine
- EPS Co., Ltd.:** The Clinical Services Provider

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