

NMRC Awards Ceremony and Research Symposium 2024  
23-24 May 2024, One Farrer, Singapore  
Building strategic partnerships and enabling translational research

# Strengthening oncology drug development networks in Asia

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Division of Medical Oncology, National Cancer Centre Singapore  
Head, Division of Clinical Trials and Epidemiological Sciences  
Platform Co-lead, Singapore Translational Cancer Consortium  
Co-Chair, Asian Thoracic Oncology Research Group and  
Asia Pacific Oncology Drug Development Consortium  
Associate Professor, Duke-NUS Medical School



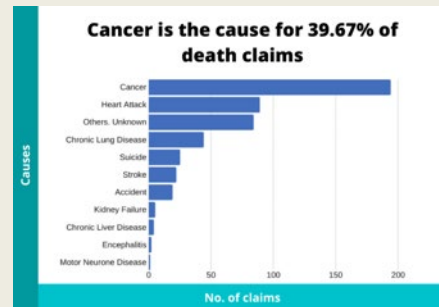
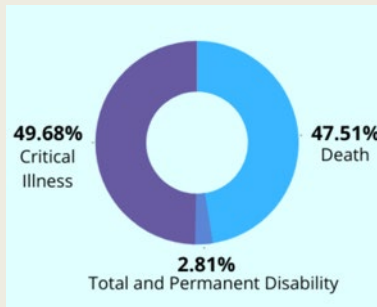
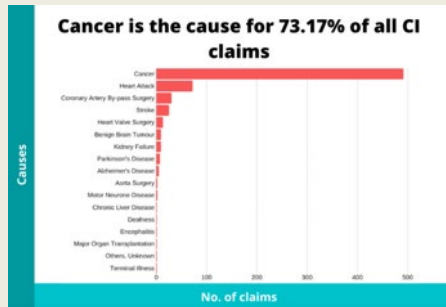
# Scope

- **The role of academic oncology drug development networks**
- **Specific developments**
  - Access to genomic profiling for clinical trials
  - Molecular Tumor Boards
  - Trial networks to enable precision oncology
- **Future perspectives**

# In 2019, cancer drugs accounted for a quarter of total drug spending at S\$375 million in Singapore

- Spending on cancer drugs has been growing at a compound annual growth rate of 20% compared to 6% for non-cancer drugs
- Singapore is projected to spend \$2.7 billion on cancer drugs in 2030

Insurance claims over 36 month period (Jul 2016 to Jun 2019)

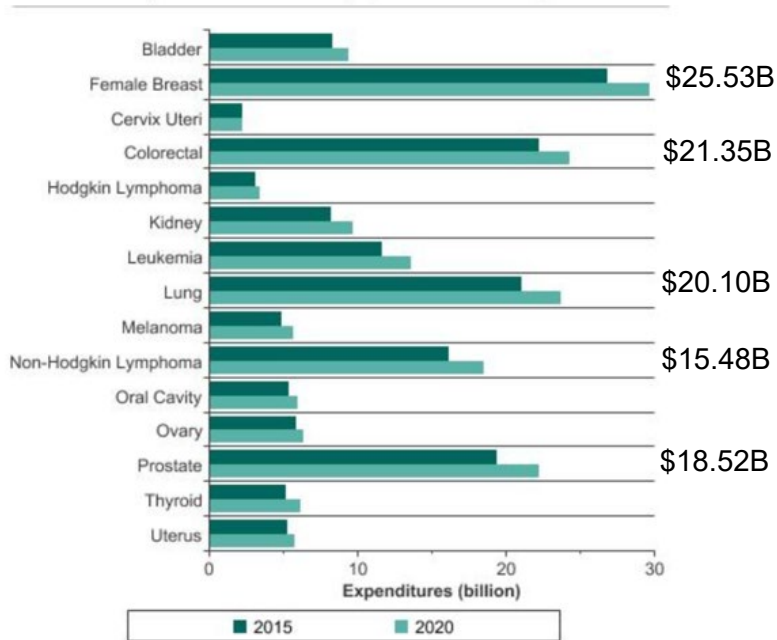


<https://smartwealth.sg/life-insurance-claim-statistics/>

*NTUC income: 8634 claims*

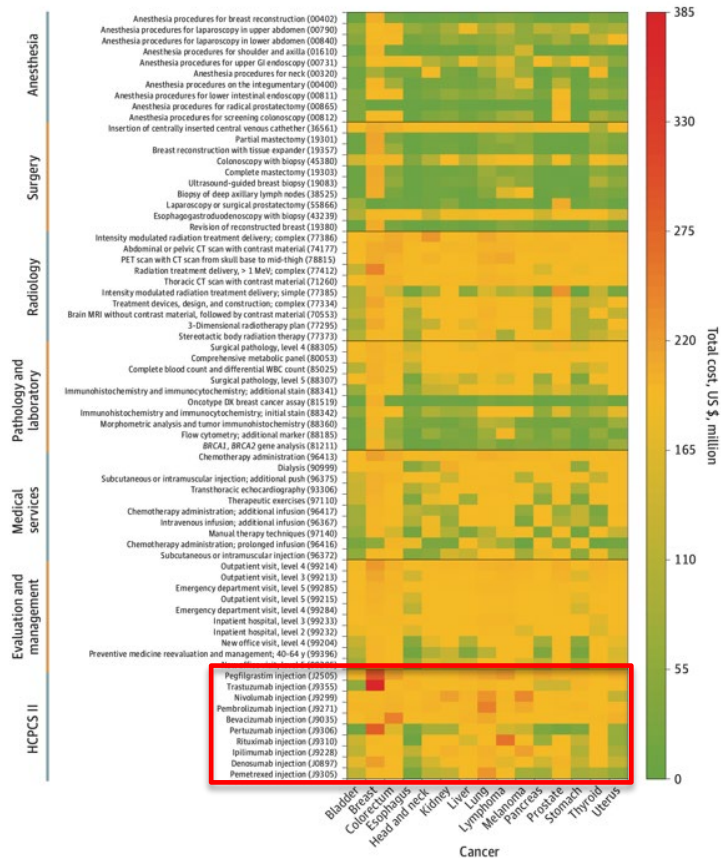
# Estimates of expenditure for cancer care

Estimates of national expenditures for cancer care (in billions of dollars) by cancer site and year



In US, overall national costs in 2015 were \$183 billion and projected to increase 34% to **\$246 billion by 2030**

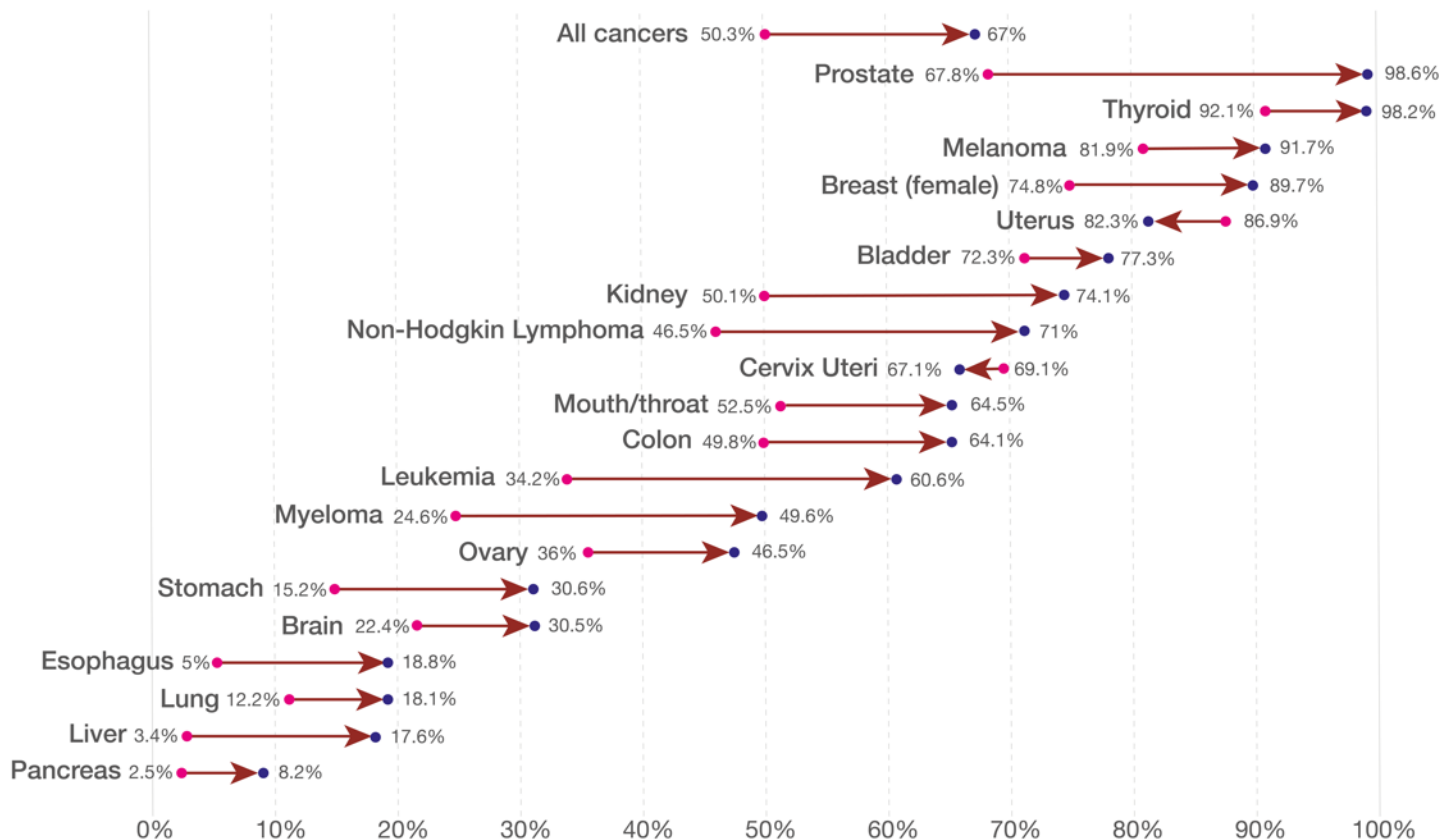
B Procedure spending by cancer subtype



# Five-year cancer survival rates in the USA

Average five-year survival rates from common cancer types in the United States, shown as the rate over the period 1970-77 [●] and over the period 2007-2013 [●]: 1970-77 [●] → 2007-2013

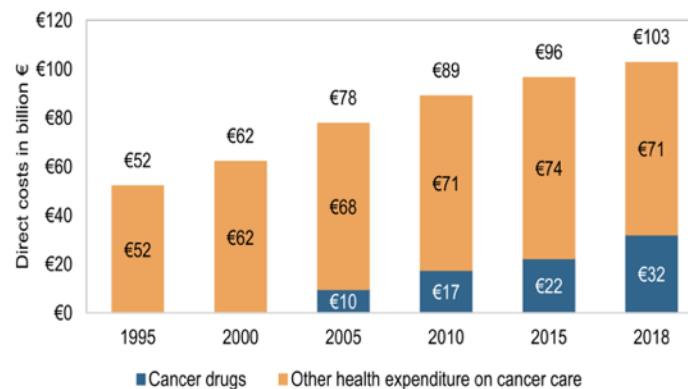
This five-year interval indicates the percentage of people who live longer than five years following diagnosis.



# Evaluate cost:benefit ratio of interventions

- **Matching right patient to right therapies**  
Optimizing molecular profiling
- **Drug resistance**  
Primary, secondary, tertiary, quaternary ...
- **Combinatorial approaches**

Direct costs of cancer in Europe 1995-2018



Hofmarcher et al. EJC 2020

## Priorities for health systems

Optimization of cost-effective therapies in advanced cancers

1. Living well with chronic illness

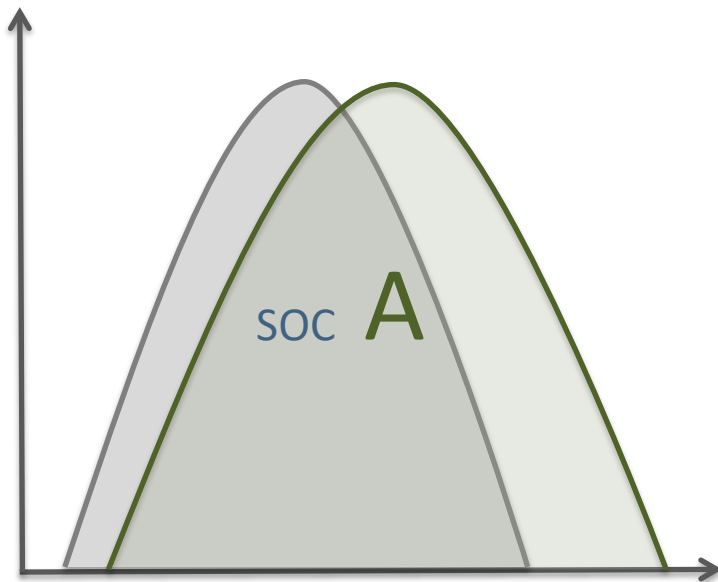
Enhance curative treatments in the setting of stage I-III

2. Secondary prevention

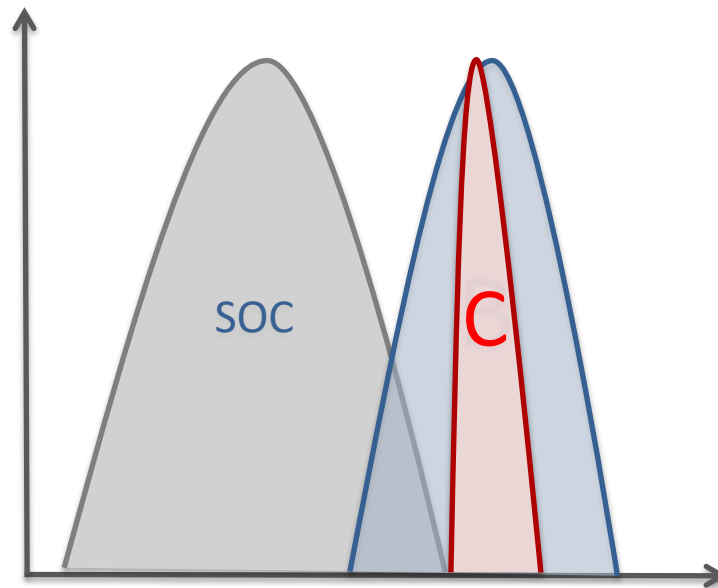
Stage shift from late stage to early stage cancers

3. Primary prevention

# Importance of patient selection



Unselected patients



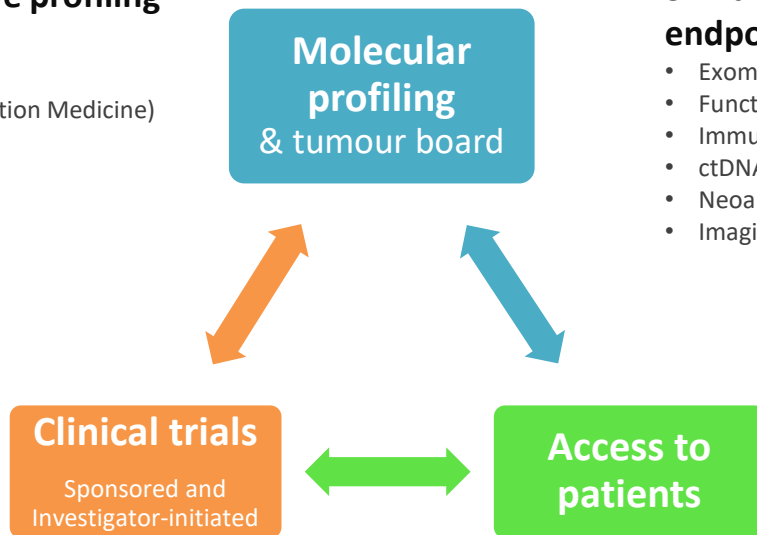
High precision Biomarker selection

- Deep understanding of disease biology
- Screen large patient populations
- Trial designs that expedite drug evaluation

# Key enablers for precision oncology

## 2. Real time prospective profiling in the clinic

- SGH pathology lab
- External vendors (e.g. Foundation Medicine)
- Other RI e.g. GIS (under LCGs)



## 1. Biomarker-driven clinical trials

- Phase I, II, III
- IIT vs industry
- Singapore Translational Cancer Consortium
- Regional networks e.g. ATORG/ APODDC

## 3. Translational science & novel trial endpoints

- Exome/ RNA-seq data, WGS
- Functional screens patient-derived models
- Immuno-monitoring, microbiome, mIHC
- ctDNA endpoints (e.g. Minimal Residual Disease)
- Neoantigen prediction e.g. for vaccine studies
- Imaging (radiomics)

## 4. Screen large patient cohorts

- National and regional networks e.g. STCC/ ATORG/ APODDC
- Expanding role of Real World Evidence



# SINGAPORE TRANSLATIONAL CANCER CONSORTIUM



1

## Peaks of Excellence & Thought-Leadership

- Build leading research and translational programmes in selected Asian cancers
- Become a reference centre for clinical trials in Asia
- Grow critical mass of local KOLs



2

## Health Impact

- Conduct world-class cancer research with high impact applications that improve health and healthcare
- Develop new ways of delivering cancer prevention, screening, treatment and care for Singapore



3

## Economic Impact

- Anchor critical mass of industry research, innovation and enterprise partnerships

# DRIVING INNOVATION & SYNERGY IN CANCER R&D

With our five integrated platforms, STCC is a “one-stop shop” for industry partners



*Prof Chng Wee Joo*  
Executive Director



*Prof Lim Soon Thye*  
Co-Director



## 1

### Cancer Clinical Trials & Investigational Medicine Units

Streamlined clinical trial start-up framework and a single contract agreement process



## 2

### Cancer Databases and Tissue Banks

Robust, secure and harmonised central catalogue portal for Asian-centric cancer samples and clinical research data



## 3

### Translational Research Integration and Support

A cooperative translational research framework for the development of a catalogue of novel molecular diagnostics and assays



## 4

### Business Intelligence and Development

A dedicated team that facilitates research partnerships and leads engagements between STCC and industry collaborators



## 5

### Impact and Population Health

A new platform that facilitates high impact novel cancer treatment approaches and evaluate measures to improve population health



*Prof Goh Boon Cher*  
NCIS



*A/Prof Daniel Tan*  
NCCS



*Dr Eng Chon Boon*  
NUHS



*A/Prof Iain Tan*  
SingHealth



*Dr Jason Chan*  
NCCS



*Dr Anand Jeyasekharan*  
CSI, NUS



*Dr Alexander Lezhava*  
GIS, A\*STAR



*Seck Yee Kwang*  
A\*STAR / BMS IPO



*A/Prof. Ker Kan Tan*  
NUHS



*A/Prof Iain Tan*  
SingHealth

**USA**  
318 million

**Germany**  
82 million

**UK**  
64.1 million



**Asia**  
701 million

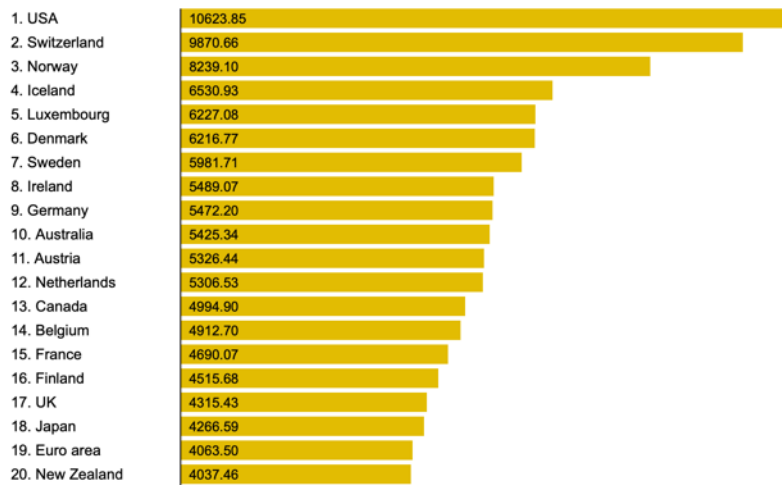
**India**  
1.30 billion

**China**  
1.37 billion

# Disparities in health care delivery

## healthcare spending per capita 2018

### GLOBAL



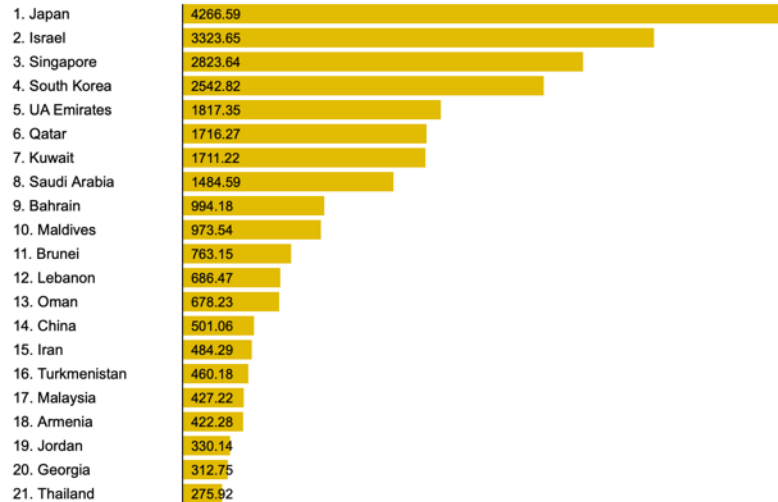
**Based on 182 countries**

Average 1172.05 USD

Highest: USA: 10623.85 USD

Lowest: Democratic Republic of the Congo: 18.51 USD

### ASIA



**Based on 41 countries**

Average 712 U.S. dollars.

Highest: Japan: 4266.59 USD

Lowest: Bangladesh: 41.91 USD.

# Barriers to effective cancer care vary

## high income vs low middle income countries

Country	Approx no. of Oncologists	Population	Oncologists/ million pop.
Indonesia	200	242.3m	0.83
Thailand	120	69.5m	1.73
Philippines	196	94.9m	2.07
Saudi Arabia	90	28.1m	3.20
Malaysia	100	28.9m	3.47
Vietnam	482	87.8m	5.49
Turkey	550	73.6m	7.47
Egypt	800	82.5m	9.69
USA	10600	311.6m	34.3
UK	1140	64.1m	17.8
France	845	66.0m	12.8

Thailand has 10 dedicated cancer centres whereas Indonesia only has 2 despite being a much larger and sprawling country

LMIC countries have on average 5-10x fewer oncologists per capita than HIC countries such as the USA or UK

Source: IMS Health Expertise, World Bank Population Figures

<i>Singapore</i>	<i>155</i>	<i>6.0m</i>	<i>25.8</i>
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# Local challenges in delivering the promise of precision oncology

- **Keeping the ecosystem in sync with oncology drug development (“high unmet need”)**
  - Regulatory agencies: health authorities, ethics boards
  - Use of surrogate endpoints
  - Rapidly evolving science: molecular profiling technologies
  - Clinical trial methodologies: small trial in defined populations, single arm
  - New pathways for drug access (accelerated approvals, single patient protocols)
- **Payers**
  - Affordability of cancer drugs
  - Impact of divergent standards of care on trial feasibilities
    - Inability to access even 1<sup>st</sup> gen/ 2<sup>nd</sup> gen SoC compounds: moving 3<sup>rd</sup> gen to frontline
    - Second in class/ bio-similars?
- **Investigators/ sites to deliver on trials**
  - Large underserved populations in Asia
  - Access to care: finances, proximity to healthcare facility, key translational infrastructure

# Sustainability of precision oncology

1. **State of the art molecular profiling and consolidating omic data in the region**
2. **Driving the leading edge of science through Molecular Tumor Boards**
3. **Delivering innovative clinical trials in the appropriate regulatory & payer climate**

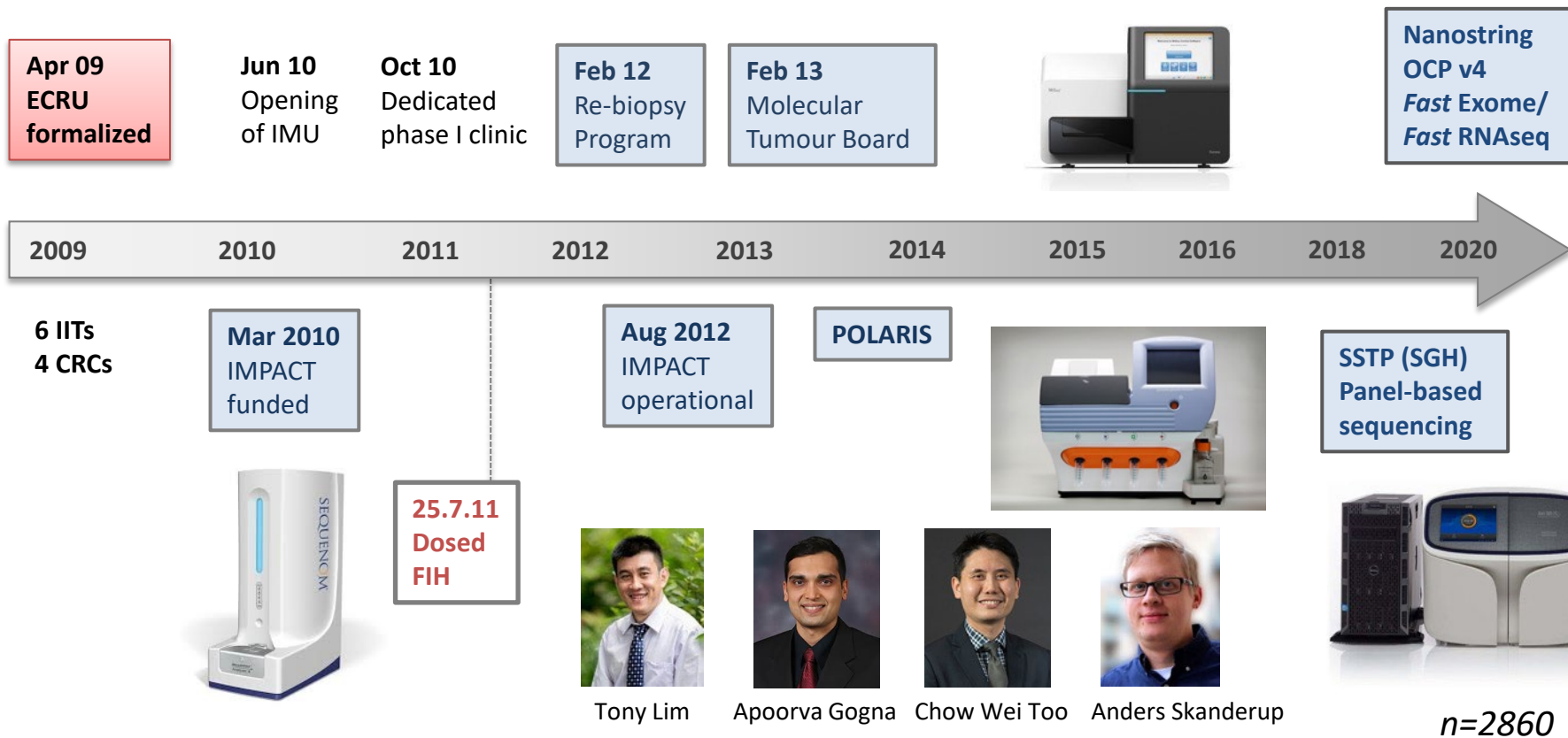
## Priorities for health systems

**Optimisation of cost-effective therapies in advanced cancers**

**Enhance curative treatments in the setting of stage I-III**

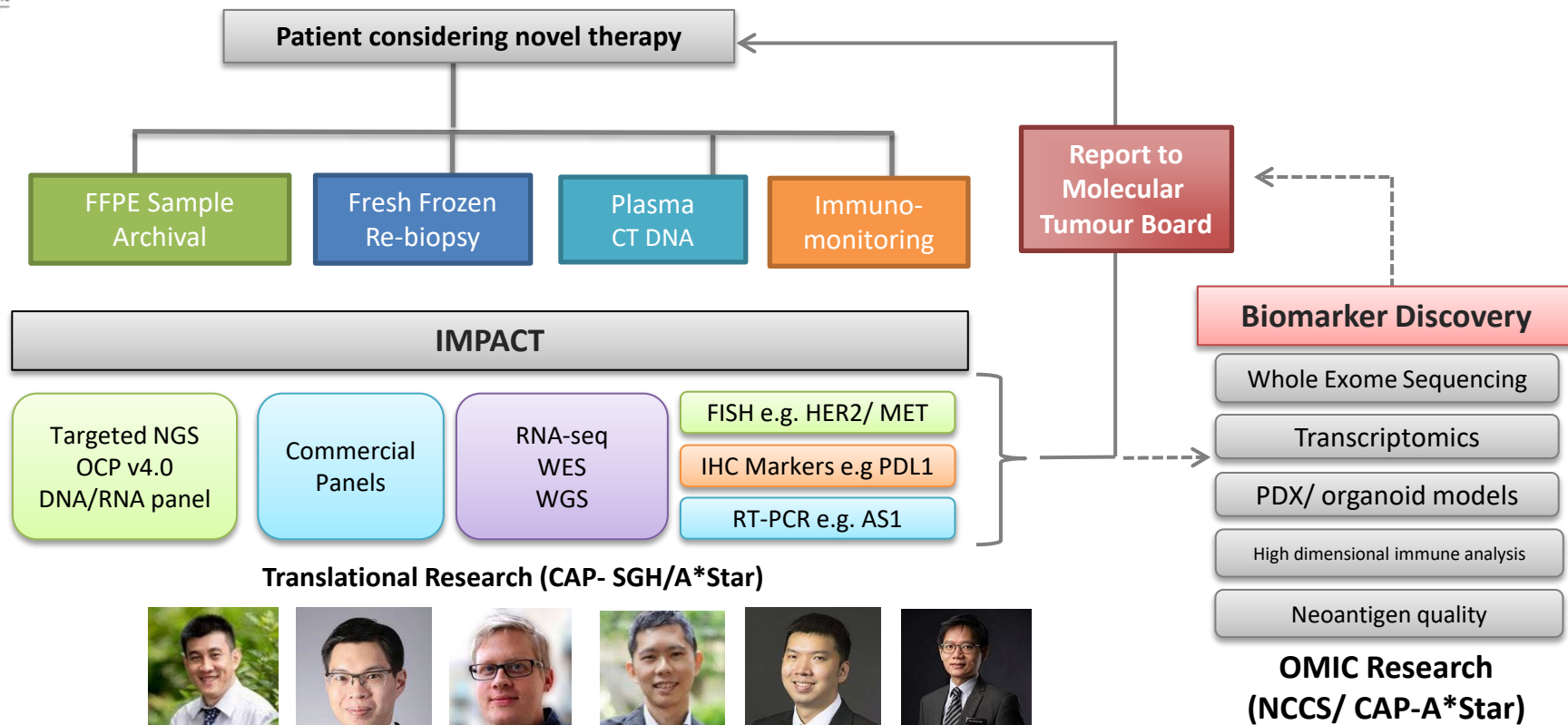
**Stage shift from late stage to early stage cancers**

# Individualized Molecular Profiling for Allocation of Cancer Therapeutics (IMPACT)





# IMPACT v2.0



## Translational Research (CAP- SGH/A\*Star)



Tony Lim



Iain Tan



A. Skanderup



Tam Wai Leong



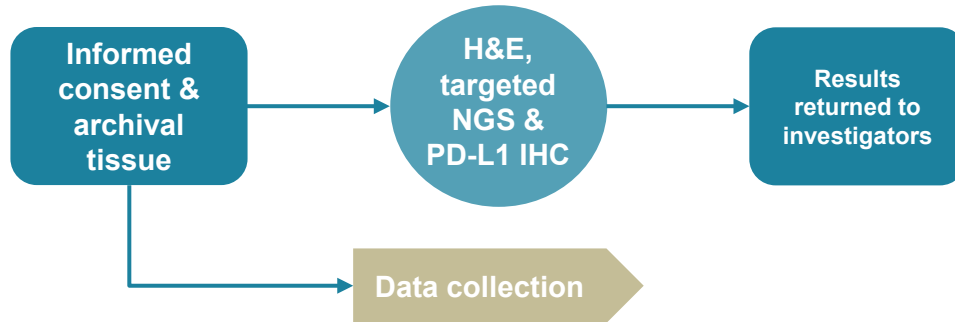
Joe Yeong

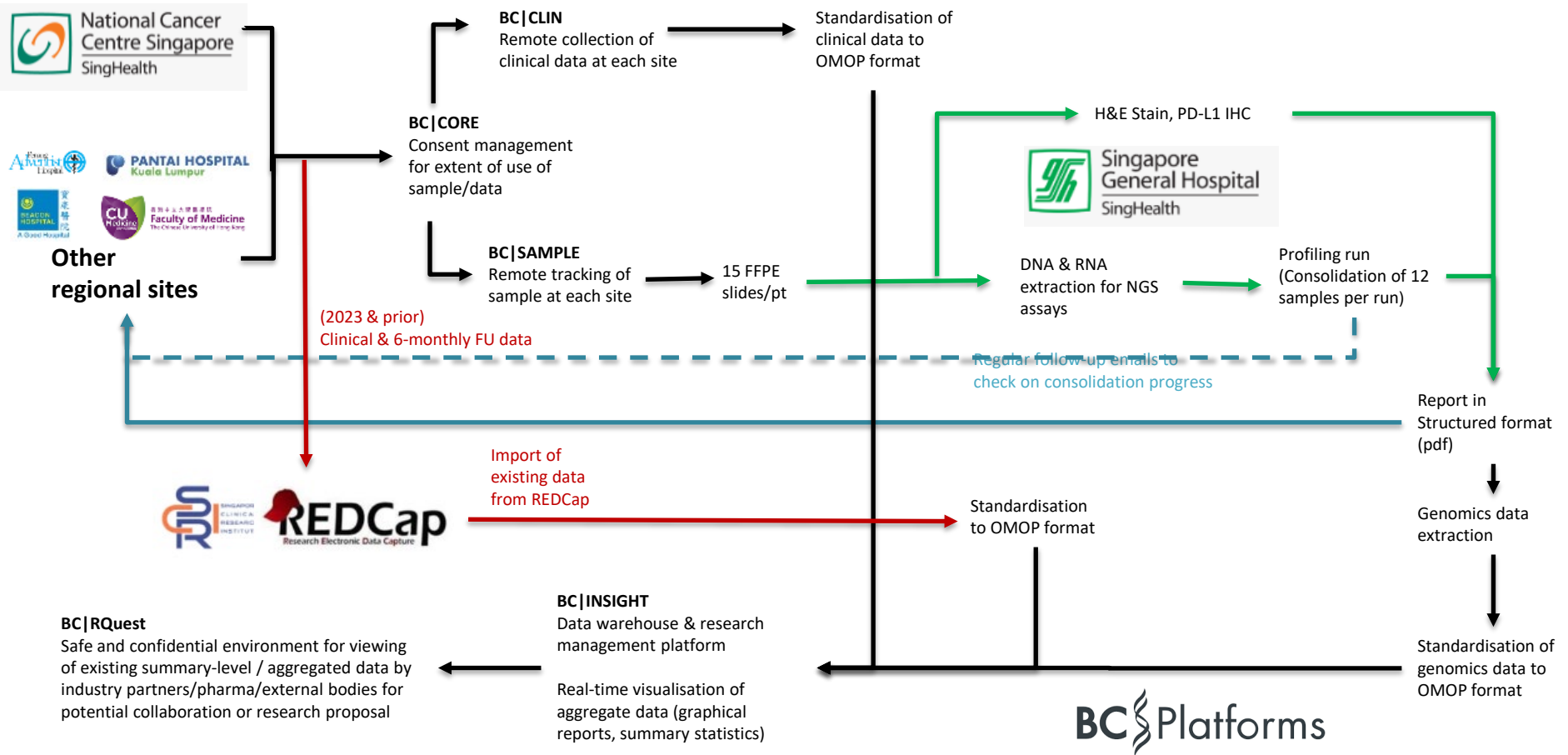


Jason Chan

# ATORG-001 Study Design

- Prospective tissue molecular profiling study of NSCLC
- Recruitment duration: 2019 – 2025
  - FPFV: Jan 2019
  - Target: 500 patients – Currently: 278/500
  - Sites: 10 active sites, 5 upcoming sites

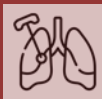




# Molecular Tumor Boards



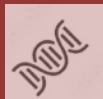
Patient  
consent &  
recruitment



Sample  
collection



Data  
collection



Molecular profiling

- FISH, IHC
- Next-generation sequencing
- Whole transcriptome sequencing
- Whole exome sequencing
- Whole genome sequencing
- ATAC-seq/CHIP-seq
- Patient-derived organoid models
- High-dimensional immune analysis



Clinical & molecular data  
curation & interpretation

- Oncological history and clinical phenotyping**
- Interpretation of molecular profiling results**
  - Variant filtering
- Variant annotation by levels of evidence:**
  - Functional consequence prediction
  - Pre-clinical data
  - FDA, NCCN approved therapies
  - Clinical trials



Molecular Tumour  
Board

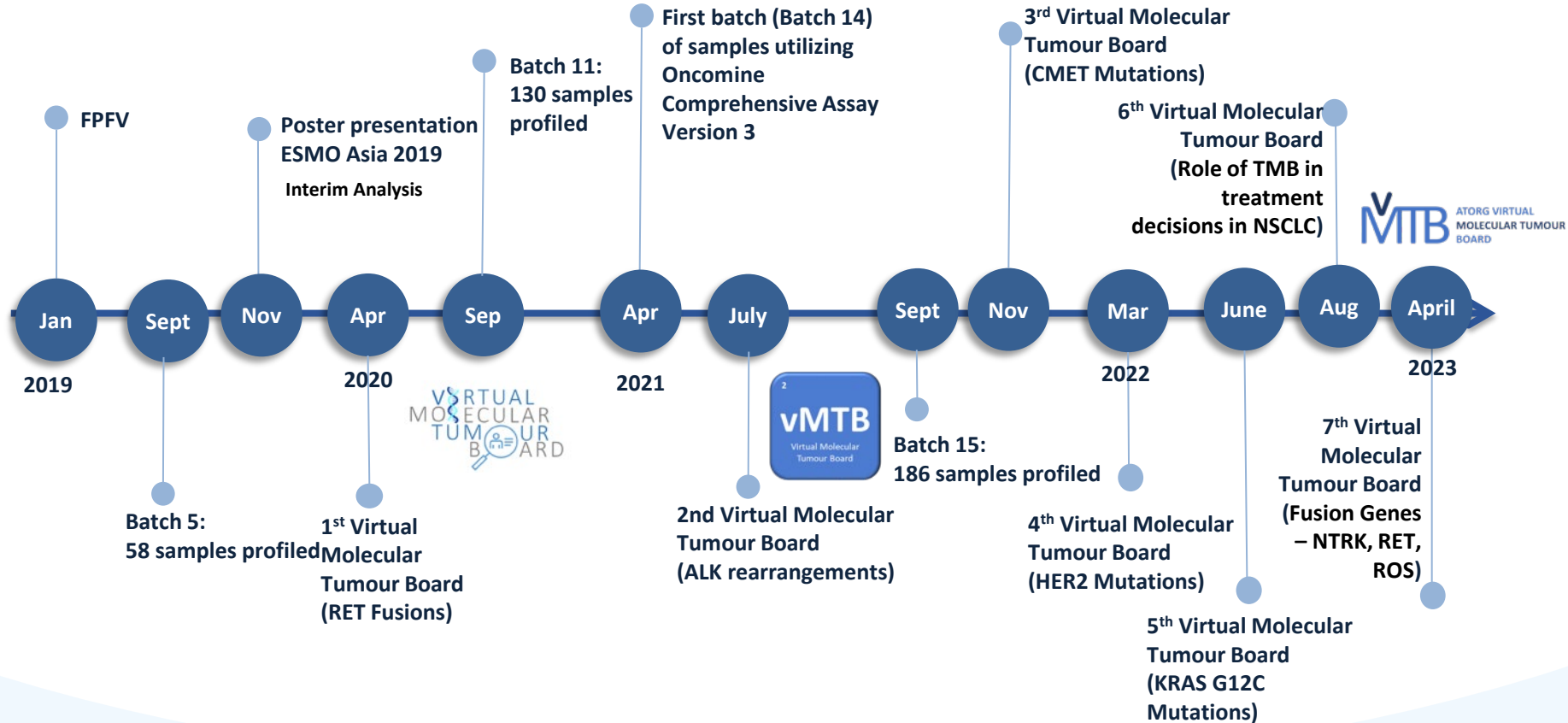
- Multi-disciplinary team of oncologists, pathologists, scientists, bioinformaticians, genetic counsellors and research coordinators**
- Discuss molecular profiling data in context with clinical data**
- Provide MTB recommendations in the form of:**
  - ✓ **Treatment options**
  - ✓ **Clinical trial options**
  - ✓ **Orthogonal assays**

**GENomic Insights Enabling platform**

Database warehouse to support  
research and development



# Virtual Molecular Tumor Boards



## Mission

To advance medical knowledge of lung cancer and improve health outcomes of patients in Asia

## Vision

To be the central coordinating platform for multi-centre clinical trials and translational research for thoracic malignancies in the Asia-Pacific region

## Aims

- Establish a trial coordination office for proof-of-concept trials
- Facilitate translational research for lung cancer across Asia
- Educate and train personnel in the conduct of clinical research

# ATORG Committees

## Executive Committee

- A/Prof Daniel Tan (National Cancer Centre Singapore)
- Prof Tony Mok (The Chinese University of Hong Kong)
- Prof Dong-Wan Kim (Seoul National University Hospital)
- Prof James Yang (National Taiwan University Cancer Center)



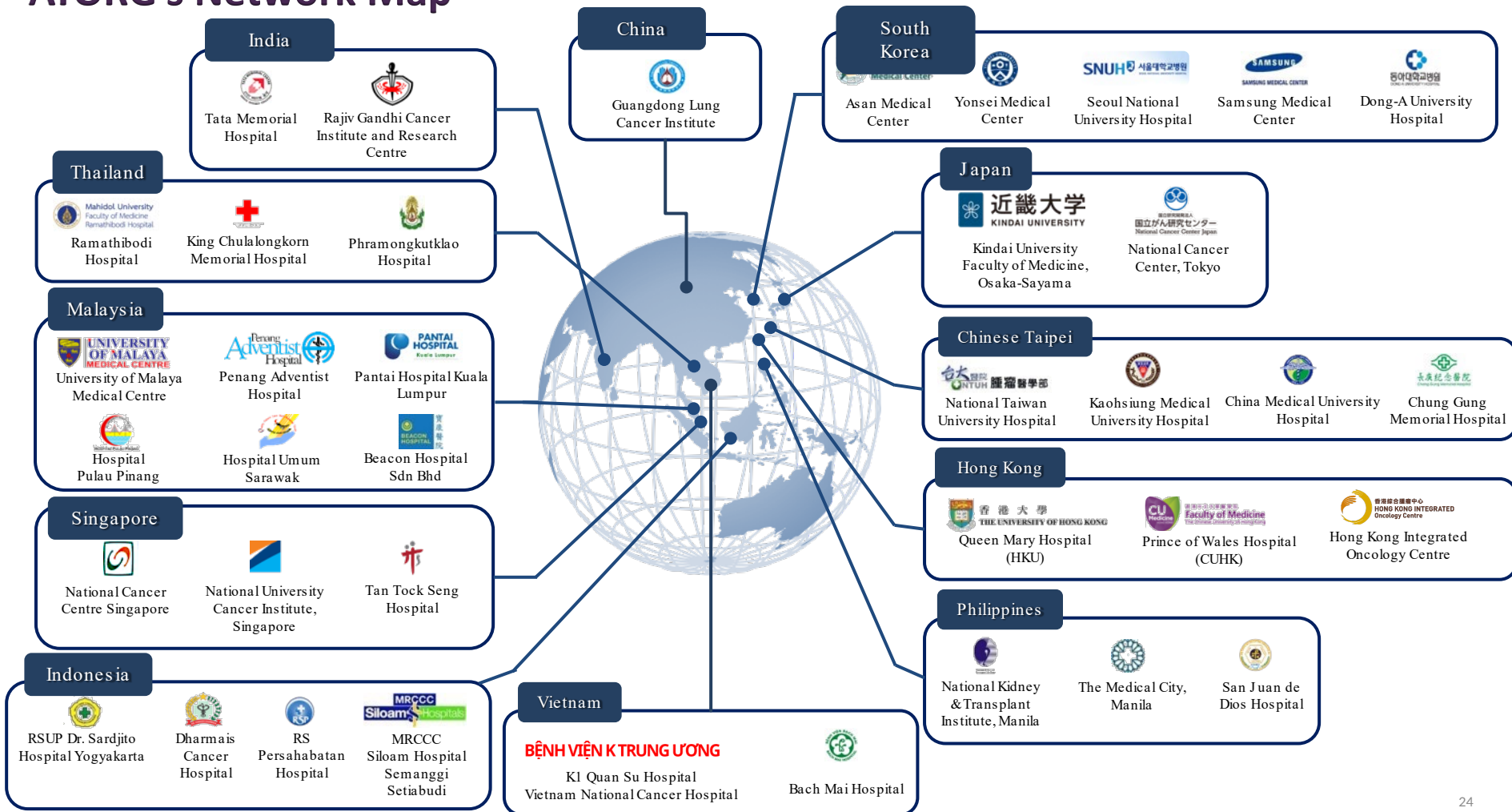
## Scientific Steering Committee

- A/Prof Daniel Tan
- Prof Tony Mok
- Prof Dong-Wan Kim
- Prof James Yang
- Dr Ross Soo (National University Cancer Institute Singapore)
- Dr Chee-Khoo Lee (University of Sydney, Australia)
- Dr Thanyanan Reungwetwattana (Ramathibodi Hospital, Thailand)

## Scientific Steering Committee Members



# ATORG's Network Map





# ATORG Studies



## Non-Interventional Clinical Studies

Study	Status
<b>ATORG001:</b> Tissue molecular profiling of non-small cell lung cancer (NSCLC)	Active, enrolling
<b>ATORG004:</b> Plasma molecular profiling in ALK inhibitor resistant NSCLC	Active, enrolling
<b>ATORG005:</b> KRAS mutant advanced NSCLC – characteristics, treatments & outcomes	Completed
<b>ATORG006:</b> EGFR ex 20 ins mutated NSCLC – characteristics, treatments & outcomes	Active, enrolling



## Clinical Trial

Study	Status
<b>ATORG-003:</b> Single-arm, open-label, Phase 2 study of dacomitinib with or without dose titration for 1 <sup>st</sup> line treatment of locally advanced or metastatic NSCLC with EGFR activation mutation	Enrolment completed



## 1<sup>st</sup> ATORG Scientific Forum 17 Aug 2017



**National Cancer Centre Singapore Auditorium**  
31 APAC Investigators, 26 Industry representatives

## MET NSCLC Consensus Meeting 29 Jan 2022

### Review Article

[Check for updates](#)

Asian Thoracic Oncology Research Group (ATORG) Expert Consensus Statement on *MET* Alterations in NSCLC: Diagnostic and Therapeutic Considerations

Myung-Ju Ahn,<sup>1</sup> Marvin Jonne L. Mendoza,<sup>2</sup> Nick Pavlakis,<sup>3</sup> Terufumi Kato,<sup>4</sup> Ross A. Soo,<sup>5</sup> Dong-Wan Kim,<sup>6</sup> Chong Kin Liam,<sup>7</sup> Te-Chun Hsia,<sup>8</sup> Chee Khooon Lee,<sup>9</sup> Thanyanan Reungwetwattana,<sup>10</sup> Sarayut Geater,<sup>11</sup> Oscar Siu Hong Chan,<sup>12</sup> Niyarat Prasongsook,<sup>13</sup> Benjamin J. Solomon,<sup>14</sup> Thi Thai Hoa Nguyen,<sup>15</sup> Toshiyuki Konuki,<sup>16</sup> James Chih-Hsin Yang,<sup>17</sup> Yi-Long Wu,<sup>18</sup> Tony Shu Kam Mok,<sup>19</sup> Daniel Shao-Weng Tan,<sup>20</sup> Yasushi Yatabe<sup>21</sup>

Virtual Platform

# Expert forums

## Stage III Expert Consensus Meeting 03 Aug 2018



**Hong Kong**  
13 Key Opinion Leaders from APAC

## Recommendations for use of NGS in APAC region. (June 2023)



### REVIEW

Recommendations for the use of next-generation sequencing in patients with metastatic cancer in the Asia-Pacific region: a report from the APODDC working group

H. H. Loong<sup>1</sup>, T. Shimizu<sup>2</sup>, A. Prawira<sup>3</sup>, A. C. Tan<sup>4</sup>, B. Tran<sup>5</sup>, D. Day<sup>6</sup>, D. S. P. Tan<sup>7</sup>, F. I. L. Ting<sup>8</sup>, J. W. Chiu<sup>9</sup>, M. Hui<sup>10</sup>, M. K. Wilson<sup>11</sup>, N. Prasongsook<sup>12</sup>, T. Koyama<sup>13</sup>, T. Reungwetwattana<sup>14</sup>, T. J. Tan<sup>15</sup>, V. Heong<sup>16</sup>, P. J. Voon<sup>17</sup>, S. Park<sup>18</sup>, I. B. Tan<sup>19</sup>, S. L. Chen<sup>20</sup> & D. S. W. Tan<sup>21</sup>

<sup>1</sup>Department of Clinical Oncology, The Chinese University of Hong Kong, Hong Kong, China; <sup>2</sup>Department of Pulmonary Medicine and Medical Oncology, Wakayama Medical University Graduate School of Medicine, Wakayama, Japan; <sup>3</sup>Cancer Trials and Research Unit, Prince of Wales Hospital, Sydney, Australia; <sup>4</sup>Division of Medical Oncology, National Cancer Centre Singapore, Singapore; <sup>5</sup>Department of Oncology, Peter MacCallum Cancer Centre, Melbourne; <sup>6</sup>Department of Oncology, Monash Health and Monash University, Australia; <sup>7</sup>Department of Hematology-Oncology, National University Cancer Institute, Singapore; <sup>8</sup>Department of Medicine, Dr. Pakis O. Torre Memorial Hospital, Bacolod, Philippines; <sup>9</sup>Department of Medicine, The University of Hong Kong, HKMAR, Pok Fu Lam, Hong Kong, China; <sup>10</sup>Department of Medical Oncology, Chiv O'Brien Lifetime Carepensions, Australia; <sup>11</sup>Department of Medical Oncology, Auckland City Hospital, Auckland, New Zealand; <sup>12</sup>Division of Medical Oncology, Phramongkolkeha Hospital, Bangkok, Thailand; <sup>13</sup>Department of Experimental Therapeutics, National Cancer Center Hospital, Tokyo, Japan; <sup>14</sup>Division of Medical Oncology, Department of Medicine, Faculty of Medicine Ramathabodi Hospital, Mahidol University, Bangkok, Thailand; <sup>15</sup>Department Medical Oncology, Tan Tock Seng Hospital, Singapore; <sup>16</sup>Radiation Therapy and Oncology Department, Hospital Unim Sarawak, Kuching, Malaysia; <sup>17</sup>Division of Hematology-Oncology, Department of Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, South Korea

## ATORG 2<sup>nd</sup> Scientific Forum 26 Jul 2019



**Seoul National University Hospital Biomedical Research Institute's Auditorium**

## Peri-operative consensus meeting 26 April 2024, Singapore



# Regional differences in clinical trials delivery

	<b>US</b>	<b>EU</b>	<b>Asia</b>
<b>Population</b>	331.9 million	447 million	4.56 billion
<b>No of countries</b>	1	27	48
<b>Regulatory approval</b>	FDA	EMA	Multiple countries
<b>Reimbursement</b>	1	Country specific	Country specific
<b>Grant funding</b>	1	1	Country specific
<b>Obstacles</b>	<ul style="list-style-type: none"> <li>• Staffing</li> <li>• Multiple trials/ investigators</li> <li>• Physician education</li> </ul>	<ul style="list-style-type: none"> <li>• Staffing</li> <li>• Multiple trials/ investigators</li> <li>• Access to molecular profiling (diff reimbursement policies)</li> </ul>	<ul style="list-style-type: none"> <li>• Staffing</li> <li>• Few trials accessible to lower HDI countries</li> <li>• Patchy access to molecular profiling</li> <li>• Disparity &amp; Diversity</li> </ul>
<b>Networks</b>	ECOG, SWOG, NCI, ASCO	EORTC, German/ French trials groups	Korean, Japan, China trials group, few outside

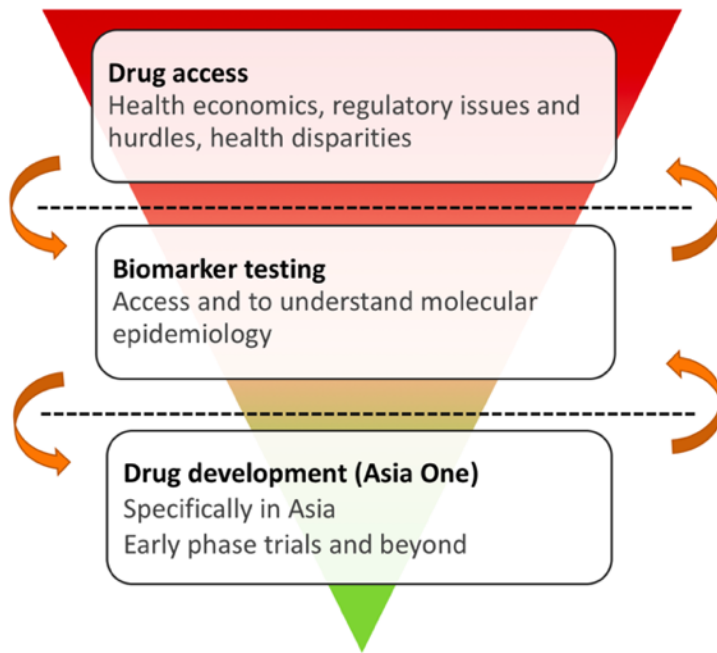
# Tackling drug development and accessibility through APODDC



## Executive Committee:

Herbert Loong (Hong Kong)  
Daniel Tan (Singapore)  
Toshio Shimizu (Japan)

improve clinical trials infrastructure including continuous training and information sharing of “best practices” in Asian sites.



Ensuring drug accessibility for patients by improving our understanding of **health economics** and **regulatory issues and/or hurdles** within the region

**Early phase to late phase clinical trials** development of a compound

# Project Orbis

A framework for concurrent submission and review of oncology products

## Project Orbis Partners

The U.S Food and Drug Administration together with the Australian Therapeutic Goods Administration (TGA) and Health Canada (HC) took part in the first Project Orbis collaborative review. Since then, other countries have joined and become Project Orbis Partners (POP).

- [Australian Therapeutics Goods Administration \(TGA\)](#) 
- [Brazil's National Health Surveillance Agency \(Agência Nacional de Vigilância Sanitária \[ANVISA\]\)](#) 
- [Health Canada \(HC\)](#) 
- [Israel Ministry of Health \(IMoH\) Pharmaceutical Administration](#) 
- [Singapore Health Sciences Authority \(HSA\)](#) 
- [Switzerland Swissmedic](#) 
- [United Kingdom Medicines and Healthcare Products Regulatory Agency \(UK MHRA\)](#) 

## 2022 Real World Evidence Webinar Session #4

### Session topics:

- 1) Introduction to RWE (Jul '22)
- 2) Next Generation RWE in personalized medicine (Aug '22)
- 3) RWE and Drug Development (Sep '22)

### 4) Genomic Databases & RWE

- 5) Big Data and RWE (Nov '22)
- 6) Future Directions and RWE Opportunities in Asia Pacific (Dec '22)

### OUR PRESENTERS



**PROF. HUAKANG TU**  
Professor & Associate Dean,  
School of Public Health at  
Zhejiang University  
Accelerating Personalized  
Oncology Care through Real  
World Clinico-Genomic Database



**PROF. HIROYUKI MANO**  
Executive Director, NCC  
Research Institute and C-CAT,  
National Cancer Center Japan  
C-CAT Experience: Future Real-  
World Clinico-Genomic Database

### MORE INFORMATION :

**FRIDAY,  
21 OCTOBER 2022**

**8:15AM-9:30AM  
(GMT+8)**

**ZOOM**

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RECEIVE THE  
WEBINAR  
DETAILS



A certificate of attendance will  
be awarded to attendees who  
meet our criteria at the end of  
the webinar series.

More details will be shared during the  
welcome & introduction part of the webinar!

Keep in Touch with us  
for the latest updates!



@APODDC



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Simply search "APODDC Page"

## 2022 Real World Evidence webinar session #5

### Session topics:

- 1) Introduction to RWE (Jul '22)
- 2) Next Generation RWE in personalized medicine (Aug '22)
- 3) RWE and Drug Development (Sep '22)
- 4) Genomic Databases and RWE (Oct '22)

### 5) Big Data & RWE

- 6) Future Directions and RWE Opportunities in Asia Pacific (Dec '22)

### OUR PRESENTERS



**DR. JEFFREY S. BROWN**  
Chief Scientific Officer, TriNetX  
Lecturer, Harvard Medical School  
Optimising clinical trial design,  
site selection, and supporting  
external comparators



**PROF. SENGWEE DARREN TOH**  
Professor and Associate Director,  
Division of Therapeutics Research  
and Infectious Disease Epidemiology,  
Harvard Medical School  
Common data models and  
distributed querying

### MORE INFORMATION :

**THURSDAY,  
24 NOVEMBER 2022**

**8:15AM-9:30AM  
(GMT+8)**

**ZOOM**

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## Real World Evidence webinar session #6: Future Directions and RWE Opportunities in Asia Pacific

### OUR PRESENTERS



**PROF. K. ARNOLD CHAN**  
Vice President for RWE  
Consulting, TriNetX  
Director, Health Data Research  
Center, National Taiwan University  
Potential Methodology Errors with  
RWE Research



**A/PROF. HERBERT LOONG**  
Clinical Associate Professor, The  
Chinese University of Hong Kong  
Synthetic Key Takeaways from  
this RWE Webinar Series

### PANEL MEMBERS

Co-moderator & Transform session on establishing  
partnership and framework to advance RWE in  
Asia Pacific



**A/PROF. MICHAEL KELEN**  
Executive Director of  
Observational Research,  
Amgen



**PROF. GRACE LI WONG**  
Professor,  
Department of Medicine & Therapeutics,  
The Chinese University of Hong Kong



**DR. KEITH D. WILNER**  
Executive Director, Oncology  
Lead Product Development, Pfizer



**MS. MICHELLE YU KITE**  
Director, Worldwide Regulatory  
Strategies, Pfizer



**PROF. HUAKANG TU**  
Professor, School of Medicine,  
Zhejiang University



**DR. JEFFREY S. BROWN**  
Chief Scientific Officer, TriNetX  
Lecturer, Harvard Medical School



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### MORE INFORMATION :

**FRIDAY,  
16 DECEMBER 2022**

**8:15AM-9:30AM  
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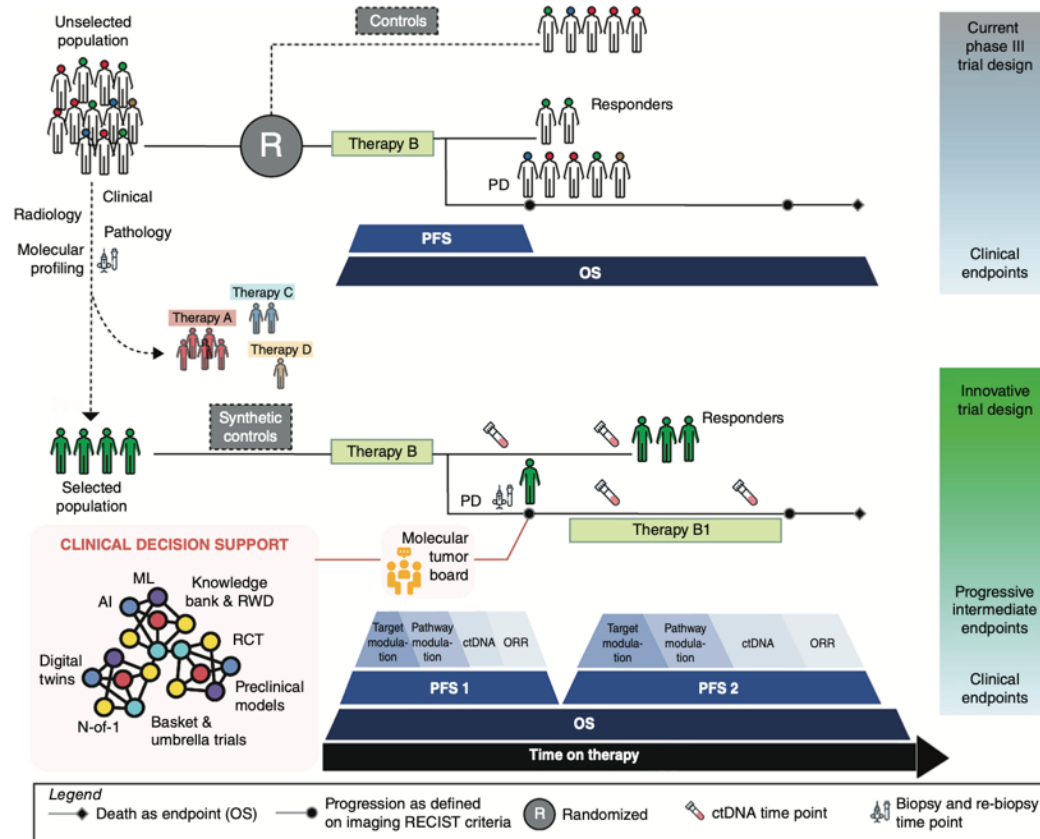


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# Accelerating drug development through multi-omics tools



# Conclusion

- **Precision oncology studies are not accomplished with genomic profiling alone**
  - Access to therapies/ trials and Screening of large populations
- **Alongside sponsored trials, there is an important role for pragmatic clinical trials complemented by RWD through leveraging on academic networks**
  - Data aggregation: clinical and translational science
  - Streamline clinical trial operations
  - Education: novel diagnostic tools and therapeutic modalities, new disease settings, molecular tumor boards
- **Collaborate on trials that can inform practice as well as incorporate innovative designs e.g. minimally residual disease to rationalize therapeutics**





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Thank you

