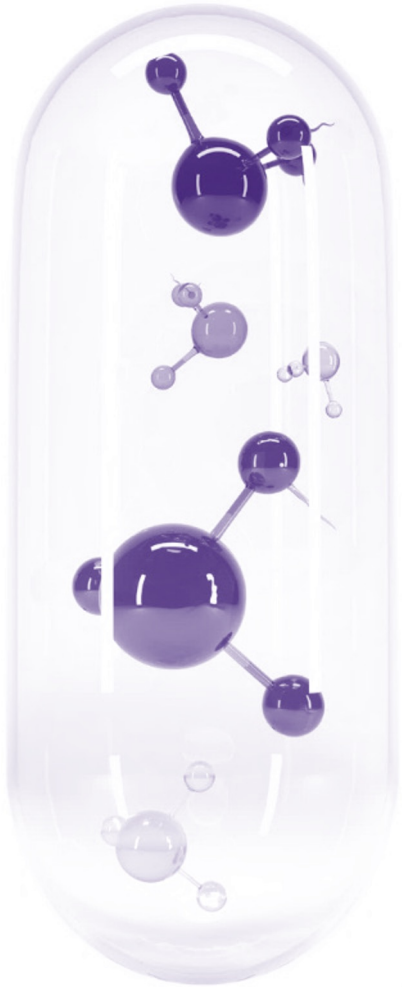
EDDC Experimental Drug Development Centre

Annual Report 2022

January – December

Contents



Bridge the drug development gap in Singapore

- Engage local entities to translate biomedical research projects into drugs for commercialization
- Bridge the drug development gap with expert know-how and innovative drug platforms

Attract research investments & catalyse the biopharma ecosystem

- Develop a pipeline of high-quality therapeutic assets that attract and sustain private investments into Singapore
- Encourage the spin-off of innovative biotech companies to enhance Singapore's biotech ecosystem

As a publicly funded national drug development platform, EDDC's Governing Board comprises members from key public agencies as well as former industry veterans.

"EDDC's sustained, cumulative efforts to translate local ideas into potential therapeutics is bearing fruit, with exceptional results delivered in 2022.
Its continued success will further invigorate Singapore's biotech sector and propel the country forward on the global stage.

Congratulations to the team!"

Prof William Chin
Bertarelli Professor of Translational Medical Science Emeritus, Harvard Medical School
Formerly SVP Discovery Research, Eli Lilly
Co-Chairman

"2022 has been a good year for EDDC, with three assets out-licensed and another one about to enter clinical trials in the US and Singapore.
EDDC is also fulfilling its role as a national platform, with more partnerships with academic and clinical partners, as well as with companies.

It has been inspiring working with Damian and team!"

Prof Benjamin Seet
Group Chief Research Officer
National Healthcare Group
Co-Chairman

Dear colleagues & friends of EDDC,

Over three years ago, we brought together the knowledge and expertise of our three legacy units and began our journey as the Experimental Drug Development Centre (EDDC). As Singapore's national platform for drug discovery and development, we are committed to developing therapeutics that save and improve the lives of patients in Singapore, Asia, and the world. We have established outreach networks to seek collaboration opportunities with the public sector and industry to translate the great science arising from the community into commercially relevant and innovative healthcare solutions, particularly for Asian-prevalent diseases. As we continue to expand our efforts, the eyes of the international community are turning towards us and the unique space we have carved out for EDDC.

This year, we are proud of the growth and progress that has been made. Through the unceasing efforts of all the functional groups in EDDC, we have made meaningful contributions in the development of therapeutic solutions to meet the needs of some of the world's most significant medical conditions; these include colorectal, ovarian and lung cancers amongst other cancer types, infectious diseases, as well as pulmonary and related fibrotic diseases. Their efforts exemplifies the kind of close team work and innovation required in drug discovery to successfully bring first-in-class or best-in-class projects to major value inflection points. This is reflected in the out-licensing deals that EDDC secured this year.

On top of that, our fee-for-service initiative, EDDC Academic Research Organization (EARO), has contributed much to supporting the emerging biotech ecosystem in Singapore through service provision and strategic collaborations.

In the coming year, you will see us further increase our impact in engaging and partnering with the local ecosystem to advance and translate early-stage drug discovery projects; we will build new and innovative capabilities and platforms in drug discovery to transform human health; and we will train a new cadre of Drug Discovery and Development scientists and professionals. In this way we will continuously strive to realise our vision of turning great science into great medicines.

We are honoured and grateful for your continued support of our vision and mission. I'm proud of what has been achieved as a team and eager for what lies ahead. As you read our second annual review, I hope to share the stories of our projects, platforms and people behind them with you.

Sincerely,

Prof Damian O'Connell
Chief Executive Officer
Experimental Drug Development Centre

EDDC's Governing Board

Co-Chairs

Prof William Chin
Bertarelli Professor of Translational Medical Science Emeritus, Harvard Medical School
Formerly SVP Discovery Research, Eli Lilly

Prof Benjamin Seet
Group Chief Research Officer
National Healthcare Group

Members

Prof Tan Sze Wee
Assistant Chief Executive
Innovation & Enterprise,
A*STAR

Prof Ng Huck Hui
Assistant Chief Executive
BMRC, A*STAR

Mr Beh Kian Teik
Chief Executive Officer
National Research Foundation

Dr Danny Soon
Chief Executive Officer, CRIS,
Ministry of Health
Executive Director, SCRI

Ms Wan Yee GOH
Senior Vice President &
Head Healthcare
Economic Development Board

A/Prof Tan Say Beng
Executive Director
National Medical Research Council

Ms Audrey Lok
Director
(Healthcare & Biomedical)
Enterprise Singapore

Dr Andreas Wallnoefer
Chair of EDDC Portfolio
Review Committee
(ex-officio)

Prof Damian O'Connell
Chief Executive Officer
EDDC
(ex-officio)

BMRC: Biomedical Research Council | CRIS: Consortium for Clinical Research and Innovation Singapore | SCRI: Singapore Clinical Research Institute

Our Organization

Damian O'Connell
Chief Executive Officer

Ang Hwee Ching
Deputy CEO

Ho Soo Yei
Chief of Staff

Management

Chief **S**cientific **O**fficer

Portfolio **D**iscovery **L**eaders

Asset **D**evelopment **L**eaders

Functions

- Target & Assay Biology I
- Target & Assay Biology II
- Target & Assay Biology III
- Therapeutic Protein & Antibody Discovery
- Antibody Design
- Computational Biology
- Project Management
- Chemical Biology
- Medicinal Chemistry
- Peptide Chemistry
- *In vivo* Pharmacology
- Biomarker Development
- Innovation

- Business Development
- Alliance Management
- Digital Communications
- Strategy Planning

- Regulatory Affairs
- Medical
- Clinical Operations
- CMC
- Quality Assurance

- Operations
- Resource Management

- Information Technology
- Information Systems

Initiatives

TARGET TRANSLATION CONSORTIUM

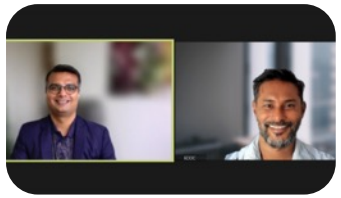
The TTC's support programme has been merged with the Singapore Therapeutics Development Review (STDR) since FY2021

EARO

EDDC in 2022

EDDC in 2022 - Snapshots

Everest Medicines licenced EDDC-2214



EDDC interviewed AUM Biosciences on partnership

Co-organized inaugural Structural Biology Symposium

- GB & PRC meeting
- EDDC Townhall
- EDDC co-organized BIO Asia Taiwan

STDR workshop

Teambuilding

STDR (September) grant call

Jan | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec**

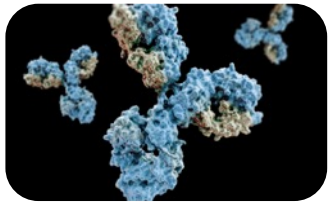
Townhall

EDDC internal Portfolio Day

STDR (April) grant call open

EDDC attended ASCO and BIO 2022

Boehringer Ingelheim licensed cancer targeting antibodies



Minister (T&I) Gan Kim Yong visited EDDC

Neuro-Horizon Pharma licensed inhibitors against Tuberculosis

Ferring-EDDC Symposium

- Townhall
- US FDA IND approval for EBC-129
- Year-end dinner

ASCO: American Society of Clinical Oncology | BIO: Biotech Innovation Organization | FDA: Food & Drug Administration | IND: Investigational New Drug | T&I: Trade and Industry

Our Key Achievements in 2022

January to December

Worked on **17** **Pipeline Projects**

Formed **6** **New Public Sector Collaborations**

Received **1** **National Awards (COVID-19)**

3 **Out-licensing deals announced**

12 **Other Engagements with Local Biotech and Industry**

3 **Innovative Platforms Initiated**

3 **New Collaborative projects with industry**

1 **Patent Application**

1 **Successful IND Application**

Awarded 9 Target Translation Consortium (TTC) projects through the STDR*

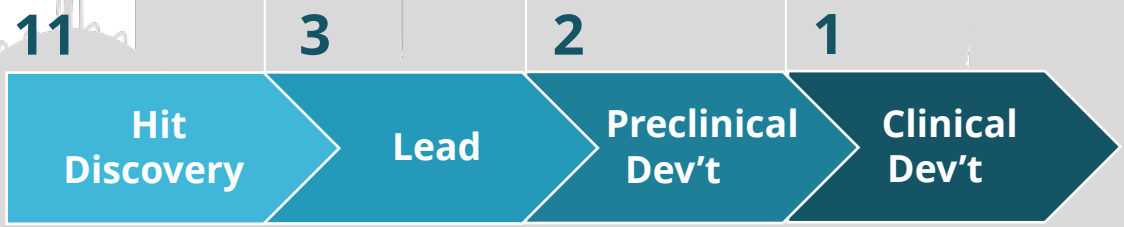
EDDC Academic Research Organization (EARO) obtained ISO 9001:2015 certification

*STDR: Singapore Therapeutics Development Review

17 Ongoing Pilot & Portfolio Projects

9 Small Molecules
8 Biologics

10 in Oncology
4 in Fibrosis
1 in Infectious Diseases
2 in Ophthalmology



3 assets out-licensed in 2022

- *Everest Medicines*
- *Boehringer Ingelheim*
- *Neuro-Horizon Pharma*

Addressing diseases relevant to Singapore & Asia

- *Targeting **4 of the top 10** cancers in Singapore*
- *Addressing conditions with unmet need and/or in aging populations e.g. Glaucoma, fibrotic diseases*

8 ongoing collaborative grant-funded projects

Contributing drug development expertise

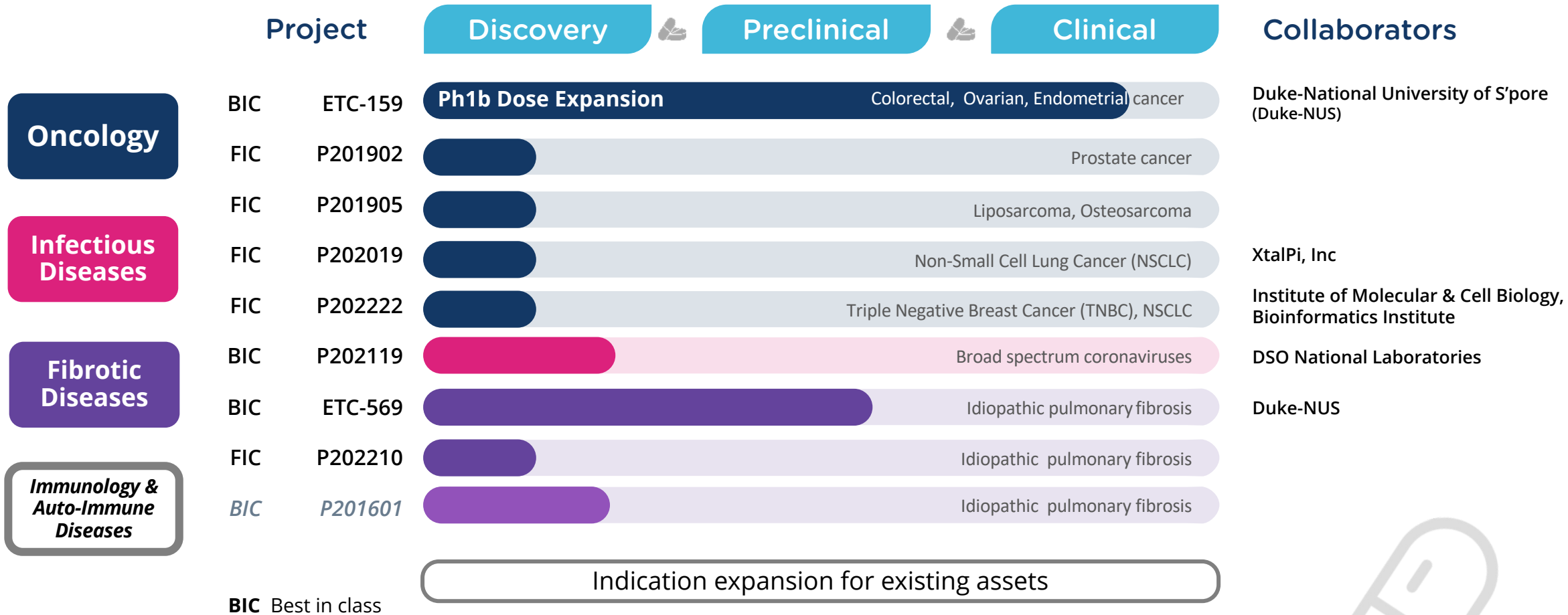
4 Early Ideas* Projects

*Internal, exploratory projects

7 Public Collaborations

3 Industry Collaborations

Small Molecule Portfolio



BIC Best in class
FIC First in class
Pilot projects in *italics*

Concluded 1 other project in 2022

Large Molecule Portfolio

	Project		Discovery → Preclinical → Clinical	Collaborators
Oncology	FIC	EBC-129	**Starting Ph 1 in 1Q2023** — Pan-solid tumours	National Cancer Centre S'pore, Bioprocessing Tech Institute, Institute of Molecular & Cell Biology
	FIC	*P202008c*	TNBC, Pancreatic cancer	
Fibrotic Diseases	*FIC*	*P202206*	Solid tumours	*Genome Institute of S'pore*
	FIC	*P202221*	Solid tumours	
	BIC	P202008f	Idiopathic Pulmonary Fibrosis (IPF)	Genscript ProBio
Ophthal -mology	*FIC*	*TBD*	IPF, Systemic sclerosis	
	FIC	P202009	Glaucoma	NUS, S'pore Eye Research Institute (SERI)
Immunology & Auto-Immune Diseases	*FIC*	*P202215*	Angiogenic Eye Diseases	*SERI*

Forming collaborations with key research partners

BIC Best in class
FIC First in class
Pilot projects in *italics*

Concluded 2 other projects in 2022

Diversifying our portfolio

EDDC appointed **Portfolio Discovery Leaders (PDLs)** since 2021 to develop strategies for expanding EDDC's portfolio of projects into broader disease areas including immuno-oncology, auto-immune diseases, fibrotic diseases and infectious diseases. Our PDLs engage the local, and where needed, international community to collaboratively identify unmet medical needs as well as drug discovery and development opportunities for these disease indications.

LIM Siew Pheng
PDL for Infectious Diseases
Director, Discovery Biology I

Christophe BODENREIDER
PDL for Fibrotic Diseases
Director, Target Translation Consortium & Executive Director, EARO

Snow LEE
PDL for Autoimmune Diseases and Immuno-Oncology
Associate Director, Discovery Biology II

Deepening our portfolio

EDDC also has **Asset Development Leaders (ADLs)** to oversee the progress of projects entering preclinical to clinical development. ADLs use their extensive discovery and/or development experience to lead integrated project teams comprising Discovery Biology, Discovery Chemistry, Translational Sciences, Development, Project Management and Business Development colleagues.

ADLs plan ahead to prepare for regulatory submissions, as well as to ensure that the projects' differentiation against the competition is well exemplified. They ensure that the team generates critical data packages within budgets and deadlines.

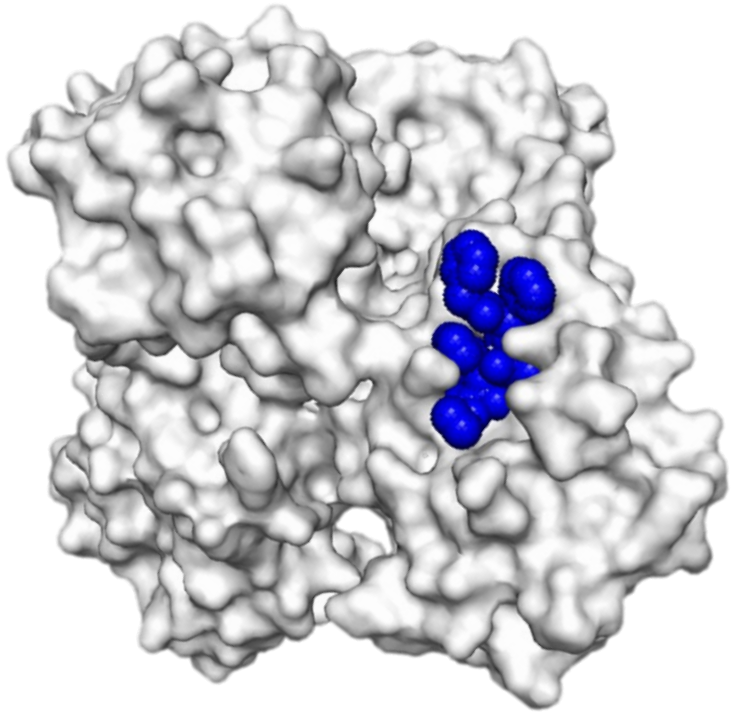
Kantharaj Ethirajulu
ADL

Veronica Diermayr
ADL

Our Key Projects

Out-licensing of Small Molecule 3C-like Protease Inhibitors to Everest Medicines

EVEREST MEDICINES ENTERS INTO A GLOBAL LICENSING AGREEMENT TO DEVELOP AND COMMERCIALIZE SINGAPORE EDDC'S 3CL PROTEASE INHIBITORS AS POTENTIALLY BEST-IN-CLASS COVID-19 ORAL ANTIVIRAL TREATMENTS
14 Jan 2022



In January 2022, EDDC's novel series of viral 3C-like ("3CL") protease inhibitors were out-licensed to Everest Medicines ("Everest") as potentially best-in-class COVID-19 oral antiviral treatments. Everest Medicines is a biopharmaceutical company focused on developing and commercializing transformative pharmaceutical products that address critical unmet medical needs for patients in Asian markets.

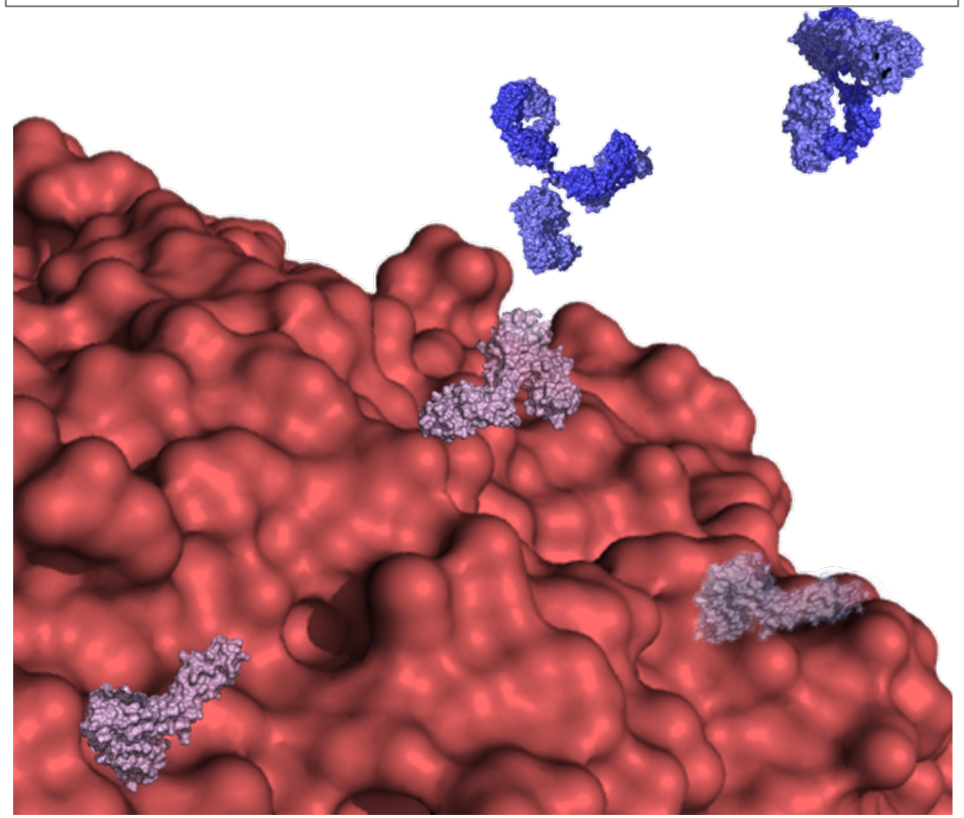
This series of inhibitors have demonstrated potent in-vitro activity against SAR-CoV-2 and its variants, as well as other coronaviruses such as MERS. The lead compound, EDDC-2214, was developed **from discovery to Preclinical Development Candidate stage in 18 months by a cross-functional team at EDDC**. Compared to several other oral COVID-19 antivirals, EDDC-2214 exhibits better in-vitro potency and pre-clinical oral bioavailability.

If successfully developed through clinical trials, EDDC-2214 can potentially be used as a treatment in future pandemics initiated by coronaviruses.

"The rapid progress of this project from conception to out-licensing is extraordinary, even by industry standards. Credit goes to the many members of the integrated project team and our collaborators who worked at full speed despite COVID-19 disruptions."
- **Kantharaj Ethirajulu, Asset Development Leader**

Out-licensing of Novel Antibodies to Boehringer Ingelheim

BOEHRINGER INGELHEIM ENTERS GLOBAL LICENSING AGREEMENT TO DEVELOP AND COMMERCIALIZE INNOVATIVE ANTIBODIES FROM A*STAR FOR TARGETED CANCER THERAPIES
2 Jun 2022



In June 2022, a panel of innovative, tumor-specific antibodies resulting from a collaboration involving EDDC, A*STAR's Genome Institute of Singapore (GIS), Institute of Bioengineering & Bioimaging (IBB) and Singapore Immunology Network (SIgN), with support from the Singapore Gastric Cancer Consortium, was out-licensed to Boehringer Ingelheim, a leading research-driven biopharmaceutical multinational company.

These antibodies exclusively target antigens that were initially identified from gastric cancer cells but are absent on normal healthy tissues. They can potentially enable the development of safer, more efficacious therapies across a range of solid tumors.

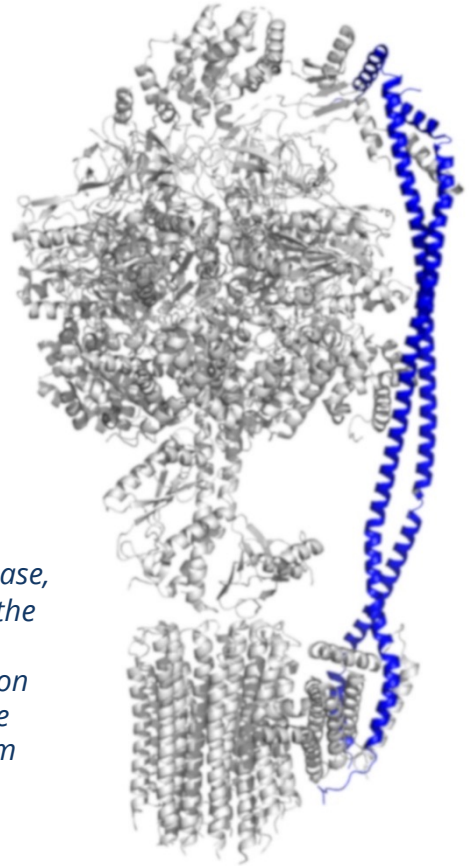
Boehringer Ingelheim aims to use these antibodies to direct therapeutic effector mechanisms such as antibody-drug conjugates and T-cell engagers exclusively to tumor cells, and to that end develop a range of highly targeted cancer treatments.

"This success is the result of the collective expertise and collaboration of all the partners. Within EDDC, our teams, with BD colleagues, also worked hard to translate the great science into validated applications, and to develop a comprehensive data package required for out-licensing. Drug discovery is truly a team sport!"
- **Snow, Associate Director, Discovery Biology II**

Out-licensing of Small Molecule ATP Synthase inhibitors to Neuro Horizon Pharma

US-BASED NEURO-HORIZON PHARMA LICENSES PROMISING COMPOUNDS FROM SINGAPORE TO COMBAT MULTIDRUG-RESISTANT TUBERCULOSIS

2 Aug 202



F_1F_0-ATP synthase, an enzyme in the oxidative phosphorylation pathway of the Mycobacterium tuberculosis

In August 2022, it was announced that a series of chemical-based compounds developed by Nanyang Technological University (NTU) and EDDC was out-licensed to Neuro-Horizon Pharma LLC (NHP), to be advanced as potential drug candidates for tuberculosis (TB).

These compounds target the F_1F_0-ATP synthase, an enzyme in the oxidative phosphorylation pathway of the *Mycobacterium tuberculosis* bacteria which causes TB. For this project, EDDC's medicinal chemists further optimised a previously discovered inhibitor of F_1F_0-ATP synthase, developing a lead series of compounds. This project was part of a broader transdisciplinary platform, TOPNet (Targeting Oxidative Phosphorylation Network), that is supported by the National Research Foundation.

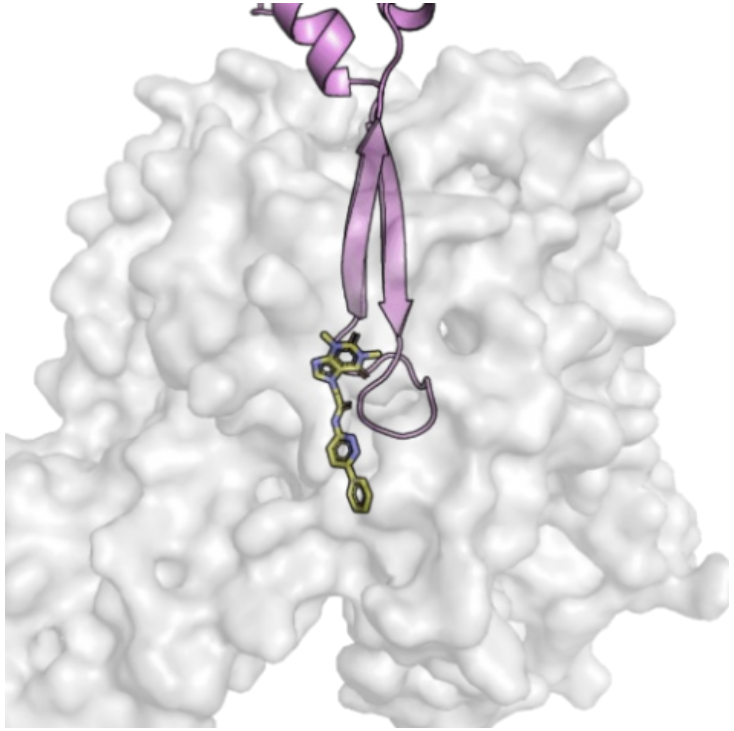
NHP is a US-based drug development company with a platform founded on extensive expertise in the area of molecular and cell biology of ATP-driven rotary nano-motors and small GTPases, and their use as therapeutic targets for innovative drug design and development.

"It has been a fruitful collaboration with EDDC. We worked like a seamless tag-team, matching our capabilities to allow each partner to focus on what each does best. I am looking forward to our next collaboration on Mycobacterium abscessus oxidative phosphorylation pathway inhibitors."

- Prof Gerhard Grüber, lead PI of TOPNet at NTU

ETC-159 progresses to Phase 1B Dose Expansion

MADE-IN-SINGAPORE CANCER DRUG ETC-159 ADVANCES IN CLINICAL TRIALS
3 Jun 2022



Duke-NUS: Duke-National University Singapore| DxD Hub: Diagnostics Development Hub | GIS: Genome Institute of Singapore | MSS: microsatellite stable | NCCS: National Cancer Centre Singapore| NUHS: National University Hospital Singapore

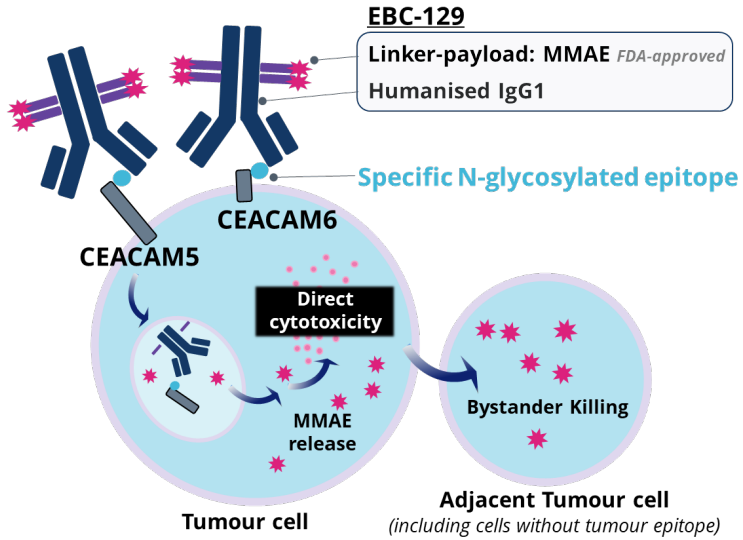
- **ETC-159** is a best-in-class small molecule inhibitor of O-acyl transferase porcupine (PORCN), jointly developed by EDDC & Duke-NUS.
- ETC-159's Phase 1B dose escalation study, where the safe dose in combination with pembrolizumab was defined, was completed in May 2022. Subsequently, ETC-159 advanced into Phase 1B dose expansion, which tests the preliminary efficacy and safety of ETC-159 in two groups of patients:
  - In one group, ETC-159 is being tested as a monotherapy in MSS colorectal cancer patients who have gene fusions involving R-spondin 2 or 3. A diagnostic test developed by EDDC, manufactured & clinically validated at POLARIS @ A*STAR's GIS, and supported by DxD Hub, is being used for patient selection.
  - In the second group, the ability of ETC-159 to sensitize MSS cancers to the immune check point inhibitor pembrolizumab is being investigated. This is done in different MSS/pMMR (proficient in mis-match repair) tumours that normally do not respond to pembrolizumab.
- In Singapore, the trial is being run at NCCS and NUH.

"The successful progression of ETC-159 into Phase 1B dose expansion is an exciting development which EDDC has been critical in driving. Early signs of drug activity have been observed in patients with recurrent treatment refractory advanced endometrial and ovarian cancers and we look forward to assessing the efficacy of this drug in a larger population of patients with these challenging gynaecological cancers."

- A/Prof David Tan, Senior Consultant, National University Cancer Institute, Singapore (NCIS); Associate Professor, Yong Loo Lin School of Medicine, National University of Singapore

EBC-129 Approved to Enter Clinical Trials

FIRST MADE-IN-SINGAPORE ANTIBODY-DRUG CONJUGATE (ADC) APPROVED TO ENTER CLINICAL TRIALS



In December 2022, the IND application for EBC-129, an antibody-drug conjugate (ADC), was cleared by the US FDA for progress into first-in-human studies in patients with solid tumours. EBC-129 and the test used for patient selection was discovered & developed through the collaborative efforts of NCCS, A*STAR's BTI & IMCB, and EDDC.

EBC-129 binds to a glycosylation site that is conserved on both CEACAM5 & 6 and is specific to cancer cells. It uses MMAE as its 'payload', which has already been validated in the clinic, hence allowing fast-tracked development. Its mechanism of action has been demonstrated, confirming its first-in-class denomination, with clear differentiation from competitors.

The clinical trial will be run at NCCS and NCIS in Singapore and at up to 3 sites in the US. An IHC-based companion diagnostic is now being progressed into a lab-developed test to be used for patient selection.

"Drug discovery is a team sport and the success of EBC-129 is an example of bringing together experts along the continuum and moving an interesting large molecule from discovery, development, CMC through to clinical trials. Our collaboration with EDDC has been a fruitful learning journey driven by a common goal to make a difference to human health."

- Dr Andre Choo, Deputy Executive Director, BTI

" FDA's approval of the IND application for EBC-129 highlights the strength of the inter-institution collaborations that drove this project from the bench to the bedside. EDDC played a key role in translating our discoveries into this novel ADC agent which has the potential to address an unmet need for patients who have exhausted standard therapies."

- A/Prof Daniel Tan, Head, Division of Clinical Trials and Epidemiological Sciences, NCCS

BTI: Bioprocessing Technology Institute |CEACAM: carcinoembryonic antigen-related cell adhesion molecule | FDA: Food and Drug Administration | IHC: Immunohistochemistry| IMCB: Institute for Molecular and Cell Biology | IND: Investigational New Drug | NCCS: National Cancer Centre Singapore | NCIS: National Cancer Institute Singapore | MMAE: monomethyl auristatin A

Growing Networks

Drug discovery and development is a team sport.

EDDC thus actively engages partners in the public and private sector to jointly develop new drug candidates or new technology platforms.

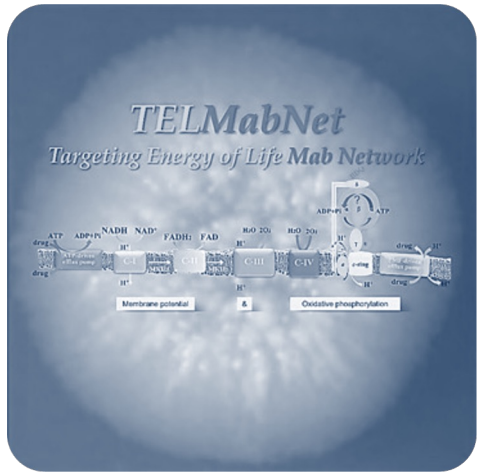
Here are highlights of some key projects this year.

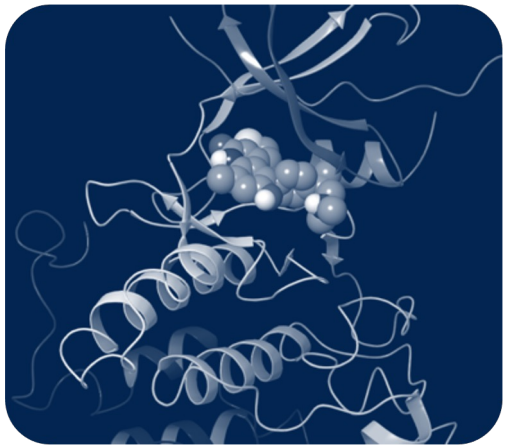
Public Partners | Projects

Collaborative Efforts

TELMabNET Non-tuberculous mycobacteria (NTM) infections are increasing in their global prevalence, morbidity and mortality and frequently surpass the global incidence of tuberculosis infections in developed countries. *M. abscessus* (Mab) is one of the most commonly identified rapidly growing NTM species and is also regarded as one of the most antibiotic-resistant mycobacteria.

EDDC is collaborating with **NTU, TTSH and overseas centres** to develop potential drug candidates for Mab infections under the TELMabNet (Targeting Energy of Life of Mycobacterium abscessus Network) programme, funded by the National Research Foundation. We had previously worked with TELMabNet's lead Principal Investigator, Prof Gerhard Grüber from NTU, in the NRF-funded TOPNet programme which resulted in a successful out-licensing deal.





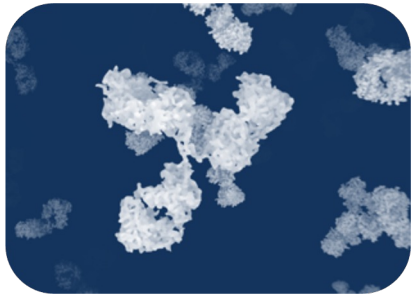
Computational Drug Discovery – EDDC's Computational Chemistry unit collaborated separately with **Duke-NUS, NUS and NCCS** to apply its druggability assessment and virtual screening capabilities to three different drug targets.

With Prof David Virshup at Duke-NUS, EDDC identified two validated hits against a novel target, Wntless. With NUS, EDDC conducted a virtual screen of a half-million compound library for a target implicated in multiple myeloma and hepatocellular carcinoma. Finally, EDDC worked on a target with NCCS that is highly flexible and which adopts multiple conformations in different physiological conditions. The Computational Chemistry unit was able to identify virtual hits for NCCS to validate in vitro. The team was glad to support the community through these collaborations.

Duke-NUS: Duke-National University of Singapore | NCCS: National Cancer Centre Singapore | NTU: Nanyang Technological University | TTSH: Tan Tock Seng Hospital

Public Partners | Projects

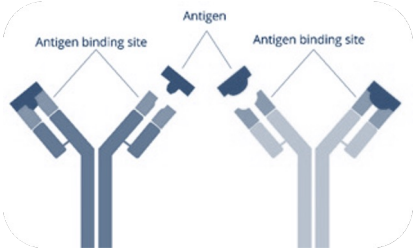
Collaborative Efforts



Antibody Discovery EDDC is collaborating with the **Genome Institute of Singapore (GIS)** on a Target Translation Consortium (TTC) project aimed at discovering and developing an antibody that binds specifically to an epitope of a transmembrane protein. If successfully developed, the antibody will serve as a tool compound to validate the utility of this target in colorectal cancer.

Ophthalmology In an ongoing collaboration with the **Singapore Eye Research Institute (SERI)** and **National University of Singapore (NUS)**, EDDC has developed recombinant proteins to test a novel therapeutic approach for the treatment of glaucoma. The proteins have shown activity in vitro and the safety and efficacy of shortlisted proteins are being tested in in vivo models.

Autoimmune Diseases EDDC collaborated with the **Singapore General Hospital (SGH)** to conduct proof-of-concept *in vivo* studies of a new antibody-based therapeutic approach to prevent macrophage-driven inflammatory response in lupus nephritis.



Antibody Development EDDC initiated a collaboration with the **Bioprocessing Technology Institute (BTI)** to work on the humanization and affinity maturation of antibodies developed by EDDC. These antibodies bind to a target that is implicated in oncology and fibrotic diseases.

Public Partners | Projects

Collaborative Efforts

PROTAC EDDC has progressed a collaboration initiated with **National University Singapore (NUS)** in 2021. In this NMRC-grant funded project, two **PROTAC (Proteolysis Targeting Chimera) molecules** have been developed. These compounds can trigger degradation of an intracellular epigenetic regulator and decrease the level of its transcription factor activity with sub-micromolar potency. EDDC optimized these compounds' pharmacokinetics, resulting in potent cancer cell killing in breast cancer in vitro models. As a next step, NUS will be testing them in in vivo oncology models.

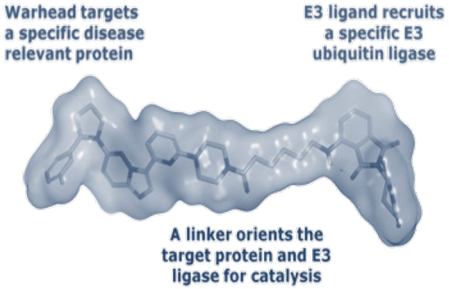
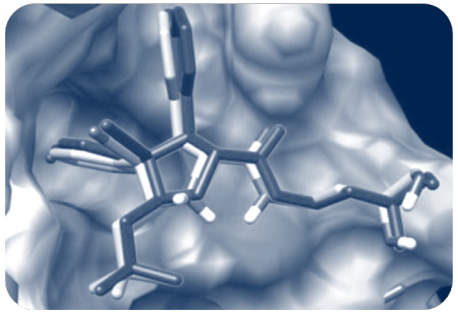
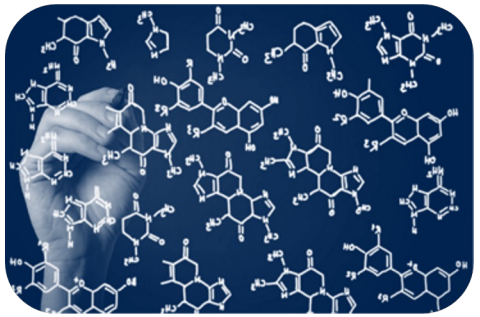


Image sourced from: https://www.genengnews.com/insights/trends-for-2020/targeted-protein-destruction-advances-in-protacs-other-degraders/



Small Molecule Activators EDDC is a collaborator on an **Institute of Molecular and Cell Biology (IMCB)**-led grant funded project that is investigating small molecule activators of a transcription factor. The project aims to evaluate the utility of pharmacological activation of the target in regenerative medicine. In 2022, our NMR team set up a method to label the target protein with fluorine atoms for NMR studies. This will facilitate the study of protein-protein, protein-DNA and protein-small molecule interactions.

Pharmaceutical Synthesis EDDC and **NUS** began a National Research Foundation-funded collaborative project to develop an automated, on-demand, end-to-end synthesis platform for pharmaceutical molecules. The partners are testing the application of this platform in accelerating the lead optimization and drug discovery process. In 2022, EDDC designed de novo compounds that can be pilot produced on the platform and will subsequently test and profile the synthesized compounds.



Public Partners | Consortium Event

Collaborative Efforts

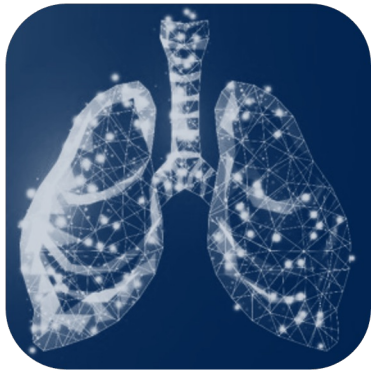
EDDC is a member of the **National Structural Biology Consortium (NSBC)** which was formed to leverage the wealth of structural biology expertise across the local ecosystem to accelerate drug discovery efforts. The NSBC brings together experts in structural biology methods such as X-ray crystallography, NMR spectroscopy and Cryogenic Electron Microscopy, and provides a platform for collaborative efforts between scientists across Singapore's public research institutions to identify and evaluate novel drug targets for drug design & development.

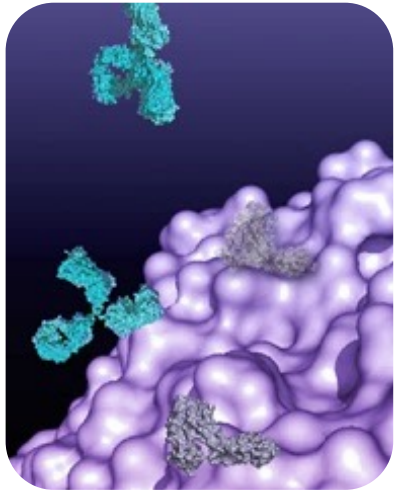
This year, EDDC participated as a member of the NSBC organizing committee for the **1st Singapore Structural Biology Symposium** from 24-25 May. The two-day event was attended by 130 participants. EDDC scientists contributed three oral presentations and a poster to showcase the integral role of structural biology in our drug discovery workflow.

Industry Partners | Projects

Collaborative Efforts

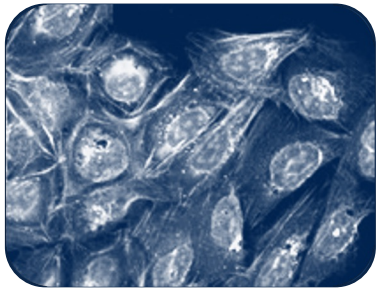
XtalPi EDDC and **XtalPi Inc. ("XtalPi")**, a pioneering pharmaceutical technology company powered by artificial intelligence (AI) and automation, initiated a collaboration to discover novel treatment candidates for non-small cell lung cancer (NSCLC). XtalPi will apply its AI technology and automation platform to discover promising candidates against a NSCLC target that EDDC has nominated. The predicted top-performing molecules with desirable drug properties will be validated by EDDC. EDDC will also provide insights and data on the NSCLC target to further accelerate the drug discovery process.





Hummingbird Bio EDDC and **Hummingbird Bioscience ("Hummingbird Bio")** concluded a joint discovery project in 2022, which involved using Hummingbird Bio's Rational Antibody Discovery (RAD) platform and EDDC's proprietary High Throughput Antibody Discovery (HiTAD) platform to an oncology target of common interest. Hummingbird Bio's RAD platform was used to derive computational and biological insights to discover and engineer antibodies targeting functional yet elusive epitopes. EDDC subsequently used its HiTAD platform to rapidly screen and characterize B cells that produced antibodies against the epitopes identified. Building on the positive working relationship established, the two organizations are discussing future projects. EDDC is also providing Hummingbird Bio access to our live cell analysis instrument.

Ferring EDDC is developing a multi-plexed single cell next generation sequencing platform with **Ferring Pharmaceuticals ("Ferring")**. This technology will enable the high throughput determination of individual cellular response to perturbations at very high resolution.



Industry Partners | Event

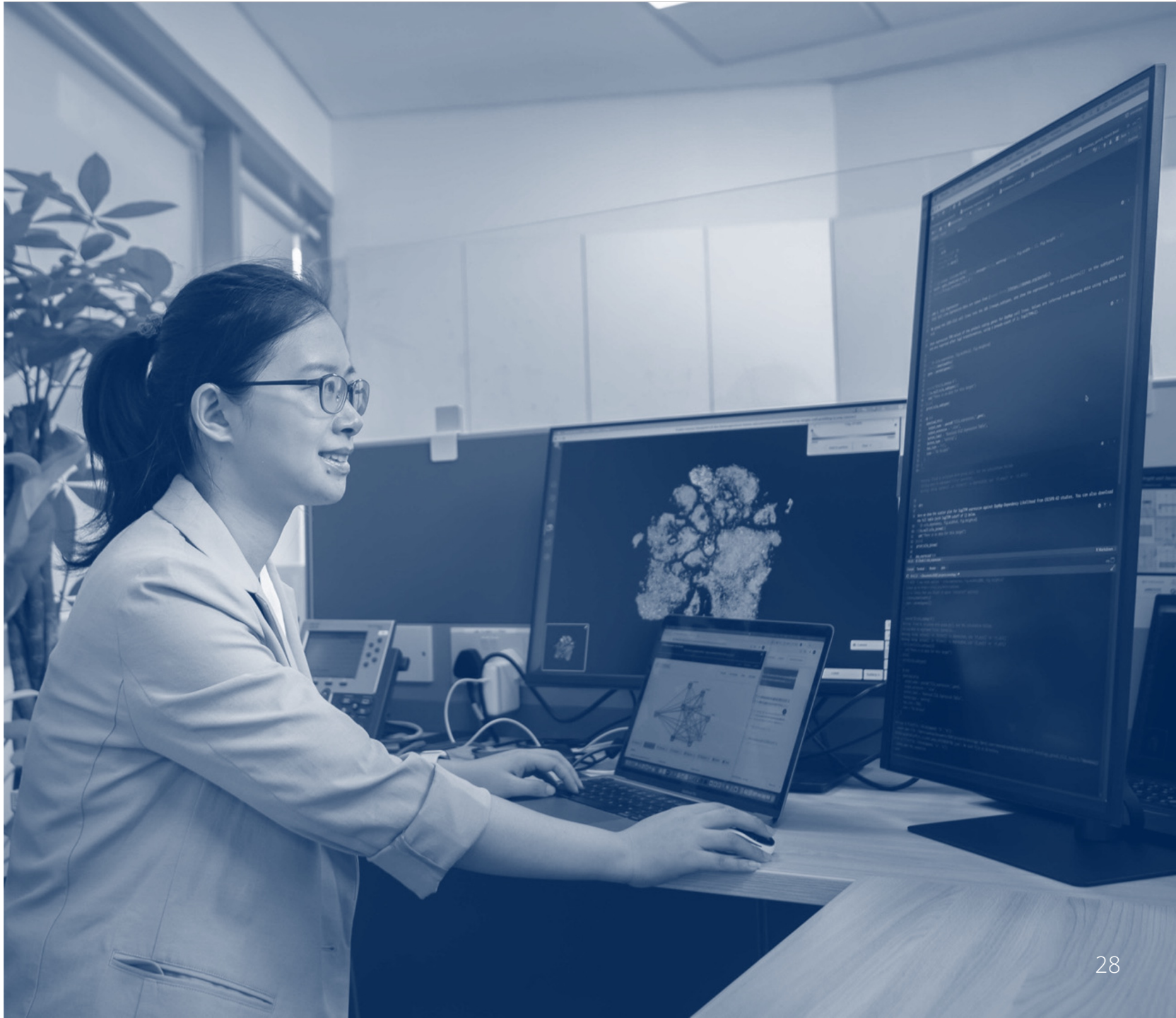
Collaborative Efforts

Ferring In October, EDDC co-organized our first post-COVID, in-person symposium with a visiting delegation from **Ferring Pharmaceuticals ("Ferring")**. Speakers from EDDC and Ferring presented on the importance of target validation, considerations in hit generation, computational approaches to drug discovery, and a case study of a public-private partnership between our two organizations. The event was over-subscribed and the attendees shared very positive feedback.

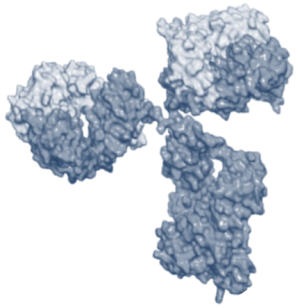
*"It was an **excellent symposium**. Not too technical, so the attendee can grasp most of the presentations and go back with an understanding of drug discovery."*

– Event attendee

Drug Discovery Platforms



EDDC is leveraging our expertise to initiate and incubate innovative platforms, in addition to our portfolio of drug development projects. These platforms address emerging areas of drug discovery and have the potential to be spun-off as new start-ups.

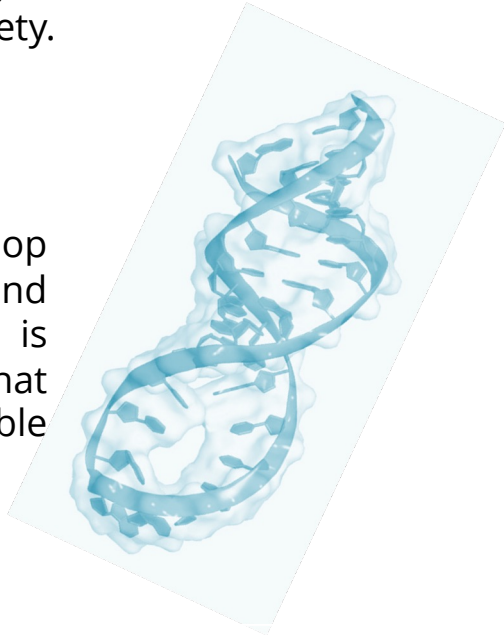


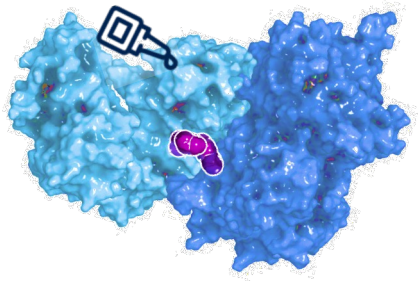
Antibody-enhanced Innate Modulation (AIM)

EDDC is developing an innovative **antibody engineering platform** to generate multi-specific antibodies that can activate the innate immune system to destroy cancer cells. The goal is to engineer these antibodies to hit multiple disease-related targets with potential synergistic potency and superior safety.

RNA Targeting platform

EDDC is partnering with multiple A*STAR research institutes with expertise in RNA biology to co-develop **workflows and tools to target RNA with small molecules**. EDDC has expanded its compound collection to include libraries that cover small molecule-RNA, and RNA-protein interactions, and is actively developing strategies for the identification and validation of small molecule compounds that bind to RNA. By leveraging our medicinal chemistry expertise, we aim to develop orally bioavailable drugs that can target RNA implicated in important diseases.





Molecular Glue platform

Molecular glues are small molecules that induce and/or stabilize the interaction between two proteins that do not usually interact. They can be used to initiate or enable targeted degradation of proteins that are involved in disease processes. Using our small molecule discovery expertise, EDDC is working on a platform to develop **molecular glues for selected targets and disease indications**.

EDDC has also been actively incorporating *in silico* solutions and building in-house computational capabilities to accelerate and increase the efficiency of drug discovery.

Target ID & validation → Screening & Hit Generation → Lead Generation & Optimization → Preclinical Studies → Clinical Development

TARGET ATLAS

Systematic data-mining and text analytics for discovery and prioritization of

- Drug-target-disease relationships
- Supporting evidence for target validation across cell-lines, tissues, animal and human disease models
- Competitive landscape

ACCELERATING HIT FINDING & OPTIMIZATION

Small molecule

- Druggability assessment to guide hit finding strategy
- Machine-learning based virtual screening to rapidly screen millions of compounds
- Structure-based computational modeling to guide hit-to-lead

Biologics

- Computational antibody design and developability evaluation

IN VITRO AND IN VIVO PK/EFFICACY

- *In silico* predications of ADME properties
- Modeling and simulation capabilities for pharmaco-kinetics, pharmacodynamics and human dose predictions

IN-DEPTH UNDERSTANDING OF BIOLOGY/MECHANISM OF ACTION

- High content image analysis facilitated by deep learning (eg for toxicity predictions)
- Extending screening capabilities with high-throughput transcriptomics (eg for biomarker discovery)

Human Capital

Great People make Great Medicines

130+ Employees

45% Doctorate Holders, of which **28%** are scholars

40% with biotech/pharma experience

30 in Chemistry fields
26 in small molecule tech platforms

17 in Large Molecule fields

20 in Drug Development

Our young talents in EDDC: *Phuong Lan Le Ngoc, Samantha Wong, Carol Koh, Tan Qian Wen, Kang Zi Han, Rachel Lim, See Yi Yang, Loh Yong Yao, Marcus Low (joined BMRC, A*STAR in September 2022), Jackie Ang, Fong Jia Yi, David Quach*

Human capital for the community

EDDC's alumni have joined biotech, investment firms and research service providers.

I&E Fellowship Programme (IFP)

The IFP is a full-time fellowship programme funded by the National Research Foundation (NRF) to grow a pool of deep-tech talent in Singapore who can translate nascent technologies to the market. The IFP also aims to develop industry-relevant skillsets in our R&D talent.

EDDC will be participating in the IFP by providing an 18-month programme where Fellows can choose from a business development and project management track, or a lab-based research translation track.

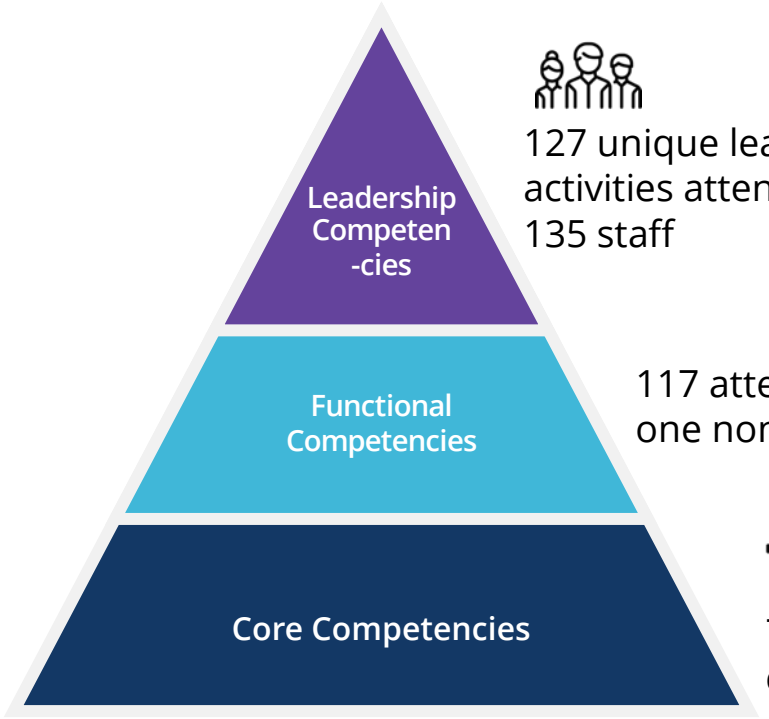
Upon completion of the programme, Fellows are free to find jobs in Innovation & Enterprise related positions, or technical R&D positions in the biopharma industry.

External training and development

EDDC staff actively participated in courses identified by A*STAR Leadership & Organization Development (L&OD) department. This included training to develop core, functional and leadership competencies, as well as courses for personal development.

91%* of EDDC staff attended a learning activity in 2022

**Target to achieve 100% by end FY2022 (end March 2023)*



127 unique learning activities attended by 135 staff

117 attended at least one non-core course

70 attended at least 1 core competency course

L&OD developmental framework for People Development.

In-house training and development

EDDC's Quality Assurance team has established a Quality Management System (QMS) to document all policies, processes, & responsibilities. Through MasterControl, an FDA Part 11 compliant online system, these documents are made available to staff for reference, and topics are assigned to specific job functions as part of compulsory training. Examinations are also included for key content.

Item	Details
Total number of Standard Operating Procedures (SOPs)	65
Total number of Work Instructions	95
Total QMS training courses	185
Examinations for important training courses	A*STAR Confidentiality Policy EDDC Personal Data Protection EDDC Procurement Guide ISO 9001:2015
Job codes	44, used to perform and track training assignments

Meet the Team

At Work & At Play

Discovery Biology I

- Target & Assay Biology I
- Target & Assay Biology II

Discovery Biology I

From left to right:
Liu Boping, Ang Qi An, Perlyn Kwek, Joma Joy, Deepika Raman, Monique Dawson

Target & Assay Biology I (TAB I)

The TAB I team specializes in the design, development and implementation of biochemical assays to elucidate the mechanism of action (MOA) of small molecules. These are applied in primary and secondary screens, identification of leads and supports the lead optimization phase of the drug discovery project. They utilize biophysical tools and develop biochemical assays that are also amenable for high throughput screening.

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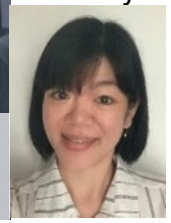

Ng Fui Mee

From left to right:
Fong Jia Yi, Wang Si Fang, Carol Koh, Elaine Choo, Ke Zhiyuan,

Target & Assay Biology II (TAB II)

The TAB II team designs, implements and performs biological studies with a focus on cellular approaches that enable deeper exploration of therapeutic hypotheses and derivation of mechanistic insights on drug action. They drive preclinical discovery workflows from hit-to-lead, lead optimization, and to preclinical development.

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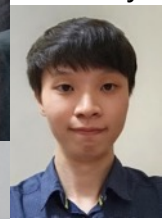

Oh Qin Yao

Discovery Biology I in 2022

2 **Publications Accepted**

Supported the activities below

1 **IND application**

IND: Investigational New Drug

1 **Out-licensing**

6 **Portfolio Projects**

2 **Innovative Platforms**

3 **Early Idea Projects**

6 **Research proposals reviewed**

Discovery Biology II

- Target & Assay Biology III
- Therapeutic Protein & Antibody Discovery
- Antibody Design
- Computational Biology

Discovery Biology II

From left to right:
Chng Song Hui, Lee Le Tian, Snow Lee, Ang Xiaoman

Target & Assay Biology III (TAB III)

The TAB III team's area of expertise is in biologics and is responsible for cell-based functional assay development and characterization of therapeutic candidates. A suite of toolbox assays has been established to evaluate the functionality of antibody-based therapeutics including antibody-dependent NK/T-cell mediated toxicity, antibody-dependent internalization, etc.

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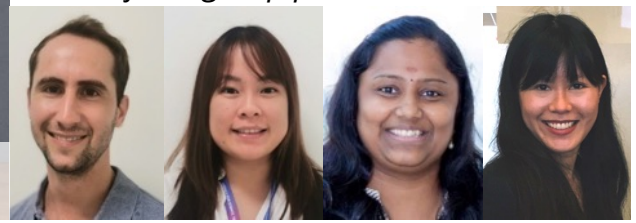


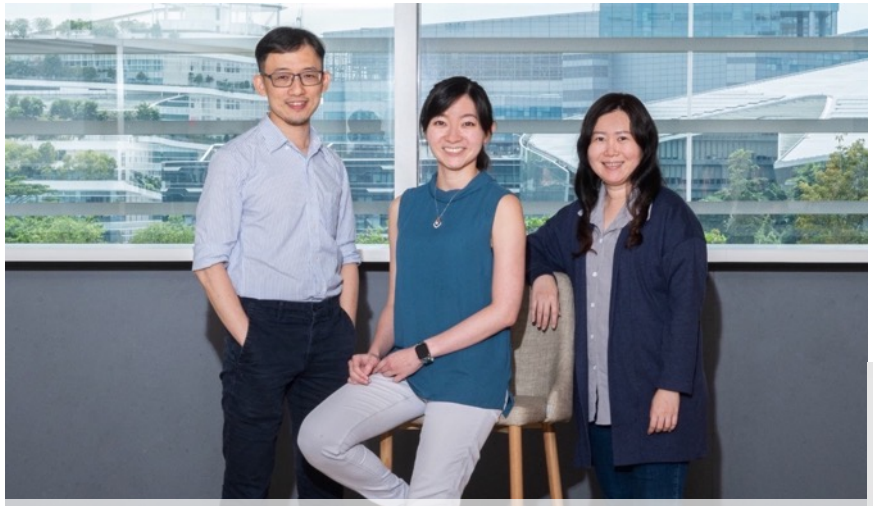
From left to right:
Manuel Suter, Ong Shi Min, Visalatchi Thairagajan, Kang Zi Han

From left to right:
Sim Wei Qiang, Tabitha Tan, Jessie Lim, Simone Dorfmueller, Joey Xu, Wan Kah Fei, Cheryl Leong, Nur Quraishah Adnan

Therapeutic Protein & Antibody Discovery (TPAD)

The TPAD team is responsible for the generation and optimization of therapeutic antibodies and fusion proteins. An end-to-end workflow has been established including tool reagent generation, antibody discovery campaign, biochemical & biophysical characterization, developability assessment, and companion diagnostic antibody generation & evaluation.

Discovery Biology II



From left to right:
Yap Thai Leong, Samantha Wong, Chiam Poh Cheang

Antibody Design (AD)

The antibody design team focuses on developing novel engineered antibodies through integrated design approaches including in-silico, data driven and experimental strategies.

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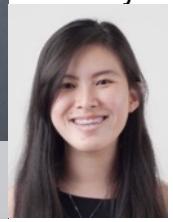
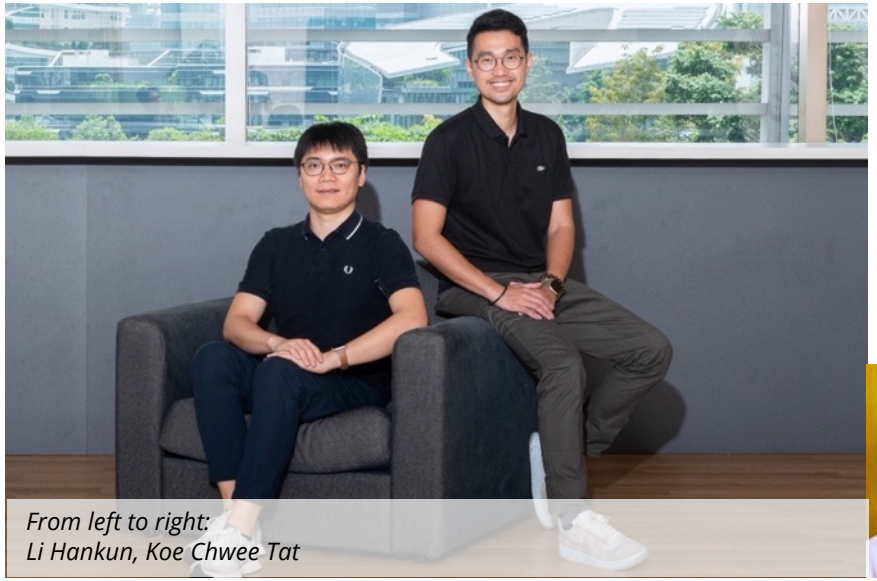


Chew Yu Fang



From left to right:
Li Hankun, Koe Chwee Tat

Computational Biology

The Computational Biology group is responsible for developing and incorporating bioinformatics methods and data-driven approaches into the drug discovery & development workflow. Their scope of work involves finding and leveraging a wide spectrum of data and analytical resources, setting up high-throughput 'Omics platforms, and establishing strategic cross-institute relationships with other data science organizations.

Absent from group photo:

Sun Miao

Discovery Biology II in 2022

3 **Partnerships With Industry**

1 **Ongoing Innovative Platform**

Supported the following

6 **Projects/ Pilot Projects**

1 **Drug Discovery Specialist for Target Translation Consortium Projects**

1 **IND application**

IND: Investigational New Drug

- ✓ Established industry-like large molecule discovery workflow
- ✓ Integrated with high-throughput automation system and data management
- ✓ Proprietary knowhow in antibody engineering for immune modulation
- ✓ Full suite of biophysical assays & bioassays to discover functional therapeutics
- ✓ Development and utilization of systematic information map
- ✓ Multi-faceted 'Omics workflows in cross-functional applications

Discovery Chemistry

- Peptide Chemistry
- Chemical Biology
- Medicinal Chemistry

Discovery Chemistry

From left to right:
Brian Chia, Subramanyam Vankadara

Peptide Chemistry

The Peptide Chemistry team is an agile 2-person drug-hunting team specializing in peptide drug discovery & development with a special focus on initiating and delivering new drug assets into EDDC's pipeline.

From left to right, top to bottom rows:
1st row: David Quach Thanh Truong, Joel Wong, Wang Gang
2nd row: Loh Yong Yao, Kang Congbao, Lim Wan Hsin, Ng Guan Zhi

Chemical Biology

The Chemical Biology team is a multidisciplinary team of chemists, biologists, and structural biologists that works in synergy to develop compounds and chemical probes for novel target identification, elucidation of biological pathways and the exploration of alternative therapeutic modalities to address "undruggable" targets.

Absent from group photo:

From left to right:
Kimberly Lim, Ng Hui Qi, Huang Qiwei

Discovery Chemistry

From left to right, top to bottom rows:
1st row: Ronald Toh, See Yiyang, Liew Si Si, Tan Qian Wen, Tan Li Hong, Sandra Sim, Yang Hai Yan, Eileen Tay, Grace Lin, Hannah Toh
2nd row: Xu Weijun, Jopseph Cherian, Padmanabhan Anbazhagan, Klement Foo

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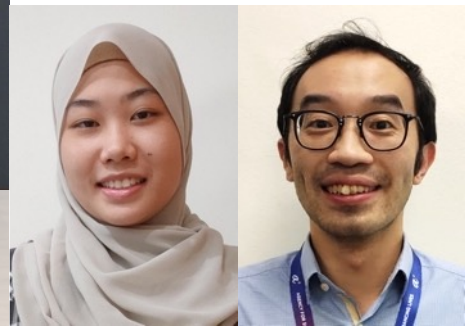


From left to right:
Juliana Binte Mohammad, Frankie Mak

Medicinal Chemistry

The Medicinal Chemistry team specializes in the design, synthesis and optimization of new chemical entities as therapeutic candidates for human diseases. With a proven track record, they adopt a data driven approach and complement it with computational tools.

Discovery Chemistry in 2022

15 **Publications Accepted**

3 **Innovative Platforms initiated**

Partnerships

2 **Projects with industry**

2 **Projects with public partners**

Supported the following

9 **Discovery or Research Projects**

1 **Drug Discovery Specialist for a TTC Project**

Translational Sciences

- *In vivo* Pharmacology
- Biomarker Development

Translational Sciences

From left to right:
Vikas Madan, Susmitha Vuddagiri, Frances Kusuma, Venkataramanan Ramadass, Hannes Hentze, Vishal Pendharkar, Vithya Manoharan

In Vivo Pharmacology (IVP)

The IVP team enables project transition from discovery to PDC/IND stage by providing critical procedural and technical expertise. They execute high-quality in-house studies and facilitate outsourcing to CROs. The team specialises in efficacy studies in oncology and immuno-oncology, fibrosis, infectious diseases, and toxicology, as well as pharmacokinetic modelling. Their work is supported by a state-of-the-art animal vivarium at Biopolis and designated laboratory software platforms for data capture & analysis.

From left to right:
Claudia Koh, Sylvia Gan, Nurul Nazihah

Biomarker (BM) Development

The Biomarker Development team develops biomarker assays to enable project transition from discovery to the PDC/IND stage. They drive BM and translational strategies from program inception to First-in-Human studies, developing high quality pharmacodynamic BM assays and patient selection biomarker companion diagnostics in alignment with clinical development objectives. The team has capabilities spanning assay design and feasibility studies, design verification and validation (in compliance with industrial standards), preclinical/clinical sample processing, to data analyses and FDA-compliant data reporting.

CRO: Contract Research Organization | FDA: Food & Drug Administration | PDC: Preclinical Development Candidate | IND: Investigational New Drug

Translational Sciences in 2022

23 **Reports for IND, QMS, and Safety**

3 **Publications/ Posters Accepted**

2 **New workflows initiated**

Supported the following

1 Platform
9 Projects

2 Grant collabs
1 EARO study

3 **Assay Validations**

1 **Clinical trials**

3 **Audits**

1 **IND application**

IND: Investigational New Drug

- ✓ Improved capabilities in humanised mouse model
- ✓ Executed & facilitated 33 pharmacology/toxicology studies
- ✓ Expanded technical biomarker-relevant technical capabilities (IHC & ELISA)

ELISA: Enzyme-linked immunosorbent assay| IHC: Immunohistochemical

Highlights of Translational Sciences

EBC-129 – Antibody-Drug Conjugate (Oncology)

EBC-129 is an antibody-drug conjugate ("ADC") developed by EDDC that targets a number of solid tumour indications. First-in-man studies will start in Q1 2023.

The **IVP group** supported all pharmacology studies (*in vivo* efficacy, PK & the GLP toxicology & safety study), and also provided guidance & oversight for the bioanalytical work performed at a CRO.

The **BM Development group** spearheaded the translation of a mAb towards a lab-developed test for patient-selection, in collaboration with IMCB, for an IHC assay. The group also played a key role in elucidating the relationship between target expression and efficacy, quality checking external and internal data, performing correlation analyses, and preparing reports for regulatory submission.

ETC-159 – Porcupine Inhibitor (Oncology)

ETC-159 is a small molecule upstream Wnt pathway inhibitor in clinical development.

The **BM Development group** conducted all pharmacodynamic (PD) analyses of clinical samples from the Ph1B dose escalation study, and provided clinical sites with BM sample collection kits. The team managed clinical BM samples, established the sample workflow for multiple BM analyses performed at different CROs and trained 9 sites. They also led the stability study for a RT-qPCR-based diagnostic test that can detect patients with RSPO fusions sensitive to ETC-159, in collaboration with POLARIS@GIS. In addition, the team assisted in A*STAR IRB management, and was key in performing the GCLP audit on a global CRO's central lab, and in an HBR audit.

CRO: Contract Research Organization | GCLP: Good Clinical Laboratory Practice | GLP: Goof Laboratory Practice | HBR: Human Biomedical Research | IHC: Immunohistochemical | IMCB: Institute of Molecular and Cell Biology | IRB: Institutional Review Board | PK: Pharmacokinetics | RSPO: R-Spondin | RT-qPCR: reverse transcription quantitative real-time polymerase chain reaction

Development

- Medical
- Clinical Operations
- CMC
- Regulatory Affairs

Development

From left to right:
Lee Yock Ann, Julienne Cometa, Venkateshan Srirangam, Stephanie Blanchard

Absent from group photo:

Ranjani Nellore

Medical

The medical team functions as safety lead and sponsor medical oversight for all our clinical. This team is also able to navigate the nuances of designing clinical trials and managing subsequent clinical development planning.

Clinical Operations

The clinical operations team manages development and execution of all clinical studies. This also includes start up activities, CRO selection and oversight. The team also ensures that study quality is maintained.

Chemistry, Manufacturing & Controls (CMC)

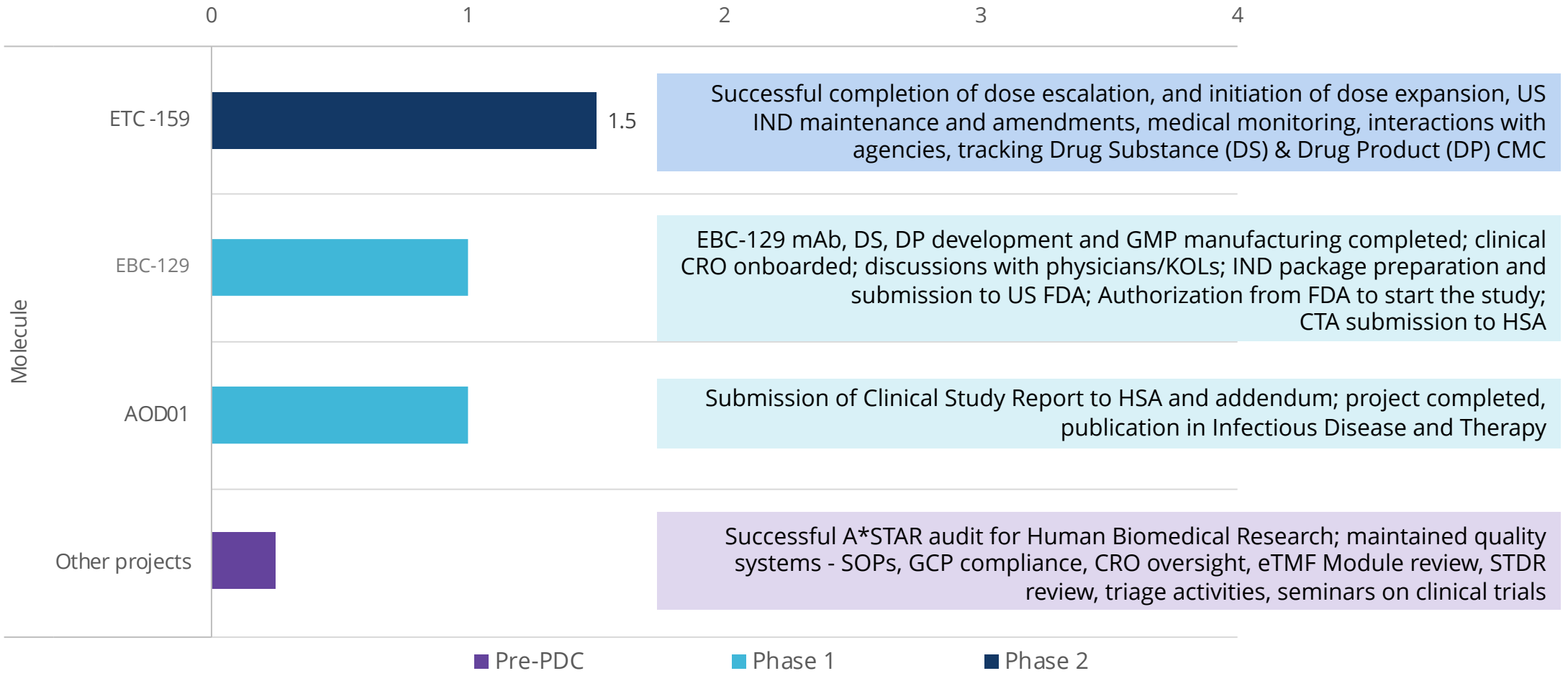
The CMC team selects and manages CDMO/CMOs for contract manufacturing of small molecules and biologics (Drug Substance and Drug Product). This team provides oversight of CMC activities and supply of Investigation product for Clinical Trials.

Regulatory Affairs

The regulatory affairs team works closely with the HSA and the FDA to co-ordinate regulatory efforts around clinical trials that EDDC is supporting. The team also works closely with scientific colleagues to offer regulatory consultations on IND submissions, development planning and regulatory submissions.

CDMO: Contract Development and Manufacturing Organization | CMO: Contract Manufacturing Organization | FDA: Food & Drug Administration | HSA: Health Sciences Authority | IND: Investigational New Drug

Development team in 2022



Successful completion of dose escalation, and initiation of dose expansion, US IND maintenance and amendments, medical monitoring, interactions with agencies, tracking Drug Substance (DS) & Drug Product (DP) CMC

EBC-129 mAb, DS, DP development and GMP manufacturing completed; clinical CRO onboarded; discussions with physicians/KOLs; IND package preparation and submission to US FDA; Authorization from FDA to start the study; CTA submission to HSA

Submission of Clinical Study Report to HSA and addendum; project completed, publication in Infectious Disease and Therapy

Successful A*STAR audit for Human Biomedical Research; maintained quality systems - SOPs, GCP compliance, CRO oversight, eTMF Module review, STDR review, triage activities, seminars on clinical trials

CDMO: Contract Development and Manufacturing Organization | CMC: Chemistry, Manufacturing & Controls | CRO: Contract Research Organization | CTA: Clinical Trial Authorization | DS: Drug Substance | DP: Drug Product | eTMF: electronic Trial Master File | FDA: Food & Drug Administration | GCP: Good Clinical Practice | GMP: Good Manufacturing Practice | HSA: Health Sciences Authority | IND: Investigational New Drug | KOL: Key Opinion Leader | PDC: Preclinical Development Candidate | STDR: Singapore Therapeutics Development Review

Project Management

Project Management

From left to right:
Phuong Lan Le Ngoc, Tan Bee Huat, Ho Soo Yei, Xu Haoying

Absent from group photo:

Until June 2022

From left to right:
Nur Huda, Sonia Frappier

Project management

The Project Management team supports EDDC's ADL/PDL/SPLs in managing portfolio projects, platforms and the project triage workflow. The team also ensures that EDDC projects proceed according to the agreed timelines and budgets. They have multi-disciplinary backgrounds; the team includes chemists and biologists with Pharma industry experiences.

ADL: Asset Development Leader| PDL: Portfolio Discovery Leader| SPL: Scientific Project Leader

Project Management in 2022

Establishment of dashboard for EOM/OOE & resource utilization

- Captured OOE and EOM spent by the various projects and platforms
- Provided key data on EDDC's manpower contribution for project agreements

Supported PRC & PMG meetings

- 6 PMG & 2 PRC meetings organized in 2022
- Facilitated prioritization of projects and Go / No-Go decision making

Publication OIC for EDDC

- 4 posters and 4 presentations reviewed and approved for conference presentation
- 19 manuscripts reviewed & approved for journal submission, 11 accepted for publication in 2022

17
ongoing projects

7
ongoing platforms

Support tender activities & Project Master list Tracking

- Monitored shipment & study delivery
- Supported LOA amendments, contract modifications and retagging of POs
- Generated new project codes and folders

Highlights from project proposal triage workflow

- 20 proposals submitted in 2022
- 4 projects entered portfolio, 6 projects on-going, 4 projects concluded, 4 projects under review and 3 projects declined

Management of competitive grant applications*

- 5 newly awarded grants in 2022
- 11 grants on-going, 4 grants completed

***EDDC participates in grant projects on a case-by-case basis**

ADME: Absorption, Distribution, Metabolism, and Excretion | BD: Business Development | EOM: Expenditure of Manpower | FTE: Full-Time Equivalent| OIC: Officer-in-charge | OOE: Other Operating Expenditure PMG: Portfolio Management Group | PRC: Portfolio Review Committee | LOA: Letter of Award | PM: Project Management | PO: Purchase Order | RCA: Research Collaboration Agreement

Innovations

Innovations

Our Workflow

IDEATION / EVALUATION → PLANNING & EXPERIMENTATION → INCORPORATION INTO WORKFLOW OR COMMERCIALIZATION

From left to right:
Teo Hsiang Ling, Goh Kay Lin, Nur Huda, Rachel Lim

Our Goals

- ✓ Incorporate innovative tools into EDDC workflow to increase R&D efficiency & accelerate timelines.
- ✓ Provide support from ideation to exit strategy for incubated platform projects.
- ✓ Engage the right domain expertise for platforms

In 2022

3 new platforms initiated

2 platforms exited

Innovations in 2022

5 Ongoing Projects

- Innate Cell Modulators
- Small Molecules targeting RNA (3 projects)
- Molecular Glue

2 Completed

- Deep learning method for data analysis & compound optimization
- UCeP

1 EDDC Workflow

Small molecule hit/lead discovery via virtual screening

1 Early Idea

Fibrosis Toolkit

1 Out-License Ongoing

UCeP (Universal Cellular Protein Profiling)

Business Development

- Business Development
- Alliance Management
- Digital Communications
- Strategy Planning
- Chief of Staff Office

Business Development

The **Business Development** and **Alliance Management** team is responsible for driving the commercialization of EDDC's portfolio assets and managing partnerships with local and international public and private organizations. The team works closely with A*STAR colleagues (such as Innovation & Enterprise, Legal, Finance) in alignment with processes that apply to national platforms.

From left to right:
Chia Hsin-Ee, Ang Hwee Ching, Zhuo Jingli, Annie Tan, Goh Kay Lin, Bernadette Chua, Tam Lay Hong

Absent from group photo:

From left to right:
Lee EunJu, Low Choon Bing

Business Development (BD)

- Spearheads EDDC's engagement with pharma and biotech companies, as well as venture capital and venture builders, to commercialize EDDC's portfolio assets.
- BD also works closely with EDDC Innovations to support the development of business plans for potential spin-offs.

Alliance Management (AM)

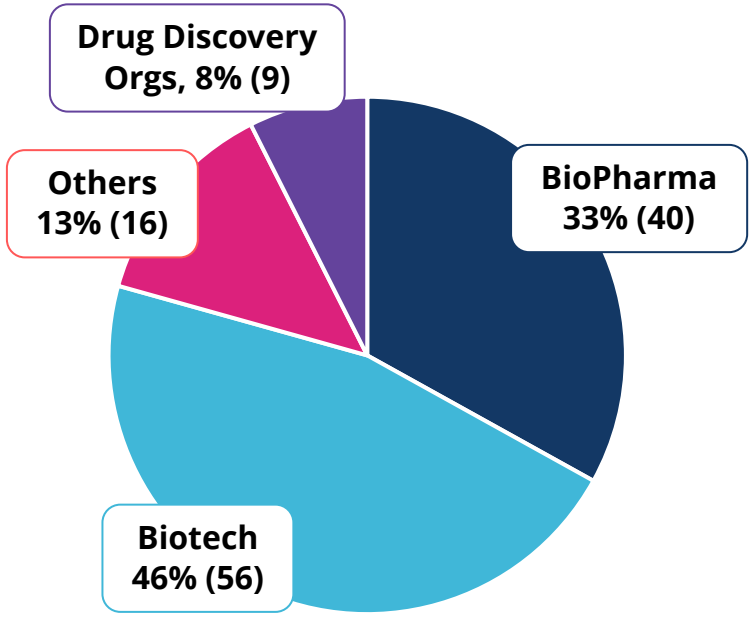
- Drives EDDC's engagement and support for public sector researchers, mainly through the Target Translation Consortium (TTC) and the Singapore Therapeutics Development Review (STDR).
- AM also manages EDDC's collaborations with and outreach to publicly funded researchers.

Business Development in 2022

3 **Licensing deals totalling >S$436 Mil in announced deal value**

Supported **Execution of 179 Agreements**

121 **Unique Companies Engaged**



12 **Local biotechs & biopharma engaged in discussions for potential collaborations**

In the past 2 years, established contact with

54 **Venture Capital (VCs) and other potential investors**

9 **International Drug Discovery organizations engaged**

From left to right:
Chia Hsin-Ee, Elizabeth Ng

EDDC's LinkedIn Page

as of 27 Dec 2022

1,205 Total followers
771 New followers in 2022

11.6% Average engagement rate

60,152 Total unique impressions

Digital Communications

The team is responsible for EDDC's online presence and maintaining our brand assets. We communicate EDDC's achievements, partnerships, expertise and capabilities through multiple channels including press releases, annual reports, and web-based written and visual content. We also support EDDC's outreach efforts to the community through events and staff speaking engagements on various platforms.

4 Direct company engagements established due to greater awareness of our work

WORK IN PROGRESS

EDDC is undergoing a brand refresh!

We are changing our look! Do look out for the official launch of our new brand in Q2 2023!

LinkedIn Highlights

In 2022, we posted 74 LinkedIn posts, including a new "Behind the Scenes@EDDC" series. Here are the top "hits" from 2022.

Top Post of the Year

Most viewed + most liked + most talked about
(12,742 views + 227 likes + 36 comments)

CNA interviews Dr Ang Hwee Ching about the 3C-like protease inhibitors designed and developed by the teams at EDDC.

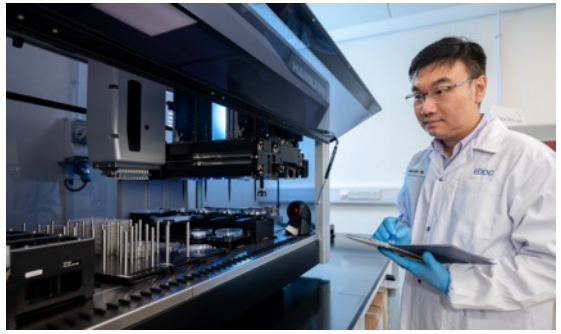
Top Post – Outreach Event

(4036 views + 130 likes + 9 re-posts)

EDDC co-organized a symposium with Ferring Pharmaceuticals.

Top Post – Out-licensing Deal

(3976 views + 147 likes + 18 re-posts)



Announcement of the out-licensing of a panel of innovative, tumor-specific antibodies to Boehringer Ingelheim.

Top Post – Behind the Scenes

(63.2% engagement rate*)

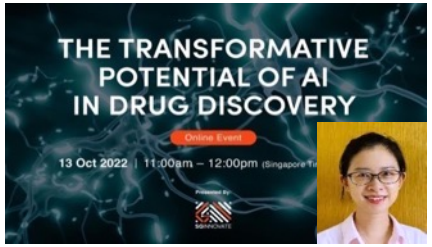
An introduction to EDDC's Chemical Biology team.

**Taken as a percentage of (total reactions + re-posts + comments) / total impressions*

Outreach Events in 2022

SGInnovate webinars on drug discovery

2 of our scientists, **Vishal Pendharkar & Sun Miao**, participated in panel discussions on the application of biological assays and AI in drug discovery.



Co-hosted a symposium with Ferring Pharmaceuticals

Lectures on Translational Medicine by EDDC Deputy CEO, Dr Ang Hwee Ching

Eureka Monsoon Certificate Course 2022 – SG Startup Enterprise:
Panel participant sharing her experience in bridging translational drug discovery efforts in Singapore

Duke-NUS Masters of International Translational Medicine session:
Guest speaker for a session on "*How do Government Agencies and Payers define RISK in terms of developing new treatments?*".

Lectures for Post-graduate students

- EDDC gave 6 lectures in an NTU post-graduate module, "Drug discovery: An odyssey from the laboratory to the market", covering target validation, large molecule discovery, pre-clinical and clinical studies.
- EDDC provided an overview of the drug development ecosystem and drug discovery process for a Bio-entrepreneurship course at LKC School of Medicine.

Other Key Functions

From left to right:
Rachel Lim, Teo Hsiang Ling, Bernadette Chua

Strategy Planning

The team works internally with all functions to align organizational plans and priorities towards EDDC's strategic goals.

We externally engage key stakeholders through organizing annual stake-holder meetings and reporting. The team also monitors EDDC's performance against agreed Key Performance Indicators.

From left to right:
Sharon Tay, Nur Huda, Ho Soo Yei, Valerie Tay

Chief of Staff (CoS) Office

The team manages EDDC's resource allocation in the areas of budget, portfolio, and personnel. We prepare budget forecast and tri-annual financial reporting to the Governing Board, and also obtain annual budget approvals.

Additionally, CoS Office organizes organization-wide events to promote communication between the staff and the management, working towards building a highly inclusive culture.

Operations

- Admin Operations (Admin Ops)
- Laboratory Operations (LabOps)
- Informative Technology (IT)
- Information Systems (IS)
- Quality Assurance

Operations

From left to right, top to bottom rows:
1st row: Connie Er, Dakshani Selvakumar, Cecilia Leong, Chan Wai Ling, Yu Lan, Samantha Lee, Selina Chan, Sebastian Tan
2nd row: Dai Mingyan, Jay Toh, Alex Khong, Damon Chong, Tan Shan Ho

Absent from group photo:

From left to right:
Debbie Soh, Helen Yeo, Poh Zhiying

Admin Ops, Lab Ops and IT teams

They are responsible for reinforcing the day-to-day operations of EDDC to maintain stability and increase scientific productivity.

Quality Assurance (QA)

The QA team provides support to EDDC's Quality Management Systems, training and audits; in addition, QA also provides input to Good Clinical Practices related activities to ensure regulatory compliance.

Key goals for 2022

1. Sustain and secure business continuity
2. Safeguard compliance
3. RIE2025 transition

Operations in 2022

156 ASSETS MGMT (Disposition)

480 REPAIRS, MAINT.

26 NEW EQPT COMMISS.

7572 TRANSACTIONS (SVP, ITQ, GR, Tenders)

58 CONTRACTS / LEGAL (NDA, MTA, CV, EC)

21 Visits to EDDC

100% IT SECURITY COMPLIANCE

100% SERVER UPTIME

1303 IT / IS TICKETS

3+3 AUDITS (3xQA + 2xHSE, 1xPDPA)

159 SOP + WI

185 QMS Training Courses

9 SPECIAL PROJECTS (LabOps, Admin, IT/IS)

COMMISS: Commissioned | CV: Contract Variation | EC: Export Control | EQPT: Equipment | GR: Goods Receipt | ITQ: Invitation to Quote | MAINT: Maintenance | MGMT: Management | MTA: Materials Transfer Agreement | NDA: Non-Disclosure Agreement | TRANS: Transactions | SOP: Standard Operating Procedure | SVP: Small Value Purchase | WI: Work Instructions

Operations in 2022

Admin Operations

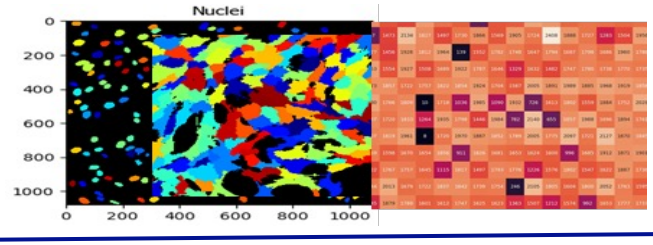
- Hosted Minister for Trade and Industry Mr Gan Kim Yong at EDDC to showcase EDDC's capabilities and progress.
- Hosted visitors from world-renowned pharmaceutical companies and others.

Lab Operations

- Completed retrofitting and full furnishing (ready to start work) of two lab spaces (approx. 140 sqm) and relocation within 4.5 months.

Admin & Lab Ops

- HSE Audit in Mar– PASSED
- PDPA Cross RI Audit Sep – PASSED
- HSE Unannounced Audit - PASSED



IT / IS

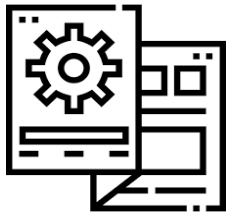
- Processed 1.35 million images for the HTP-Ferring Cell Painting Project. Parallel image analysis workflow developed to reduce processing time from 3 years to 4 months.

HSE: Health, Safety and Environment | HTP: High-Throughput Phenomics| PDPA: Personal Data Protection Act | RI: Research Institute

Quality Assurance in 2022

MasterControl™

- Launched MasterControl to all EDDC users in Q1, 2022.
- One-stop solution for EDDC QMS documents and training management.
- Compliance system for regulated documents.



- Implementation of established Standard Operating Procedures and Work Instructions.
- Provide opportunity for continuous quality improvement.

- Obtained ISO 9001:2015 certification in April 2022 with no major non-conformities.
- Continuous improvement to remain ISO 9001 compliant.

- Conducted 3 audits in 2022: including EARO ISO 9001 internal audit, ETC-159 clinical investigational site audit, and CRO Oversight audit for PPD Central Laboratories.
- Provide assurance for quality delivery.

CRO: Contract Research Organizations | ISO: International Organization for Standardization | QMS: Quality Management System

Target Translation Consortium (TTC)

The TTC is coordinated by EDDC in our role as the national drug discovery and development platform.

Click here to find out more about TTC!

About the TTC

Target Translation Consortium (TTC)

The Consortium brings together the 8 public sector performers in Singapore.

Click here to find out more about TTC!

Established in June 2019, the TTC facilitates the preclinical validation of putative drug targets arising from publicly-funded research, by helping investigators to:

- Establish a stronger, causal link between the target and disease pathogenesis
- Demonstrate that target modulation may potentially result in the desired therapeutic effect

Integration with the STDR *(2021 – 2025)*

The TTC's funding programme was integrated into the **Singapore Therapeutics Development Review (STDR)** scheme in FY2021, as the **STDR's "Pre-Pilot Stream 1"**. This streamlined the funding pathway and ensures continued support for promising drug discovery & development projects in Singapore. Successful TTC projects can go through an accelerated review process for STDR "Pilot" funding.

Scan to watch **"Considerations in Drug Discovery"** video series by TTC!

Key Developments

Snapshot of TTC in 2022

Here's a look a look at TTC's key developments this year.

9 TTC (STDR Pre-Pilot Stream 1) projects awarded from STDR Pre-Pilot 2021 call

8 EDDC and 1 IMCB scientists were appointed as Drug Discovery Specialists to support PIs

STDR Pre-Pilot 2022 grant call opened from Sept – Oct 2022

1 TTC 2020 project awarded STDR 2021's Pilot grant

1 TTC 2020 project "fast-tracked" and awarded STDR 2022 Pilot grant

Supported and participated in the STDR roadshows, symposium and workshop

EDDC Academic Research Organization

Enabling drug discovery research in Singapore through access to EDDC's drug discovery & development expertise and technology platforms.

Click here to find out more about EARO!

EDDC Academic Research Organization (EARO)

From left to right:
Goh Kay Lin, Christophe Bodenreider, Sravanthy Manesh, Shivaji Rikka

Business Operations

The Business Operations team plays the essential role of managing processes, engaging partners and identifying how EARO can best serve them. The team ensures that services are executed in alignment with quality requirements and within a proper legal framework. In addition, they regularly survey the local ecosystem to better understand the needs of Singapore-based companies and strategize the implementation of new technologies accordingly.

From left to right:
Doris Tee, Christophe Bodenreider, Wong Mei Yee, Chang Hong Yun, Jackie Ang, Justina Fulwood, Riazul Raziq

High-Throughput Screening (HTS)

Boasting the only fully integrated compound management automation platform for drug screening in Singapore, the HTS platform can screen thousands of compounds every day for any given assay. The mission of HTS is the rapid identification of high-quality hit compounds for EDDC's and partners' projects. The group support projects from assay development to Lead declaration.

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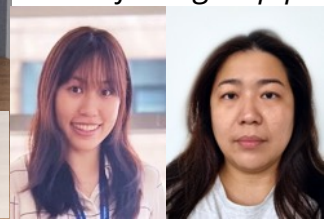

From left to right:
Cheryl Tan, Amelia Yap

EDDC Academic Research Organization (EARO)

From left to right:
Linna Lyu, Shivaji Rikka, Giriharan Periyasamy, Matan Thangavelu, Connie Chong

High-Throughput Phenomics (HTP)

The phenomics platform specializes in advanced cellular imaging and phenotype profiling to address complex biological questions in various disease models that are otherwise missed using traditional end-point assay methods. This allows a deep dive into the mechanism of action of therapeutic agents and enables the implementation of novel screening strategies to accelerate early-stage drug discovery.

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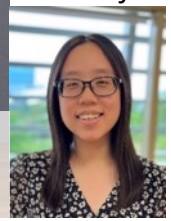

Gian Yi Lin

From left to right:
Nithya Baburajendran, Jothi Anantharajan

Protein Structure & Biophysics (PSB)

The team specializes in the determination of high-resolution structures of proteins and protein-ligand complexes. The structural information permits structure-based design, shortening the time for compound optimization. PSB has also optimized its processes to determine antibody-antigen interaction (epitope mapping). The team uses in-house diffractometers and commercial beamline at synchrotrons to ensure fast turnaround of projects.

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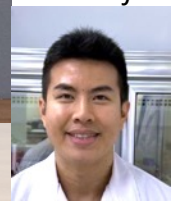


Yeo Yee Khoon

EARO in 2022

69

Services Executed

EARO successfully supported 36 partners from the public and private sector, including academic research groups, local biotechnology companies and MNCs.

Received ISO9001 Certification

The certification is a testimony of EARO's adherence to a quality management system that ensures service excellence from all our platforms while maintaining complete process traceability, transparency, and data security.

Established Cell Painting Assay for Drug Screening

HTP platform developed and established Cell Painting as a powerful drug screening assay suitable for testing large libraries. Thousands of cellular features can be measured in parallel, giving unique insights on the mechanism of action of therapeutic agents.

108

Co-crystal Structures

PSB platform has supported EDDC discovery projects by solving >100 protein ligand structures. This has enabled structure guided compound optimization and decision making for several projects. In addition, the team has worked with external companies and partners and solved >200 structures.

9

Screening Campaigns

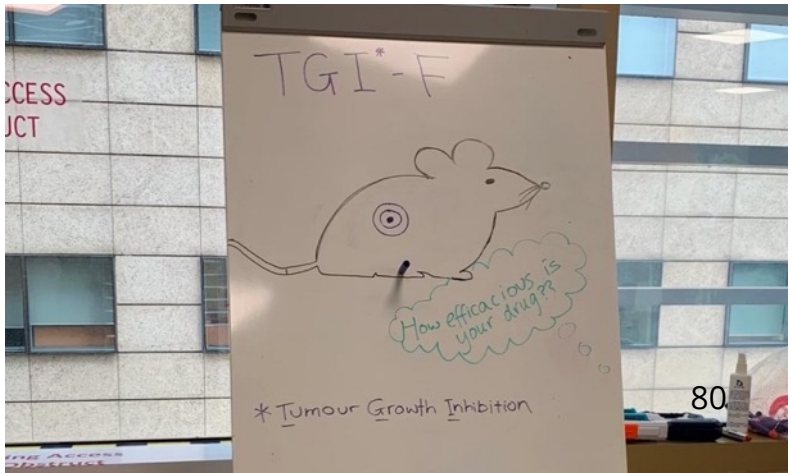
The screening capacities of EARO are unique in Singapore. Large libraries (10,000s to 100,000s) were used for 3 EDDC discovery projects and 6 external projects.

Social Events

At EDDC,
we celebrate our wins
and have fun as a team

Social Fridays

Fun, informal gatherings organized by our staff for our staff every 1st Friday of the month

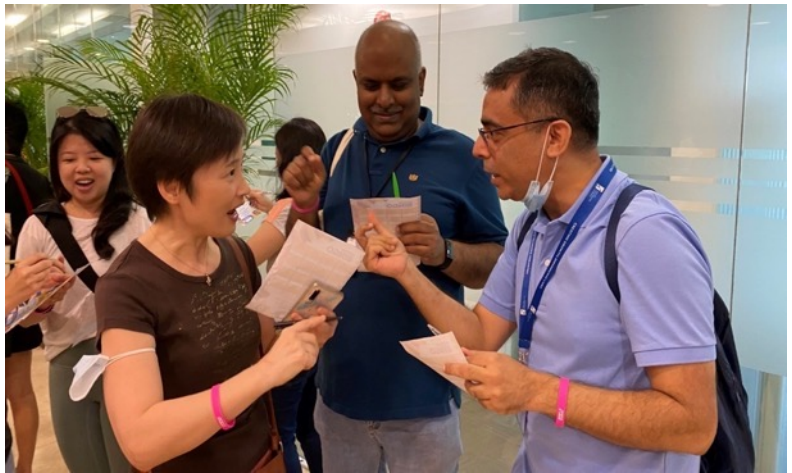


Celebration Party

18 May 2022

Team Building

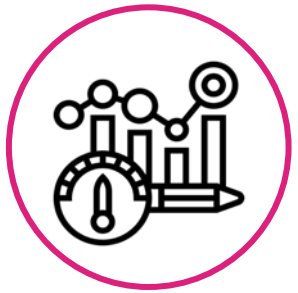
18 November 2022



Year-End Dinner

09 December 2022

Looking Ahead



Looking Ahead to 2023

Expanding outreach efforts to address diseases with unmet needs

We will be reaching out on a concerted basis to individual institutions with our Portfolio Discovery Leaders, Small & Large Molecule leads and Alliance Management team. Our goal is to jointly identify high potential projects addressing diseases of global importance with unmet medical needs in the areas of:

- Oncology & immuno-oncology
- Auto-immune diseases
- Fibrosis
- Ophthalmology

Catalysing public-private interactions

- EDDC will invite industry to partner us in educational efforts that inform the community about drug discovery, development & commercialization.
- EDDC aims to create channels in 2023 where publicly funded researchers can interact and pitch their projects directly to VCs and bio-pharma in/with interest in Singapore.

Increasing the scope of computational drug discovery efforts

- We will refine our "Target Atlas" and integrate high throughput next generation sequencing platforms into our drug discovery workflow. This will run alongside our computational chemistry capabilities.
- We will also be rolling out an EDDC-wide plan to create a data-centric organization, in which valuable scientific and business-related data from current and past projects can be leveraged to inform future drug discovery efforts.

Strengthening our capabilities in targeting RNA with small molecules

- EDDC will continue to invest in the development of new tools and platforms to target RNA, leveraging on our extensive expertise in small molecule drug discovery.
- We will also increase our collaborations with RNA biologists to pilot new methods, and convene a community to explore this emerging and exciting space.

Experimental Drug Development Centre (EDDC)

10 Biopolis Road, #05-01, Chromos, Singapore 138670

+65 6407 4333

https://www.a-star.edu.sg/eddc

info@eddc.a-star.edu.sg

Experimental Drug Development Centre (EDDC)