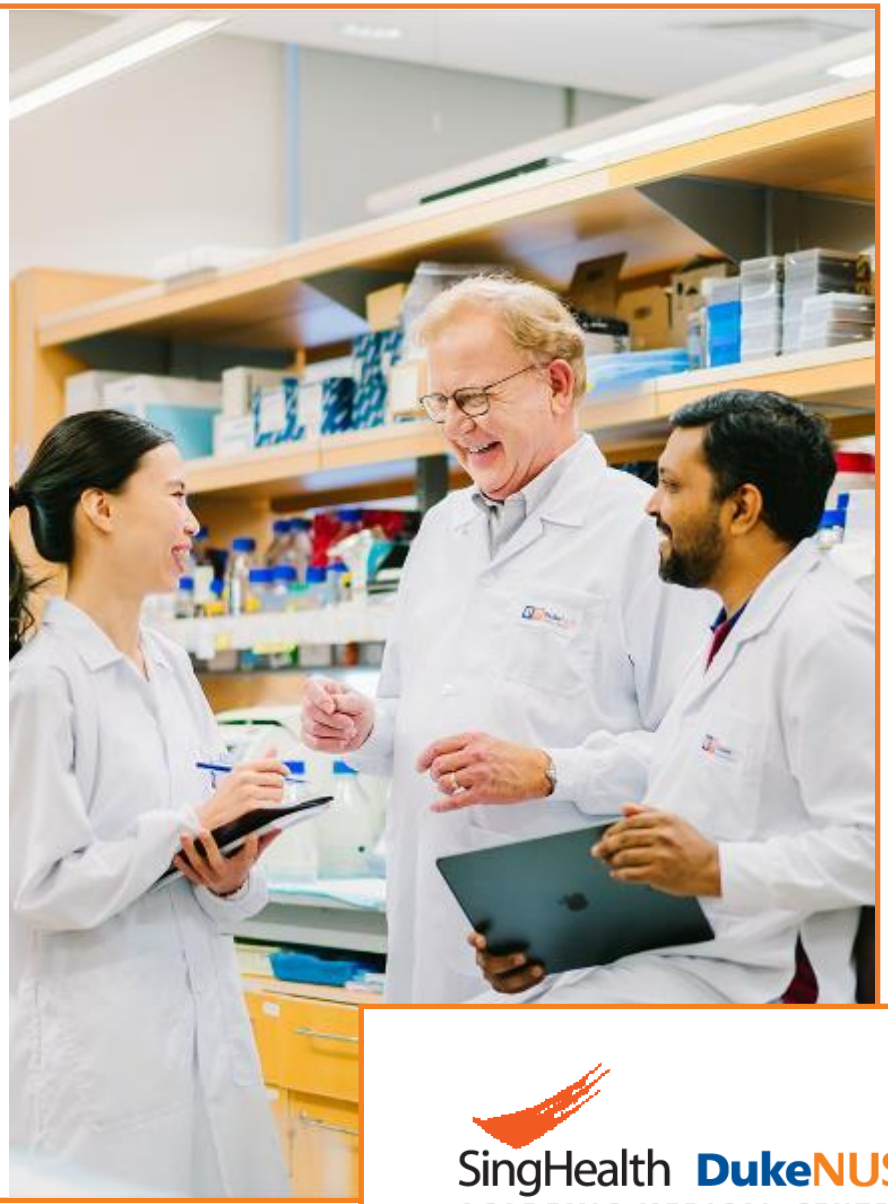
DukeNUS Medical School

# Duke NUS Medical School

## Research In Singapore For Asia And The World



Transforming Medicine, Improving Lives

SingHealth DukeNUS ACADEMIC MEDICAL CENTRE

# Empowering Health Through Collaborative Innovation

Established in 2005 as a landmark collaboration between Duke University and the National University of Singapore

Home to USA's **largest and oldest academic clinical research organisation**

**Singapore's first and only US-style graduate medical school**

A leading global university and **Singapore's flagship university**

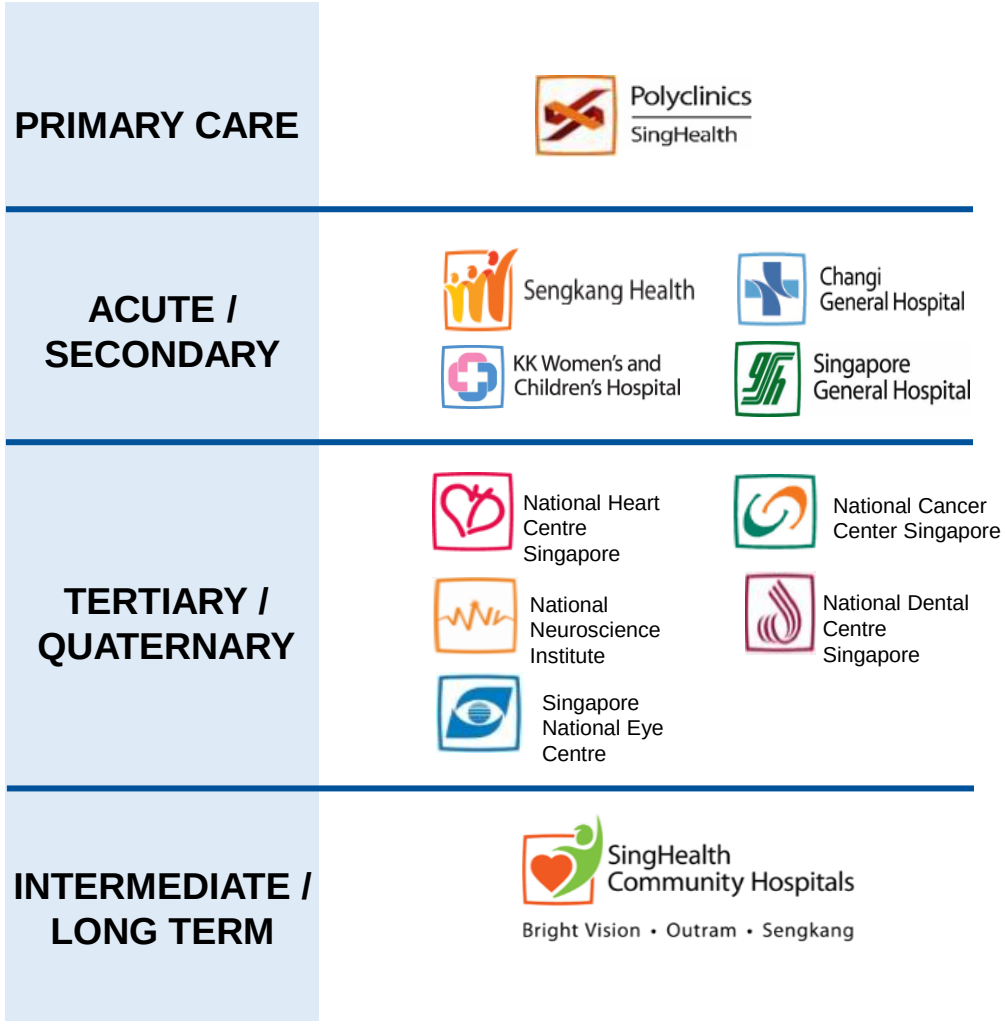
An autonomous school that provides both innovative education & impactful research

# Academic Medicine Partnership With SingHealth

## Integrated with SingHealth, the largest public healthcare cluster, to form Singapore's premier Academic Medical Centre (AMC)

Singapore Health Services (SingHealth) is Singapore's **largest healthcare cluster** that provides a **real-world setting** for the development of research and education at Duke-NUS

The SingHealth **Duke-NUS Academic Medical Centre (AMC)** operates as a cohesive collaboration, seamlessly blending cutting-edge clinical and translational research with patient care and delivery systems.



# Making Waves - Driving Basic Science Towards New Innovative Solutions

Research at Duke-NUS is optimised through its wide variety of programmes, institutes and collaborations, which help to translate discoveries and innovations into commercial applications that can enhance healthcare and improve the lives of not only patients, but also the general population

## OUR RESEARCH BY NUMBERS

**>11000**
Papers published in international peer-reviewed journals

**>3000**
Faculty in research and education

**>$772m**
In research funding locally and overseas

**11**
Current Singapore Translational Research (STaR) Investigators

**>300**
Synergistic Research Alliances

**3**
National Research Foundation Investigator ships

**8**
National Research Foundation Fellowships

All information accurate as of 31 Dec 2022, unless stated otherwise.

# Research Excellence: Unveiling The Five Signature Research Programmes

## Duke-NUS Signature Research Programmes

Cardiovascular & Metabolic Disorders

Neuroscience & Behavioural Disorders

Cardiovascular Diseases

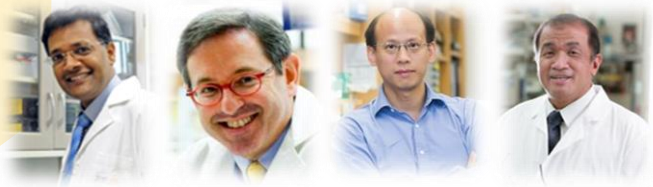
Neurological & Sense Disorders

Infectious Diseases

Diabetes

Cancers

Cancer & Stem Cell Biology

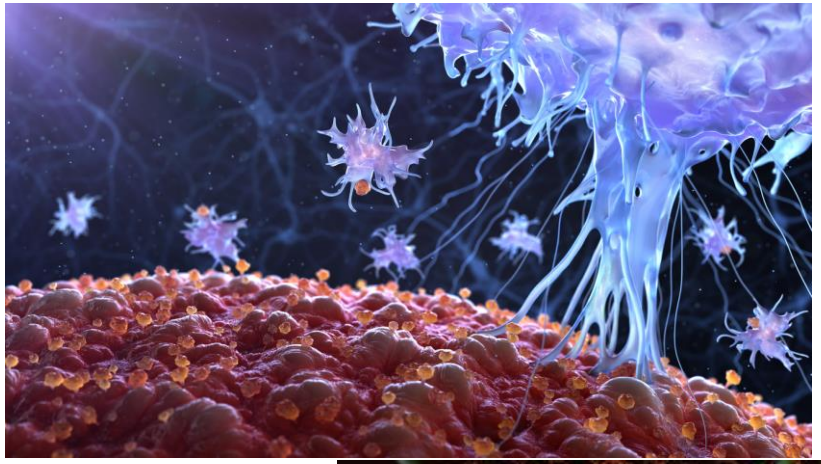


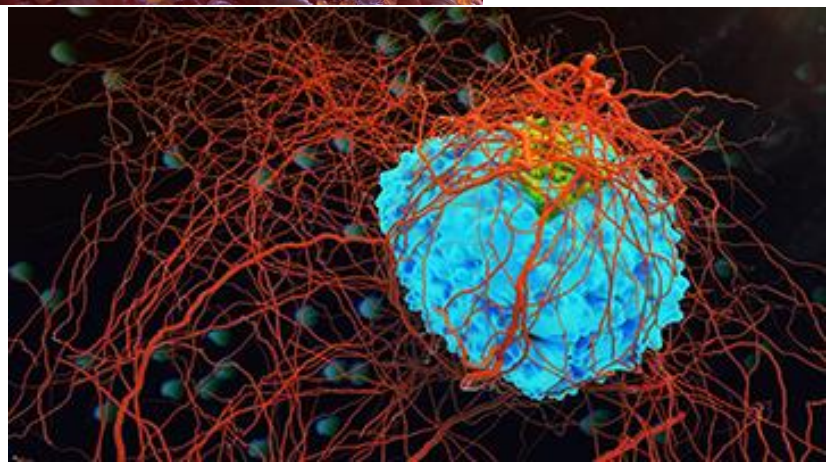
Emerging Infectious Diseases

Health Services & Systems Research

# Elevating Oncology And Stem Cell Breakthroughs

The **Cancer and Stem Cell Biology Program** pioneers diverse research, spanning basic science, disease investigation, drug discovery, and groundbreaking trials.
“Collaborating across Singapore, including National Cancer Centre, Singapore General Hospital, A*STAR, and more, we push boundaries in cancer research and treatment."





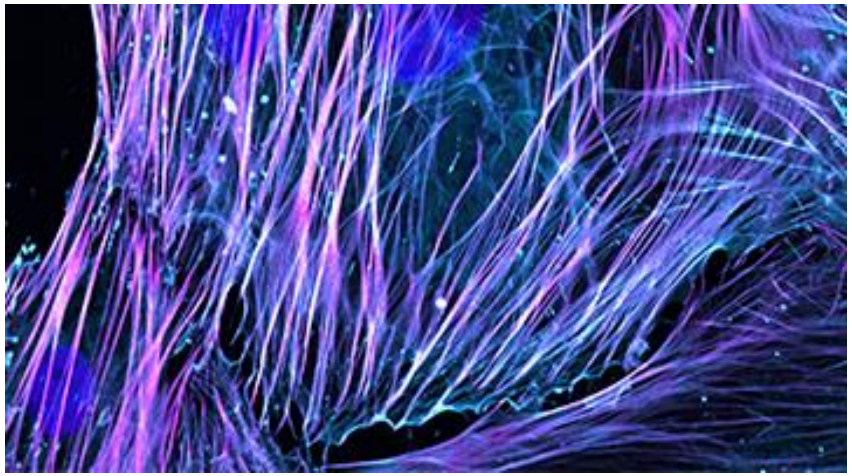
# Elevating Oncology And Stem Cell Breakthroughs

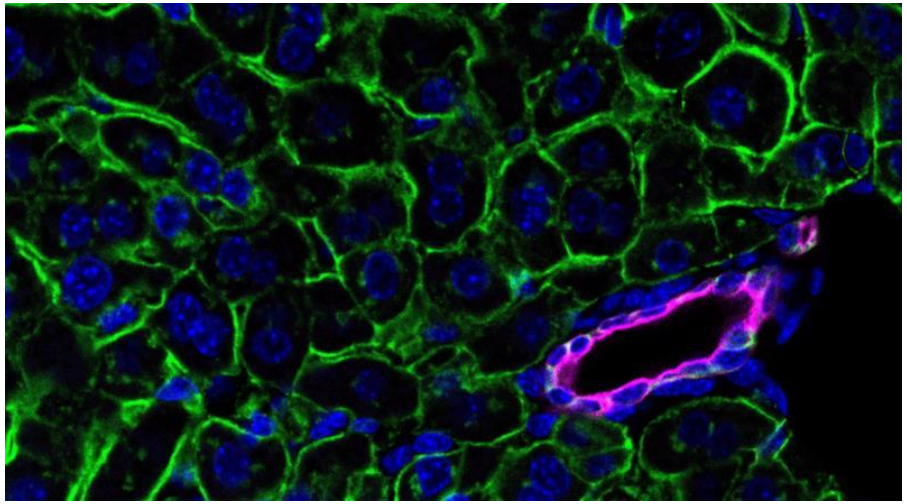
## Empowering Breakthroughs: Unleashing Innovation in Cancer and Stem Cell Frontiers.

| Major Research Themes | Focus / Targets | Therapy Areas | Technologies / Tools |
|---|---|---|---|
| Cancer biology & stem cell biology | • **Wnt sigalling**, biogenesis, delivery and targets<br>• **ARF-MDM2-p53** tumor suppressive mechanisms<br>• Regulation of **telomerase** activity<br>• **mRNA** modifications and translation<br>• Targeting the **mTOR kinase**<br>• **G Protein** signaling (e.g. GNA12 subfamily)<br>• Inhibition of isoprenylcysteine carboxyl-methyltransferase (**ICMT**)<br>• Dissecting the role of **Bcl-2 family** molecules<br>• Stem cell biology in **epithelial tissues** | • Oncology, including but not limited to:<br>  ○ Breast cancer<br>  ○ Gastric cancer<br>  ○ Biliary tract cancers<br>  ○ Liver cancer<br>  ○ Head & neck cancer<br>  ○ Lung cancer<br>  ○ Epithelial cancer<br>• Haematology, including but not limited to:<br>  ○ Chronic myelogenous leukaemia<br>• Cancer cachexia<br>• Wound healing<br>• Ageing<br>• Infectious Diseases<br>• Obesity and diabetes | • Radiopharmaceutical chemistry<br>• In vivo nuclear / fluorescent imaging (rodents, non-human primates)<br>• Novel mouse models (e.g. for the studies of epithelial stem cells and cancer)<br>• Budding yeast models<br>• Drosophila models<br>• Computational modelling<br>• Machine learning<br>• Cancer genomics and epigenomics<br>• (Epi)transcriptomics |
| Computational biology and (epi)genomics | • **Injury response & oxidative stress**<br>• Genomic and epigenomic profiling<br>• Extracellular and post-translational signaling<br>• **RNA metabolism**, alternative splicing, (epi)transcriptomics<br>• Long non-coding RNAs | | |
| Translational and molecular imaging | • Imaging cancer immunotherapy<br>• Image-guided delivery approaches<br>• Development of imaging biomarkers | | |

# Unveiling Insights Into Cardiovascular And Metabolic Health

**Cardiovascular and Metabolic Disease Program** delves into heart and metabolic research, expertise in fat cell biology, blood-brain barrier, mitochondrial health, diabetic kidney intricacies, heart development, genetics, and clinical trials.



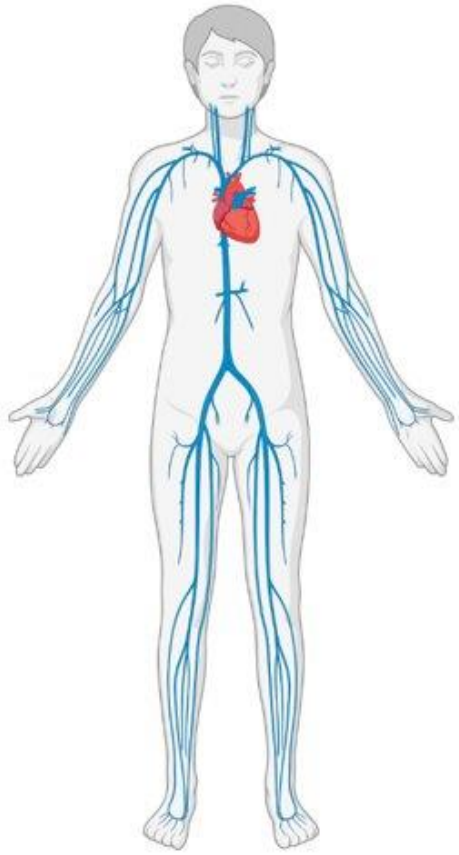


DukeNUS Medical School | Cardiovascular & Metabolic Disorders

# Unveiling Insights Into Cardiovascular And Metabolic Health

## Deciphering Health Intricacies for Innovative Strategies in Preventing, Diagnosing, Treating Cardiometabolic Conditions

- Complications of Diabetes
- Metabolism and Diabetes
- Cardiovascular Disease
- Computational Science

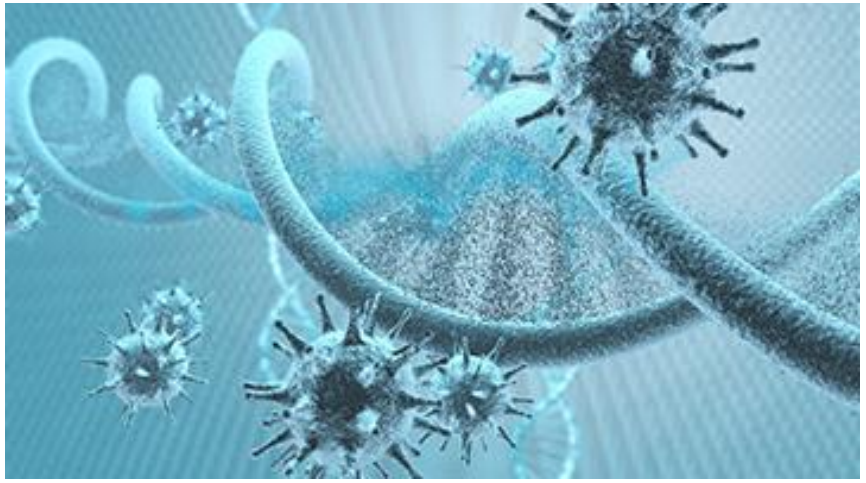


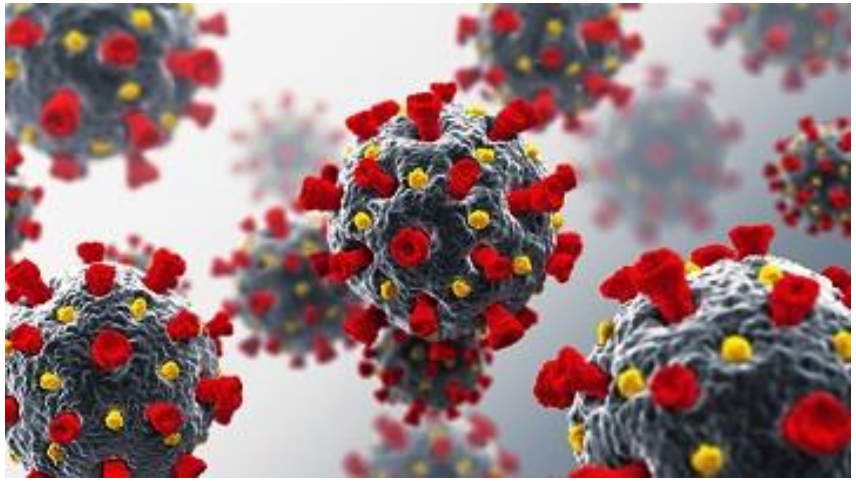
**Therapy Areas**

- Cardiomyopathies
- Myocardial infarction
- Heart failure
- Coronary artery disease
- Diabetic Nephropathy
- Chronic kidney disease
- Ocular angiogenic diseases
- Obesity
- Hypertension
- Diabetes
- Mitochondrial diseases
- Arrhythmogenic Disease
- Fibrotic diseases
- Ageing

# Fostering Excellence In Emerging Infectious Diseases

**Emerging Infectious Diseases** Program focus spans all facets of emerging infectious diseases - from uncovering pathogens, understanding molecular mechanisms, and exploring immunology, to pioneering therapeutics, vaccine trials, and global health investigations





DukeNUS Medical School | Emerging Infectious Diseases

# Fostering Excellence In Emerging Infectious Diseases

## A premier regional infectious disease hub for reference and research

| Major Research Themes | Focus / Targets |
|---|---|
| Disease emergence and epidemiology | • Evolution and emergence of infectious diseases<br>• Human and animal disease surveillance, virus isolation and characterisation<br>• Understand viral disease ecosystems<br>• Roles played by mutation, natural selection, recombination/reassortment and host immune response on virus diversity |
| Immunology | • Innate and adaptive immune response<br>• Mast cell responses to viral pathogens<br>• Vertical transmission (mother to child) |
| Treatment, detection and control | • Adoptive T-cell Therapy<br>• HLA-peptide specific antibodies<br>• Novel vaccination strategies<br>• Antibody based serological tests<br>• Animal models for therapeutics studies<br>• Zooprophylaxis |
| Molecular biology and computational science | • Genetic changes and implications for epi/pandemic<br>• Identify and elucidate the molecular details underlying the interplay between viruses and host cells (e.g. functional genomics)<br>• Viral morphology, protein structure & function |

### Therapy Areas

- Infectious diseases due to:
  - Respiratory viruses (inflenza, SARS-CoV-2)
  - Enteric viruses
  - Flavivirus (e.g. Dengue, Zika)
  - Zoonotic viruses
- Hepatitis B
- Hepatocellular carcinoma

### Platforms

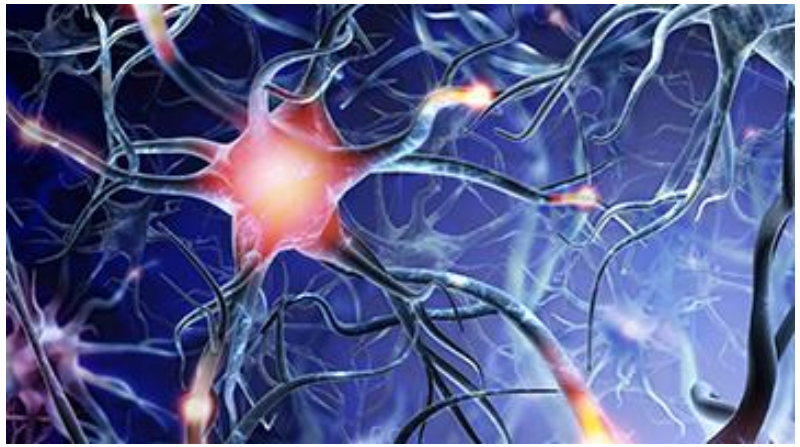
- ViREMiCS

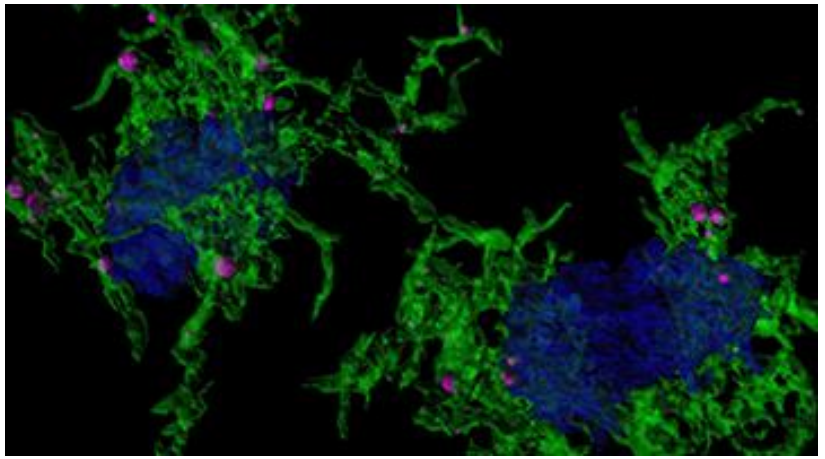
### Technologies / Tools

- Genome-scale CRISPR knockout, Haploid Genetic Screen, Genome-wide RNAi
- X-ray crystallography
- Cryo-electron microscope
- 3-D Microfluidics Platform
- ‘omics’-technologies
- Imaging
- Novel mouse models (e.g. flaviviral infection) to study new therapeutics

# Unveiling Neurological Mysteries for Health

**Neuroscience and Behavioural Disorders** focuses on understanding the nervous system's structure, functions, and mechanisms underlying disorders. Collaborating with clinical faculties, we stand strong in neurodegenerative diseases, cognitive disorders, and more.





DukeNUS Medical School | Neuroscience & Behavioural Disorders

# Unveiling Neurological Mysteries for Health

## Deciphering Human Intelligence and Translating Discoveries into Brain Disorder Strategies

**Neurodegeneration**

- **Parkinson's Disease**
- Alzheimer’s Disease
- Amyotrophic Lateral Sclerosis
- Spinal Muscular Atrophy
- Huntington’s Disease

**Neuropsychiatry & Neurodevelopmental Disorders**

- Autism
- Schizophrenia
- Attention Deficit Hyperactivity Disorder
- Angelman Syndrome
- Microcephaly
- Depression
- Sleep & Circadian Rhythms

# Revolutionizing Health Systems

Duke-NUS's **Health Sciences and Systems Program** leads in deciphering global health systems.
Unveiling service effectiveness, scalability, and economics, we foster interdisciplinary collaboration. Partnering with government, health systems, and social entities, we employ implementation science, health economics, qualitative research, and more.

Health Services & Systems Research

# Revolutionizing Health Systems

## Empowering Tomorrow's Health: Unveiling Insights through HSSR Excellence

| Major Research Themes | Research Focus |
|---|---|
| Implementation science | • Implementation research includes evaluation of existing policies and standard practices, patient needs and the socio-economic factors that impact access to care |
| Health economics | • Includes behavioural economic trials, economic modelling, health technology assessments, and preference assessment using state-of-the-art techniques |
| Decision science | • Application of modelling methods to promote informed decision-making regarding complex healthcare issues |
| Survey / qualitative research | • Collecting data to understand the demand for healthcare services, medical & social patterns of behaviour, patient & provider perspectives, and to inform modelling efforts |
| Quantitative medicine | • Developing novel statistical methods and associated clinical trial designs, including artificial intelligence, big data analytics, and longitudinal data analysis |
| Epidemiology | • Population-based epidemiological studies, development of patient-reported outcome measures, new prevention and treatment models, and etiological studies |
| Data science | • Advanced computational and intelligent solutions to improve patient care, including artificial intelligence, machine learning, data science, and leveraging real-world data |

### Databases

- Diabetes registry
- ED Database
- Cardiovascular Database
- Asthma, COPD
- Colorectal, Breast, Lung, Lymphoma
- Liver Cancer, Distal Pancreatectomy ,Pancreatectomy Databases
- Infection surveillance Registry
- Deidentified Image Database

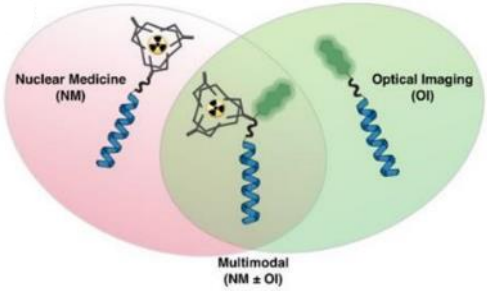
### Platforms

- ODySSEy
- TriNetX
- DEDUCES
- JARVIS

# Unique Initiatives: Platforms To Work Towards a Common Cause

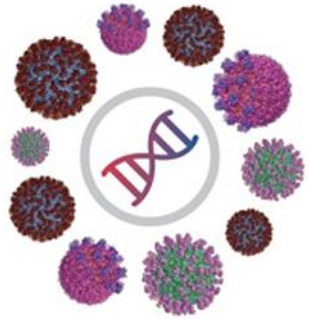
## Cancer Immuno-Therapy Imaging "CITI" Programme

An integrated, multidisciplinary platform for translational immune-oncology imaging that addresses the urgent call for biomarker-driven approaches to monitor tumour immune response.




## Viral Research and Experimental Medicine Centre - ViREMiCS

Aims to accelerate the clinical translation of vaccines and therapeutics by working with academia and industry partners to develop molecular tools that accurately assess the safety and efficacy of vaccines and therapeutics.



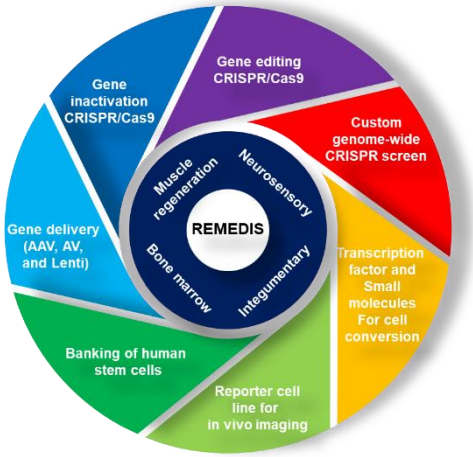
## The Diabetes studY in Nephropathy And other Microvascular cOmplications - DYNAMO

A multi-institute research programme developed for research towards reducing diabetic kidney disease (DKD) in Singapore by 30% within the next five years.

DYNAMO
Diabetes studY in Nephropathy And other Microvascular cOmplications

## Regenerative Medicine Institute of Singapore - REMEDIS

A newly founded institute that is developing cellular-based and regenerative therapeutics and tools as new treatment strategies for key disease areas to improve patient care.



# Leveraging Some Of The World's Most Sophisticated Biomedical Research Facilities

## Animal Facilities

### Animal BSL 3 (video)

The first facility in Singapore that can house non-human primates in open cage systems in a biosafety level 3 containment.

### Behavioral Phenotyping Core
(webpage)

Mouse models to study neurological disorder and anxiety behaviors

### Mouse Monitoring Core
(webpage)

Features the PhenoMaster (Next Generation model) from TSE Systems - a multi-modular platform that allows fully automated and perfectly synchronised metabolic, behavioural and physiological monitoring

## Imaging Facilities

### Laboratory for Translational and Molecular Imaging
(webpage)

- Probe chemistry (conjugation / radiolabeling)
- *In vitro* binding & internalization
- *In vitro/ex vivo* autoradiography
- *In vivo* model development
- *In vivo* pharmacokinetics & pharmacodynamics
- Data analysis & interpretation
- Setup for rodents and non-human primates

### Confocal Microscopes

Zeiss LSM 710 Inverted and Upright microscopes

## Stem Cell and Gene Editing (SCAGE)
(webpage)

SCAGE provides services involving two Nobel Prize winning technologies – induced pluripotent stem cell (iPSC) reprogramming and CRISPR gene editing.

- Reprogramming of fibroblasts, PBMCs, CD34+ cells, etc
- RNA reprogramming (virus-free method) and Sendai reprogramming methods offered
- iPS characterization assays and karyotyping offered
- Gene knockout
- Targeted mutations at specific sites in gene
- Gene knock-in
- Designing of guide RNAs and donor templates
- Off-target analysis

## Insectary Facility
(webpage)

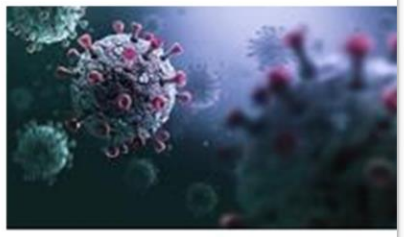
BSL2 insectary for infectious oral feeding. Optimized protocols for dengue, Zika and chikungunya viruses. With colonies of *Aedes aegypti, Ae. Albopictus* & *Ae. Malayensis*

## Metabolomics
(webpage)

Providing customized services. Specialized in identifying and quantifying over 1000 biologically relevant metabolites.

- Amino Acids
- Acyl Carnitines
- Free / Total Carnitines
- Organic Acids
- Sphingolipids & Phosphatidylcholines
- 1- & 3-Methylhistidine
- Tryptophan metabolism pathway metabolites

# Promising Translational Research

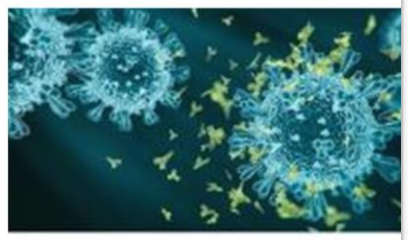


24 Aug 2023

New study classifies SARS viruses and variants into three serotypes,

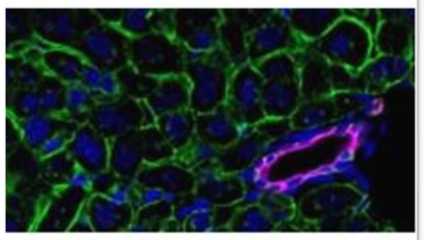
15 Aug 2023

Duke-NUS and Paratus collaborate on a human anti-inflammatory drug



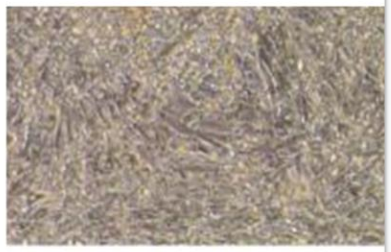
27 Jul 2023

Newly-discovered antibodies can neutralise COVID-19 variants,



19 Jul 2023

Singapore scientists find that a special omega-3 lipid might prevent



08 Jun 2023

Duke-NUS researchers develop promising stem cell-based

01 Feb 2023

Duke-NUS and NHCS scientists first in the world to regenerate diseased

23 Sep 2022

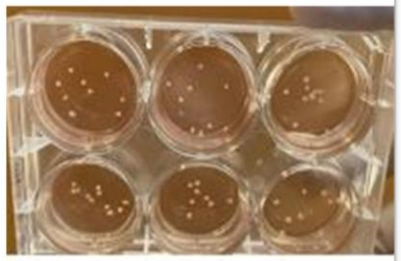
Duke-NUS grants TIIM Healthcare exclusive licence to commercialise technology for intelligently triagi...

21 Jun 2022

Duke-NUS, Johnson & Johnson join hands to advance dengue innovation through a new discove...

10 Jun 2022

Duke-NUS Centre for Outbreak Preparedness launched in Singapore to enhance regional capacity for...



07 Sep 2021

Scientists grow miniature brains that mimic the major pathological features of Parkinson's disease

·NUS: Cancer mutations caused by bacterial toxin p

24 Jul 2020

Singapore develops first-of-its-kind rapid COVID-19 test to detect neutralising antibodies with high...


14 Nov 2019

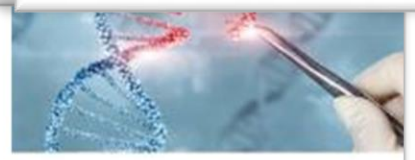
Singapore-led global diabetes stud gets special mention at American Society of Nephrology's annual...

14 Apr 2023

Scientists from Singapore and Sweden achieve promising results towards restoring vision in...

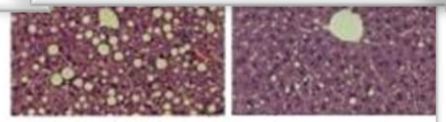
05 Dec 2022

A dengue vaccine? Duke-NUS scientists identify new findings in a key protein that may help



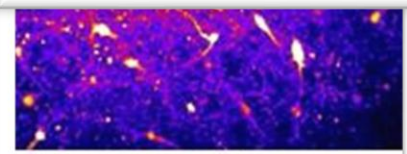
25 Aug 2022

Duke-NUS scientists develop new technique to reveal the hidden genome



21 Sep 2022

Duke-NUS: Preclinical study suggests spermidine can help treat advanced non-alcoholic fatty liver...



15 Jan 2020

Innovative research uncovers mechanism behind epilepsy in Angelman syndrome, may lead to...

09 Jan 2020

Development of first-in-class antibody therapeutics and new partnership bring hope to patient...

# Forging Futures: Pioneering Partnerships And Proven Industry Excellence

Devices
Digital innovations
Diagnostics
Research & Tools
Therapies

Over the last 18 years we have worked with many large companies, biotech's, startups and investors to bring innovative solutions for patients from vaccines to drugs, diagnostics to AI enabled decision making tools, training, education and policies.

# Making Waves - Driving Basic Science Towards New Innovative Solutions


In only 18 years, Duke-NUS has achieved an impressive number of invention disclosures, patent applications and licensing, while forming 25 start-up companies, raised $150M+ in outside capital and 160+ jobs created

## CREATING NEW SOLUTIONS

**253**
Invention Disclosures

**43**
Licenses completed

**>130**
Patents filed

**>27**
Patents granted

**25**
Active start-up companies

All information accurate as of 31 Dec 2022, unless stated otherwise.

# Scientists At the Medical School are At The Forefront Of Innovation

Devices
Digital innovations
Diagnostics
Research & Tools
Therapies

## 32 Active “Commercialization Projects”:

**4**

**Neuro**

**6**

**Heart + Metabolic**

**10**

**Oncology**

**2**

**Health Sciences**

**9**

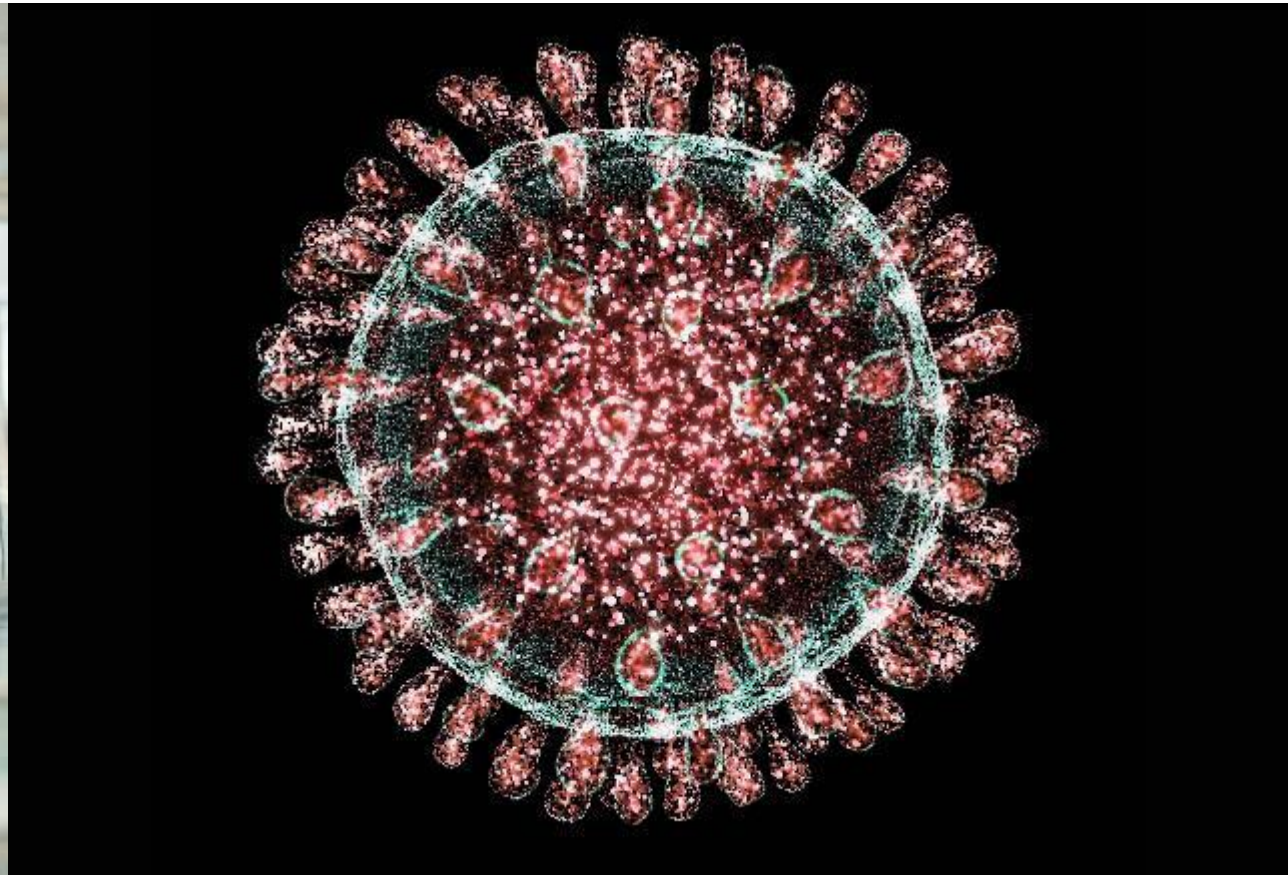
**Infectious disease**

# Strategic Commercialization: Aligning Business Success With Purposeful Impact

Devices
Digital innovations
Diagnostics
Research & Tools
Therapies

TRAVECTA THERAPEUTICS
Vanteres
MOGRIFY Transforming Cell Therapy
Vitreogel
Digital LifeLine
ENLEOFEN
PAIRXBIO
StraTiffCare Empowering Personalized Medicine for Tomorrow
Neurobit Technologies
evecxia therapeutics
CoVBio
CognaLearn Exclusive licensee of Duke-NUS optimized learning methods & technology
LION TCR WE HUNT VIRUSES
InFiBiO
HEALTHSEQ

# Duke-NUS Inventions: A Snapshot



# Novel approach to treating symptoms of Angelman Syndrome

## The Problem Statement

**Angelman Syndrome is caused by disruptions in UBE3A gene**

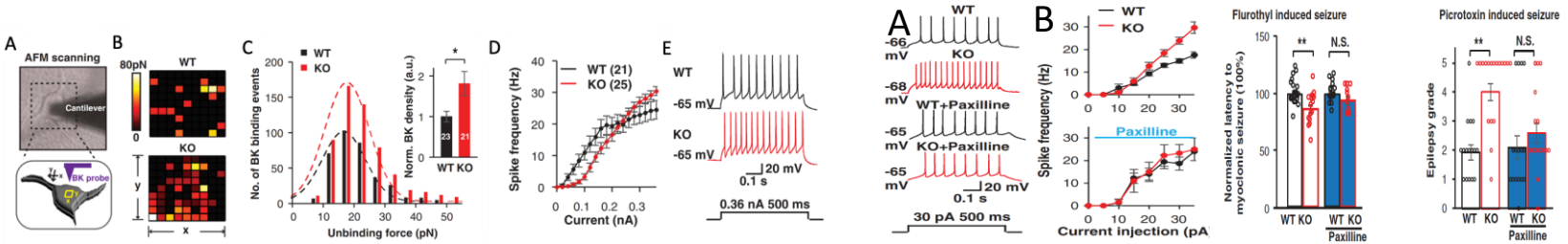
- Serious, incurable, rare  (1 in 15,000)
- Epilepsy in 80 to 95% of patients before 3 years of age
- Linked to mutation / loss-of-genes associated with the 15q11-q13 locus mainly, UBE3A
- Disruptions in the expression / function of UBE3A protein can result in AS disease pathogenesis

**No targeted approach to treat AS-seizures: a major problem**

- Seizures are **treated with medications** and dietary therapies, while sleep issues are treated with **medications** and sleep training

**BK antagonists** provide a promising therapeutic opportunity for the prophylaxis and treatment of seizures in patients with Angelman syndrome

- Our scientists demonstrate that UBE3A suppresses neuronal hyperexcitability via ubiquitin-mediated degradation of calcium and voltage-dependent big potassium (BK) channels
- UBE3A deletions augment BK channel function in human neurons
- Augmented BK channel activity manifests as increased intrinsic excitability in individual neurons and subsequent network synchronization
- The BK antagonist paxilline, normalizes the augmented neuronal excitability changes observed in neurons of UBE3A-deficient organoids
- Other BK antagonists (GAL021, IBTX) also normalized excitability in UBE3A KO human neurons
- BK antagonist reduces seizures/epilepsy in mice caused by Flurothyl or Picrotoxin

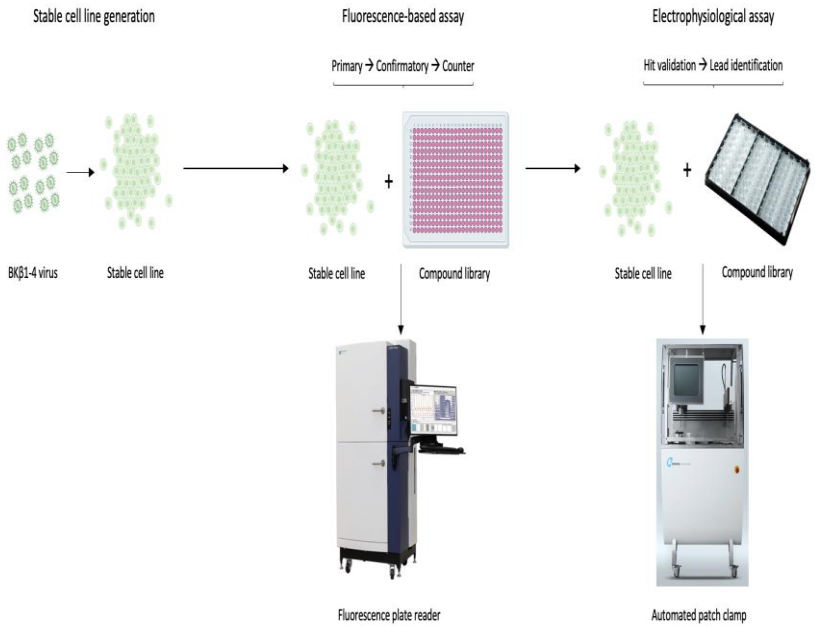


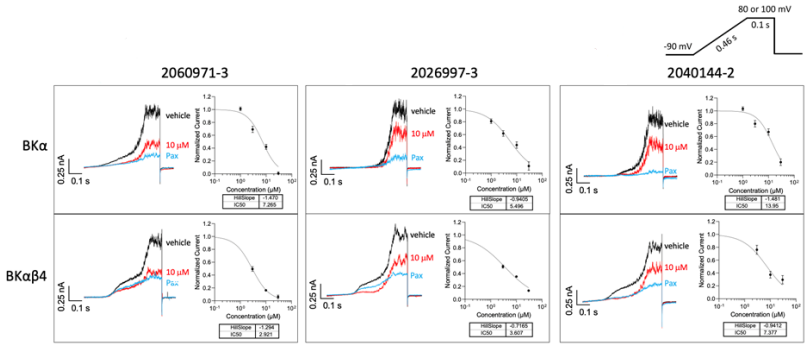
# Novel Approach To Treating Symptoms Of Angelman Syndrome

## Our Solution

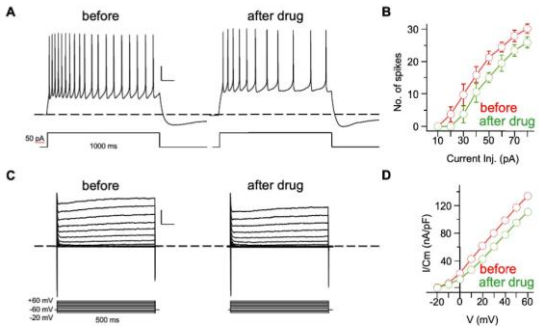
**Targeting the BKαβ4, a CNS-specific BK complex in the brain, by identifying specific antagonist(s) reduced neuronal hyperexcitability and ameliorate seizures in AS patients.**

### Identified CNS-specific BK channel modulators using high throughput screening of compound libraries




**Three compounds could reduce BK currents in Qpatch-HTX automated patch recording.**
**Lowest IC50 in BK alpha-beta – 3.236 mM**




**The BKαβ4 specific antagonist treatment reduces neuronal excitability in human-induced neurons derived from UBE3A KO hESCs.**

# WWP2: A Novel And Actionable Drug Target For Pathological Fibrosis

## The Problem Statement

Tissue fibrosis causes harmful scarring due to disrupted healing.

Lack of safe, targeted cures for fibrosis-related disorders leads to global burdens.

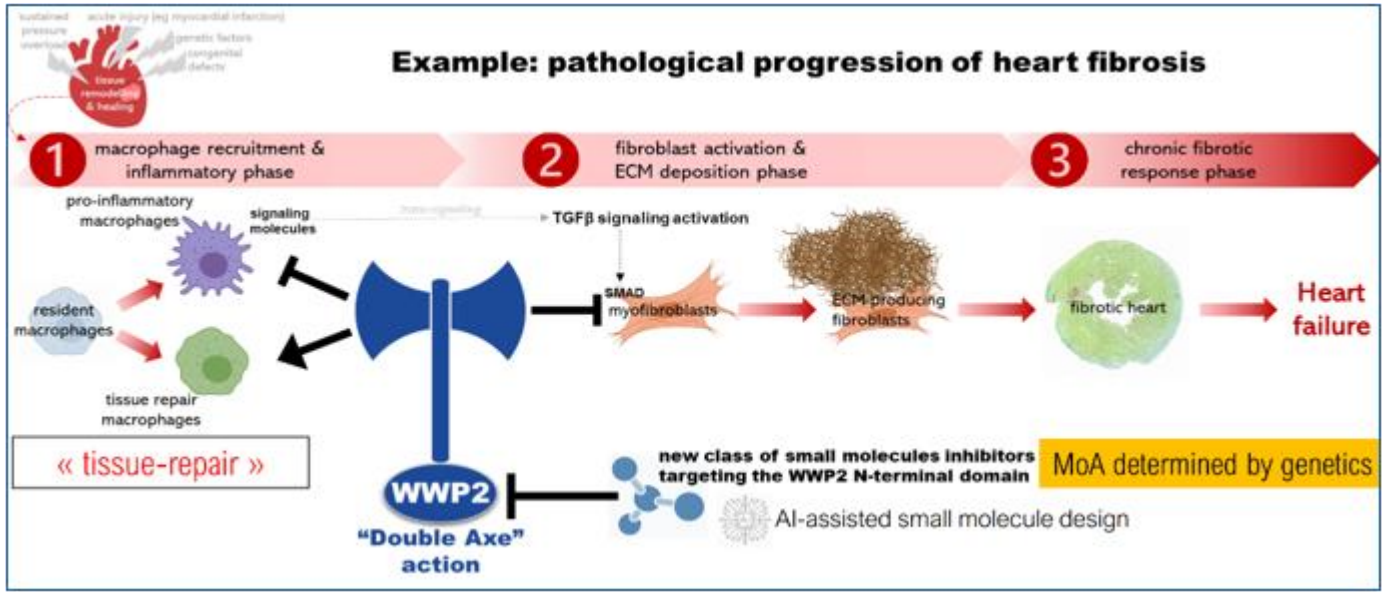
Common diseases lack preventive treatments; current therapies lack specificity and may cause toxicity. **Unmet needs persist for safe and effective fibrosis treatments**.

## WWP2 is a new anti-fibrotic target which directly regulates the development of pathological fibrosis in different tissues

WWP2 is a new anti-fibrotic target which directly regulates the development of pathological fibrosis in different tissues -experimentally validated (*in vivo*) using disease models of:

- **dilated cardiomyopathy (DCM), myocardial infarction (MI) & heart failure (HF)**
- **chronic kidney disease (CKD) & acute kidney injury (AKI)**
- **idiopathic pulmonary fibrosis (IPF)**

Different from traditional upstream inhibition of TGFβ(e.g., by drugs Losartan, Tranilast)
WWP2 inhibition exerts a compelling “Double Axe” regulatory action on different phases of fibrogenesis, working both upstream(❶in macrophages) and downstream(❷in fibroblasts) of TGFβsignaling activation



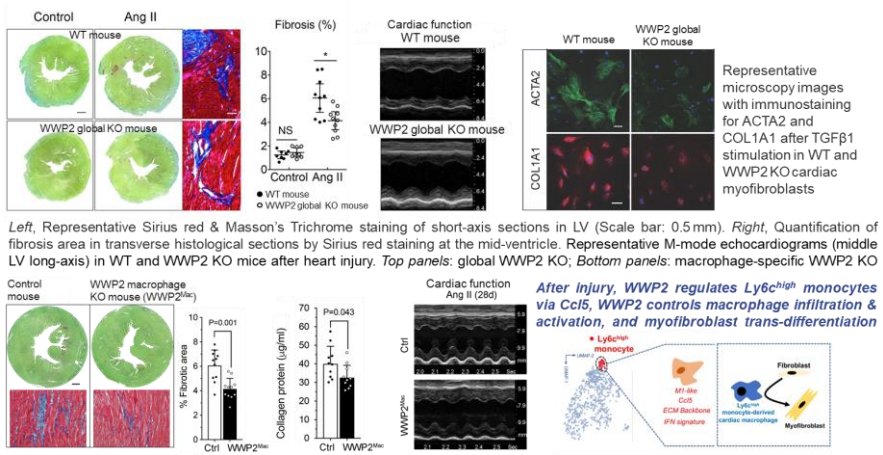
# WWP2: A Novel And Actionable Drug Target For Pathological Fibrosis

## WWP2: Orchestrating TGFβ Signaling for Cardiac Fibrosis Control

- **Operating both upstream and downstream** of TGFβ signaling, WWP2 holds sway over cardiac fibrosis regulation.
- **In the early-inflammatory phase** of fibrosis, WWP2's pivotal role involves a "Double Axe" action, influencing macrophages.
- **Revolutionizing WWP2 Inhibition**: Unveiling a Novel Mechanism through AI-Guided Drug Prediction and Screening.
- **Emergence of a New Class**: N-terminal-targeting WWP2 Inhibitors as Innovative Antifibrotic Therapy

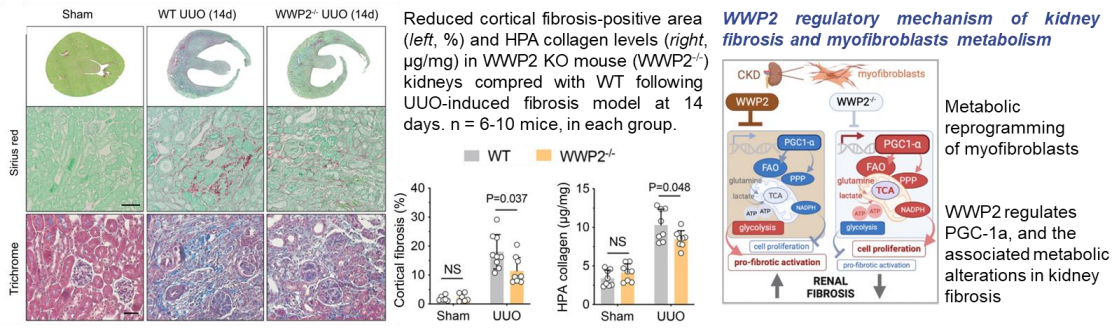
## Key Data

### WWP2 regulates pathological cardiac fibrosis via its action in fibroblasts and macrophages




*Left*, Representative Sirius red & Masson's Trichrome staining of short-axis sections in LV (Scale bar: 0.5 mm). *Right*, Quantification of fibrosis area in transverse histological sections by Sirius red staining at the mid-ventricle. Representative M-mode echocardiograms (middle LV long-axis) in WT and WWP2 KO mice after heart injury. *Top panels*: global WWP2 KO; *Bottom panels*: macrophage-specific WWP2 KO

### WWP2 regulates the metabolic reprogramming of renal myofibroblasts to promote kidney fibrosis in chronic kidney disease (CKD)

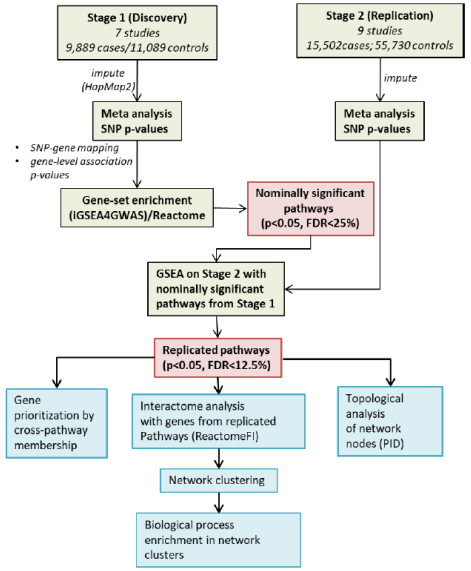



Representative images of WT and WWP2-/- (WWP2 global KO) mouse kidneys following UUO model for 14 days. (n=8 for each condition). Top and middle panels, Sirius Red staining for whole section and representative fibrotic area. Scale bars, 50 μm. Bottom panels, representative images of Masson's trichrome staining for representative fibrotic area. Scale bars, 20 μm.

# Furin: Novel Pro-Atherogenic Gene

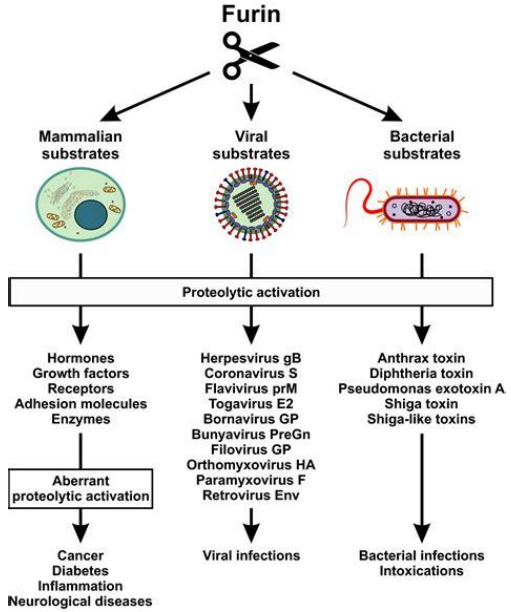
## Furin: Why are we interested?

We discovered FURIN to be a common component of six biological pathways significantly associated with atherosclerosis

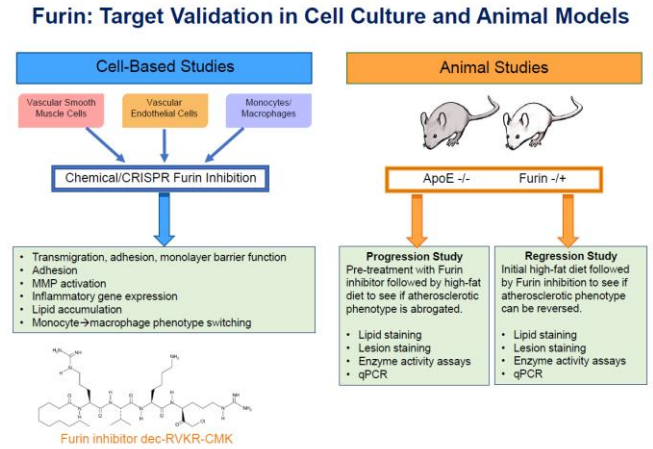



(Ghosh et al., 2015)

Pathway analysis of a large genotyped CAD case: control cohort (Cardiogram consortium)



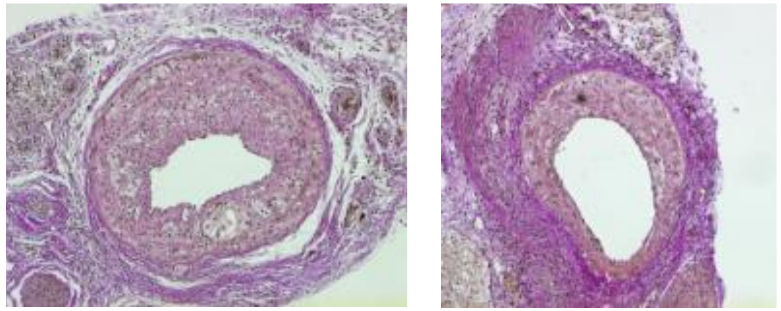

**FURIN** is a protease that cleaves a wide variety of proteins and thereby regulates a large number of biological processes including embryogenesis, homeostasis and disease




Furin inhibition showed positive effects, including reduced atherosclerosis in Ldlr-/- mice, decreased plaque formation in ApoE-/- mice, lower monocyte migration and inflammation in cell-culture, and decreased systemic inflammation. Additionally, it lowered matrix metalloprotease activation and increased HDL-cholesterol levels in Ldlr-/- mice, while furin overexpression increased plaque area in ApoE-/- mice.

# Furin: Novel Pro-Atherogenic Gene

Atherosclerotic plaque thickness upon inhibition or overexpression of FURIN



We studied FURIN inhibition's impact on monocytes/macrophages in atherosclerotic plaques via cell-culture experiments. Utilizing CRISPR, we knocked down FURIN in monocytes and compared knockout cells to wild-type. FURIN inhibition led to reduced cell growth, lipid uptake, and monocyte migration. Inflammatory gene expression varied, and genes related to "complement/coagulation cascade" were significantly downregulated in FURIN deficient cells. Phagocytic activity remained unchanged.

## Next Steps

- Explore targeted cell-specific FURIN inhibition for improved efficacy and fewer side effects compared to systemic inhibition.
- Investigate whether FURIN deletion in monocytes/macrophages, endothelial cells, and vascular smooth muscle cells can yield anti-atherosclerotic effects in animal models.
- Additionally, broaden the spectrum of disorders benefiting from FURIN inhibition and evaluate small molecule FURIN inhibitors as potential anti-infective agents.

## Publication


Meta-Analysis › Arterioscler Thromb Vasc Biol. 2015 Jul;35(7):1712-22. doi: 10.1161/ATVBAHA.115.305513. Epub 2015 May 14.

**Systems Genetics Analysis of Genome-Wide Association Study Reveals Novel Associations Between Key Biological Processes and Coronary Artery Disease**

Sujoy Ghosh, Juan Vivar, Christopher P Nelson, Christina Willenborg, Ayellet V Segrè, Ville-Petteri Mäkinen, Majid Nikpay, Jeannette Erdmann, Stefan Blankenberg, Christopher O'Donnell, Winfried März, Reijo Laaksonen, Alexandre F R Stewart, Stephen E Epstein, Svati H Shah, Christopher B Granger, Stanley L Hazen, Sekar Kathiresan, Muredach P Reilly, Xia Yang, Thomas Quertermous, Nilesh J Samani, Heribert Schunkert, Themistocles L Assimes, Ruth McPherson

PMID: 25977570 PMCID: PMC4841833 DOI: 10.1161/ATVBAHA.115.305513

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› Arterioscler Thromb Vasc Biol. 2019 Mar;39(3):387-401. doi: 10.1161/ATVBAHA.118.311903.

**FURIN Inhibition Reduces Vascular Remodeling and Atherosclerotic Lesion Progression in Mice**

Gopala K Yakala [1], Hector A Cabrera-Fuentes [2 3 4 5 6], Gustavo E Crespo-Avilan [2 3], Chutima Rattanasopa [1 2], Alexandrina Burlacu [7], Benjamin L George [3], Kaviya Anand [1], David Castaño Mayan [1], Maria Corlianò [1], Sauri Hernández-Reséndiz [2 3], Zihao Wu [1], Anne M K Schwerk [8], Amberlyn L J Tan [1], Laia Trigueros-Motos [1], Raphael Chèvre [1], Tricia Chua [1], Robert Kleemann [8 9], Elisa A Liehn [3 10 11], Derek J Hausenloy [2 3 12 13 14 15], Sujoy Ghosh [2 3], Roshni R Singaraja [1]

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PMID: 30651003 PMCID: PMC6393193 DOI: 10.1161/ATVBAHA.118.311903

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