NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | Graduate College

Joint PhD Program Description

The description for the Joint PhD program will be posted online as a sub-page to

Joint PhD Programmes | Graduate College | NTU Singapore.

Name of Partner University	Karolinska Institute (KI)
Country	Sweden
Year of JPP Establishment	28 April 2009 (1st agreement) extended until 31 Dec 2025
Program	☒ Joint Degree ☐ Joint Supervision
Description of the Program (150-250 words)	The programme has and still provides a remarkable opportunity for Singaporean students (from NTU) to get the "best of two worlds" and spend two years or more at one of the world most prestigious medical universities, KI in Stockholm. It generally attracts the best students graduating from NTU UG programmes and contributes to interdisciplinary collaborations and the broad disciplinary range of projects is emphasised by the fact that students on this programmes are working with main supervisors in NTU. Furthermore, this programme has significantly contributed to the deepening and strengthening of NTU-KI relations and research collaborations. When the programme started, NTU was a minor player but along with NTU's strengthening in biomedical sciences and the establishment of the LKC School of Medicine, this has changed and the joint programme is one of the cornerstones in NTU-KI relations. It has contributed to visiting professorships from KI and help to contribute and establish NTU further in the biomedical science field in Singapore and beyond. The programme has been scientifically very successful with a large number of top publications.
Disciplines	Biomedical sciences
PMC Names	Prof. Lars Nordenskiöld (NTU) Assoc. Prof. Koh Cheng Gee (NTU) Prof. Balázs Zoltán Gulyás (NTU/KI) Prof. Sven Pettersson (KI) Prof. Robert Harris (KI)
PMC Emails	Prof. Lars Nordenskiöld (larsnor@ntu.edu.sg) Assoc. Prof Koh Cheng Gee (cgkoh@ntu.edu.sg) Prof. Balázs Zoltán Gulyás (balazs.gulyas@ntu.edu.sg) Prof. Sven Pettersson (sven.pettersson@ki.se) Prof. Robert Harris (robert.harris@ki.se)

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Joint Projects

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | Graduate College

1. Optimizing T Cell Immunotherapy in Pancreatic Cancer Through Microbial Modulation

Date Posted	24 March 2025	
Home University	NTU	
Partner University	Karolinska Institute	
Supervisors	**Home**	**Partner**
Name	Prof. Andrea Pavesi	Prof. Margaret Sällberg Chen
School	Lee Kong Chian School of Medicine (LKCMedicine)	Department of Laboratory Medicine
Email	Andrea.pavesi@ntu.edu.sg	margaret.chen@ki.se
Website	https://www.pavesilab.com/	https://ki.se/en/people/margaret-chen
Project Description (200-300 words)	Pancreatic ductal adenocarcinoma (PDAC) remains refractory to immunotherapies such as antibody and cell therapy, partly due to its immunosuppressive tumor microenvironment. Emerging evidence implicates the tumor microbiome as a key modulator of antitumor immune responses in pancreatic cancer, with certain commensal bacteria and their metabolites shown to affect cancer immunotherapy efficacy in preclinical models. However, the mechanisms underlying these interactions remain poorly understood, limiting translational progress[1]. In this collaborative project between Prof. Pavesi's lab and Prof. Sällberg Chen's lab at Karolinska Institute, we will investigate how the microbiome within tumors shapes intratumoral T cell responses. Key objectives include: (1) characterizing the microbial communities present in pancreatic tumors and determining their impact on T cell immunotherapy; (2) exploring strategies to improve T cell infiltration and persistence in tumors with specific microbial signatures; and (3) elucidating how microbiome-derived metabolites influence tumor-specific T cell functions, including whether ex vivo conditioning of CAR T cells with these metabolites can bolster their anti-tumor activity. We will leverage integrated metagenomic sequencing, metabolomic profiling, and single-cell transcriptomics to dissect these tumor–microbe–immune interactions. By uncovering the interplay between the tumor microbiome and intratumoral T cells, this research aims to identify novel translational strategies to enhance therapy for pancreatic cancer, ultimately contributing to more effective and durable treatments for this lethal malignancy. [1]: https://doi.org/10.3389/fimmu.2024.1434771	

Program/Center Website(s)	https://www.ntu.edu.sg/medicine
Additional Information (e.g., files with project details)	NA

2. Biophysical Studies of Phase-Separated Peptides for Therapeutic Applications

Date Posted	23 May 2023	
Home University	NTU	
Partner University	Karolinska Institute	
Supervisors	**Home**	**Partner**
Name	Ali Miserez/Konstantin Pervushin	Michael Landreh Marie Henriksson/David Lane
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Project Description (200-300 words)	In recent years, there has been growing evidence that coacervate microdroplets (biocondensates) produced by liquid-liquid phase separation (LLPS) are promising carriers for intracellular delivery of macromolecular therapeutics. The NTU applicant has developed a family of stimuli-responsive phase-separating peptides (PSPs) capable of delivering a wide range of large macromolecular modalities (anti-tumour peptides and proteins, plasmid DNA, mRNA, etc…) inside mammalian cells. In collaboration with the KI team, this platform has notably established the ability to deliver a short variant of Omomyc, a potent anti-cancer protein that inhibits the MYC transcription factor implicated in most cancers, and which does not efficiently cross the cell membrane on its own. While PSPs can recruit a wide range of macromolecules, we still have a spare molecular understanding behind the recruitment mechanism of cargos within the microdroplets, in particular the type of intermolecular interactions involved. Separately, the KI team has developed biophysical methods based on mass spectrometry (MS) that can interrogate intermolecular contacts within biocondensates. In this project, we will aim to combine our joint expertise with the following approach: PSPs developed at NTU will be used to recruit therapeutics cargos developed by KI, such as anti-cancer proteins, stapled peptides, and antibodies, that target specific diseases. Biophysical studies of PSP/cargos will then be conducted at KI	

	by MS to systematically identify intermolecular interactions governing the recruitment of therapeutic cargos within the microdroplets. These studies will be complemented at NTU by NMR studies using methods specifically established by our team for coacervates/biocondensates. At NTU, the student will be designing PSPs optimized for different type of cargos and will also conduct solution as well as solid-state NMR studies. At KI, the student will be trained in advanced MS techniques and live cell assays.
Program/Center Website(s)	At NTU, the work is currently being supported by a MOE Tier 3 grant. PI website: https://personal.ntu.edu.sg/ali.miserez/ At KI, the work is supported by funding from the Swedish Cancer Society and the Swedish Research council. PI Websites: https://ki.se/en/mtc/david-lane-group https://ki.se/en/mtc/principal-investigator-michael-landreh https://ki.se/en/mtc/marie-arsenian-henriksson-group
Additional Information (e.g., files with project details)	There has been an on-going collaboration between the two teams for almost 2 years, with promising data obtained in the intracellular delivery of Omomyc (developed at KI) using PSPs designed at NTU, with therapeutic activity observed *in vitro*.