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VIVEK MURALI

MEDICAL STUDENT – BIOMEDICAL ENGINEER

A passionate and highly motivated second-year medical student keen on leveraging research and innovation to directly alleviate patient lives. Alongside my past experiences of designing medical devices in the MedTech industry, I also pursue independent research projects in computational modelling of cancer cell growth. My goal is to eventually translate strong abstract research findings into practical healthcare solutions that will make a difference to the society and community that has raised us.

EDUCATION

MD-PhD Candidate	DUKE-NUS Graduate Medical School	2021 - PRESENT
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- MD-PhD, Expected 06/2028

BACHELOR'S DEGREE	National University of Singapore (NUS)	2015 - 2019
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- Biomedical Engineering (Honours); GPA 4.87 / 5.00
Selected and attended a year-long exchange program at Imperial College London from 2017 - 2018
Awards: Lee Kuan Yew Gold Medal, IES Gold Medal, Biomedical Engineering Achievement Award (AY2015/2016 & AY2016/2017), Dean's List (AY2015/2016 Semester 2, AY2016/2017 Semesters 1 & 2)

RESEARCH EXPERIENCE

INDEPENDENT RESEARCH	DUKE-NUS Graduate Medical School	JUN 2019 - PRESENT
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Supervisor: Dr. Lisa Tucker- Kellogg

- Developing theoretical generalizations of the impact of uniformity of pairwise drug interactions on the speed of evolving drug resistance under the context of multi-drug combination therapies. This ongoing research is an extension of the work completed in my final year project during my undergraduate studies.
Main Finding: Longer duration of cancer control was achieved by multi-drug cocktails having higher uniformity of pairwise Combination Index (CI) (i.e., all pairs of drugs within the cocktail having similar levels of non-additivity), compared with multi-drug cocktails having equal overall CI, but greater differences in the pairwise CI's.

FINAL YEAR PROJECT	National University of Singapore (NUS)	AUG 2018 – JUN 2019
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Supervisors: Dr. Lisa Tucker- Kellogg, Dr Alberto Corrias

- Dissertation title: "Computational Simulations of Cancer Evolution and Response to Drugs in Investigating Merits of Synergism and Antagonism".
Main Finding: Developed a simple, deterministic proof of a published finding, eradicating the need for computational load or complex mathematical derivations to support it. This allowed for greater theoretical generalizations of the merits of non-additivity in cancer therapy in two-drug systems pairwise CI's.

PUBLICATIONS AND PATENTS

JOURNALS

- Elysia C. Saputra, Vivek Murali, Lisa Tucker-Kellogg. Computational modeling of evolution in tumor cell populations shows differences in the symmetry of resistance after treatment with synergistic or antagonistic combination drugs [abstract]. In: Proceedings of the Annual Meeting of the American Association for Cancer Research 2020; 2020 Apr 27-28 and Jun 22-24. Philadelphia (PA): AACR; Cancer Res 2020;80(16 Suppl):Abstract nr LB-372.

CONFERENCES

- Abstract accepted for a talk at eSMB2020. The talk was presented by my supervisor Asst. Prof. Lisa Tucker-Kellogg.
Abstract: During Multi-Drug Combination Therapy, the speed of evolving drug-resistance is affected by the uniformity of pairwise synergism, additivity or antagonism between the drugs.

PATENTS

- “Devices and methods for aiding conception” – US Patent No. 11,357,481 – Date of Patent: June 14, 2022.
Co-inventor under Hannah Life Technologies

WORK EXPERIENCE

PRODUCT DEVELOPMENT MANAGER	<i>Hannah Life Technologies Pte Ltd</i>	SEP 2020 – JUL 2021
<ul style="list-style-type: none">• Leading the planning and execution of higher-level tasks such as liaising with external CROs, facilitating discussions pertaining to potential clinical trials and working towards submitting a 510(k)-pre-market approval.• Managing and mentoring a team of engineers and interns to improve existing products and procedures while creating two new innovative devices.• Managed to quickly set up an internal small-volume production of devices to meet key goals despite the disruptions brought about by COVID-19.		
PRODUCT DEVELOPMENT ENGINEER	<i>Hannah Life Technologies Pte Ltd</i>	JUN 2019 - SEP 2020
<ul style="list-style-type: none">• As the lead engineer, contributed to the design and development of the company’s flagship product: An over-the-counter conception aid device that can be used during intercourse.• Primarily involved in developing 3-D CAD models using Solidworks, designing and building prototypes, conducting validation and verification testing following risk analysis using FMEA.• Assisted the company in receiving funding from Y-Combinator accelerator program.		
ENGINEERING INTERN	<i>Privi Medical Pte Ltd</i>	MAY 2017 - SEP 2017
<ul style="list-style-type: none">• Assisted in bench testing and compilation of 510(k) documentation, which proceeded gaining FDA approval.• Assisted the Quality Head in setting up the Quality Management System for Privi Medical from scratch and managed successfully to clear stage one audit by Tuv Rheinland in accordance with ISO 13845 standards.		

ACADEMIC PROJECTS AND RESEARCH

UNDERGRADUATE RESEARCH	<i>NUS Computational Bioengineering Lab</i>	JULY 2018 – AUG 2018
<ul style="list-style-type: none">• Assisted in an ongoing code development project on non-linear optimization in modelling the mechanical behavior of biological tissues. Uncovered and corrected an improper implementation of one of the constitutive models used in the computational code.• Drafted a comprehensible guide on mathematical fundamentals and derivations behind all the hyper-elastic constitutive models used in the code.		
UNDERGRADUATE RESEARCH	<i>NUS Cardiovascular Biomechanics and Ultrasound Lab</i>	SEP 2016 – MAR 2017
<ul style="list-style-type: none">• Investigated experimental procedures in growing uniform carbon nanotubes to reduce shear stress and chances of blood damage in blood pumps.• Designing and setting up a flow circuit to evaluate the effectiveness of various surface structures on blood damage through hematocrit measurements.		
UNDERGRADUATE PROJECTS	<i>NUS Biomedical Engineering Curriculum</i>	2015 - 2019
<ul style="list-style-type: none">• BN3103 Design Project: Designed and prototyped a novel pupil expander leveraging Nitinol’s shape memory property.• BN2402 Project: Designed and prototyped a physiological stress sensor device using Arduino.		

VOLUNTEERING

STARPALS MEDIMINDER	<i>HCA Hospice Care Singapore</i>	2015 - 2021
<ul style="list-style-type: none">• <i>Paediatric Care Volunteer</i> providing hours of respite for family members in taking care of their children. This encompasses PEG/NG Tube feeding, suctioning, etc. This usually occurs on an ad-hoc basis depending on family needs.		

SKILLS

Technical: Solidworks 3D Cad, Shapr3D, Matlab, Microsoft Office

Hard Skills: Statistical Analysis, Stochastic Computational Modelling, Product Management and Development, Bilingual - English and Chinese

Soft Skills: Research and Analysis, Problem-solving and Critical Thinking, Collaboration and Teamwork