Arunaa Nagarajan Ganesan

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EDUCATION

Carnegie Mellon University **Pittsburgh, USA**
MS in Biotechnology and Pharmaceutical Engineering *Aug 2023 - Dec 2024*
GPA: 3.76/4.00

PSG College of Arts and Science **Coimbatore, India**
BSc in Biotechnology *Sep 2020 - Aug 2023*

TECHNICAL SKILLS

Laboratory Skills: Molecular techniques: Immunofluorescence microscopy, PCR, UV spectrometry, Western Blot, Good laboratory practices, Restriction Digestion, Immunoprecipitation, NTA (Nanoparticle Tracking Assay), Scanning Electron Microscopy, Primary T-cell culture, Flow cytometry, ELISA, Enzyme-Linked ImmunoSpot (ELISpot), Cytotoxicity assays (LDH), T-cell proliferation assays,single-cell RNA sequencing (scRNA-seq)
Microbial Techniques: Isolation using Streaking and plating, Cell-Culture, Staining techniques, Tissue culture.
Data analysis: GraphPad Prism, FlowJo, Python.

WORK EXPERIENCE

Investigating Tumor-Infiltrating Lymphocytes in Glioblastoma **Pittsburgh, PA**
Research Assistant – Glioblastoma T-cell Therapy & Cancer vaccine - Kohanbash Lab *July 2024 - Present*

- Expanded TILs by 300% using IL-2 protocols, boosting cytotoxicity 50% above control via neoantigen-driven responses. Tested 12 neoantigens against TILs targeting an antigen with known T cell activity as a control.
- Developed and validated assays to characterize T cell functionality, using western blotting to quantify a 2-fold increase in activation markers (e.g., IFN-gamma) and assess exhaustion markers (e.g., PD-1 expression).
- Utilized flow cytometry with 85% purity in T cell subset identification, leveraging FlowJo for data analysis.
- Conducted single-cell RNA sequencing on 1,000+ TILs, revealing a significant upregulation in key immune response genes, correlating with enhanced anti-tumor cytotoxicity compared to unprimed T cells.
- Assessed T cell cytotoxicity using ELISpot, ELISA, and LDH assays, demonstrating increase in tumor cell lysis.
- Performed statistical analyses of experimental data using GraphPad Prism, providing robust data visualization and quantification of immune responses, supporting conclusions on TIL efficacy. Optimized TIL-neoantigen interactions, resulting in a 25% improvement in immune response targeting in murine glioblastoma models.

Engineering EVs with Surface Quorum Sensing Peptides for Cell Communication **Pittsburgh, PA**
Graduate Research Assistant:Streptococcus pneumoniae- Hiller Lab, Carnegie Mellon University *Jan 2024 - Jun 2024*

- Developed and optimized protocols for high-yield isolation of extracellular vesicles (EVs) from Streptococcus pneumoniae using ultracentrifugation and size-exclusion chromatography techniques and cryopreserved them.
- Applied molecular biology techniques, including PCR, gene cloning, and gene knockout, to engineer bacterial strains for targeted EV studies, enabling the analysis of modified EVs for cellular uptake & cellular communication.
- Conducted quantitative assays (Picogreen, Ribogreen, BCA) to measure protein and nucleic acid concentrations, and nanoparticle tracking analysis (NTA) to evaluate EV size and cargo composition for EV engineering.
- Optimally incorporated quorum-sensing peptides onto EV surfaces and assessed their impact on cell signaling.

Discovered novel antimicrobial compounds from natural source: Rosa indica **Coimbatore, India**
Pharmaceutical Intern: Natural source, Centre for Bioscience and Nanoscience Research *Jul 2022 - Aug 2022*

- Analyzed chemical profiles of Rosa indica leaves using UV spectroscopy (conjugated structures). Performed TLC & identified 33.33% more bands in the ethanol vs. methanol extract, suggesting potential antimicrobial content.
- Evaluated the antimicrobial activity of the extracts by employing Well diffusion & Broth Dilution Assay.
- Utilized a C18 column in Reverse phase High-Performance Liquid Chromatography (RP-HPLC), to confirm and further identify the antimicrobial contents in the Rosa indica leaf extract with ethanol as the mobile phase.

PROJECTS

Fluorescent protein expression in *E.coli* **Pittsburgh, PA**
Carnegie Mellon University *Jan 2024 - Mar 2024*

- Engineered *E.coli* to express an unknown fluorescent protein by constructing a plasmid, transforming cells, and inducing expression. Characterized the unknown protein, using SDS- PAGE & UV Vis spectroscopy.
- Identified the unknown fluorescent protein using PCR, sequencing, and fluorescence microscopy.
- Analyzed the combined data using Benchling software and validated the findings from NCBI data.

PUBLICATION

- **Defining approaches to mitigate toxicological impacts of pyrogallol on exposure to biological systems** Link