

DONG, Lingkai

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Fudan University Jiangwan Campus, No. 2005 Songhu Road, Yangpu District, Shanghai, China

EDUCATION BACKGROUNDS

The Hong Kong University of Science and Technology

Master of Science in Chemical and Biomolecular Engineering

Aug. 2021-Nov. 2022

- Cumulative Grade Point Average: 3.64 / 4.3 Ranking: N/A
- Main modules: Polymer and Material Characterization, Pharmaceutical Engineering, Protein Engineering, Advanced Biochemical Engineering, Data Science in Biological Engineering, etc.

Nanjing Normal University

Bachelor of Science in Biotechnology

Sep. 2017-Jun. 2021

- Cumulative Grade Point Average: 3.51 / 5.0 Ranking: 2/54
- Main modules: Biochemistry, Molecular Biology, Genetics, Cell Biology, Microbiology, Cell Engineering, Genetic Engineering, Biostatistics, Bioinformatics, etc.

PROFESSIONAL EXPERIENCES

Fudan University

Research Assistant, Lab of Advanced Materials

Aug.2023-present

Supervisor: Prof. Tiancong Zhao, Prof. Dongyuan Zhao

Southern University of Science and Technology

Visiting Scholar / Teaching & Research Assistant

Oct. 2022-Jul.2023

Supervisor: Prof. Peng George Wang

RESEARCH & PROJECTS

Vesicle-like polydopamine nanomaterials with high viscosity for more efficient T cell activation in vitro

Aug. 2023-Present

Supervisor: Prof. Tiancong Zhao, Prof. Dongyuan Zhao

Nanoscale artificial antigen-presenting cells(aAPCs) are often used for T cell activation in vivo or in vitro. Previous studies have shown that differences in topology (e.g. morphology, hardness) of nanomaterials can result in different T cell activation efficacy. In this work, we designed artificial antigen-presenting cells based on a novel highly viscous vesicle-like polydopamine Cap, which shown better T cell activation efficiency compared to spherical nanoparticles.

- Preparation of BSA/antibodies-modified polydopamine Cap and NPs
- Cellular uptake assay of PDA Cap and NPs
- Co-culture of aAPCs with Jurkat for T cell activation analysis

In Vitro and In Vivo Screening of Lipid Nanoparticles Containing Novel Biodegradable Ionizable Lipids

Oct. 2022-Jun. 2023

Supervisor: Prof. Peng George Wang

Ionizable lipids with unsaturated tails, multiple tails, branched tails, and bio-degradable linkages are considered to have potentially higher mRNA delivery efficiency based on structure-activity relationship(SAR) studies of ionizable lipids reported previously.

A library of novel ionizable lipids embodying biodegradable disulfide bonds as well as unsaturated/branched tails was tested in this work. Lipid nanoparticles containing different novel

ionizable lipids were manufactured by microfluidic mixers firstly, then prepared FLuc-mRNA LNPs were characterized and screened in vitro and in vivo for mRNA delivery efficiency. Finally, in vivo toxicity of LNPs comprising potent novel ionizable lipids were evaluated. The commercial ionizable lipids SM102, MC3 and ALC0315 were set as references in this work.

- Preparation and characterization of LNPs containing novel ionizable lipids
- In vitro and in vivo screening of FLuc-mRNA LNPs
- In vitro and in vivo toxicity evaluation of LNPs comprising novel ionizable lipids

Preparation and Stability Testing of Lipid-coated Hydrogel Microparticles

Sep. 2021-Jul. 2022

Supervisor: Prof. Ying CHAU

Artificial antigen-presenting cells(aAPCs) can activate and expand T cells in vitro, which have great potential for tumor immunotherapy. Hydrogels have been widely used for medical treatment and drug delivery due to their good biocompatibility.

We prepared a series of artificial antigen-presenting cells based on lipid-coated hydrogel microparticles. Firstly, we designed and synthesized different lipid-like ‘anchors’ for modifying hydrogel microparticles. Next, the stability of the lipid membranes on the surface of hydrogel microparticles were tested. Ultimately, two ‘anchors’ were able to provide a half life of more than 500 hours in DC medium and a half life of about 100 hours when co-cultured with T cells.

- Preparation of hydrogel microparticles with different biomaterials, e.g. dextran, hyaluronic acid
- Synthesis of ‘anchors’ with different structures and lengths
- Co-culture of aAPCs with T cells or placing aAPCs in DC medium/PBS solution
- Quantitative analysis of stability and half-life of POPC/DSPC coated hydrogel microparticles by scanning confocal microscopy

Functional Analysis of Drosophila TCTP Regulating Immune Signaling Pathway to Enhance Cell Tolerance to Deltamethrin

Dec. 2020-May 2021

Supervisor: Prof. Luogen Cheng

Translationally controlled tumor protein(TCTP) is a multifunctional protein that is highly conserved in a variety of species. TCTP expression is highly regulated and affects many life processes such as cell growth and differentiation. Since the expression of TCTP was upregulated in drug-resistant insects, we analyzed the effect of TCTP on the expression of *drsl1*, a gene downstream of the Toll-like receptor signaling pathway, to investigate the regulatory role of TCTP on cellular tolerance.

- Studying the relationship between resistance of Drosophila cells to Deltamethrin and TCTP expression
- Overexpression and interference of TCTP gene in Drosophila cells
- Analyzing the changes of TCTP expression levels in cells and their effects on gene *drsl1* by qPCR

Screening and Identification of Soil Fungi Carrying Soybean Mosaic Virus

“2019 Provincial Key (National) College Student Innovation and Entrepreneurship Training Program”

Jun. 2019-Apr. 2020

Supervisor: Prof. Kai Xu,

Current research shows the main transmission mode of SMV is seed transmission and aphid transmission, but soil fungi are an important way for plant viruses to spread. Since soybean mosaic disease tends to strike in a certain region year after year, soil fungi are likely to be the mediators of SMV and cause soybean mosaic disease. We attempted to screen for fungi capable of carrying SMV to provide new perspectives on the control of soybean mosaic disease.

- Cultivating model plants and inoculating Soybean Mosaic Viruses
- Isolating and purifying soil fungi
- Screening out the fungi suspected of carrying SMV

PUBLICATIONS

- [1] Yang L, Yang Q, Lin L, Zhang C, **Dong L**, et al. Glyco-CyTOF: An Highly Multiplexed Imaging Platform for Glycome Analysis and Biomedical Diagnosis. *Under Review by Analytical Chemistry*
- [2] Lu Y, Peng R, **Dong L**, Xia K, Wu R, Xu S, Wang J. Multiomics Dynamic Learning Enables Personalized Diagnosis and Prognosis for Pancancer and Cancer Subtypes. *Briefings in Bioinformatics*. 2023 Nov 24;6:378
- [3] Shen Z, Liu C, Wang Z, Xie F, Liu X, **Dong L**, Pan X, Zeng C, Wang PG. Development of a Library of Disulfide Bond-Containing Cationic Lipids for mRNA Delivery. *Pharmaceutics*. 2023 Feb 1;15(2):477.

INTERNSHIP EXPERIENCES

- Microbial fermentation product technology training** Apr. 2020-Jun. 2020
- Training of fermentation equipment operation
 - Fermentation process monitoring
 - Quality testing of fermentation products
- Edible fungi cultivation training** Sep. 2019-Jan. 2020
- Preparation of medium and inoculation of spores of edible fungi
 - Controlling and recording room temperature and humidity
 - Harvesting sub-entities and analyzing the quality
- Field Practical Training on General Biology** Jul. 2019
- Visiting the taxidermy museum
 - Collection of common plants, animals and mushrooms in the wild
 - Classifying and making specimens of plants, animals and mushrooms

EXTRACURRICULAR EXPERIENCES

- Summer School of Center for Quantitative Biology, Peking University 2021
- Summer Camp for Excellent College Students, School of Biomedical Engineering, SJTU 2020
- Minister of Human Resources Department of Enactus, Nanjing Normal University 2019
- Member of School-level A Class Project in ' Xiongying ' Innovation and Entrepreneurship Plan 2019
- Captain of the School-level Volunteer Service Team 2019
- Project Manager of Nanjing Normal University Charity Project Center 2018
- Member of college-level volunteer teams 2017

HONORS

- Outstanding Student Scholarship, Nanjing Normal University 2021
- Third Prize of Outstanding Student Scholarship, Nanjing Normal University 2021
- Band 2 in the National Computer Rank Examination 2020
- Third Prize of Outstanding Student Scholarship, Nanjing Normal University 2020
- Second Prize of Nanjing Normal University Summer Social Practice Outstanding Team 2019
- Host of College Student Innovation and Entrepreneurship Training Program Provincial key Project 2019
- Third Prize of Outstanding Student Scholarship, Nanjing Normal University 2019
- Third Prize of Nanjing Normal University Summer Social Practice Outstanding Team 2018

ENGLISH SKILLS

CET-4: 500, CET-6: 471, IELTS: 6.5

PERSONAL PAGE

lkleodong.github.io