Reflection on HKU Summer Research Program Experience

My summer research experience at the University of Hong Kong's School of Biomedical Science was a transformative journey that seamlessly blended scientific discovery with cultural immersion and professional growth.

Under the mentorship of Professor He Mu, I embarked on an project to establish a system for investigating the impacts of fluidic mechanical stimuli on mouse tracheal epithelial cells. This research aimed to shed light on the fundamental aspects of Planar Cell Polarity in cilia cells, a crucial factor in coordinated and directional cilia beating. The potential implications of this work for disease understanding and treatment strategies added a sense of purpose to our daily efforts in the lab.

The project's interdisciplinary nature allowed me to leverage my engineering background while delving into biological concepts, creating a unique combination of "dry lab" and "wet lab" approaches. This integration of diverse skills was particularly evident in our three-pronged methodology: harvesting primary mouse trachea epithelial cells, establishing a flow device to create tunable and constant fluidic shear stress, and investigating cell responses under various conditions.

Each step of the process presented its own challenges and learning opportunities. Fabricating the PDMS master molds using a 3D printer required multiple iterations to determine the optimal configuration. The delicate process of incorporating the Transwell insert into the chip design demanded precision and patience. Perhaps the most rewarding moment was observing the cultured MTECs under the microscope, witnessing the beating cilia cells - a tangible result of our meticulous cell culture procedures.

The successful establishment of the microfluidic system, a first for our lab, filled me with a sense of accomplishment. It also opened up exciting possibilities for future work, including computational fluid simulations and experiments with different cell types.

Beyond the laboratory, my time in Hong Kong was rich with cultural experiences and networking opportunities. The city's vibrant blend of Eastern and Western influences created a dynamic backdrop for my research journey. From exploring bustling street markets to finding moments of serenity in local temples, each day offered new insights into Hong Kong's unique cultural tapestry.

The diversity within the research team itself was a microcosm of Hong Kong's international character. Collaborating with peers and mentors from various backgrounds not only enhanced our project but also broadened my global perspective. Our discussions often extended beyond scientific topics, touching on cultural differences, shared experiences, and future aspirations in the field of biomedical research.

Networking was a key component of the Summer Research Program. The poster presentation session, where I shared our project's findings, was a highlight. It provided a platform to practice

scientific communication skills and receive valuable feedback from experts across different fields. These interactions not only refined my understanding of our work but also gave me insights into the broader landscape of biomedical research at HKU and beyond.

The support and guidance from Professor He Mu were instrumental to the project's success. Our mentor-mentee relationship went beyond technical supervision; it was a source of inspiration and professional insight. The collaborative spirit among my peers in the summer program created a supportive environment where ideas flourished, and friendships formed.

This summer experience reaffirmed my passion for research and highlighted the importance of interdisciplinary approaches in solving complex biological questions. It taught me the value of persistence in the face of experimental challenges and the joy of discovery when hard work pays off.

As I reflect on my time at HKU, I am grateful for the opportunity to have contributed to cutting-edge research while immersing myself in a new cultural environment. The skills I've gained, the connections I've made, and the memories I've created will undoubtedly shape my future academic and professional endeavors.

This summer research program has been more than just a scientific endeavor; it has been a holistic growth experience, enhancing my capabilities as a researcher, collaborator, and global citizen. As I move forward in my academic journey, I carry with me not only the technical knowledge gained but also a deeper appreciation for the global nature of scientific research and the endless possibilities that arise when diverse minds come together in pursuit of knowledge.


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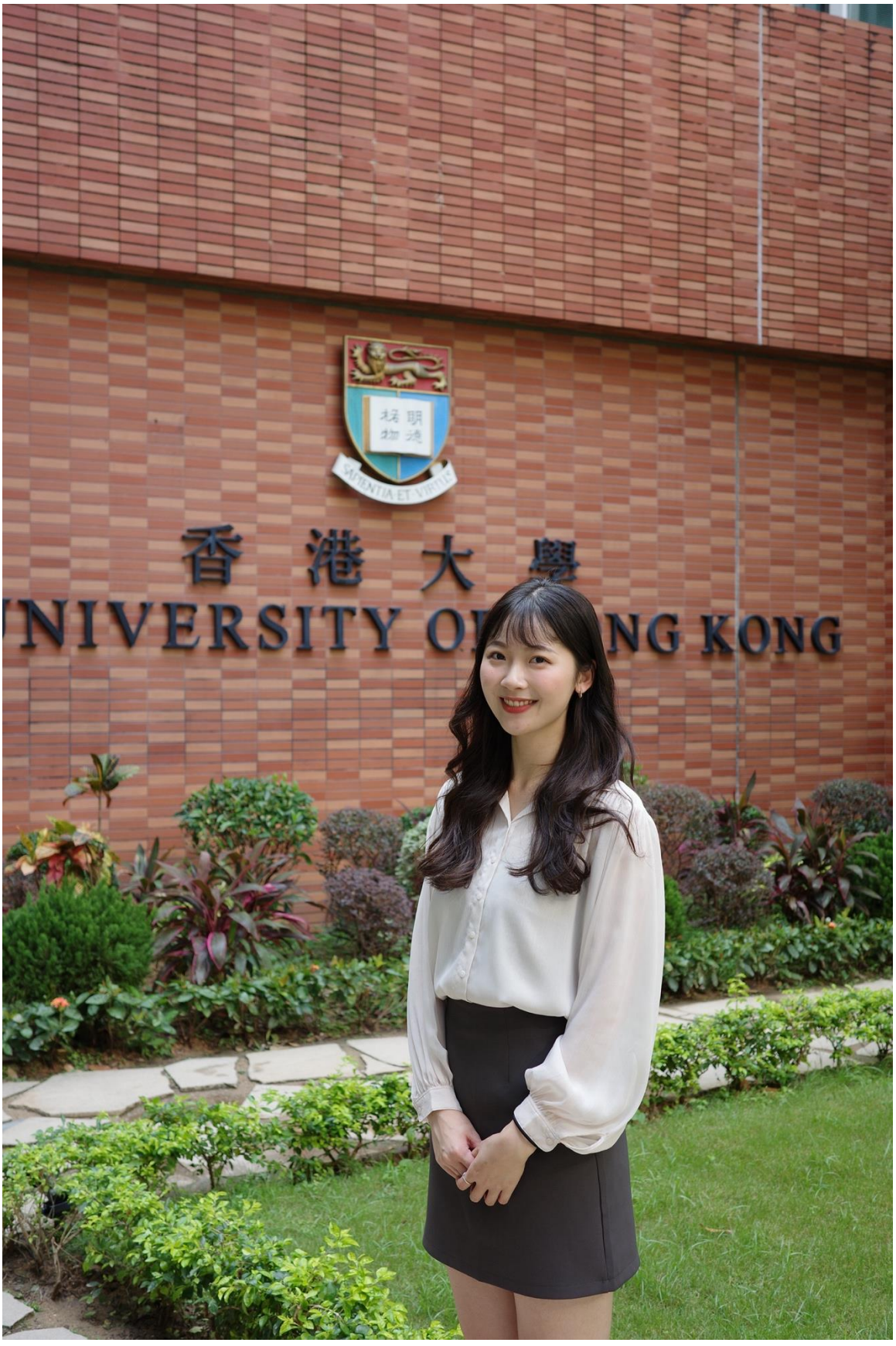
HKU
LAW
Faculty of Law, The University of Hong Kong
Chen De-Fu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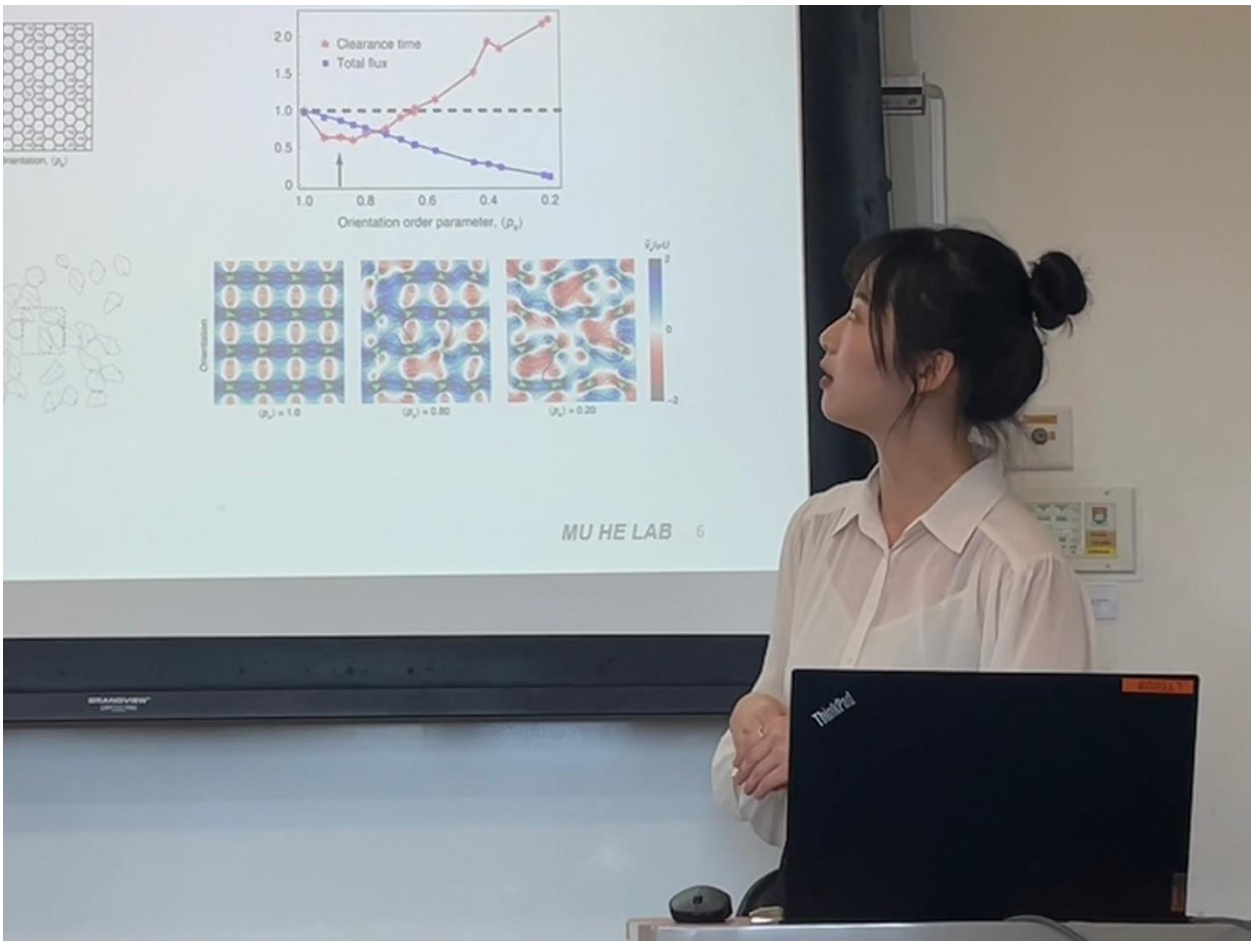
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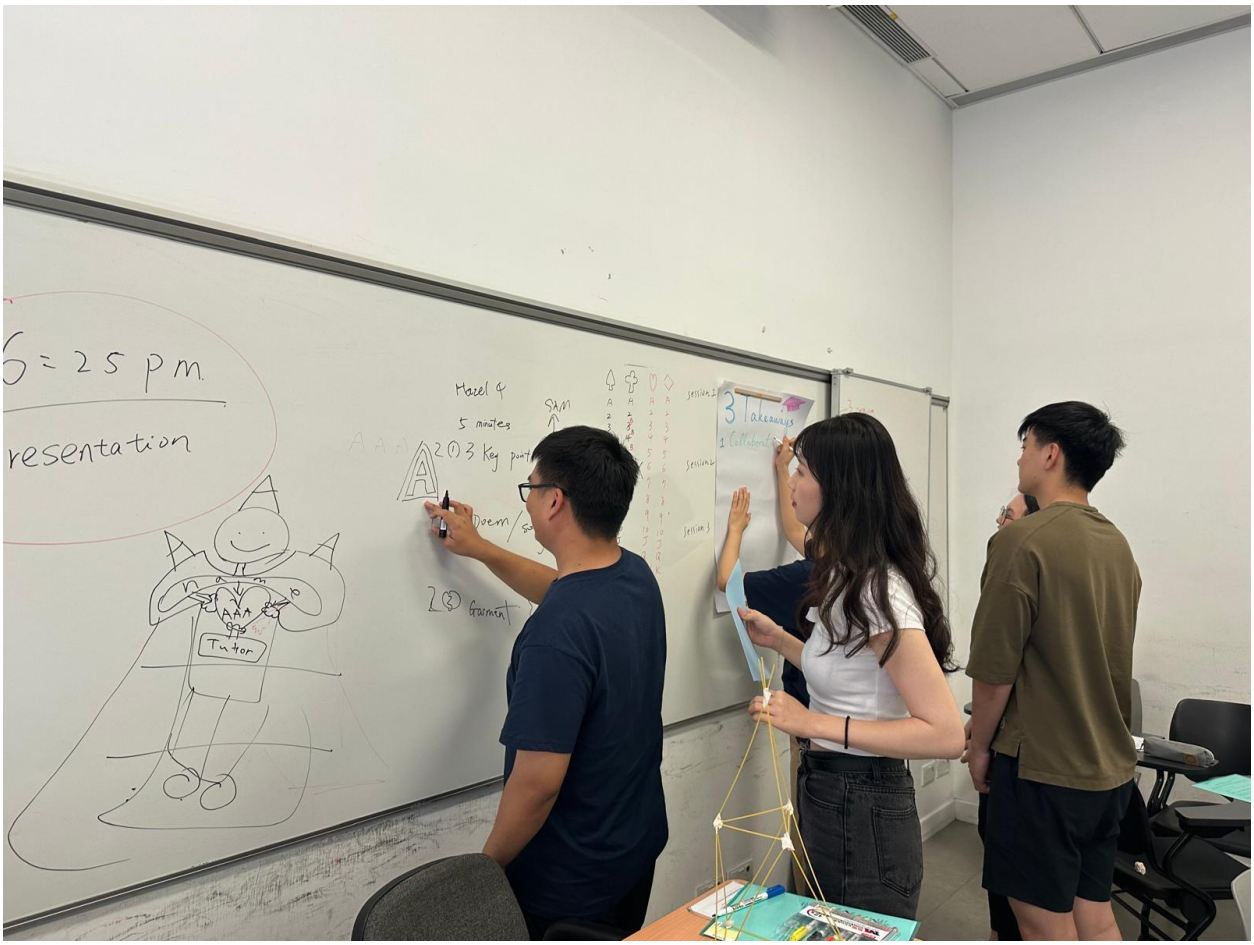
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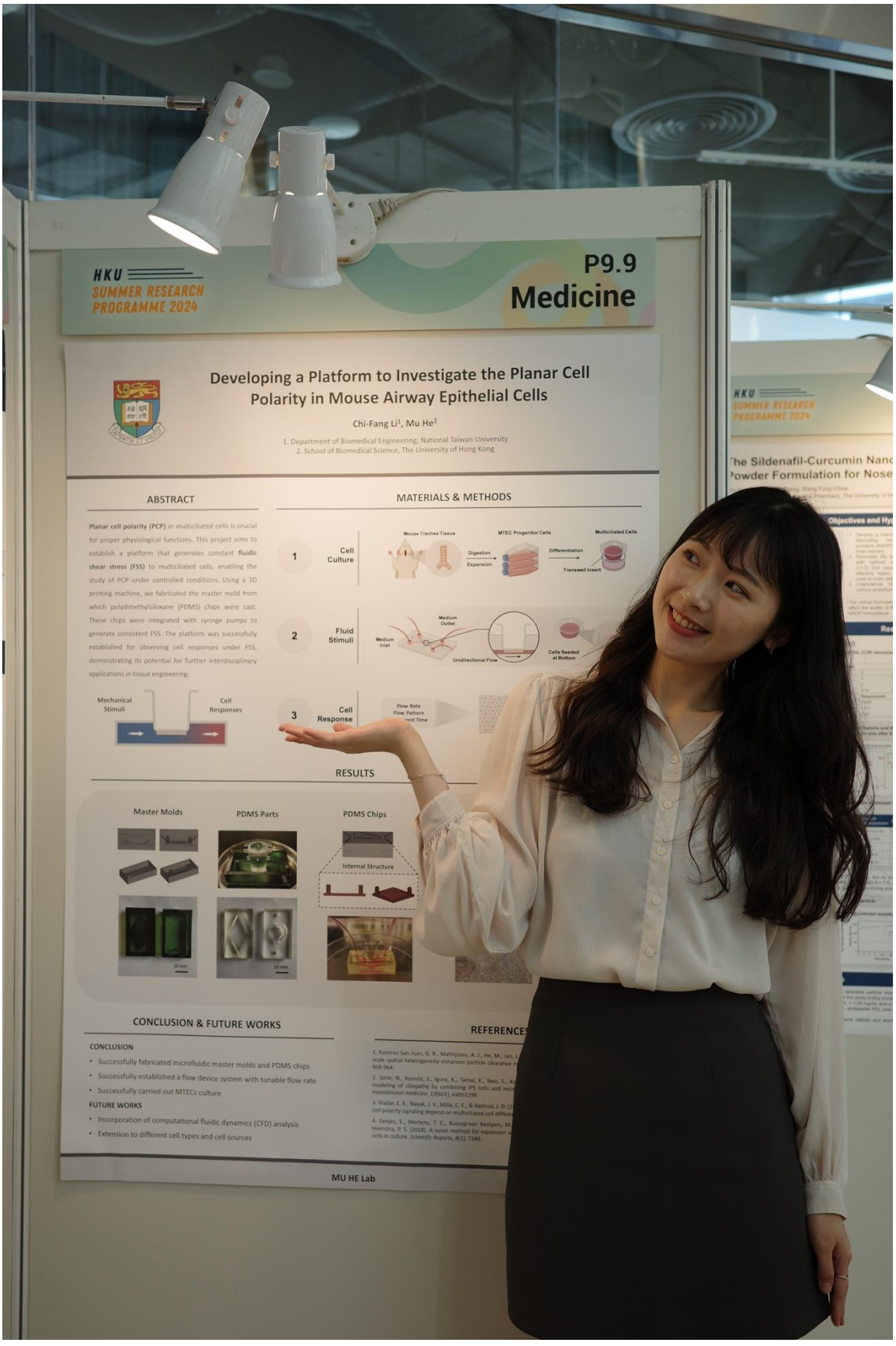
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Medicine
Developing a Platform to Investigate the Planar Cell Polarity in Mouse Airway Epithelial Cells
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ABSTRACT
Planar cell polarity (PCP) in multiciliated cells is crucial for proper physiological functions. This project aims to establish a platform that generates constant fluidic shear stress (FSS) to multiciliated cells, enabling the study of PCP under controlled conditions. Using a 3D printing machine, we fabricated the master mold from which polydimethylsiloxane (PDMS) chips were cast. These chips were integrated with syringe pumps to generate consistent FSS. The platform was successfully established for observing cell responses under FSS, demonstrating its potential for further interdisciplinary applications in tissue engineering.
Mechanical Stimuli
Cell Responses
MATERIALS & METHODS
1 Cell Culture
Mouse Trachea Tissue
MTEC Progenitor Cells
Multiciliated Cells
Digestion
Expansion
Differentiation
Transwell Insert
2 Fluid Stimuli
Medium Inlet
Medium Outlet
Unidirectional Flow
Cells Seeded at Bottom
3 Cell Response
Flow Rate
Flow Pattern
RESULTS
Master Molds
PDMS Parts
PDMS Chips
Internal Structure
CONCLUSION & FUTURE WORKS
CONCLUSION
• Successfully fabricated microfluidic master molds and PDMS chips
• Successfully established a flow device system with tunable flow rate
• Successfully carried out MTECs culture
FUTURE WORKS
• Incorporation of computational fluidic dynamics (CFD) analysis
• Extension to different cell types and cell sources
REFERENCES
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Objectives and Hyp


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Capturing Your Learning
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