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Label-free removal of residual undifferentiated iPSCs by inertial microfluidic cell sorter

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23 Feb 2023, 4.00pm
Host: Dr Deepak Choudhury

Seminar Abstract

Spinal cord injury (SCI) remains a significant challenge for the medical community with limited treatment options. Recent advancements in cell therapy, specifically the transplantation of spinal cord progenitor cells (SCPCs) derived from human induced pluripotent stem cells (iPSCs), have shown promising results. However, the presence of residual undifferentiated iPSCs in the transplanted cell population presents a high risk of tumor development post-transplantation.

To address this challenge, a size-based, label-free cell separation technique has been developed. The technology utilizes an inertial microfluidic-based device to remove residual undifferentiated iPSCs with high efficiency, without affecting cell viability and function. By profiling the size of SCPCs after a 10-day differentiation process, it was found that the large-sized group contains a significantly higher number of cells expressing pluripotent markers. The results showed that the technology can effectively reduce the number of undifferentiated cells in an SCPC population, ensuring the safety of transplanted cells.

About the Speaker

Tan Dai Nguyen earned his B.Eng (Hons) in Mechatronics from Ho Chi Minh City University of Technology in 2016. He then obtained his Ph.D. in Mechanical Engineering from Nanyang Technological University (NTU) in 2021, where he conducted research in Professor Du Hejun's laboratory on acousto-microfluidic devices for cell manipulation and their applications in tissue fabrication. After earning his Ph.D., Tan Dai continued his postdoctoral studies in Professor Jongyoon Han's laboratory at the Singapore-MIT Alliance for Research and Technology Centre (SMART), focusing on the label-free detection and separation of tumor-risk cells from iPSC-derived spinal cord progenitors using microfluidic technology. In November 2022, Tan Dai joined BTI - Biomanufacturing Technology Group as a Research Scientist to advance his knowledge in cell manufacturing and advanced bioprocessing.

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