HKU Med
LKS Faculty of Medicine
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CHEMICAL REPROGRAMMING FOR CELL FATE MANIPULATION

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SEMINAR HIGHLIGHTS

Pluripotent stem cells have the ability to proliferate indefinitely and differentiate into all functional cell types of an organism, making them vital “seed cells” in regenerative medicine. Therefore, establishing and obtaining pluripotent stem cells is one of the most important scientific questions in the field of stem cells and regenerative medicine. Chemical reprogramming employs small molecules to induce cell state transitions, a method that bypasses the need for gene transfer, representing a safer and more controllable approach to manipulate cell identity. We have established a novel chemical reprogramming approach that enables the conversion of differentiated human somatic cells into pluripotent stem cells. Here, I will introduce the development of chemical reprogramming approach and the mechanisms of human cell plasticity regulation.

INSIGHTS INTO BACTERIAL TOXINS: FROM HOST FACTORS TO THERAPEUTIC APPLICATIONS

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SEMINAR HIGHLIGHTS

Upon production and release, bacterial toxins function as sophisticated "guided missiles" that specifically target host cells through receptor recognition, membrane translocation, and modulation of intracellular substrates. This targeted activity enables a straightforward genetic screening approach: toxin-sensitive cells are eliminated, while resistant populations survive and can be amplified for subsequent genetic analysis to identify critical host factors involved in toxin susceptibility. On the other hand, evolution has sculpted bacterial toxins into multi-domain proteins capable of executing coordinated, multi-step mechanisms of action. These modular architectures provide versatile platforms for bioengineering applications. This unique combination of properties positions bacterial toxins as powerful tools for both basic research and therapeutic development.

8 July 2025 (Monday)
2:00 PM - 3:30 PM

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