



Wolfson Department of Chemical Engineering Seminar

Thursday, September 12th, 2024 at 10:30

Conference room, floor 3, Chemical Engineering Building

**Developing a Dual-Delivery Platform (DUAL) of mRNA and Proteins
Lipid Nanoparticles to the Brain**

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MSc Seminar

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mRNA therapy has emerged as a promising class of drugs for addressing various genetic disorders by restoring functional protein levels. Lipid nanoparticles (LNPs) encapsulating mRNA offer an effective and safe delivery tool, optimizing gene therapy approaches. Herein, we developed a delivery platform of mRNA and neuronal membrane proteins and evaluated their functional ability to deliver both proteins and mRNA payloads to neurons. We named it DUAL. Using a microfluidic approach, we bioengineered a reproducible DUAL formulation that effectively encapsulated nucleic acid cargos and confirmed the integration of neuronal membrane proteins. Both *in vitro* and *in vivo* studies using neuronal cell line and local LNPs administration to mouse motor cortex demonstrated a non-toxic association of DUAL with neurons resulting in notable Luciferase expression. The performance of DUAL was comparable to standard mRNA-LNPs.

These outcomes provide preliminary evidence for a new delivery system capable of carrying multiple functional proteins and mRNA, all in one LNP! While obtaining equal delivery capabilities as good as standard mRNA-LNPs. The versatility of the DUAL platform could optimize treatments for genetic and brain diseases that require combination therapy involving both mRNA and proteins.

Refreshments will be served at 10:15.