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|  |  |  הטכניון - מכון טכנולוגי לישראל TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY  |
| הפקולטה להנדסה כימיתע"ש וולפסון |  |  |
| The Wolfson Department of Chemical Engineering |  |  |

**Wolfson Department of Chemical Engineering Seminar**

**Monday, December 16th, 2024 at 13:30**

**Room 6**

**Encapsulation of Exosomal Volatile Molecules for Modulating immune Pathways**

**Rand Shibel**

**Mid-PhD Seminar**

Advisor: Prof. Hossam Haick

Department of Chemical Engineering, Technion-Israel Institute for Technology

The study of cell-cell crosstalk, particularly within the context of cancer research, is crucial for understanding the complex interactions that contribute to tumorigenesis, proliferation, metastasis, and overall cancer development. Cell-surface receptors are central in these processes, acting as mediators for signal transduction through various cascades that influence cellular responses. An important aspect of tumor progression is the role of systemic inflammation, which significantly contributes to the development and spread of many solid tumors. Proinflammatory cytokines and immune-inflammatory cells, such as neutrophils, platelets, and lymphocytes, are involved in sustaining this inflammation, thereby influencing cancer dynamics. In this context, volatile organic compounds (VOCs) emerge as a promising class of immune-modulatory molecules that could enhance our understanding of immune signaling. This study focuses on investigating the impact of VOCs on different signaling pathways in immune cells, specifically monocytes. The NF-κB pathway for instance, plays a pivotal role in regulating immune responses, including inflammation. By using the U937 monocyte cell line and CRISPR/Cas9 gene editing to generate NFKB1-/- (NF-κB deficient) human monocytes, the study explores the unique VOC signatures associated with exosomes from distinct cells under various conditions, such as LPS (lipopolysaccharide)-stimulated inflammation. One of the key findings is that encapsulation of specific VOCs, such as 2-butanone, into liposomes provides novel insights into how VOCs can modulate immune responses. By reducing the activation of NF-κB and lowering inflammatory cytokine levels, VOCs could represent new therapeutic targets, particularly for diseases involving chronic inflammation, like cancer. This study holds immense potential to reshape our understanding of immune modulation and introduces VOCs as a new class of signaling molecules that could offer new avenues for both diagnosis and therapeutic interventions in cancer and other inflammatory diseases.

Refreshments will be served at 13:15.