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| הפקולטה להנדסה כימית  ע"ש וולפסון |  |  |
| The Wolfson Department of Chemical Engineering |  |  |

**Wolfson Department of Chemical Engineering Seminar**

**Wednesday, March 16th, 2022 at 13:30**

**Room #6, Via Zoom:** [**https://technion.zoom.us/j/97577956516**](https://technion.zoom.us/j/97577956516)

**Active Targeting of Nanoparticles to The Brain**

**For Treating Parkinson’s Disease**

**Mor Sela**

**PhD Mid-Seminar**

Advisor: Prof. Avi Schroeder

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Abstract

Parkinson's disease is a progressive, debilitating degenerative nervous disorder. The disease mainly affects dopamine-producing neurons. The symptoms of the disease include - tremors, bradykinesia, rigid muscles, imbalance etc. In addition to motor symptoms there are behavioral problems such as depression and delusions. In the disease, the neurons in the brain gradually break down or die. One of the reasons is degeneration of the neurons due to a massive aggregation of the protein - alpha-synuclein (AS). Aggregated AS binds the proteasome, inhibits cell activity, and results in an interruption to dopaminergic neurotransmission.

In parallel, nanotechnology is an innovative medical tool that is conducted at the nanoscale. Researchers have shown that nanoparticles can be used for diagnosing and treating neurodegenerative diseases. However, one of the main obstacles is the low distribution of the nanoparticles in the brain. Our research goal is developing nanotechnology targeted delivery systems to the brain for the treatment of Parkinson's disease. By chemical tools we conjugate different targeted moieties to the surface of the nanoparticles. These moieties allow to more particles to cross through the blood brain barrier (BBB) and reach the brain. In Parkinson’s disease, there are unique receptors that are overexpressed in the BBB, and we expect that the targeted nanoparticles will cross through them and their accumulation in the brain will increase. In addition, the particles are encapsulated with therapeutic monoclonal antibodies (mAb), which bind to early AS oligomer fibrils and thus prevent the aggregation performance.

In conclusion, this research will provide important information regarding the ability of therapeutic nanoparticles to penetrate the BBB. The loading and activity of protein loaded nanoparticles may be a promising therapeutic strategy for reducing Parkinson’s disease associated neuroinflammation. The success of the research will improve Parkinson's patients' life and disease outcomes.