הטכניון - מכון טכנולוגי לישראל

TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY

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

Wolfson Department of Chemical Engineering Seminar

Monday, May 30th, 2022 at 16:30

Room #6

Nanoparticles Accumulate in the Female Reproductive System during Ovulation Affecting Cancer Treatment and Fertility

Maria Poley

PhD Seminar

Advisor: Prof. Avi Schroeder

Department of Chemical Engineering, Technion-Israel Institute for Technology

Abstract: Throughout the female menstrual cycle, physiological changes occur that affect the biodistribution of nanoparticles within the reproductive system. We demonstrate a 2-fold increase in nanoparticle accumulation in murine ovaries and uterus during ovulation, compared to the non-ovulatory stage, following intravenous administration. This biodistribution pattern had positive or negative effects when drug loaded nanoparticles, sized 100-nm or smaller, were used to treat different cancers. For example, treating ovarian cancer with nanomedicines during mouse ovulation resulted in higher drug accumulation in the ovaries, improving therapeutic efficacy. Conversely, treating breast cancer during ovulation, led to reduced therapeutic efficacy, due to enhanced nanoparticle accumulation in the reproductive system rather than at the tumor site. Moreover, chemotherapeutic nanoparticles administered during ovulation increased ovarian toxicity and decreased fertility compared to the free drug. The menstrual cycle should be accounted for when designing and implementing nanomedicines for females.