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

Wolfson Department of Chemical Engineering Seminar
Wolfson Department of Chemical Engineering,
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Room #6

Using nanotechnology to target cancer associated neurons as a tool for treating breast cancer

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PhD Seminar

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There is a connection between the nervous system and cancer progression. Cancer cells grow and invade the nerves in the tumor microenvironment, and use the nervous system as a mean for metastatic spread. Moreover, nerves and their axons actively infiltrate the tumor tissue and stimulate cancer-cell growth, proliferation, invasion and migration. These processes are promoted by cancer cells through the secretion of neurotrophic factors and cytokines, but also by the nervous system through the secretion of neurotransmitters.

I studied the nerve-cancer crosstalk and how nanotechnology can be utilized to target breast-cancer neurons and interfere with their signaling to inhibit cancer development. Bupivacaine is a non-opioid anesthetic that can be used as a molecule that targets neurons, while also potentially relieving cancer-associated pain. The addition of bupivacaine to the co-culture of neurons cells with cancer cells reduced neurons viability, followed by a decrease in cancer cells proliferation. Systemic administration of free bupivacaine leads to cardiovascular and neuronal toxicity; hence, the delivery system is crucial. I developed bupivacaine-loaded liposomes that curbed tumor progression by targeting the neurons within breast cancer tumors. When the liposomes were intravenously injected into breast cancer-bearing mice, tumor growth and metastasis formation were significantly reduced. Moreover, a favorable accumulation of liposomes in the tumor and their distribution with tumor neurons was observed. Overall, this study that was published in *Science Advances*, presents a novel clinical strategy for cancer therapy using analgesic nanoparticles that target nerves in breast-cancer tumors.