Bar-Ilan University
אוניברסיטת בר-אילן

Faculty of Exact Sciences
Department of Chemistry

הפקולטה למדעים מדויקים
המחלקה לכימיה

S E M I N A R

Monday 17/12/18, 12:00 pm

Building 211, seminar room

SPEAKER:

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The Institute for Drug Research, Hebrew University of Jerusalem, Jerusalem, Israel

TOPIC:

Making cell-type specific metabolic maps of tissues: New tools and new insights

Understanding cellular heterogeneity is a major goal in many fields including Developmental and Cancer Biology. Metabolomics - the unveiling of metabolic composition, offers a powerful tool for understanding gene function and regulatory processes involved in such heterogeneity. However, metabolomics studies on cancer have thus far been performed primarily on whole organisms, organs, or cell lines, losing information about individual cell types within a tissue.

We developed a protocol for the metabolic analysis of cell populations within a tissue. Using the root of *Arabidopsis thaliana*: a pronounced model of cell-type analysis, we drew the first metabolic map of a tissue.

Here, we modified this protocol, and used it to characterize the metabolic composition of cell populations within a tumor. The requirement for rapid blood vessel synthesis is a hallmark of solid tumors. We hypothesized that there should be metabolic alterations between tumor cells proximal (perivascular) and distal to vasculature, sorted cell populations in tumor according to their distance from vasculature, and studied their metabolic content in a glioblastoma (GBM) model. Our non-targeted metabolic analyses strongly point

to a shift in the membrane lipid content of perivascular GBM cells. Specifically: significant increase in the lipid degree of unsaturation and the length of the fatty acid chain, leading to increased membrane fluidity and higher invasiveness and migratory potential.

A metabolic zonation of membrane lipids was also found in breast cancer patients between the tumor and the healthy tissue.

Taken together, our work offers a novel approach for the metabolic mapping of tumor cell populations as well as non-tumorous tissues. Our results strongly suggest a gradient in lipid content in the tumor environment and within the tumor. These findings may have important implications in cell-specific treatment Therapies, as well as in the diagnosis of tumors.