Announcing the Final Examination of Sydney Laxton for the degree of Master of Science in Biotechnology

Thesis Title: Investigating the Role of CCT2-Containing Extracellular Vesicles as a Biomarker for Breast Cancer Disease Progression

Date: Monday, June 15th
Time: 1:00 PM
Room: BSBS-103
Zoom Meeting Link: https://ucfmed.zoom.us/j/98523725600

Abstract

Detecting early metastatic progression or recurrence after initial treatment remains a major challenge in breast cancer (BCa). Current liquid biopsy approaches, including the detection of circulating tumor cells (CTCs) and circulating tumor DNA (ctDNA), provide valuable information but are limited by analytical complexity and the lack of clinically actionable biomarkers. Native or naïve extracellular vesicles (EVs) have emerged as a promising alternative for liquid biopsy, as these particles are actively shed from tumor cells and carry molecular cargo that reflects their cells of origin. However, few studies have identified oncogenic EV-associated biomarkers. In this study, we focus on the eight-subunit protein-folding complex, Chaperonin-Containing TCP-1 (CCT), specifically its CCT2 subunit, which our lab identified as a key driver of cancer cell survival and invasiveness, as well as a biomarker for CTCs. Using an optimized EV isolation protocol coupled with a novel intra-vesicle flow cytometry method, we examined the CCT2 content of EVs derived from BCa cells. We demonstrate that BCa cells with elevated CCT2 expression, including some triple-negative breast cancer cell lines and cells engineered to exogenously express FLAG-tagged CCT2, release EVs enriched in both CCT2 protein and RNA compared with EVs from cells with lower CCT2 levels. Analysis of plasma and peripheral blood mononuclear cells (PBMCs) from BCa patients across stages and disease further revealed increased levels of CCT2-positive EVs and cells compared with healthy controls. Notably, a substantial fraction of CCT2-positive EVs lacked canonical EV markers such as CD63 or Alix, suggesting the presence of previously unrecognized, potentially oncogenic, EV subsets. Collectively, these findings identify CCT2 as a possible biomarker for tumor-derived EVs and demonstrate its utility for non-invasive monitoring of disease status. Tracking CCT2 levels in EVs may be a novel strategy for detecting early recurrence and assessing treatment responses in BCa patients.

Thesis Committee:
Dr. Annette Khaled (Committee Chair)
Dr. Deborah Altomare
Dr. Alicja Copik
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Approved for distribution by Dr. Annette Khaled, Committee Chair on 06/02/26.

The public is welcome to attend.