RECIPROCAL SIGNALLING BETWEEN ADIPOCYTE-DERIVED STEM CELLS AND BREAST CANCER CELLS IN VITRO

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Background: Aside from non-skin melanoma, breast cancer is the most prevalent form of cancer affecting females in the United States. Recent studies of adipogenic protein secretions, or adipocytokines, have led to an appreciation of adipose as an endocrine organ. This study begins to examine reciprocal endocrine signaling between breast cancer cells and adipose-derived stem cells (ASCs) from peripheral adipose tissue to identify novel mechanisms of proliferation, differentiation and tumor progression.

Materials and Methods: In an effort to better understand reciprocal endocrine signaling from adipose tissue in obesity, adipose-derived stem cells (ASCs) isolated from patients with three different body mass indices (BMI) were incubated for one week with conditioned medium (CM) from three different human breast cancer cell lines representing three major subtypes of clinical breast cancer: MCF-7 cells (estrogen receptor (ER) positive and progesterone receptor (PR) positive); BT-474 cells (HER2/neu overexpressed), and MDA-MB-231 cells (ER negative, PR negative, HER2/neu negative). Conversely, CM from ASCs was incubated with breast cancer cells. ASCs were isolated from patients with BMIs 18.26 (under weight), 23.65 (normal weight) and 24.98 (over weight). Cell growth was measured by the MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) assay and CyQuant proliferation assay. ASC adipogenic differentiation was assessed via quantification of intracytoplasmic Oil Red O lysosome uptake.

Results: Preliminary data indicated that CM from MCF-7 and MDA-MB-231 cells significantly induced ASC adipogenic differentiation and cell growth for all three BMIs, whereas CM from BT-474 cells did not significantly affect differentiation and inhibited cell growth of ASCs derived from patients with normal and overweight BMIs.

Conclusions: Preliminary data from CM experiments suggest that secretions from ASCs from patients of underweight, normal, or over-weight BMIs may aid in breast cancer progression via an endocrine signaling mechanism. Differentiation experimental data suggest CM from the more differentiated ER, PR positive breast cancer cell line stimulates adipogenesis whereas CM from the Her2/neu over-expressing breast cancer cells of a less differentiated phenotype inhibits ASC differentiation.