Holographic and molecular characterization of early disseminated cells from breast cancer patients

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Growing evidence suggests that cancer cells disseminate into blood vessels at an early stage, seeding metastatic sites in breast cancer. These early-stage tumor cells that lodge or extravasate at metastatic sites can enter dormancy, marking a potential source of late recurrence and therapy resistance. Thus, the presence of early disseminated cells poses risks to patients but also holds potential benefits for early detection and opportunities for possibly curative interventions. We evaluated this in a cohort of women with newly diagnosed early-stage breast cancer (Stage 0, 1, 2). Blood samples were collected prior to initiation of therapy and analyzed by Astrin Biosciences' AI-empowered proprietary holographic imaging platform combined with in-flow protein marker expression for the presence of disseminated tumor cells. The platform was previously trained on holographic signatures (encoding both optical and morphological signatures) of 100 million+ individual cells and could differentiate healthy from cancer cells with greater than 99% accuracy. Preliminary data from this study revealed that blood samples from the majority of early breast cancer patients exhibited disseminated cancer cells. Gene expression patterns from the enriched cancer cells were further profiled via quantitative PCR using a selective gene panel consisting of breast-specific and cancer-specific genes. We were able to identify selective sets of breast and cancer-specific genes in these patients confirming breast origin with cancer-like features. In summary, we utilized holographic imaging coupled with proprietary deep learning approaches to identify early disseminated cells in women who are undergoing screening for breast cancer. Molecular analyses of these cells confirmed breast cancer origin. Combined, this work enables Astrin Biosciences to develop a two-pronged assay consisting of holographic plus molecular characterization of disseminated cells for early detection of breast cancer.