Cancer Stem Cell Repository: A New Tool for Triple Negative Breast Cancer and Hormone Positive Breast Cancer

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Breast cancer is one of the most common cancers among American women. Breast cancer is also a global problem, accounting for nearly a quarter of all cancers in women. It is estimated that **globally, 1.7 million** women are diagnosed with breast cancer annually(1) (2). About 1 in 8 (12%) women in the US will develop invasive breast cancer during their lifetime. The chance that breast cancer will be responsible for a woman's death is about 1 in 36 (about 3%) (3, 4). While white women are more likely to receive a diagnosis of breast cancer, black women (African American) are more likely to die from breast cancer than women of any other racial/ethnic group (3, 4). In addition, studies have demonstrated that non-white minority women tend to have a more advanced stage of disease at the time of diagnosis (3, 4). A contributing factor to these differences is the type of breast cancer that is more common amongst non-white minority women, commonly referred to as Triple-negative breast cancer (TNBC). TNBC refers to any breast cancer that does not express the genes for estrogen receptor (ER), progesterone receptor (PR) and Her2/neu (5). TNBCs have a relapse pattern that is very different from hormone-positive breast cancers, and many hypothesize that there are subgroups of patients with chemo-resistant TNBC, which is initiated and maintained by cancer stem cells (CSCs) (6, 7). Although breast cancers are highly heterogeneous, the majority of women with breast cancer still receive the same treatment, as though the breast cancers were all the same. **Despite decades of advances in breast cancer research, there are no therapies approved for Triple Negative Breast Cancer.** The battle against this disease is still ongoing. Cancer stem cells (CSCs) represent the driving or initiating cell type of a tumor and have been demonstrated to give rise to all cell types in a tumor. Importantly, these cells are able to persist in tumors as a distinct population, resist radiation and chemotherapy due to their slow turnover and stem-like properties, and are highly tumorigenic. This phenomenon may be a key factor of tumor relapse following therapy, and increased mortality in minority women with TNBC. The recent advances made in the isolation and characterization of CSCs has rapidly gained attention in the field of drug discovery as the next-generation of therapeutic targets. Additionally, the use of CSCs as a human *in* vitro cell model for TNBC are a potential diagnostic tool that can possibly predict tumor recurrence and therapy efficacy for patients with TNBC. Therefore, the identification of new biomarkers and the development of specific therapies targeted towards CSCs hold promise for advanced treatment regimens and above all, patient survival and improved quality of life (6, 7).

The overarching challenge is the issue of efficacy regarding drug treatment of genetically diverse women with TNBC. To address the issues of efficacy, drug development, recurrence, and metastasis of TNBC, it is important that a genetically diverse CSC repository for TNBC be developed. Ideally, this CSC repository should be composed of primary cells that are isolated from patient breast cancer core biopsies. Using novel biomarkers and specialized cell sorting techniques, Jeevan BioSciences,Inc(www.jeevanbiosciences.com) has identified and isolated CSCs from patient tissue samples and is presently creating a repository. These cells have been validate through *in vivo* and *in vitro* analysis as having stem cell properties and were able to produce multiple cell types. However, there is a need to expand the CSC repository to represent the current demographic of all genetically diverse women in the US, who are diagnosed with TNBC as well as hormonal breast cancer.

CSCs are a unique cell model, which can be used for drug discovery and basic research into their proliferative, apoptotic, and drug-resistance properties. These cells can help predict patient outcome and response to radiation, chemotherapy, and targeted therapeutics, as well as be used for any longitudinal analyses to identify how CSCs respond to treatment. Currently, there **is not** a human, cell model or animal model that represents the genetic diversity seen in worldwide populations that are diagnosed with TNBC and hormonal breast cancer. The creation and expansion of a CSC repository will create very important *in vitro* cell models that represent the genetic diversity of the current population that is diagnosed with TNBC and hormonal breast cancer in America as well as the rest of the world.

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