Cancer Stem cells in breast cancer

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Introduction

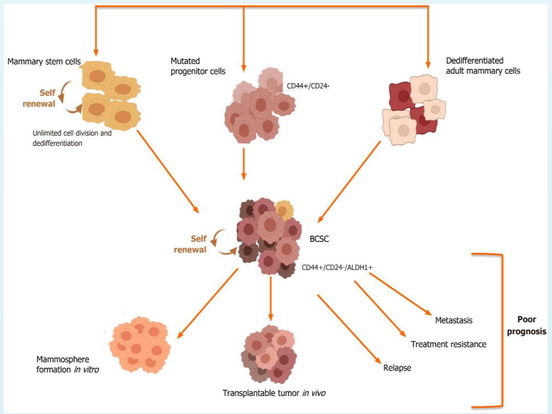
Many tissues have a tiny number of undifferentiated stem cells that cycle throughout an individual's lifetime, renewing the differentiated cells of tissues as needed. Many stem cells divide infrequently, and the divisions are asymmetric, meaning that one daughter cell stays a stem cell while the other commits to a differentiation path. In the field of breast cancer research, the hypothesis of cancer stem cells being responsible for tumor formation, maintenance, and treatment resistance has gained traction. Tumors are made of heterogeneous populations of cells with a hierarchical organization driven by cancer stem cells, and therapeutic targeting of these cells has the ability to remove residual disease (CSCs). When it comes to breast cancer, this small population of cells displaying stem cell properties is known as breast CSCs (BCSCs) .[3]

Genetics of breast cancer

Factors that are genetic. Much research has recently been done on the impact of family history and hereditary mutations on breast cancer. Mutations in the genome: BRCA1, which is found on chromosome 17, was the first major gene linked to hereditary breast cancer. In 1990, linkage research in families with suggestive pedigrees led to the discovery of this gene. BRCA2 was discovered on chromosome 13 in 1994. Breast and other cancers are more likely if you have a BRCA1 or BRCA2 mutation. Large rearrangements and deletions in BRCA1 or BRCA2 can potentially affect BRCA's function, resulting in a clinical condition similar to that seen in carriers of these genes' mutations. [1]

How Cancer Stem Cell Work against Cancer

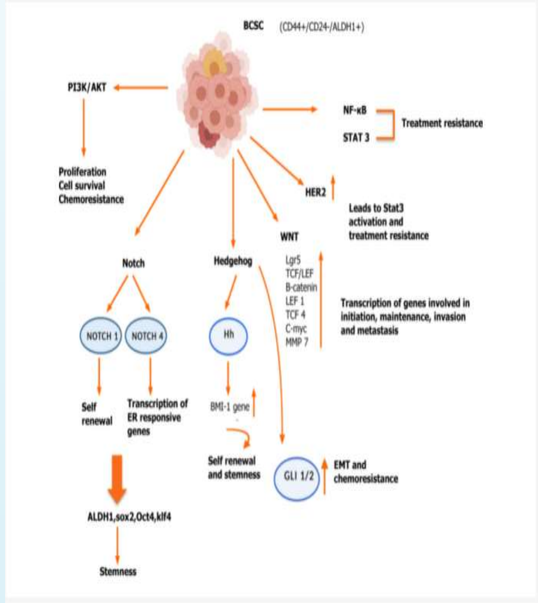
In most cases, stem cell transplants do not immediately combat cancer. Instead, they assist you in regaining your body's ability to produce stem cells following treatment with extremely high doses of radiation therapy, chemotherapy, or both. (Advances in cancer treatments have resulted in a significant decrease in the incidence of mortality among breast cancer patients; a major accomplishment of today's cancer therapies.) Females in the United States have a 5-year survival rate of 89 percent and a 15-year survival rate of 78 percent. Tumors have a tiny population of self-renewing undifferentiated cells.. Because of their striking resemblance to the stem cell population seen in normal tissues, these cancer cells have been dubbed CSCs, or tumor-initiating cells, and make up 0.1 percent to 1.0 percent of the tumor mass. CD44, CD24, and CD25 were the first markers for CSCs to be discovered. The origin of CSC is still a point of contention..[2]



(Figure 1)

How Cancer Stem Cell Work against Cancer

The increased expression of cell surface markers such as CD44 and CD24, as well as greater activity of the enzyme aldehyde dehydrogenase, can be used to identify the BCSC subpopulation (ALDH1). When these BCSCs are transplanted into SCID/nude mice, they can develop mammospheres, which are three-dimensional spheres created by cloning single cancer stem cells. The poor outcomes associated with aggressive breast cancer subtypes have been linked to these malignant stem cells. .[2]



(Figure 2)

How Cancer Stem Cell Work against Cancer

Mutations that result in amplification or deletion of important effector genes have been demonstrated to upregulate a number of pathways in breast cancer stem cells. The gene products of the abnormal pathways give cancer cells an edge in terms of growth and survival, allowing them to spread and develop resistant to conventional therapies. BCSC: Breast cancer stem cell; NF-B: Nuclear factor kappa beta; PI3K: Phosphatidylinositol 3-kinase; ER: Estrogen receptor; EMT: Epithelial mesenchymal transitions; HER2: Epidermal growth factor receptor 2; ALDH1: Aldehyde dehydrogenase; HER2: Epidermal growth factor receptor 2; ALDH2: Epi Hedgehog, Hh .[2]

Conclusion

Many tissues have a modest number of undifferentiated stem cells that cycle to replenish differentiated tissue cells as needed). Breast CSCs (BCSCs) are a small population of cells in breast cancers that have stem cell features; the goal of this study is to find out more about them. In most cases, stem cell transplants do not immediately combat cancer. Instead, they assist you in regaining your body's ability to make stem cells following treatment with extremely high doses of radiation or chemotherapy..

Reference

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