

Cancer Stem Cells

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Stem cells are one of the biggest topics being studied today. Where stem cells get the most attention is in cloning and the formation of different tissues and organs. However, recent studies have been done to show the relationship between stem cells and cancer. It has been shown that certain types of cancer cells show similar properties that stem cells hold. These cells are called "cancer stem cells".

Stem cells are cells that have unique features that include being unspecialized, meaning that they can form into any type of cell in the body (i.e. skin cell, bone cell, etc.), they can divide for long periods of time, and are capable of self renewal (they can take the same form as the parent cell). Cancer cells are formed when normal cells mutate. Where normal cells form together to make tissue, these mutated cells form together to make tumors. Some tumors can be malignant or cancerous.

Studies have shown that the characteristics of stem-cell systems and/or the specific stem-cell properties are relevant to some forms of human cancer. These properties of "tumor-initiating" cells have very similar properties to stem cells. Just as some forms of cancer cells mutate from certain cells it is possible that cancer stem cells arise by mutation from normal stem cells.

Cancer stem cells make it difficult for certain types of cancers to be treated. The main problems that cancer stem cells cause are they can be the source of all the malignant cells in a primary tumor; they can be the drug-resistant cells that are responsible for relapse after a chemotherapy-induced remission; and they can give rise to distant metastases. These problems are all caused by the cancer cells to differentiate into certain types of cells.

Cancer stem cells have been studied in certain types of systems. One system is the Hematopoietic System. Here is where the organs and tissues are focused on. The most prevalent type of cancer in this system is leukemia. Cancer stem cells are evident in two different types of leukemia; chronic myelogenous leukemia (CML) and acute myelogenous leukemia (AML). Treatment for these two types of leukemia using cancer stem cells involve finding certain surface markers that are shown by the cancer stem

cells to attack these cells. However, in both cases, it is still in the testing phase.

Cancer stem cells are also being used in breast cancer. Studies have shown that patients with advanced stages of metastatic breast cancer demonstrated that cells with a specific cell-surface antigen could successfully establish themselves as tumor xenografts. Cancerous tissue was placed into mice and the experiment showed that only cancer stem cells could successfully grow the tumor inside the mouse.

Stem cell research is on the rise, however cancer detection using this method has many challenges. Some of these challenges include how different chemotherapy agents affect the evolution of cancer stem cells during conventional treatment, finding out whether different cancer stem cells have different weak points, and finding out whether targeting self renewal cells will kill the cancer cells or just suppress them during treatment. Though there are many questions scientist believe that the eradication of cancer stem cells will be necessary to improve the outcome of treatment for at least some cancers.

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