



## ***Cancer Stem Cells: Bad Seeds in Tumorigenesis***

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Both normal stem cells and cancer cells possess unique ability to self-renew and many pathways that are classically associated with cancer are also involved in the regulation of normal stem cell development. However, in contrast to normal stem cells, cancer cells often renew themselves in a poorly regulated manner. Due to the fact that stem cells can repair their DNA as they self-renew, they have greater potential to accumulate mutations, some of which may transform them into cancer stem cells, which can survive various bouts of chemotherapy. Signaling pathways associated with oncogenesis, such as the Wnt, Notch, and Sonic hedgehog (Shh) pathways are also involved in the regulation of self-renewal of stem cells. Any abnormality in these signaling pathways during stem cell differentiation can lead to tumorigenesis. There is strong evidence that aberrant activation of the Wnt signaling results in the initiation and self renewal of mammary tumor stem cells; and aberrant expression of Notch-4 and Shh exerts pleiotropic effects on both stem cell self-renewal and differentiation. A tumor mass can be considered as an abnormal organ that contains a variety of tumor cells, which are at different stages of differentiation. In this “abnormal organ” only a limited number of cells possess the capacity to self-renew, which are considered cancer stem cells. Identification and selective destruction of these cancer stem cells should certainly change the way cancer therapy is implemented. Currently, all phenotypically diverse cancer cells are treated in a manner that considers each cell to have unlimited proliferative and metastatic potential. There is a strong possibility that cancer stem cells are more resistant to chemotherapeutic agents than other tumor cells with “limited” proliferative potential. Chemotherapeutic agents may cause complete regression of tumors, but might spare enough cancer stem cells in their quiescent state to allow later relapse and metastasis. This presentation will provide a brief overview of cancer stem cells and highlight the involvement of selected pathways in tumorigenesis.