Cancer stem cells: an evolving concept
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Once a cancer has been diagnosed, treatments vary according to cancer type and severity. Surgery, radiation therapy, and systemic treatments such as chemotherapy or hormonal therapy represent traditional approaches designed to remove or kill rapidly-dividing cancer cells. These methods have limitations in clinical use. For example, surgeons may be unable to remove all the tumor tissue due to its location or extent of spreading. Radiation and chemotherapy, on the other hand, are non-specific strategies—while targeting rapidly-dividing cells, these treatments often destroy healthy tissue as well. The new concept of cancer stem cell plasticity and bidirectional conversion between stem and non-stem cells has added additional complexity to these highly studied paradigms and may help explain the tumor heterogeneity observed in solid tumors. The process of cancer stem cell plasticity in which cancer cells harbor the dynamic ability of shifting from a non-CSC state to a CSC state and vice versa may be modulated by specific microenvironmental signals and cellular interactions arising in the tumor niche. In addition to promoting CSC plasticity, these interactions may contribute to the cellular transformation of tumor cells and affect response to chemotherapeutic and radiation treatments by providing CSCs protection from these agents.