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Cancer stem cells and their niche.

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The unique characteristics of stem cells, specifically pluripotency and self-renewal, are critical for sustaining the lifelong functionality of organs. Stem cells reside in a special microenvironment called the niche. Stem cells interact with the niche via adhesion molecules and exchange molecular signals that maintain the specific features of stem cells. A better understanding of the nature of stem cells and their niches is expected to provide an alternative approach to the treatment of various serious diseases, including cancer, in clinical practice. It has been suggested that tumor tissue contains a type of stem cell referred to as a cancer stem cell. Interestingly, there are a number of molecules that are commonly expressed in normal and cancer stem cells that lead to different phenomena depending on the local conditions. In this review, the hematopoietic system is used as an example to show how stem cells interact with different niches. The regulatory mechanisms of two kinds of bone marrow niche, osteoblastic and vascular, are covered in this review. Furthermore, the involvement of the niche in cancer stem cell regulation, tumor invasion and metastasis, and its response to oxidative stress is described, and novel therapeutic approaches involving the interactions between cancer stem cells and their niches are addressed.

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