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Review

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Beyond tumorigenesis: cancer stem cells in metastasis

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Abstract

The importance of cancer stem cells (CSCs) in tumor-initiation has been firmly established in leukemia and recently reported for a variety of solid tumors. However, the role of CSCs in multistage cancer progression, particularly with respect to metastasis, has not been well-defined. Cancer metastasis requires the seeding and successful colonization of specialized CSCs at distant organs. The biology of normal stem cells and CSCs share remarkable similarities and may have important implications when applied to the study of cancer metastasis. Furthermore, overlapping sets of molecules and pathways have recently been identified to regulate both stem cell migration and cancer metastasis. These molecules constitute a complex network of cellular interactions that facilitate both the initiation of the pre-metastasis niche by the primary tumor and the formation of a nurturing organ microenvironment for migrating CSCs. In this review, we surveyed the recent advances in this dynamic field and propose a unified model of cancer progression in which CSCs assume a central role in both tumorigenesis and metastasis. Better understanding of CSCs as a fundamental component of the metastatic cascade will lead to novel therapeutic strategies against metastatic cancer.

Keywords: stem cells, cancer stem cells, metastasis, metastasis niche, mouse model