Insights in Stem Cells

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Short Note on Cancer Stem Cells

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DESCRIPTION

Cancer stem cells (CSCs) are cancer cells (found within tumours or hematological cancers) which have characteristics similar to normal stem cells, namely the ability to give rise to all cell types found in a specific cancer sample. In contrast to certain other non-tumorigenic cancer cells, CSCs are therefore tumorigenic (tumor-forming). Through the stem cell processes of self-renewal and differentiation into multiple cell types, CSCs have the potential to generate tumours. Such cells are thought to persist as a distinct population in tumours, causing relapse and metastasis by giving rise to new tumours. As a result, the development of specific therapies targeting CSCs remains optimistic for improved cancer patient survival and quality of life, particularly in patients with metastatic disease. Existing cancer treatments have largely been developed on the basis of animal models, with therapies capable of promoting tumour shrinkage regarded effective. Animals, on the other hand, do not provide a complete model of human disease. Tumor relapse is particularly hard to study in mice, whose life spans do not exceed two years. In the early stages of testing, the efficacy of cancer treatments is typically assessed by the ablation fraction of tumour mass (fractional kill). Because CSCs make up a small proportion of the tumour, drugs which target specific stem cells may not be selected for. According to the theory, conventional chemotherapies kill distinguishable or differentiating cells, which make up the majority of the tumour but do not generate new cells. CSCs are a type of population, which gave rise to it, can go unnoticed and lead to relapse. John Dick discovered cancer stem cells in acute myeloid leukemia in the late 1990s. They have been a major focus of cancer research since the early 2000s. Tannishtha Reya, Sean J. Morrison, Michael F. Clarke, and Irving Weissman, biologists, coined the term in a strongly cited paper in 2001. Cells within the tumour population exhibit functional heterogeneity in different tumour subtypes, and tumours are formed from cells with varying proliferative and differentiation capacities. Because of this functional heterogeneity among cancer cells, multiple propagation models have been developed to account for heterogeneity and differences in tumor-regenerative capacity: the cancer embryonic cells (CSC) and stochastic models. However, some argue that this distinction is artificial, because both processes act in complementary ways in terms of actual tumour populations. It is worth noting that in healthy human esophageal epithelium, the cell proliferation burden is met by a stochastically dividing basal epithelium. However, as it progresses to the precancerous Barrett's oesophagus epithelium, a small dedicated stem cell compartment appears, supporting epithelial proliferation, while evidence for a stochastically dividing compartment contributing to tissue maintenance vanishes. As a result, dedicated stem cell compartments, at least in certain neoplastic tissues, maintain and expand the size of the transformed compartment. The cancer stem cell model, also known as the Hierarchical Model, recommends that tumours are organized hierarchically (with CSCs at the top). Cancer stem cells (CSC) are tumorigenic cells that are biologically distinct from other subpopulations inside the tumour cancer population, They are distinguished by two characteristics: their long-term ability to self-renew and their ability to distinguish into non-tumorigenic progeny that contributes to tumour growth.

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CONFLICT OF INTEREST

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