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Topic: Cancer Stem Cells: Impact on Treatment

Introduction to the Special Issue "Cancer Stem Cells: Impact on Treatment"

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Despite the fact that currently existing therapeutic approaches are highly effective and can markedly improve clinical outcome in cancer patients with even advanced diseases, the problems of treatment resistance, therapy recurrences and unfavorable disease progression are still not solved. It is generally believed that the small population of the intratumoral carcinoma stem cells (CSCs) is responsible for poor clinical outcome, because CSCs are considered as a reason for the tumor heterogeneity, diminished sensitivity to chemo- and radiotherapy and enhanced abilities for metastatic spread.[1-5] Investigation of the biological properties of CSCs is a hot topic in cancer research. In order to know more about CSC behavior, it is necessary to possess the CSC-specific molecular patterns distinguishing CSCs from non-CSCs. Using currently existing surrogate CSC biomarkers [CD133 (prominin-1), CD44, CD24, Bmi-1, Notch family members, Hedgehog, aldehyde dehydrogenase 1 (ALDH1), nestin, *etc*.], subpopulations carcinoma cells with stem cell properties can be isolated for further investigations.[2] Recent studies have demonstrated that a variety of intracellular pathways are affected in CSCs: CSC metabolism is characterized by activation of glycolytic pathways[6] and intracellular redox potential is dysregulated;[1,7,8] molecular mechanisms governing cell cycle, cell proliferation and cell death development are also disrupted. Thus, there is a hypothesis that one of the reasons of CSC insensitivity to chemotherapeutics and ionizing radiation is the slower CSC proliferation and CSC quiescence.[1] It is known that chemotherapeutic agents and radiotherapy eradicate fast dividing and proliferating carcinoma cells more effectively than the slower dividing cells.[1] Therefore, it is logical to suggest that quiescent CSCs should be changed in their intracellular signalings underlying cell cycle regulation and cell division. Indeed, Gardane *et al*.[9] and Vaidya[10] in their article have clearly demonstrated that low doses of curcumin can accelerate proliferation of the leukemic cells and application of 5-fluorouracil becomes more effective compared to the treatment with 5-fluorouracil without curcumin. These findings help to assume that administration of the compounds affecting quiescence of carcinoma cells can improve therapy results in cancer patients with malignant tumors containing a high number of quiescent CSCs.

Review article by Kim *et al*.[11] highlights therapeutic opportunities to target CSCs and to reach better treatment results in cancer patients. Recent years have seen an increased number of research reports on the CSC-related intracellular and intratumoral molecular pathways that can be effectively blocked in order to reach better survival rate in cancer patients. This review article provides an analysis of different strategies that can be introduced into the clinical practice in order to improve therapy outcome in patients with unfavourable prognosis.

The Guest Editor and contributors to this special issue of the journal *Journal of Cancer Metastasis and Treatment* hope that basic researchers and clinicians will read these articles with great interest.

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Conflicts of interest

There are no conflicts of interest.

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