

## **Cancer Stem Cells**

Cancer stem cells (CSCs) are auto-regenerating cells, able to proliferate and differentiate through symmetrical and asymmetrical cell divisions, with tumorigenic potential and specific surface markers useful for CSC identification and isolation. The most distinguishing characteristic of CSCs compared to cancer and normal cells is stemness; the self-renewal and unlimited ability to proliferate into heterogeneous malignant cells under hypoxic and acidic conditions. Also, CSCs play important roles in tumor formation, metastasis and cancer relapse. The percentage of CSCs in the total tumor mass is very low (0.05–3% of total cancer cells), but because of their unique cellular properties, CSCs are considered the ultimate obstacle to effective tumor therapy. Even though CSCs compose limited population of tumor mass, they have high drug resistance and distinct survival abilities, challenging us to develop new alternatives to traditional cancer treatment. Furthermore, hypoxia is advantageous for CSCs and leads to the rapid growth of cancer cells and upregulation of angiogenic factors; thus, hypoxia allows CSCs to escape chemo- and radiotherapy. Therefore, effective CSC treatment strategies must emphasize not only the cell-autonomous growth and survival stimuli, but also the crosstalk involving cell–cell interactions and the microenvironment. To develop effective and translatable therapeutics, we must continue to improve current anticancer drugs to target both cancer cells and CSCs in various model systems and elucidate the complexity of the involvement of CSCs in tumor progression.

**Key words:** Cancer stem cells, Stemness, Self-renewal, Microenvironment, Treatment strategies