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Radiation responses of cancer stem cells.

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Abstract

Recent experimental evidence indicates that many solid cancers have a hierarchical organization structure with a subpopulation of cancer stem cells (CSCs). The ability to identify CSCs prospectively now allows for testing the responses of CSCs to treatment modalities like radiation therapy. Initial studies have found CSCs in glioma and breast cancer relatively resistant to ionizing radiation and possible mechanisms behind this resistance have been explored. This review summarizes the landmark publications in this young field with an emphasis on the radiation responses of CSCs. The existence of CSCs in solid cancers place restrictions on the interpretation of many radiobiological observations, while explaining others. The fact that these cells may be a relatively quiescent subpopulation that are metabolically distinct from the other cells in the tumor has implications for both imaging and therapy of cancer. This is particularly true for biological targeting of cancer for enhanced radiotherapeutic benefit, which must consider whether the unique properties of this subpopulation allow it to avoid such therapies.

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