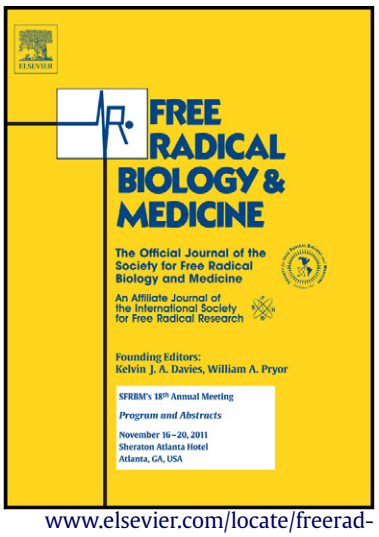

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Cancer Cells with Irons in the Fire

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Abstract
Iron is essential for the growth and proliferation of cells, as well as for many biological processes that are important for the maintenance and survival of the human body. However, excess iron is associated with the development of cancer and other pathological conditions, due in part to the pro-oxidative nature of iron and its damaging effects on DNA. Current studies suggest that iron depletion may be beneficial for patients that have diseases associated with iron overload or other iron metabolism disorders that may increase the risk for cancer. On the other hand, studies suggest that cancer cells are more vulnerable to the effects of iron depletion and oxidative stress in comparison to normal cells. Therefore, cancer patients might benefit from treatments that alter both iron metabolism and oxidative stress. This review highlights the pro-oxidant effects of iron, the relationship between iron and cancer development, the vulnerabilities of iron-dependent cancer phenotype, and how these characteristics may be exploited to prevent or treat cancer.

Keywords

Iron; Oxidative stress; Iron overload; Cancer; Iron chelators

Highlights

Iron is crucial for cellular growth and proliferation.
Iron overload leads to high oxidative stress and carcinogenesis.
Iron depletion and antioxidants may prevent cancer in iron overload diseases.
Both iron depletion and pro-oxidants may selectively target cancer cells.
Targeting iron metabolism may be beneficial to patients with iron overload and cancer.