The role of iron chelation in cancer therapy.

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Source

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Abstract

This review focuses on advances and strategies in the use of iron chelators as anti-tumor therapies. Although the development of iron chelators for human disease has focused primarily on their use in the treatment of secondary iron overload, chelators may also be useful anti-tumor agents. They can deplete iron or cause oxidative stress in the tumor due to redox perturbations in its environment. Iron chelators have been tested for their anti-tumor activity in cell culture experiments, animal models and human clinical trials. Largely for pragmatic reasons, clinical studies of the anti-tumor activity of iron chelators have generally focused on desferrioxamine (DFO), a drug approved for the treatment of iron overload. These studies have shown that DFO can retard tumor growth in many different experimental contexts. However, the activity of DFO is modest, and advances in the use of chelators as anti-cancer agents will require the development of new chelators based on new paradigms. Examples of iron chelators that have shown promising anti-tumor activity (in various stages of development) include heterocyclic carboxaldehyde thiosemicarbazones, analogs of pyridoxal isonicotinoyl hydrazone, tachpyridine, O-trensox, desferrithiocin, and other natural and synthetic chelators. Apart from their use as single agents, chelators may also synergize with other anti-cancer therapies. The development of chelators as anticancer agents is largely an unexplored field, but one with extraordinary potential to impact human cancer.