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Importance of Iron Metabolism

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Iron is a vital micronutrient that is mandatory for fundamental processes in both humans and bacteria. Iron is an essential trace element which promotes cell proliferation and growth. It also has the potential to initiate redox cycling and free radical synthesis. Hence, it is engaged in initiating tumorigenesis, its microenvironment and metastasis. Acquisition of iron, efflux, storage and regulation pathways are disturbed in carcinogenesis which suggests a reprogramming role of iron metabolism in tumor cell survival. Targeting iron metabolic pathways may give a new insight for prognosis and therapy[1].

Globally many people suffer from iron overload toxicity diseases e.g. trans fusional iron overload in thalassemia and hereditary haemochromatosis. Accumulated toxic iron deposits can cause tissue damage and identified in neurological disorders as well such as Alzheimer's and Parkinson's [2]. Regulation of iron is an essential defense mechanism against microbial infections. Individuals with toxic iron overload are more prone to bacterial infections as it is up taken by bacteria for their growth and survival [3]. These bacteria release iron binding molecules and then resorb them to recover iron deficiency. They also get rid of extra iron from transportation and hemoglobin. Microbes face more metabolic pressure when they have to strive hard to acquire it. Hence, the microbes with iron deficiency have a slower rate of reproduction as compared to others [5]. A small amount of iron is lost by sweating and shedding of cell from skin as well as mucosal lining of the digestive tract. However, most of it is restored and recycled by the reticuloendothelial system, which also breaks down the red blood cells[6]. Iron homeostasis is perturbed in inflammation and sepsis, causing raised iron transportation, influx into cells and reduction in iron efflux. Iron may be used as a predictive and diagnostic marker to evaluate the severity of diseases related to iron metabolism, sepsis and inflammation. Further studies are required to explore the drugs targeting specifically to iron metabolic pathways and providing an optimal therapeutic opportunity.

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