Abstract

Iron is essential for the correct function of various biochemical processes. Most living organisms developed elaborate strategies for homeostasis of this metal, including specific approaches for its acquisition and trafficking, to incorporate it into different pathways in various cellular compartments. Across the domain of parasitic protists, iron plays a crucial role in the interaction between pathogen and its host, where the struggle for scavenging available iron is a basis for nutritional immunity. This work summarizes the current knowledge about iron acquisition and trafficking in a spectrum of facultative and obligative unicellular parasites, with experimental discoveries of the iron acquisition strategies and response to iron-deficient conditions in parasitic protists *Naegleria fowleri* and *Acanthamoeba castellanii*. Based on this, the validity of exploiting iron chelation therapy is theoretically and experimentally assessed. Further work focuses on the utilization of mitochondrial targeting as a method of improving the potential of therapeutic compounds, including iron chelators, and describing their action *in vitro* and *in vivo* against a range of parasites.