Spectroscopic Characterization and Comparison of the Binuclear Non-Heme Ferrous sites in m-Ferritin and S-Nitric Oxide Reductase

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Binuclear non-heme iron proteins catalyze a diverse range of reactions. These reactions involve the activation of dioxygen and most recently, nitric oxide, at a largely conserved diiron active site. Relatively little is known about the electronic and geometric structure of the ferrous sites in *Moorella thermoacetica* flavodiiron protein (FprA) and Bullfrog m-ferritin (mFr). Ferritin is a spherical 480 kDa protein made up of 24 monomers, which form a hollow center. The ferroxidase site present in each monomer catalyzes the oxidation of Fe(II) to a ferric-oxo mineral precursor which is then removed from the ferroxidase site and stored in the core of the protein as ferric oxide(1). The FprA has been shown to function as a scavenging nitric oxide reductase (S-NOR) in anaerobic bacteria, reducing two NO molecules to water and N_2O (2). A combination of circular dichroism (CD), magnetic circular dichroism (MCD), and variable-temperature, variable-field MCD (VTVH MCD) have been used to probe the Fe(II) binding to these active sites, as well as the zero-field splitting and the exchange-coupling between the irons due to their coordination environment and bridging ligation (3). These data provide greater understanding of the structure/function correlations between theses enzymes and further elucidate their overall reactivity and reaction pathways.

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