

CsoR metalloregulatory protein: function, mechanism and relevance

ABSTRACT

Transition metals are required constituent in bacterial metabolism to assist in some enzymatic reactions. However, intracellular accumulations of these metal ions are harmful to the bacteria as it can trigger unnecessary redox reactions. To overcome this condition, metalloregulatory proteins assist organisms to adapt to sudden elevated and deprived metal ion concentration in the environment via metal homeostasis. CsoR protein is a copper(I) [Cu(I)] sensing operon repressor that is found to be present in all major classes of eubacteria. This metalloregulatory protein binds to the operator region in its apo state under Cu(I) limiting condition and detaches off from the regulatory region when it binds to the excess cytosolic Cu(I) ion, thus derepressing the expression of genes involved in Cu(I) homeostasis. CsoR proteins exist in dimeric and tetrameric states and form certain coordination geometries upon attachment with Cu(I). Certain CsoR proteins have also been found to possess the ability to bind to other types of metals with various binding affinities in some Gram positive bacteria. The role of this metalloregulatory protein in host pathogen interaction and its relation to bacterial virulence are also discussed.

Keyword: Copper-sensing operon repressor; CsoR; Metalloregulatory protein; Dimer; Cu(I); Tetramer