

Thiol, His–His Motif, and the Battle over Cu(II) in the Relationship of CopM Metallophore and OprC Outer Membrane Protein

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The mechanisms of Cu import across the bacterial outer membrane have been investigated only in a few cases. One such mechanism involves the outer membrane OprC transporter with a unique CxxxM-HxM metal-binding site, discovered recently. This newly identified site in OprC is located outside the cell and is, therefore, most likely to bind Cu(II) through this domain. Since OprC may interact with azurin to facilitate the removal of copper, our study investigated the potential role of CopM metallophore. We selected two putative metal-binding sites in CopM, characterized by MxxHH and MHxxH motifs, which can bind Cu(II) and may interact with the extracellular CxxxM-HxM motif of OprC. At pH 7, the MxxHH motif in CopM was the most effective ligand for Cu(II) ions compared to the MHxxH domain and the novel CxxxM-HxM site in OprC. Furthermore, the CxxxM-HxM site in OprC, where a cysteine residue also binds Cu(II) ions alongside histidine, does not effectively compete with the MxxHH metal-binding site in CopM. This comparison suggests that the CopM MxxHH domain binds Cu(II) ions very strongly and is unable to give them back to the OprC; therefore, it is perhaps transported together with copper ions through OprC into the bacterial cell.

Słowa kluczowe

Copper, Ions, Ligands, Monomers, Peptides and proteins

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