Exploring binding preferences: Cu(II), Ni(II), and Zn(II) complexes of mycobacterial GroEL1 His-rich and Glu/His-rich domains

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Streszczenie

Mycobacterial histidine-rich GroEL1 protein significantly differs from the well-known methionine-glycine-rich GroEL chaperonin and most preferably participates in Cu(II) homeostasis. Some GroEL1 proteins, however, do not possess six but only three histidine residues and more acidic residues that can function as binding sites for metal ions. To evaluate the importance of this difference, we examined and compared the properties of GroEL1 His-rich or Glu/His-rich C-terminal domains as ligands for Cu(II), Ni(II), and Zn(II) ions. We studied the stoichiometry, stability, and binding sites of Cu(II)/Ni(II)/Zn(II) complexes of two model peptides: XEN = Ac-DKPEEEEDGHGHAH (M. xenopi) and ABS = Ac-DKPAEEADHGHGHHGHAH (M. abscessus) in the pH range 2–11. In the case of Cu(II), Ni(II), and Zn(II) complexes of XEN and ABS, ABS always formed more stable complexes. For XEN, there seemed to be no preference for Ni(II) or Zn(II) ions. In contrast, for ABS, Zn(II) formed a complex that was slightly more stable than the one formed by Ni(II). This may be due to the 6 His residues, which preferentially interact with Zn(II) rather than Ni(II). The study identified that an equilibrium of complexes—known as polymorphism—may occur in ABS complexes. Therefore, distinct sets of histidine residues may be involved in metal binding.

Adres publiczny

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