

Zn(II) and Cu(II) Coordination Enhances the Antimicrobial Activity of Piscidin 3, but Not That of Piscidins 1 and 2

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Streszczenie

Piscidins, antimicrobial peptides isolated from fish, are potent against a variety of human pathogens; they show minimum inhibitory concentration values comparable to those of commercially used antimicrobials. Piscidins 1 and 2 are generally more effective than piscidin 3 when applied alone; the contrary is observed for their metal complexes: Zn(II) and Cu(II) coordination does not enhance the efficacy of piscidins 1 and 2, while a moderate enhancement is observed for piscidin 3. All three piscidins bind Cu(II) in a so-called albumin-like binding mode, while for Zn(II) complexes, two coordination modes are observed: piscidins 1 and 2 bind Zn(II) by imidazole nitrogens from His4, His11, and His17 side chains; piscidin 3 coordinates Zn(II) by His3, His4, and His11 imidazole nitrogens and additionally supports the interaction, formed by carbonyl oxygen from His4. Most likely, the high antimicrobial activity of piscidin complexes is due to neither the stability of their complexes nor the change in their secondary structure. Copper(II) complexes with piscidins 1 and 2 can form hydroxyl radicals, which could be responsible for the antimicrobial membrane damaging activity of these complexes. Clearly, a different mechanism (most likely an intercellular targeted one) is observed for piscidin 3 metal complexes; in most cases, the coordination of Cu(II) and Zn(II) enhances the antimicrobial potency of piscidin 3, showing that not only piscidin 3 alone but also its metal complexes have a different mode of action than piscidins 1 and 2.

Słowa kluczowe

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