

Full Papers

新颖的双胰岛素取代钴(III)卟啉的制备和表征

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摘要 通过酰胺键将原卟啉环上的丙酸基与胰岛素的B29赖氨酸残基的ε-胺基共价耦合, 制备了一种新颖的双胰岛素取代钴(III)卟啉CoPI (CoP为原卟啉IX-钴(III)配合物, I为胰岛素)。FTIR和CD (圆二色光谱)研究显示CoPI的构象在pH 6.9类似于胰岛素自身, 而在pH 8.2其结构发生了显著的变化。pH吸收滴定显示在碱性条件下(pH > 8), 游离的CoP和胰岛素形成稳定的配合物, 配合物的解离平衡常数为 $(2.0 \pm 0.3) \times 10^{-5}$ (含锌胰岛素)或 $(2.2 \pm 0.3) \times 10^{-5}$ mol/L(缺锌胰岛素), 配合物生成的准一级速率常数为 9.5×10^{-3}

s⁻¹。

关键词 [金属卟啉, 胰岛素, 共价连接](#)

分类号

Preparation and Characterization of a Novel Insulin-Disubstituted Co(III) Porphyrin

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Abstract A novel insulin-disubstituted Co(III) protoporphyrin IX, CoPI, where I is insulin and CoP is Co(III) protoporphyrin IX, was prepared by covalently coupling the propionate groups on the porphyrin ring to the ε-amino groups of B29-Lys on insulin via amide linkages. The FTIR spectra in the amide I region (1600—1700 cm⁻¹) and circular dichroism study show that CoPI has a conformation similar to the insulin at pH 6.9, whereas it exhibits significant conformational changes in structure as compared with the insulin self at pH 8.2. The pH absorption titration indicates that the alkaline conditions (pH≥8.0) are required for the formation of complexes between the free CoP and the insulin. The thermodynamic and kinetic data reveal that free CoP is bound to either the zinc-insulin or free insulin with a dissociation constant of $(2.0 \pm 0.3) \times 10^{-5}$ or $(2.2 \pm 0.3) \times 10^{-5}$ mol/L.

Key words [metalloporphyrin](#) [insulin](#) [covalent attachment](#)

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