

MALDI-TOF质谱技术研究铁蛋白蛋白壳表层的电荷分布

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采用Sephacryl S-300排阻层析和DEAE-纤维素层析技术分离纯化鱼工鱼肝铁蛋白(Liver ferritin of *Dasyatis Akajeii*, DALF)。纯化后的DALF经梯度聚丙烯酰胺凝胶再次分离后,显示出两条凝胶带,即单分子DALF和双聚态DALF。选用基质辅助激光解吸离子化飞行时间质谱技术(MALDI-TOF MS)研究DALF的电荷分布时,发现DALF蛋白壳表面上显示出三种不同质荷比的分子离子峰,其质荷比为10369.41 m/z、20710.33 m/z和41809.43 m/z。当DALF亚基被解离后,这三个分子离子峰随之消失,因而推测DALF蛋白壳表层存在着高密度正电荷区域,并与该蛋白形成非电惰性有着密切联系。通过拟出DALF蛋白壳表面电荷分布模型,进一步阐明DALF从铂电极上接受电子的机理。

STUDIES ON CHARGE DISTRIBUTION ON THE SURFACE OF PROTEIN SHELL OF FERRITIN WITH A MASS SPECTROMETRIC TECHNOLOGY OF MATRIX-ASSISTED LASER DESORPTION IONIZATION/TIME OF FLIGHT (MALDI-TOF MS)

Liver ferritin of *Dasyatis Akajeii* (DALF) was separated and purified with exclusion chromatography and DEAE-cellulose chromatography. After being purified, DALF was further separated by the grads of polyacrylamide gel electrophoresis to show two protein bands, a single molecular DALF and a dimer ferritin. Using a technology of MALDI-TOF MS for studying the charge distribution, three peaks of molecular ion with different m/z from DALF were found on the surface of the ferritin, which are measured to be 10,369.41 m/z, 20,710.33 m/z and

41,809.43 m/z. However, these peaks are disappearing while DALF was decomposed into the subunit, suggesting that there is positive charge area of high density on the surface of DALF protein shell. These phenomena are tightly connected to the electro-active properties of the protein. In order to understand the mechanism of picking up electrons from the physical electrode, a model was established to study the charge distribution on the surface of protein shell of DALF.

关键词

鱼工鱼肝(Liver of *Dasyatis Akajeii*); 铁蛋白(Ferritin); 质谱(Mass spectrometry); 电泳(Electrophoresis); 电荷分布(Charge distributing); 电子传递(Electron transfer)