

# 用傅里叶变换红外光谱技术研究 HIV-1融合肽的插膜深度与角度

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为探讨HIV-1gp41N端融合肽诱导膜融合的机理,利用傅里叶变换红外光谱技术研究了化学方法合成的代表HIV-1gp41N末端的23肽(HIVWT)分别与酸性POPG和中性POPC脂膜作用后,多肽H/D交换程度的变化及其在膜中的取向。结果表明,HIVWT分子中的大部份氨基酸残基被POPG脂膜保护,分子骨架上的酰胺质子只有11.9%可被D交换,而HIVWT被POPC脂膜保护的则小得多;在POPG脂质体中,HIVWT分子中的 $\alpha$ -螺旋与脂双层平面的角度为 $29 \pm 2^\circ$ , $\beta$ -折叠与脂双层平面的夹角为 $25 \pm 1^\circ$ 。在POPC脂质体中,HIVWT分子的 $\alpha$ -螺旋与脂双层平面的角度为 $22 \pm 1^\circ$ ; $\beta$ -折叠与脂双层平面的夹角为 $26 \pm 3^\circ$ 。根据实验结果,对HIVWT的插膜状态进行了讨论。

## STUDY ON THE MEMBRANE INSERTION DEPTH AND ORIENTATION OF HIV-1 FUSION PEPTIDE BY FOURIER TRANSFORMED INFRARED SPECTROSCOPY

To investigate the mechanism of membrane fusion induced by HIV-1 gp41 N terminal fusion peptide, we studied its membrane insertion state and orientation by H/D exchange and polarized FTIR in acidic POPG and neutral POPC liposomes, respectively. The results indicate that only 11.9% of backbone amide protons of HIVWT in POPG vesicles undergo H/D exchange, whereas 44.6% amide protons are exchangeable for HIVWT in POPC SUV. The average angles of  $\alpha$ -helix and  $\beta$ -strand of HIVWT with respect to the POPG bilayer surface are  $29 \pm 2^\circ$  and  $25 \pm 1^\circ$ , respectively. In the presence of POPC SUV, the average angle between the  $\alpha$ -helix of HIVWT and the bilayer surface is  $22 \pm 1^\circ$ , and the average angle of  $\beta$ -strand of HIVWT is  $26 \pm 3^\circ$ . The membrane insertion state of HIVWT was discussed.

### 关键词

HIV-1融合肽(HIV-1 fusion peptide); FTIR; H/D交换(H/D exchange); 分子取向(Orientation)