

# SSB蛋白与ssDNA相互作用的动力学和可视化研究

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研究大肠杆菌单链结合蛋白 (single-stranded DNA-binding protein, SSB) 与单链DNA (single-stranded DNA, ssDNA) 的相互作用对于了解其在DNA复制、重组和修复中的作用是非常重要的。通过表面等离子共振技术 (surface plasmon resonance, SPR) 得到了在有、无镁离子的情况下, SSB与ssDNA两者的平衡解离常数 (equilibrium dissociation constant, KD) 分别为 $9.67 \times 10^{-7}$  M和 $4.79 \times 10^{-7}$  M, 阐明了镁离子对于两者作用形式的影响。利用原子力显微镜技术分别观察SSB蛋白、ssDNA和SSB-ssDNA复合物的成像, 为下一步研究SSB在DNA代谢中作用模式的单分子可视化奠定了基础。

## Kinetic Assay and Visualization of Interaction of Single-Stranded DNA-Binding Protein with its Substrate

Study of interaction of *E. coli* single-stranded DNA-binding protein (SSB) with its substrate, single-stranded DNA (ssDNA), is very important for understanding its essential roles in replication, recombination and repair of DNA. In this report, interaction of SSB with ssDNA was monitored by surface plasmon resonance (SPR) and directly observed using atomic force microscopy (AFM), which presented an attempt to investigate the binding mode of SSB by a single-molecule visualization methodology. The resulting SSB protein was a correctly folded tetramer with an apparent binding to 43-mer ssDNA with the equilibrium dissociation constant (KD) of  $9.67 \times 10^{-7}$  M and  $4.79 \times 10^{-7}$  M respectively whether MgCl<sub>2</sub> was present or not as determined by SPR. In the AFM images, individual ssDNA, SSB protein and SSB-ssDNA complex were visualized. The used ssDNA was long enough for cooperative SSB binding and the authors observed that SSB protein distributed on ssDNA non-specifically.

### 关键词

SSB蛋白 (SSB); 单链DNA (ssDNA); 相互作用 (interaction); 动力学 (kinetic assay); 可视化 (visualization)