

研究论文

## 黄曲霉毒素B<sub>1</sub>抗体和纳米金颗粒的相互作用机理

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**摘要** 研究了纳米金标黄曲霉毒素B<sub>1</sub>单克隆抗体(McAb)探针的制备及其标记机理, 确定了稳定标记5种不同粒径金溶胶(10.7~67.4 nm)所需McAb的最适质量浓度, 分别为0.07, 0.051, 0.033, 0.019, 0.012 mg/mL, 作用时间为5 min, pH为7.4. 对金标探针复合物进行透射电镜、红外光谱和免疫反应性鉴定的结果表明, 与未标记抗体相比, 抗体探针的免疫亲和常数、效价和常温贮藏稳定性得到了明显提高. 通过荧光光谱和圆二色谱研究纳米金与AFB<sub>1</sub>单抗McAb的相互作用机理, 发现纳米金对McAb产生静态猝灭, 猝灭的速率常数随着温度升高而降低. 确定了结合位点数和结合常数. 结果显示, 表明McAb的色氨酸残基与纳米金颗粒之间发生了Förster偶极-偶极无辐射能量转移. 初步确定反应前后McAb构象组成发生了变化是McAb探针亲和力和稳定性提高的原因.

**关键词** [黄曲霉毒素B<sub>1</sub>](#), [AFB<sub>1</sub>抗体](#), [纳米金溶胶](#), [McAb探针](#), [作用机理](#)

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## Mechanism of Interaction Between Nano Gold Colloid and Monoclonal Antibody(McAb) of Aflatoxin B<sub>1</sub>

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**Abstract** The optimal condition for AFB<sub>1</sub> conjugating to nanogold particles was obtained by studying the preparation and the reaction. Optimum pH for conjugation was determined to be 7.4, reaction time was 5 min, and the least stable content of McAb to colloidal gold in five diameters(10.7—67.4 nm) was 0.07, 0.051, 0.033, 0.019, 0.012 mg/L gold solution, respectively. Combination of McAb with nanogold particles was also characterized with TEM, IR spectra and immunoreactivity. The results show that the titer of McAb increased obviously. Colloidal gold has a powerful ability to quench the McAb fluorescence via a nonradiative energy transfer mechanism. The fluorescence quenching data were analyzed according to Stern-Volmer equation. The binding constant of reaction was obtained. The data of enthalpy and entropy proved that the main interactions were London-van der Waals force and hydrogen bond between colloidal and McAb. From the synchronous spectrum colloidal gold has not obvious effect on the conformation of McAb. It was proposed that the small change of conformation of McAb was the reason of increase of titer, affinity and stability.

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