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论文

痕量甲胎蛋白的免疫纳米金催化-氧化亚铜微粒共振散射光谱分析

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摘要:

用粒径15 nm 的纳米金标记单克隆羊抗人甲胎蛋白(GAFP), 制备了甲胎蛋白(AFP)的免疫纳米金探针(AuGAFP). 纳米金及AuGAFP均对葡萄糖还原铜(Ⅱ)生成Cu_2O微粒这一慢反应具有较强的催化作用, Cu_2O微粒在620 nm处产生1个较强的共振散射峰. 将AFP-AuGAFP免疫反应与离心分离技术结合, 建立了超痕量AFP的免疫纳米金催化-Cu_2O微粒共振散射光谱新方法. 随着AFP浓度的增大, AFP-AuGAFP免疫复合物微粒增多, 离心液中AuGAFP浓度降低, 620 nm处的共振散射光强度$I_{620\ nm}$线性降低, 其降低值ΔI_{RS}与AFP质量浓度ρ(AFP)在0.10～16.0 ng/mL范围内呈现良好的线性关系, 其回归方程为ΔI_{RS}=4.27ρ(AFP)+1.28, 检出限为0.05 ng/mL. 本方法所用试剂易得, 反应易控制, 灵敏度高, 选择性好, 用于定量分析人血清中的AFP, 结果令人满意.

关键词: 甲胎蛋白 纳米催化 免疫纳米金 氧化亚铜微粒 共振散射光谱法

Immunonanogold Catalytic-Cu_2O Particle Resonance Scattering Spectral Determination of Trace *α*-Fetoprotein

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Abstract:

15 nm-nanogold was used to label monoclone goat antihuman *α*-fetoprotein antibody(GAFP) to obtain immunonanogold probe(AuGAFP) for *α*-fetoprotein(AFP). Both nanogold and the probe have catalytic effect on the slow Cu_2O particle reaction between Fehling reagent and glucose that exhibit a resonance scattering peak at 620 nm. Combining AFP-AuGAFP immunoreaction with centrifugation technique, a highly sensitive immunonanogold catalytic-Cu_2O particle resonance scattering spectral assay for AFP was proposed. With addition of AFP, the AFP-AuGAFP immunocomplex increased, the excess probe in the supernatant decreased, and the resonance scattering intensity at 620 nm decreased linearly. The decreased intensity ΔI_{RS} was linear to AFP concentration[ρ(AFP)] in the range of 0.10—16.0 ng/mL, with a regression equation of ΔI_{RS}=4.27ρ(AFP)+1.28, and a detection limit of 0.05 ng/mL. This method was applied to the detection of AFP in sera, with high sensitivity and good selectivity, in addition to low-cost reagents and easy controlling reaction.

Keywords: *α*-Fetoprotein Nanocatalysis Immunonanogold Cu_2O particle Resonance scattering spectral assay

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