

研究论文

硅壳纳米颗粒对COS-7细胞的生物效应

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摘要 从硅壳纳米颗粒对细胞存活率、细胞周期及细胞生长曲线的影响等方面系统地考察了包裹RuBpy染料的硅壳荧光纳米颗粒(FSiNPs)对美洲绿猴肾细胞(COS-7)的生物效应. 结果表明, FSiNPs对COS-7细胞的影响是浓度依赖性的, 低浓度($<0.2 \mu\text{g}/\mu\text{L}$)的FSiNPs对细胞的存活率、细胞周期及整个生长过程均无负面影响, 但随着与COS-7细胞作用的FSiNPs浓度的增大, FSiNPs对COS-7细胞的毒性也逐渐增大, 尤其是对细胞周期及细胞生长曲线的影响更为敏感. 同时, 利用FSiNPs的荧光信号同步指示作用, 考察了COS-7细胞对FSiNPs的吞噬作用, 发现 FSiNPs通过细胞膜的吞噬作用随机地进入到细胞内, 一部分FSiNPs被细胞当成异物外排到细胞培养基中, 另一部分则进入到下一代细胞中. 随着细胞传代次数的增多和新生胞质的产生, FSiNPs在细胞内的含量逐渐减少, 最后消失. 在这一过程中, 细胞的形态和生长状况依然良好. 上述研究结果有望为FSiNPs在细胞生物学的研究和应用提供一定的安全标准, 并为开展基于新型纳米颗粒的纳米颗粒器件的研究与应用打下了基础.

关键词 [硅壳纳米颗粒\(SiNPs\)](#) [COS-7细胞](#) [生物效应](#)

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Bioeffects of Silica-coated Nanoparticles on COS-7 Cells

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Abstract In this paper, the cell livability, cell cycle and cell growth curve were analyzed to evaluate the bioeffects of silica-coated nanoparticles on COS-7 cell line. The results indicate that the cytotoxicity of FSiNPs on COS-7 cells was concentration dependent. No measurable cytotoxic effects of FSiNPs were observed on the cell livability, cell cycle and cell growth if the nanoparticles concentration below $0.2 \mu\text{g}/\mu\text{L}$. But the cytotoxic of FSiNPs on COS-7 cells would increase with the increasing of nanoparticles concentration. Meanwhile, the cellular uptake of FSiNPs at low concentration by COS-7 cells was also examined by employing the fluorescence dye RuBpy doped as a signal for tracking the silica coated nanoparticles. It was found that cells can uptake FSiNPs at random by cell membranous endocytosis when they co-cultured together, and then they excluded parts of FSiNPs to cell culture medium, also parts of FSiNPs can be distributed to the next generation cells. Moreover, the content of FSiNPs in cells are less and less following the manifold of new cytoplasm and cells reproduction, while cells still remained a good shape and growth state after the uptake of nanoparticles. These results provide safely standards for the research, analysis and application of FSiNPs in cell biology. Also, it was a foundation of the research of bionano-device based on the novel nanoparticles.

Key words [Silica coated nanoparticles\(SiNPs\)](#) [COS-7 cell line](#) [Bioeffects](#)

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