Golden siRNA Nanoparticle Conjugates

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Conventional cancer chemotherapy is administered systemically and while being effective on tumors; it also causes undesired, yet severe side effects. Therefore, the development of targeted therapies which are effective locally, would provide cancer patients with less harmful, less debilitating treatment. The mechanisms involved in small interference RNA (siRNA) gene silencing open new horizons for the development of the targeted therapy of malignant and benign diseases since siRNA has proven to be highly effective in silencing specific genes and modulating intracellular signaling pathways. However, systemic delivery of siRNA has been difficult due to its degradation prior to reaching the tumor and poor cellular uptake.

The Mirkin's laboratory at Northwestern University found that loading siRNA onto the surface of gold nanoparticles can protect siRNA from degradation and increase its effectiveness in regulating genes involved in cancer. As a result of this discovery, cancer researchers would have at their disposal a straightforward method of delivering these potent gene-regulating agents into targeted cells.

The Mirkin's group developed a novel pretreatment stripping method to assure that gold nanoparticle conjugates do not include any nucleases. This method allowed for adding any RNA molecules to the nanoparticles. Using confocal microscopy, the investigators were able to observe the nanoparticles entering cultured tumor cells. More importantly, the researchers also showed that once inside the cell, the siRNA was capable of escaping from the nanoparticle surface and inactivating its gene target. The amount of gene silencing achieved with the siRNA-nanoparticle construct was double that observed when cells were treated with siRNA alone. The future experiments will include…..

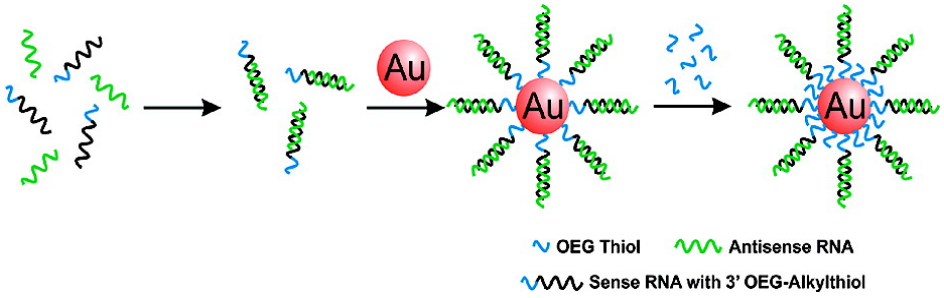

Figure illustrates preparation of polyvalent RNA gold nanoparticle conjugates