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Targeting Gold Nanoparticles (GNPs) into the Nucleus of Cells

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The interactions of synthetically produced gold nanoparticles (GNPs) with living organisms are getting attention in the biomedical sciences. GNPs have been extensively used due to their ability to act as both an anti-cancer drug carrier in chemotherapy and as a dose enhancer in radiotherapy. Most GNPs research involved GNPs in the cytoplasm of the cell. However, it is predicted that therapy response can be further enhanced if NPs can be effectively targeted into the nucleus of a cell. An effective strategy for designing a GNP-peptide complex for targeting the nucleus will be presented. Two peptides were conjugated onto GNPs. The role of one peptide enhanced the uptake into the cell while the other one enhanced nuclear delivery. With nuclear targeting, there is a possibility in the production of additional low-energy secondary electrons in response to irradiation within the nucleus causing more damage to DNA. This research will establish a more successful NP-based platform for combining more than one treatment modality, such as chemotherapy and radiotherapy which can lead to a more aggressive approach in treatment of cancer.

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