Abstract No.128

Gold Nanoparticle as a Drug Delivery System for Thiol-Containing Purine Antimetabolites

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Over expression of different efflux membrane transporter proteins such as p-glycoprotein (P-gp), multidrug resistance protein 1 (MRP1) and breast cancer resistance protein (BCRP) is associated with high levels of resistance to a variety of anticancer agents. In spite of many synthetic purine derivatives being tested so far, as anticancer drugs, 6-Mercaptopurine (6MP) and 6-Thioguanine (6TG) are the only purine antimetabolites that are currently in use for cancer treatment. The thiol group of these drugs may increase their elimination through conjugation with thiol-containing molecules. Gold nanoparticles (GNPs), on the other hand exhibit strong binding affinity towards thiols, and therefore above mentioned purine antimetabolites can be easily loaded on their surface. In the current research, GNPs were synthesized and characterized for their shape, size and percent entrapment efficiency using transmission electron microscopy (TEM), UV/vis spectroscopy and thermal gravimetric analysis (TGA). To estimate the improvement of drug delivery of GNPs, MCF-7 breast cancer cell line was treated by both 6TG and 6TG-functionalized GNPs (6TG-GNPs). The results of this and previous studies revealed that GNPs significantly enhance the anti-cancer activity of 6TG and 6MP, suggesting enhanced intracellular uptake of the drugs by endocytic mechanism. Therefore, the improved anti-proliferation activity of these purine antimetabolites by GNP carriers could make possible the reduction of the overall concentration of the drug, renal clearance and its side effects during cancer treatment.

Keywords: Anticancer Activity, Gold Nanoparticles, Purine Antimetabolites.

Abstract No.129

Investigation on Elasticity of Intact and Diabetic RBC Membrane Using Optical Tweezers

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As a useful nondestructive nano-tool for manipulating isolated biological cells and individual molecules, optical tweezers (OT) have been used widely in many research areas such as biology, medicine and physics. The nanometer positioning ability along with sub-picoNewton force resolution have turned OT into a valuable tool in biology and physical sciences.The elastic nature of a red blood cell (RBC) plays an important role in blood flow in themicrocirculatory system in which a typical RBC passes through blood vessels of diameter less than its diameter by deforming itself to a large extent. The mechanical properties of RBC membrane can provide valuable biological information.We measured the elasticity of the RBC membrane using OT. OT was used to apply calibrated forces to human erythrocytes via streptavidin coated polystyrene beads with a diameter of 3.28μm bound to their membrane. By applying enough stretching force, a tether could be formed from the membrane. The force at which the tether formed, and the force required to keep the tether while separating the trapped bead and RBC, could be used as parameters that could be used to calculate the rigidity of the membrane. The maximum force exerted by optical tweezers on the normal cell was~a few tens pN. In the next phase we're going to study the elastic properties of diabetic RBC membrane.

Keywords: Optical Tweezers, Red Blood Cell, Microcirculatory System, Streptavidin Coated Polystyrene Beads, Tether, Stretching Force.

Abstract No.130

Effect of Silica Nanoparticle Supported Imidazolium Ionic Liquid on Thermal Reversibility of Human Carbonic Anhydrase II

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Irreversibility caused misfolding and aggregation for proteins which are a common phenomenon both in the cell, in-vitro protein refolding and