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Labeling of Folic Acid on Bovine Serum Albumin

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Labeling of Folic Acid on Bovine Serum Albumin

A Project

Submitted

To

Governors State University

By

Hari Krishna Kosuri

In Partial Fulfillment of the

Requirements for the Degree

of

Masters in Science

December, 2010

Governors State University

University Park, Illinois

Abstract

Recent Clinical research focused mainly on the therapeutic safety which mainly involves the avoidance of toxicities. To prevent the toxicities, site targeted drugs are improved which exhibit their therapeutic action on the specific target or the diseased target without disturbing the healthy cells. Folic acid, a natural Vitamin (Vit B9) has shown promising results in site specificity mainly in the cancer cells where they are abundantly present.

Folic acid is of great importance because of the promising results of several clinical trials which demonstrate that Folic acid increases the potency and simultaneously reducing the toxicity of the cancer therapies. Various different forms of drugs attached to the Folate for the target delivery are protein toxins, chemotherapeutic agents, oligonucleotides, liposomes with entrapped drugs, radiotherapeutic agents, immunotherapeutic agents, gene therapy vectors, MRI contrast agents and enzyme constructs for prodrug therapy. Recent clinical studies reveal that studies on coating of folate on surfaces such as gold surfaces and nanoparticles further increased the scope of use of Folate as a site specific target delivery system. Folic acid used as a folate binding protein or the folate receptor is used to target the diseased cell. The Folate receptor FR- α is used as a receptor to carry the folate into the cells. For the Folate based drug delivery systems, the concentration of the folic acid on the protein or the drug also acts as a variable for the transport of the drug, less concentration of the folic acid on the protein or drug may result in the poor binding of the drug or the protein to be transported to the folate where as a very high concentration of the folic acid may not bind to the protein or the drug as the formation of precipitates are evident. Therefore to avoid the overlabeling or underlabeling, optimal concentrations are to be designed for proper efficiency of the drug delivery to the target site. Recent research limited on a single concentration of the folate which is bound to the protein for

the target delivery. Our project mainly focused on the maximum labeling of the folate onto the protein to provide the best results for the target delivery. The labeling was carried out using the Human Bovine Serum Albumin as the protein and the EDC as the linker to bind the Folic acid on the protein.