The development of nanostructured magnetite ($\text{Fe}_3\text{O}_4$) has been widely touted as a revolutionary paradigm shift for biomedical field particularly in Nanomedicine. In recent years, considerable effort has been focused in the improvements in controlling size, shape, and surface modifications to gain better behaviors as well as improved functionalization. In this work, we obtained $\text{Fe}_3\text{O}_4$ NP through the control of chemical coprecipitation method and compared two kind of surface modifications. The aim of this study was to evaluate the bioconjugation of HER2 monoclonal antibody to the NP with two different surface modification. Here we obtained dextran coated magnetite NP (MDx) through formation of ferrofluid; on the other hand, aminosilane were attached to NP (MAs), the alkoxy groups are hydrolyzed to form silanol groups that bond chemically to the NP, according with FTIR spectrums. Furthermore, the nanoparticles coated and uncoated were characterized with SEM, EDS, XRD and RAMAN. Moreover, MDx and MAs were functionalized with a monoclonal single chain fragment variable antibody (scFv) for active targeting of the HER2 antigen. The scFvs were obtained by recombinant DNA technology? foreign peptide domains were fuse to coat protein pIII in phage display vector pComb3X. The influence of coating on antibody conjugation was determinate, we here report the development of a new generation of enzyme linked immunosorbent assay (ELISA) using a magnet to immobilized antibody-NP bioconjugate taking advantages from the fact that activated magnetic nanoparticles can be manipulated by applying a magnetic field for immobilization; then a secondary antibody binds to the scFv yield to of the monoclonal scFv antibody chemically attached on nanoparticles. The antiHA recognizes specific region of scFv and then the enzyme attached yields the chemiluminescent reaction. Absorbance (405 nm) was read with a BioRad®, Benchmark Plus, microplate spectrophotometer. Results showed that the aminosilane coated NP were 1.6 times more efficient conjugating the scFv than dextran coated NP.

Keywords: Magnetite, Surface Modification, Nanomedicine

References:


Presenting author's email: christian.chapa@uacj.mx