**513f The Effect of Mangetic Nanoparticles on the Binding Affinity/Avidity of Antibody-Antigen Interactions**

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It has been previously reported that the magnetophoretic mobility of labeled cells show a saturation type phenomenon as a function of the concentration of the antibody-nanoparticle conjugate. Starting with the standard antibody-antigen relationship, a model was developed which takes into consideration multi-valance interactions and various attributes of flow cytometry and cell tracking velocimetry, CTV, measurements to determine both the apparent dissociation constant and the antibody binding capacity of a cell. This model was then evaluated on peripheral blood lymphocytes labeled with anti CD3 antibodies conjugated to FITC, PE, or DM (magnetic beads). Reasonable agreements between the model and the experiments were obtained. In addition, estimates of the limitation of the number of magnetic nanoparticles that can bind to a cell as a result of steric hindrance were consistent with measured values of magnetophoretic mobility. More significant, however, is the observation that the conjugation of magnetic nanoparticles to antibodies significantly reduces the binding affinity/avidity of the antibody for its ligand. This corresponds to the need to use a significantly higher concentration of antibody-nanoparticle conjugate to achieve a desired level of saturation of the target ligand. Finally, a scale up model was proposed and tested which predicts the amount of antibody conjugates needed to achieve a given level of saturation as the total number of cells reaches 10^10, the number of cells needed for certain clinical applications, such as T-cell depletions for mismatched bone marrow transplants.