Public Abstract

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Development of a FRET Biosensor to Detect the Pathogen *Mycoplasma capricolum*

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Graduation Term Fall 2005

Mycoplasmas are a species of bacteria that invade any type of cell and are highly adaptable to changing environments which makes this particular pathogen difficult to detect and eliminate. We are developing an optical biosensor based on Fluorescence Resonance Energy Transfer (FRET) for fast detection of these pathogens, specifically for *M. capricolum*. Three different anti-peptide antibodies, (E, F_1, and F_2), were conjugated with AF-546 dye (donor). Then the antibodies were complexed to Protein G labeled with AF-594 dye (acceptor) near the Fc-binding region on the antibodies. This complex was then exposed to two different *M. capricolum* peptides (E and F), or the entire bacteria. The results showed that when the bacteria or peptide specific for the antibody binds, there was a change in the 3-D conformation of the antibody which caused a measurable increase in the acceptor emission. α-pep F_1 had the most distinct conformational change at 12% so it was used in two different systems (organic dyes and a gold nanoparticle quenching system) and immobilized onto optical fibers. Our current data illustrated that this novel fiber optic biosensor measures conformational changes that occur when antibodies and antigens bind and thus is a viable detection method for mycoplasma pathogens.