Optical biosensors for food pathogen detection

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Project Rationale
Our goal was to develop a fiber optic sensor for detecting foodborne pathogens, including *Listeria monocytogenes*, *Escherichia coli* O157:H7 and *Salmonella Enteritidis*. We have been able to develop a fiber optic sensor for *L. monocytogenes* and *E. coli* O157:H7. We have also developed a sensitive and specific fiber optic detection assay for *S. Enteritidis* in poultry. The assay was compared with time-resolved immunofluorescence (TRF) for confirmation. An efficient multi-pathogen array, using a flow through immobilization protocol, has also been developed for detection of *L. monocytogenes*, *E. coli* and *S. Enteritidis*. Pilot studies are currently underway to study the binding efficiencies of an antibody-pathogen complex using different surface chemistries in order to have a better understanding of the molecular nature of interactions. This approach will help us increase sensitivity and specificity of binding on the sensor.

Project Objectives
- Develop and evaluate an antibody-coupled fiber optic biosensor [ANALYTE 2000™] for detection of *S. Enteritidis*.
- Develop an efficient, multi-pathogen array using the fiber optic biosensor.
- Screen and identify monoclonal and polyclonal antibodies, developed in our laboratory, for *L. monocytogenes*, *E. coli* O157:H7 and *S. Enteritidis*.
- Develop efficient surface chemistry protocols for evaluation and quantification of binding interactions of the antibody-pathogen complex on the surface of the fiber optic sensor.
- Deploy the common selective (SEL) media developed in our laboratory for the enrichment of targeted pathogens.
- Explore the viability of other biosensor platforms for the development of a multi-pathogen array biosensor.

Project Highlights
The development of a fiber optic biosensor for detection of *S. Enteritidis* was the most important accomplishment this year. The success of the project provides proof of the principle of detection of *S. Enteritidis* using an efficient flow through antibody immobilization using a fiber optic biosensor. The low detection level achieved also emphasizes that target specific antibodies developed in our laboratory can be used as bio-probes on fiber optic sensor platforms. 

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