Public Abstract

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Title: Development of a Capillary Based *Helicobacter hepaticus* Biosensor

Helicobacter hepaticus is a bacterium that causes hepatitis in rats and mice. Infection is easily spread in animal research facilities and is problematic because it may confound or invalidate research studies. Early detection helps prevent the spread of infection through removal of infected animals from the colonies. The objective of this study was to develop a biosensor platform for the detection of *H. hepaticus* in fecal samples to aid researchers in preventing the spread of infection in animal facilities.

This research involved developing an optical biosensor using capillary tube waveguides and immunologic principles. *H. hepaticus* was immobilized to the inner wall of the glass capillary tubes. This allowed for the establishment of a competitive immunoassay between the immobilized and sample *H. hepaticus* (analyte). A *H. hepaticus* antibody was conjugated to a fluorescent dye, which served as a fluorescent tracer and facilitated immunoassay analysis. The labeled antibody was added to the prepared samples containing *H. hepaticus*. Sample *H. hepaticus* consumed the antibodies in solution, thereby preventing the antibodies from attaching to the immobilized *H. hepaticus*.

Several methods were utilized to analyze the fluorescence resulting from the immunoassay. Sample mixture analysis quantified the antibodies remaining in solution and had a 10 ng limit of detection. Immobilized capillary analysis examined the amount of labeled antibodies bound to the capillary walls and had a 1.0 ng limit of detection with an assay time of approximately one hour. This biosensor was shown to detect low levels of *H. hepaticus* in a rapid and accurate manner.