

Covalently linked immunomagnetic separation/adenosine triphosphate technique (Cov-IMS/ATP) enables rapid, in-field detection and quantification of *Escherichia coli* and *Enterococcus* spp. in freshwater and marine environments

Christine M. Lee¹, John F. Griffith², William Kaiser³ and Jennifer A. Jay¹

¹*UCLA Civil and Environmental Engineering, Los Angeles, CA*

²*Southern California Coastal Water Research Project, Costa Mesa, CA*

³*UCLA Electrical Engineering, Los Angeles, CA*

ABSTRACT

Developing a rapid method for detection of fecal pollution is among the critical goals set forth by the Environmental Protection Agency (EPA) in its revision of water quality criteria. In this study, we examined the efficacy of using covalently-linked antibody-bead complexes to measure *Escherichia coli* or *Enterococcus* spp. in fresh and marine water. Water samples analyzed using a covalently-linked immunomagnetic separation/adenosine triphosphate quantification technique (Cov-IMS/ATP) and culture-based methods yielded good correlations for *E.coli* ($R = 0.87$) and *Enterococcus* spp. ($R = 0.94$), with method detection limits below EPA single-sample recreational water quality standards. Cov-IMS/ATP was also used as a field method to rapidly distinguish differential loading of *E.coli* between two stream channels to their confluence and may also have utility as a source-tracking tool. Due to its portability and economy, Cov-IMS/ATP is a potential alternative rapid detection method to expensive, laboratory intensive methods such as quantitative polymerase chain reaction (qPCR), particularly in circumstances where beach sites are distant from the laboratory and resources are scarce.

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