

Flow Cytometry-Based Systems and Methods for Detecting Microbes

Technology Summary

Foodborne illnesses occur in both industrialized and developing countries and may be increasing due to rapidly evolving food production practices. However, the primary tools used to assess food safety are decades old and require 48 to 56 hours to get the results.

FDA innovators developed a sensitive flow cytometer-based system to detect microbial contamination that improves the time to result for food safety assessment. They overcome previous limitations of flow cytometer methods by eliminating background fluorescence and improving the signal to noise ratio to allow accurate measurement of bacterial load or other pathogens such as viruses, protozoa, and theoretically even prions.

The new assays provide results in several hours when detection of one cell in a complex matrix is required and can be performed in just minutes if no sample enrichment is required. Yet the results from assays are identical to standard culture plate methods to measure bacterial contamination. This system offers a powerful approach to real-time assessment of food safety, useful for industry self-monitoring and regulatory inspection.

Potential Commercial Applications

- Regulatory inspection of food, water, biologics, drugs, and other products
- In house monitoring and quality control (QC) for food, water, biologics, drugs, and other products
- Basic research tool
- Potential to detect, identify, and quantify bacteria, virus, and possibly prion in samples

Competitive Advantages

- Elimination of background fluorescence improving signal to noise
- Rapid assay time compared to current microbial detection assays
- High sensitivity (single cell)
- Able to determine type of microbial contamination and distinguish their viability
- Minimizes sample manipulation
- Quantitative
- Assays are linear over 5 orders of magnitude

Development Stage: In vitro data, prototype

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Publication(s):

Buzatu DA, Moskal TJ, Williams AJ, Cooper WM, Mattes WB, Wilkes JG. An integrated flow cytometry-based system for real-time, high sensitivity bacterial detection and identification. PLoS One. 2014 Apr 9;9(4):e94254. doi: 10.1371/journal.pone.0094254. eCollection 2014. PMID: 24718659

Buzatu DA, Cooper WM, Summage-West C, Sutherland JB, Williams AJ, Bass DA, Smith LL, Woodruff RS, Christman JM, Reid S, Tucker RK, Haney CJ, Ahmed A, Rafii F, Wilkes JG. Photobleaching with phloxine B sensitizer to reduce food matrix interference for detection of Escherichia coli serotype O157:H7 in fresh spinach by flow cytometry. Food Microbiol. 2013 Dec;36(2):416-25. doi: 10.1016/j.fm.2013.07.007. Epub 2013 Jul 31.

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Product Area: Foodborne illnesses, food safety, flow cytometer, microbial contamination

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