Detection of *Salmonella* Bacteria in Milk Using Gold-coated Magnetic Nanoparticle Clusters and Lateral Flow Filters

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A novel method was developed for the detection of *Salmonella* bacteria using gold-coated magnetic nanoparticle clusters (Au/MNCs) and lateral flow filters. Unlike a conventional lateral flow immunoassay (LFA) membrane, where antibodies are immobilized on test and control lines to observe a signal, the test line in the new method is formed simply by pressing a nitrocellulose membrane to decrease its thickness. Half-antibody fragment-functionalized Au/MNCs were used to capture *Salmonella* in milk and then dispersed in a small volume of buffer solution in which one end of the lateral flow filter was immersed. The free Au/MNCs rose to the pressed test line, while the *Salmonella*-Au/MNC complexes remained in the solution because they were too large to pass through the pores inside the lateral flow filter. The flow of free Au/MNCs was blocked at the test line because of the reduced pore size, and their accumulation caused the test line to darken. The color of the test line was inversely proportional to the *Salmonella* concentration, and the limit of detection for *Salmonella* in milk was determined to be 10^3 CFU/mL by the naked eye.