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Aptamer-based sensor for the detection of Cryptosporidium parvum in water

Cryptosporidium parvum is an intestinal parasite that can be spread through environmental and recreational waters. This parasite is resistant to chlorine disinfection, and it is the known cause of the diarrheal disease Cryptosporidiosis. In this study, we are developing nanotechnology-based rapid detection methods that can be used for screening purposes. One approach uses a two-stage, label-free aptasensor for the colorimetric detection of Cryptosporidium parvum using gold nanoparticles. This approach is based on the color shift from red to purple when they are aggregated due to a change the nanoparticle stability in a solution. When gold nanoparticles and aptamers are incubated together, they form a very stable dispersed complex. The presence of C. parvum oocysts will cause some of the aptamers to desorb from the gold nanoparticle's surface, causing the aggregation of said nanoparticles upon the addition of high concentrations of salt. The aggregation of these gold nanoparticles will, in change, cause a visible color shift from red to purple, indicating the presence of C.parvum. This label-free, two- stage aptasensor plan can be completed in less than an hour and it can detect a reasonably low concentration of C .parvum oocysts. Other variations of this approach are also being explored to further improve the sensitivity and selectivity..