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Rapid detection of pathogenic E. coli based on CRISPR technology

Access to sufficient amounts of safe and nutritious food is critical for maintaining life and promoting good health. Consumption of foods that are contaminated with pathogens can cause serious diseases ranging from diarrhea to cancer. Many foodborne infections can result in long-term impairment or death. Hence, the detection of foodborne pathogens such as pathogenic *Escherichia coli* is essential for public safety. Conventional methods for detecting these bacteria are based on culturing on selective media and following standard biochemical identification. Despite their accuracy, these methods can be time-consuming. PCR-based detection methods rely on sophisticated and time-consuming protocols as well as specialized technicians which can be difficult to find in areas with limited resources. In this project, we are developing a robust detection method based on CRISPR-Cas12a sensing, which is rapid, highly sensitive and specific for the detection of pathogenic *E. coli.* The detection reaction includes amplified PCR products for the pathogenic regions, reporter probe, Cas12a enzyme, and guide RNA that is specific to three pathogenic genes in *E. coli*. The CRISPR reaction with the pathogenic bacteria resulted in fluorescence light in positive samples after excitation under UV light. This technique is highly precise, sensitive, rapid, cost effective, and easy to use, and it can overcome the limitations of the current detection approaches. This project could result in a versatile detection method that is easily adaptable for Rapid Response in the detection and surveillance of diseases that pose large-scale biosecurity threats to human health, and plant and animal production.