Comparative Analysis of DNA based Aptamers for *E. coli* O157:H7

by

Saika SIDDIQUI

Abstract

*Escherichia coli* (*E. coli*) is a gram-negative bacterium which forms the normal flora of humans and animal gastrointestinal tract. While most strains are harmless, some strains could be harmful such as Shiga toxin producing *E. coli*, of which *E. coli* O157:H7 is the most important serotype due to its involvement in several outbreaks. *E. coli* O157:H7 produces verotoxins that cause severe damage to the lining of the intestines, leading to bloody diarrhea and can lead to more serious conditions as hemolytic uremia syndrome in vulnerable groups such as young children and elderly. Fast detection of such pathogens is very important for better management. Even though antibodies are widely used for pathogen detection, other biorecognition molecules are being actively explored.

Aptamers are rapidly growing as alternative bio-recognition molecules. Several DNA aptamers have been selected for *E. coli* O157:H7. However, in order to further explore their potential, a comparative binding affinity analysis under uniform conditions is warranted. In this work we present a comparative analysis in terms of binding characteristics of DNA based aptamers for *E. coli* O157:H7. We performed a systematic characterization of DNA-based aptamers for *E. coli* O157:H7 using real time PCR. The study included all main *E. coli* O157:H7 DNA aptamers reported in the literature. The effect of biotin tag modification on binding efficiency of the aptamers was also studied. Effect of monovalent and divalent cations in binding buffer on the binding efficiency of these aptamers were checked. The nonspecific binding characteristics of these aptamers with other non-pathogenic strains of *E. coli* were also investigated. We believe this study provides a clearer picture about the binding efficiency for DNA based aptamers with *E. coli* O157:H7. It would be important to the development of new aptamers and their application to biosensors.

Date: 24 Apr 2020 (Friday)
Time: 2:00 pm
Venue: Online via Zoom

Examination Committee:
Prof. Levent YOBAS (Chair)
Prof. George J YUAN (Supervisor)
Prof. Tuan Anh NGUYEN

All are welcome!