SHORT ABSTRACT

The presence of toxic and immunogenic epitopes in wheat causes celiac disease when consumed by susceptible individuals with genetic predisposition. The detection is of prime importance for the management of this chronic inflammatory disease, which is also caused by the consumption of other cereals like barley and rye. The present study focused on the development of aptamer probes against two peptide sequences present in the alpha-gliadin subunit of wheat gluten protein which contain few epitopes of celiac disease. As an outcome of this study, high-affinity DNA aptamers as detection probes against gluten have been developed which can replace costly antibodies with several associated advantages. The two native peptides of wheat alpha-gliadin, PFPQPQLPYPQPQLPY (P16) and PQPFRPQQPYPQSQPQY (P17) which contain the DQ2.5 restricted toxic and immunogenic epitopes glia-α1a, glia-α1b, glia-α2 and glia-α3 were selected as target for SELEX process. In vitro selection of single stranded DNA aptamers against these target peptides was successfully carried out. Two potential anti-gliadin DNA aptamer candidates, aptamer AG1 against peptide P16 with dissociation constant of 1.54 µM and another aptamer AG75 against the peptide P17 with dissociation constant of 3.7 µM were generated. These novel anti-gliadin aptamers with high binding affinity towards their targets are potential alternative bio-recognition probes for integration in diverse sensing platforms.