

Fluorometric Aptasensor: Evaluation of Stability and Comparison to Standard Enzyme-Linked Immunosorbent Assay

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Abstract : Celiac disease (CD) is an immune system disorder that is triggered by ingesting gluten. As a gluten-free (GF) diet has become a concern of many people for health reasons, a gold standard had to be nominated. Enzyme-linked immunosorbent assay (ELISA) has taken the seat of this role. However, multiple limitations were discovered, and with that, the desire for an alternative method now exists. Nucleic acid-based aptamers have become of great interest due to their selectivity, specificity, simplicity, and rapid-testing advantages. However, fluorescence-based aptasensors have been tagged as unstable, but lifespan details are rarely stated. In this work, the lifespan stability of a fluorescence-based aptasensor is shown over an 8-week-long study displaying the accuracy of the sensor and false negatives. This study follows 22 different samples, including GF and gluten-rich (GR) and soy sauce products, off-the-shelf products, and reference material from laboratories, giving a total of 836 tests. The analysis shows an accuracy of correctly classifying GF and GR products of 96.30% and 100%, respectively when the protocol is augmented with molecular sieves. The overall accuracy remains around 94% within the first four weeks and then decays to 63%.

Keywords : aptasensor, PEG, rGO, FAM, RM, ELISA

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