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Abstract

Detection of Peanut Food Allergen Using a Biomimetic Labelled Electrochemical Sensor †

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Common food contaminants include pathogens, toxins, pesticides, veterinary drugs and illegal additives, while common allergens are mainly proteins [1]. Food induces different hypersensitivity reactions in allergic people when humans are exposed to harmful allergens. Generally, patients with food allergies undergo prophylactic practices as there is no medical treatment. Food allergy affects 1–10% of the population and reports show that its prevalence in children increased by 50% between 1997 and 2011 [2]. Symptoms can occur from minutes to hours after exposure, and may include difficulty in breathing, low blood pressure, itchy rash, swelling of the tongue, and life-threatening systemic reaction called anaphylaxis.

Ara h1, 2, 3 and 6 are considered to be major allergens found in peanuts which trigger to an immunological response in more than 50% of the allergic population representing the first leading cause of anaphylactic fatalities worldwide [3]. ELISA is the most commonly used method for determining low levels of food allergens in food (ingredients, processed foods and beverages) [4], but lacks of simplicity and reduced costs and oftentimes leads to delays in results acquisition. Since functional foods and new food manufacturing technologies are emerging, there is an ongoing demand for analytical strategies for *on-site* sensitive detection of food allergens.

This poster presents a strategy for the determination of the presence of allergens in food products by enabling an electrochemical approach based on DNA strands. The affinity reaction between the DNA strands and Ara h1, followed by conformational and structural changes in the recognition layer, was triggered by means of electrochemical mediators labelled at the DNA sequence. Several strategies were addressed to diminish the protein fouling at the electrode surface and obtain the optimal sensing parameters. Each step of electrode modification was characterized by electrochemical techniques such as cyclic and differential pulse voltammetry, and electrochemical impedance spectroscopy. Applications on food samples will be presented.

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Conflicts of Interest:

References

1. Melinte, G.; Hosu, O.; Cristea, C.; Marrazza, G. *TrAC Trends Anal. Chem.* **2022**, *154*, 116679.
2. Facts and Statistics Food Allergy Research. Available online: http://www.foodallergy.org/life-with-food-allergies/food-allergy-101/facts-and-statistics (accessed on).
3. Mueller, G.A.; Maleki, S.J.; Pedersen, L.C. *Curr. Allergy Asthma Rep.* **2014**, *14*, 429.
4. Hosu, O.; Selvolini, G.; Marrazza, G. *Curr. Opin. Electrochem.* **2018**, *10*, 149–156.