

32nd Euro Congress on

Cancer Science & Therapy

March 07-08, 2019 | Barcelona, Spain

Impedimetric label-free detection of salivary EGFR on screen printed electrode

Imad Abrao Nemeir^{1,2}, Walid Hleihel¹, Joseph Saab¹, Abdelhamid Errachid² and Nadia Zine²¹Holy Spirit University of Kaslik, Lebanon²University of Claud-Bernard Lyon-1, France

Breast cancer is the leading cancer epidemic for women worldwide. With two million new cases in 2018 alone, it is estimated that it affects 1/8 women worldwide. Epidermal growth factor receptor (EGFR) is a protein biomarker that has been linked to many types of breast cancer including triple negative. Its presence leads to poor prognostic and survival rates. Current EGFR detection techniques are plagued with high cost and a long detection time, increasing the need for a newer detection method. Biosensors are devices that can convert a biological signal into an electronic one. Their low cost, specificity, and selectivity makes them an attractive alternative to traditional methods of biomarker detection. Screen-printed electrodes (SPE) are unique electrodes with a low manufacturing cost and high surface area, making them ideal for biosensor development. In recent years, saliva has risen as an alternative for blood due to its availability in large quantities, its simple collection without specialized personnel, and its abundance in biomarkers, including EGFR, for a large spectrum of diseases. We report the development of a biosensor for the detection of EGFR in phosphate buffer solution (PBS) on SPE using electrochemical impedance spectroscopy. First the SPE was functionalized using the electrodeposition of 4-carboxymethylanyline (CMA) through cyclic voltammetry, and then anti-EGFR antibodies were immobilized to the CMA using EDC/NHS protocol. The biosensor has a linear detection range for EGFR from 0 to 120 pg mL⁻¹ in PBS, and has a higher signal toward EGFR than other interferences, HER2 and HER3 in PBS. Also, the sensor is currently being optimized for the detection of EGFR in artificial saliva and subsequent quantification using the standard addition method.

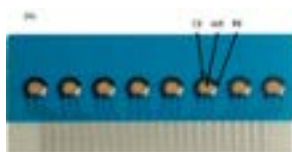


Figure 1: Biosensor platform containing 8 integrated SPE with each SPE containing a silver/silver oxide reference electrode (RE) a carbon counter electrode (CE) and a gold working electrode (WE).

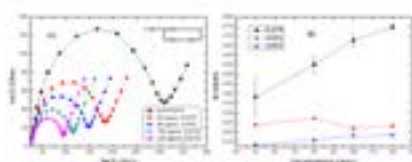


Figure 2: (A) Nyquist impedance plot ($\text{Re}(Z)$ vs $\text{Im}(Z)$) of $\text{K}_3[\text{Fe}(\text{CN})_6]/\text{K}_4[\text{Fe}(\text{CN})_6]$ (5mM) in PBS (pH=7.4) at various concentration of EGFR. (B) Sensitivity curve of the biosensor bio-functionalized for the detection of EGFR, HER2 and HER3.

Recent Publications

1. Pilleron S, et al. (2019). Global cancer incidence in older adults, 2012 and 2035: A population based study. International Journal of Cancer 144(1):49-58.

2. Gonzalez-Conchas G A, et al. (2018). Epidermal growth factor receptor overexpression and outcomes in early breast cancer: A systematic review and a meta-analysis. *Cancer Treatment Reviews* 62:1-8.
3. Hasanzadeh M, et al. (2017) Early stage screening of breast cancer using electrochemical biomarker detection. *TrAC Trends in Analytical Chemistry* 91:67-76.
4. Felix F S, et al. (2018) Electrochemical immuno sensors-A powerful tool for analytical applications. *Biosensors and Bioelectronics* 102:470-478.
5. Porto-Mascarenhas E C, et al. (2017) Salivary biomarkers in the diagnosis of breast cancer: A review. *Critical Reviews in Oncology/Hematology* 110:62-73.

Biography

Imad Abrao Nemeir is pursuing his PhD at the University of Claude Bernard Lyon, France and the Holy Spirit University of Kaslik, Lebanon, working under the financial support of the UK Lebanon Tech Hub under their Primi spot project..

imad-nmeir@hotmail.com

Notes: