Evaluation and comparison of two different sensors developed for the PARP inhibitor drug

Şeyda Nur SAMANCI[1,2]
Göksu ÖZCELIKAY-AKYILDIZ[2], Esen BELLUR ATICI[3,4], Sibel A. OZKAN[2]
[1]*Department of Analytical Chemistry, Faculty of Pharmacy, Ankara University, , Ankara, Türkiye*
[2]*Department of Analytical Chemistry, Faculty of Pharmacy, Afyonkarahisar Health Sciences University, Afyon, Türkiye*
[3]*DEVA Holding A.S. R&D Center, Tekirdag, Türkiye*
[4]*Department of Chemistry, Gebze Technical University, Kocaeli, Türkiye*
seydasamanci@outlook.com

Niraparib (NPB), an inhibitor of poly adenosine diphosphate [ADP]-ribose polymerase (PARP), is utilized in the treatment of ovarian cancer resulting from BRCA mutations. In this investigation, two distinct sensor types were developed to achieve sensitive, rapid, precise, and low detection limits in the determination of niraparib [1-2]. The first is a nanosensor comprising ZnO and gold nanoparticles, determined by the direct method, while the second is a molecularly imprinted polymer-based sensor, determined by the indirect method. The development of the MIP sensor involved the use of electropolymerization on a glassy carbon electrode (GCE) with NPB serving as a template molecule, along with 3-amino phenyl boronic acid (3-APBA) and aniline (AN) as functional monomers. Both sensors were evaluated through electrochemical analyses, employing voltammetric techniques. Surface characterizations were performed using scanning electron microscopy. The nanosensor achieved a detection limit of 0.893 nM within the concentration range of 80-600 nM. The MIP sensor demonstrated lower detection limits compared to the nanosensor, with a detection limit of 0.408 pM in the concentration range of 2-10 pM. Serum applications were conducted for both sensors. The recovery results for the nanosensor ranged from 98.39% to 102.24%. For the MIP sensor, recovery results were between 100.23% and 101.08%. Both sensors yielded satisfactory recovery results. Furthermore, interference studies for both sensors were conducted to investigate the effects of common substances found in biological fluids, including K^+, Na^+, Ca^{+2}, Cl^-, DOP, AA, UA, and PAR.

References

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