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Early detection of breast cancer using electrochemical and nano biosensor

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Blood circulating microRNAs are known as novel and validated biomarkers for application in early detection of diseases including cancers. The aim was to design and fabricate precise sensors for quantification of miRNAs in real samples (serum/plasma) without any sample manipulation. Two sensors (an electrochemical biosensor and nanobiosensor) were developed for quantification of miR-155, as a biomarker related to the early phase of breast cancer expression. Both sensors showed high specificity and selectivity, so that they could discriminate between target miR-155 and single-base mismatch, three-base mismatch, completely unmatched oligonucleotides. Reproducibility, stability and functionality of the sensors in the real samples (serum/plasma) were found to be significant. Both sensors had a low detection limit and wide linear ranges with simplicity, less consumed time and low cost, which were superior to the most of previously published works. It seems our method can be introduced to be used in clinical labs and also detection of other miRNA biomarkers through other optimizations.

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Diagnosis of cervical cancer and the ecological Papanicolaou: Environmental performance of xylene, hydrochloric acid and ammonia solution

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Little importance has been placed on sustainability and supportability of the Pap stain, standard for the diagnosis of cervical cancer, for the global environmental health, as it uses environmentally toxic and carcinogenic reagents such as xylene, hydrochloric acid and ammonia solution. Here, we propose the eradication of the use of these environmentally toxic-carcinogenic reagents through the validation of the Ecologic Papanicolaou (Eco-Pap). Reagent handling strategies were divided in three phases. We used Harris' progressive Hematoxylin, polychromatic solution and direct mounting that were analyzed by PEED cytology, Staining Quality Index (SQI) and the Bethesda system 2014. A total of 70 603 Pap smear stained with Eco-Pap were admitted (SQI=0.91), validation of Eco-Pap versus the conventional staining for Papanicolaou was optimal (Kappa=0.89) and the sensibility and specificity of the method were of 57% and 98%, respectively, which show a better performance in comparison with the conventional method. Eco-Pap reduced the environmental contamination produced by xylene (72 liters), hydrochloric acid and ammonia (each 6 liters) during one year where all the diagnosis coincided with the cytological and histological details, being cost saving and generating an environmental performance in the diagnosis of cervical cancer. In conclusion, the Eco-Pap is an innovative method that may become into a sustainable and supportable technology.

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