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# Development of electronano diagnostic platforms for influenza virus detection based on neuraminidase activity assessment

**Ulku Anik**
Mugla Sıtkı Kocman University, Turkey

Each year, the Influenza virus infects millions of people and kills hundreds of thousands of them. Because of this, rapid detection of influenza viruses is very important. Influenza viruses have two major surface glycoproteins as Hemagglutinin (HA) and Neuraminidase (NA). HA and NA recognize the same molecule (sialic acid) and have the opposite activity also sharp changes in either protein affects virus replication. Most previous studies of influenza virus receptor-binding properties have been based on either a virus-mediated HA, or on HA inhibition essays. On the other hand, NA enzyme is important for the release of virions from the host cell surface and viral aggregates and may also be involved in ensuring that the virus is targeted to respiratory epithelial cells. Based on this fact, our group manages to develop nanomaterial modified and/or plain electrochemical viral ınfluenza model biosensor in which receptor-binding properties have been based on NA activity for the first time. For this purpose, plain and nanomaterial modified glassy carbon paste electrode (GCPE) and gold screen printed electrodes (Au-SPE) based viral Influenza biosensor were fabricated. In this concept, firstly graphene based nanomaterials (like graphene, graphene-metallic nanocomposites) were synthesized and characterized. Fetuin A glycoprotein, which has affinity to viral HA, was immobilized onto optimum electrode surface. Then, NA enzyme cleaves linked sialic acid and the galactose molecules, which has affinity to PNA (Peanut agglutinin) lectin, become exposed. After their addition, the PNA lectin molecules interact with the portion of cleaved fetuin which remaining attached on the electrode surface. As a consequence, the resistance of electrode surface was increased and all of these steps were monitored by using electrochemical impedance spectroscopy (EIS).

ulkuanik@gmail.com