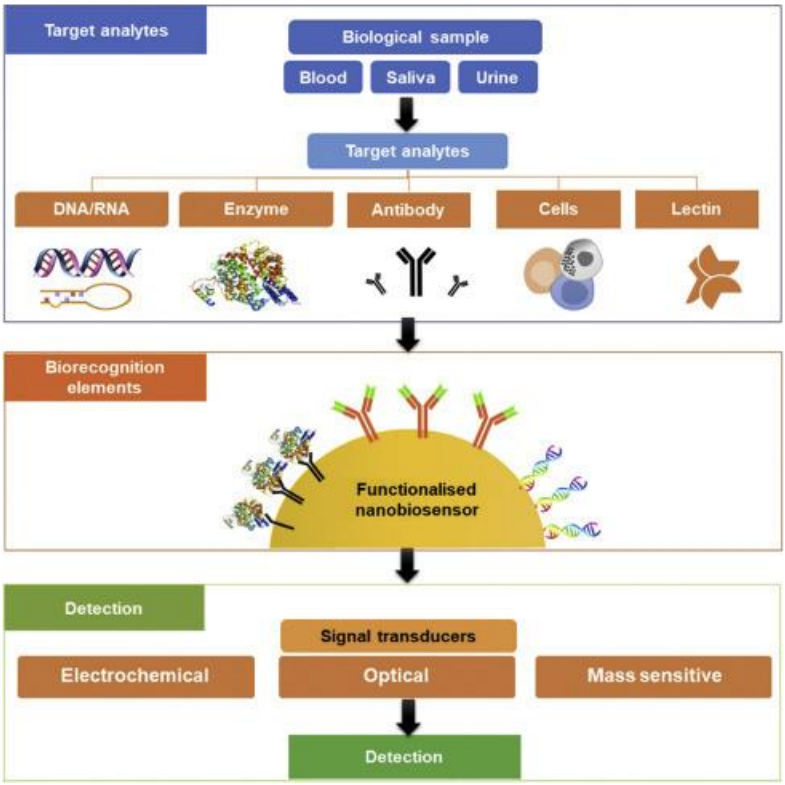
Scientists at NIAB Hyderabad developed a user-friendly biosensor for detection of *Japanese Encephalitis* and *Avian Influenza virus* infection

A compact and user-friendly graphene field effect transistor (GraFET) based ultrasensitive biosensor have been developed by Scientists at DBT's National Institute of Animal Biotechnology (NIAB), Hyderabad for the detection of Japanese Encephalitis Virus (JEV) and Avian Influenza Virus (AIV). The novel sensing platform comprised of carboxy functionalized graphene on Si/SiO_2 substrate for covalent immobilization of JEV and AIV antibodies. The change in the resistance due to antigen-antibody interaction was monitored in real time to evaluate the electrical response of the sensors. The sensors were tested in the range of 1 fM to 1 µM for both JEV and AIV antigens, and showed a limit of detection (LOD) upto 1 fM and 10 fM for JEV and AIV, respectively, under optimised conditions. Outbreak of JEV in pigs, humans, and AIV in poultry mostly occurs in rural areas and the spread of JEV and AIV can be limited with the aid of this ultrasensitive GraFET based biosensor.



Japanese Encephalitis Virus (JEV) belongs to the family *Flaviviridae* genus Flavivirus and exists in a zoonotic cycle between the *Culex* mosquitos as the transmission vector, pigs as the

amplifying host (98-100% infection rate), water fowl as the reservoir host and humans/cattle/horses as the dead end host. It causes a non-specific febrile illness, meningitis, encephalitis and meningo-encephalitis in humans. Avian Influenza Virus (AIV) is a disease caused by infection of avian influenza type A virus from *Orthomyxo viridae* family, transmitted through direct contact, contaminated surfaces or viral droplets in air and is a major threat for poultry birds. There is no fool-proof vaccination available for either JEV or AIV and hence it is imperative to detect the virus at an early stage of infection. Conventional diagnostic methods such as Enzyme-Linked Immunosorbent Assays (ELISA), Reverse Transcriptase Polymerase Chain Reaction (RT-PCR), Plaque Reduction Neutralisation Test (PRNT), Hemagglutination Inhibition (HI) test, Complement Fixation Test (CFT), Immunofluorescence Test (IFT), virus isolation, etc. are time-consuming, laborious and require trained personnel. Hence, there is a need for the development of user-friendly diagnostic tests. Graphene, a two-dimensional nanomaterial has gained immense interest in biosensing applications due to its large surface-to-volume ratio, and excellent electrical properties.

Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7155165/

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