

Wednesday, 16th February, 9.30am, Online

Host: Dr. Susana Velasco

SARS-Cov-2 on a Chip: Harnessing Viral Antigens Arrays and Machine Learning for Making Better Diagnosis, Analysis, and then Vaccine

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COVID-19, which is caused by SARS-CoV-2, is the worst pandemic of the century. By February 9, 2022, 401,152,197 cases have been diagnosed, with 5,766,256 deaths (<http://coronavirus.jhu.edu/map.html>). Detecting the viral cause of these illness and analysing the individual immune responses are paramount to determine risks to global population and help develop vaccines. Serological tests represent a most widely used tool to complements virus detection, indicating past or recent infection, which can be harnessed for therapeutic gain. However, a real improvement in results is still needed. We developed a SARS-CoV-2 multi-antigen array and tested it with serum samples collected from COVID-19 patients and healthy subjects in Donostia-San Sebastian. Eventually, a machine learning model were developed to precisely predict COVID-19 using a combined approach of array and machine learning technology. Both sensitivity and specificity of the test for SARS-CoV-2 are over 90%. Interestingly, we found the possible clue that explain how the impact of pre-existing antibodies to human coronaviruses causing common cold viruses. We propose that the SARS-CoV-2 antigen array will be used in future studies to discriminate patients infected with SARS-CoV-2 at the national level. Using the unique data generated from this approach, a computational model can be developed to improve predictions of vaccine effectiveness.