In *vitro* diagnostic turbidimetric methods for SARS-CoV-2.

The development of a simple, quick and low cost COVID 19 test, capable of providing a diagnostic result on a large number of subjects, would greatly increase the feasibility of massive screening of the population in order to trace the onset of a SARS-CoV-2 epidemic.

Our method is based on the low cost turbidimetric technique, already present in any chemical-biological analysis laboratory for immunological assays. The innovative idea, developed in collaboration with the group of Dott.ssa Rita Berisio (IBB, Naples), consists in detecting the presence of the virus through the turbidity that occurs following the aggregation between functionalized liposomes and Sars-Cov2.

Recently new molecules, based on the N-terminal sequence of the human h-ACE2 receptor, capable of binding the RBD domain of the Spike protein present on the surface of SARS-CoV-2, has been engineered.[1,2]

Starting from the known sequence of this protein, peptidomimetic molecules of different length and composition have been synthesized and one of these peptides, showing micromolar affinity with the RBD domain of the Spike protein, has been linked to a pegylated phospholipid and inserted into a liposomal membrane.

The design idea consists in taking saliva samples from patients and placing it in contact with a suspension of the functionalized liposomes. The binding between the specific peptide and the Spike protein would lead to the aggregation of liposomes and viruses that would lead to a variation in light scattering in the visible range which can be measured by turbidimetry or spectrophotometry. In these preliminary results we have used a 1:1 adduct between streptavidin and a commercial RBD domanin biotylinated, as virus model. We have performed trasmittance measurments through a spectrophotometer at different ratio between liposome and adduct and we have found a significant reduction of trasmittance, likely due to the aggregation.

The preliminary data are promising for achieving the goal of sensitivity needed. Further experiment at lower concentration using matrix mimiking the saliva fluid are required to confirm the efficacy of the method.

References: 1 Panda et al. ACE-2-derived Biomimetic peptides for inhibition of Spike protein of SARS-CoV- ChemRxiv. 2020. doi.org/10.26434/chemrxiv.12335933.v12; 2 Romani et al. An engineered stable mini-protein to plug SARS-Cov-2 Spikes. 2020 doi.org/10.1101/2020.04.29.067728

Keywords: Sars-CoV-2; Diagnostic test; Turbidimetry.

Contacts: Valeria Menchise – valeria.menchise@unito.it Phone : +39 3497521018