

Experimental report

19/02/2021

Proposal: DIR-212

Council: 4/2020

Title: The severity in COVID19 symptoms is inversely correlated with serum cholestrol levels. Is this related to impaired functions of HDL?

Research area:

This proposal is a new proposal

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Samples: PROTEIN
LIPIDS
Human HDL

Instrument	Requested days	Allocated days	From	To
FIGARO	1	0		
D17	1	2	12/09/2020	14/09/2020

Abstract:

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In this experiment, it was investigated whether the co-incubation of Spike protein (S) with HDL affects the ability of HDL to exchange lipids with the membrane, which could lead to an imbalance in lipid metabolism and regulation of serum lipid and lipoprotein concentrations.

To do this, we prepared supported lipid bilayers composed of deuterated 1,2-dimyristoyl-D54-3-sn-glycerophosphatidylcholine (dDMPC) and perdeuterated cholesterol (dcholesterol) at 80:20 mol% as model membranes and characterized in three isotopic contrasts at 37 °C using neutron reflection at the D17 reflectometer. After characterization in DTBS, HTBS and cmSi we incubated three independent model membranes with either: The SARS-CoV-2 Spike protein, HDL, and a mixture of HDL and SARS-CoV-2 Spike protein. Upon 5 h incubation time, the bilayers were rinsed and fully characterized in DTBS, HTBS, and CmSi.

The results obtained by neutron reflectometry showed that the spike protein binds and removes lipids from the membrane. Co-incubation of spike protein and HDL affected the lipid exchange process of the membrane. For future experiments, we hope to study the role of cholesterol in the SARS-CoV-2 Spike protein binding to model membranes.

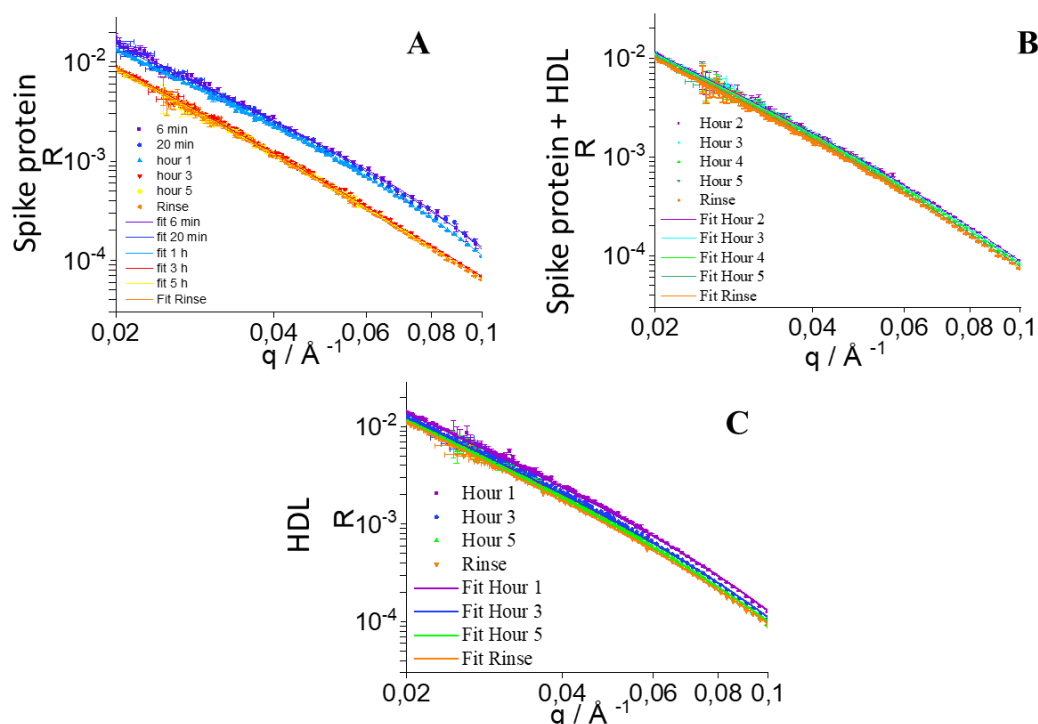


Figure 1. Neutron Reflection profiles of the kinetics including best fits (Line) and raw data (symbol). for the model membranes exposed to Spike protein (A), Spike protein + HDL (B), and HDL (C) in h-TBS at 37 °C after 5 hour of incubation and upon rinsing with excess h-TBS.