EuroHPC Summit Week 2021 including PRACEdays21

Wednesday 24 March 2021, 10:00 – 10:45, Keynote Talk "Research on COVID-19"

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Abstract:

Title**: Functional role of the glycan shield in the activation of the SARS-CoV-2 S protein**

Protein glycosylation plays a crucial role in viral pathogenesis, as suggested by the extensive N-glycosylation coat on viral fusion proteins. Recent structural and glycoanalytic studies have shown that the SARS-CoV2 spike (S) protein is not shielded as effectively as the envelope glycoproteins of "evasion strong" viruses, with the receptor binding domain (RBD) exposed to potential antibody recognition. Also, experimental evidence indicates important differences in the type of glycosylation, where complex, rather than oligomannose N-glycans, constitute the majority of the SARS-CoV2 S shield1. Understanding the specific functions of this unique glycosylation pattern is particularly tricky because of the glycans' intrinsic conformational disorder prevents them from being easily characterised with standard structural biology techniques. In this talk I will present how high-performance computing (HPC) molecular simulations have contributed to advance our knowledge on the role of glycosylation in the SARS-CoV2 infection mechanisms. I will focus in particular on how we identified a unique functional role of the glycan shield in the activation of the S glycoprotein2 and how specific glycoforms may modulate its binding to ACE2.

1. Watanabe, Y.; Allen, J. D.; Wrapp, D.; McLellan, J. S.; Crispin, M., Science 2020.
2. Casalino, L.; Gaieb, Z.; Goldsmith J.; Hjorth C.; Dommer, A.; Harbison, A.; Fogarty, C.; Barros, E.; Taylor, B.; McLellan J.; Fadda, E.; Amaro, R., ACS Central Sci (2020).

Bio - Elisa Fadda

1999 Laurea (BSc and MSc) in Chemistry from the Università degli Studi di Cagliari

1999-2004 PhD in Theoretical Chemistry at the Université de Montréal, under the supervision of Prof Dennis R. Salahub, on the development of *ab initio* QM methods for the prediction of NMR shieldings from time-dependent density-functional theory (TD-DFT)

2004-2008 Postdoc under the supervision of Dr Régis Pomès at the Hospital for Sick Children Research Institute in Toronto, on large scale simulations based on classical mechanics of ions translocation in respiratory chain proteins and ion challels

2008-2013 Research Fellow in Prof Robert J. Woods (CCRC) Computational Glycoscience lab in the School of Chemistry at the National University of Ireland, Galway (NUIG) on the simulation of glycoproteins and glycan-processing enzymes

2013-2014 Assistant lecturer in the Department of Chemistry at Maynooth University (MU)**2014-present** Assistant Professor in the Department of Chemistry and Hamilton Institute at MU and PI of the Computational Glycoscience research group.

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