

Research Symposium on Coronavirus

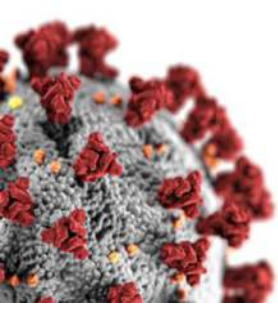
6 May 2020 online

Summary

On 6th May, the **Societat Catalana de Biologia (SCB)** organized a Research Symposium on Coronavirus, the first meeting of scientists from different centres and disciplines working on COVID-19 in Spain. The Symposium was held online and divided into four sessions, with 29 speakers from 22 different research centres and more than 500 participants.

The Symposium was inaugurated by Dr. **Robert Fabregat**, Director of Research and Innovation in Health of the Generalitat de Catalunya, and Dr. **Montserrat Corominas**, Professor of the University of Barcelona and President of SCB.

Session 1 began with Dr. **Júlia Vergara-Alert**, from IRTA-CReSA, with an extensive revision of the animal models that are used for the study of SARS-CoV-2. It was followed by Dr. **Julià Blanco**, from IGTP and IrsiCaixa, who described the steps for the production of new vaccines for COVID-19 and highlighted that these vaccines will be likely to be produced in 12-18 months instead of the 10-year period that usually takes to be approved for human use. These two researchers are part of the IRTA-IrsiCaixa-BSC-Grifols consortium that is developing a vaccine based on the spike protein of SARS-CoV-2. The third speaker was Dr. **Joan Joseph**, from VHIR, who described different antigens that are being studied as potential immunogens for vaccine development and presented their proposal, CoVHIRvac. Then it was the turn of Dr. **Israel Fernández-Cadenas**, from IIB Sant Pau, who provided a summary on their project based on the study of genes that are differentially expressed in COVID-19 patients according to the severity of the disease. The project aims to find new drug targets to overcome the bottleneck of translating results from mice to humans. Dr. Fernández-Cadenas' group will perform genome-wide studies in samples from young patients, a population in which they predict the genetic component will contribute more to disease development. Next invited speaker was Dr. **Jordi Serra-Cobo**, from IRBio, who exposed the results from the studies on viral transmission that they have performed for years in bats from different territories in Spain and Africa. Dr. Serra-Cobo highlighted the key role that plays the interaction between human society and the environment where the pathogens live in the emergence of new zoonosis. The session concluded with the talks by Dr. **Antoni Trilla**, from Hospital Clínic de Barcelona and UB, and Dr. **Raquel Villar-Hernández**, from IGTP. Dr. Trilla reviewed the most important epidemiological data of the pandemics that is known so far. He stressed on the high transmissibility of SARS-CoV-2, also in asymptomatic people and the importance of physical distance and provided data on fatality rate and excess mortality in Spain, which are higher than in other countries. In her presentation, Dr. Villar-Hernández provided an updated overview on the evidence to use tuberculosis vaccines for COVID-19, insisting that despite bacillus Calmette-



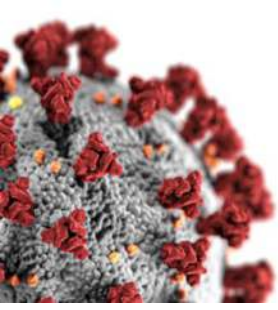
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Guérin has shown to increase immune response in bladder cancer, its utility to prevent coronavirus infections has not been proved.

Session 2 started with Dr. **Albert Bosch**, from UB, presenting the project of detecting SARS-CoV-2 in wastewater, an approach based in the capacity of the virus to infect enterocytes, resulting in its excretion in an inactivated form. He explained that the virus could be detected in treated and untreated sewage and in sludge. Then, Dr. **Lluïsa Pedro-Botet**, from Hospital Germans Trias i Pujol, presented their approach for early detection of COVID-19 using an olfactory paper-based test. Dr. Pedro-Botet explained that the project has started with a prospective cohort with patients from three hospitals, Vall d'Hebron, Clínic and Germans Trias i Pujol. Supported by previous studies showing that 73% of patients experienced anosmia prior to COVID-19 diagnosis, the test is being developed with the Nasum-Tech technology of B-Braun. After that, Dr. **Bonaventura Clotet**, from IrsiCaixa and Hospital Germans Trias i Pujol, addressed his conference on the different antiviral drugs that are available for the treatment of COVID-19 and the importance of combining them with anti-inflammatory drugs in stages of pulmonary affectation to obtain better recovery results. Dr. Clotet recalled the success of combinational therapy in AIDS and highlighted the potential of similar approaches in the fight against coronavirus. The following speaker was Dr. Susana Otero, from Vall d'Hebron University Hospital, who provided a detailed evaluation of SARS-CoV-2 serological assays compared to real-time quantitative polymerase chain reaction (RT-qPCR) and informed that these rapid tests show low sensitivity and specificity in areas with low prevalence of infection. Dr. **Sílvia Vidal**, from IIB Sant Pau, presented their project based on the study of immunoglobulins M and G (IgM and IgG) against coronavirus in hospital workers, which includes asymptomatic workers, those with symptoms who were RT-qPCR negative and those with symptoms who were RT-qPCR positive. By analysing the antibodies generated by each group, they aim to better understand the immune response against SARS-CoV-2 and define potential treatment options. Regarding COVID-19 detection, Dr. **Raul Bescos**, from the University of Plymouth, described their approach of analysing nitrite, lactate and microorganisms in saliva as potential biomarkers for the diagnosis and prognosis of COVID-19. Afterwards, Dr. **Rafael Máñez**, from Bellvitge University Hospital and IDIBELL, presented their previous work on the removal of non-neutralizing antibodies for the treatment of bacterial infections, and their current project based on the same strategy to boost the immune response in COVID-19 patients. To close the session, Dr. **Gemma Moncunill**, from ISGlobal, exposed the data they have obtained in RT-qPCR and serological studies from health workers in Hospital Clínic. In their cohort, 9.3% of the subjects were seropositive and, among them, nearly 40% had not been previously



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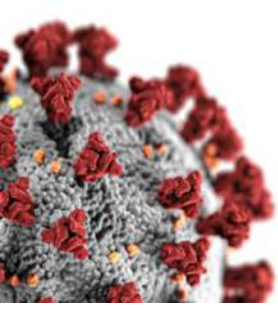
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diagnosed, anticipating low seroprevalence in the general population and offering evidence for the need of more RT-qPCR tests to be performed.

Session 3 opened with the talk by Dr. **Tanja Ducic**, from ALBA Synchrotron, on the use of synchrotron-based Fourier-transform infrared (SR-FTIR) microspectroscopy to detect changes in the biomolecular signature of cells or tissues at different stages of viral infection. The second talk was by Dr. **Juan José López-Moya**, from CRAG, who presented their project on the production of SARS-CoV-2 antigens with plant biotechnology to help overcome the bottleneck of high amounts of immunogens needed for vaccine manufacturing. At her turn, Dr. **Laia Fernández-Barat**, from IDIBAPS, explained how they are analysing IgG antibodies from recovered patients of COVID-19 to find those epitopes that are more potently bound by these IgGs and use them to produce monoclonal antibodies for treatment. Another project aiming to improve the treatment of COVID-19 was the online resource based on natural language processing presented by Dr. **Patrick Aloy**, from IRB Barcelona, which can find compounds analogous to molecules that have been described to be good candidates for the treatment of the disease among a library of 800.000 bioactive molecules previously catalogued. From the perspective of a laboratory that has studied coronavirus infections in animals for years, **Jordi Rodon**, from IRTA-CReSA, presented the results they have obtained with different antivirals to treat COVID-19, and their project analysing the mutations of the virus present in Catalonia. Finally, this session ended with the talks by Dr. **Marta Monguió-Tortajada** and Dr. **Sandra Acosta-Verdugo**, from IGTP and IBE-UPF, respectively. Dr. Monguió-Tortajada exposed the potential of the use of extracellular vesicles derived from mesenchymal stem cells to prevent pulmonary fibrosis in COVID-19 critical patients due to the properties of these cells as promoters of tissue immunomodulation and repair. Finally, Dr. Acosta-Verdugo explained how they are generating organoids of brain, lung and intestine cells that can be used to test molecules for drug repurposing to treat COVID-19.

The fourth and last session of the Symposium began with the presentation of Dr. **Fernando González-Candelas**, from UV-FISABIO, describing some of the data obtained from 300 viral genome sequences from hospitals in the Comunitat Valenciana. The project, named SeqCOVID-Spain, is a consortium between CSIC and ISCIII, and has revealed, for example, that only two variants of SARS-CoV-2 have established in the Comunitat Valenciana. After that, Dr. **Francisco Martínez-Jiménez**, from IRB Barcelona, exposed the preliminary results that their group has obtained studying the mutations of SARS-CoV-2 in 16000 infected individuals, showing that the mutational spectra is not random, and it



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is consistent across infected human populations. Afterwards, Dr. **Eva Maria Novoa**, from CRG, highlighted the importance of analysing RNA modifications from infected patients in a uniform way, for which they have developed an online resource to integrate data from nanopore sequencing. This information will allow to study the effect of RNA modifications in several aspects of the disease, including immune response. Following Dr. Novoa's talk, Dr. **Jonathan Mudge**, from EBI-EMBL, presented the contribution of the Gencode project in reanalysing the annotation of human genes linked to COVID-19 through several approaches, for example including long-read transcriptomics data that was not available when genes were firstly annotated. Dr. **Josep Quer**, from VHIR, presented their recent contribution of sequencing the virus from two patients in Vall d'Hebron Hospital. The three main aims of their current project are to determine genetic signatures that can be associated to severity of COVID-19, to explain the localisation of the disease in the upper or lower respiratory tract according to genetic variation, and to identify conserved regions within the viral genome to be used as targets of vaccines or drugs. In his turn, Dr. **Andrej Bugrim**, from Silver Beach Analytics, presented the global network analysis they have performed with over three hundred human proteins that can interact with viral proteins expressed upon SARS-COV-2 infection, which suggests, for example, the molecular mechanism involved in impaired surfactant metabolism, a proposed cause of lung injury. In the last presentation of the Symposium, **Xavier Hernández-Alias**, from CRG, introduced the results indicating that viruses, including SARS-CoV-2, adapt their codon usage to the pool of tRNA expressed by the tissues they infect, favouring their tropism. They have observed an improved translational adaptation of SARS-CoV-2 to the upper respiratory airways, which could explain the high transmissibility of the virus.

Dr. Montserrat Corominas, who thanked not only the invited speakers and chairs of the sessions for their contributions but also all participants, closed the Symposium. She encouraged them to follow the Societat Catalana de Biologia, an institution that will continue contributing to the sharing and discussion of scientific production among researchers and its communication to the society, two roles that are of special importance in the current pandemics.

Barcelona, 13th May 2020