NATO Emerging Security Challenges Division

Science for Peace and Security (SPS) Programme

New and validated tools for the diagnosis and follow-up of SARS-CoV-2 infected individuals

Official launch

Tuesday, 5 May 2020, 11:00-12:30 – Videoconference

PROJECT OVERVIEW	
Description	The COVID-19 pandemic has emphasized the importance of the efficient diagnosis of viruses. As such, this project proposes to use immuno-diagnostic methods to provide a rapid and accurate diagnosis of the SARS-CoV-2 infection. The objective is to produce recombinant structural proteins coded by SARS-CoV-2, and monoclonal antibodies (mAbs) specifically able to recognize these proteins. These reagents will be used to develop robust COVID-19 diagnostic tests through a coordinated and multidisciplinary approach combining expertise in immunology, virology and molecular biology.
Goals	The aim of this project is not only to produce immunodiagnostic tools specific for SARS-CoV-2 antigens in sera of patients or contacts, but also to detect viral particles or viral-released proteins in biologic fluids of infected individuals for a rapid diagnosis based on the detection of antigens. The detection of antigens as a measure of individuals' infectivity has already been applied to the diagnosis of active tuberculosis, for which the differential diagnosis is crucial in order to plan therapies and restriction measures.
Expected Results	Accurate diagnoses are fundamental to the effective treatment of patients, and are essential to isolating those individuals who have contracted the virus, and reducing viral spread through large screening programmes. The current laboratory diagnosis of COVID-19 requires specialized laboratories with expensive equipment and trained technicians. These limitations make the procedure unsuitable for rapid and simple diagnoses and screenings of patients, thus making efforts to contain virus outbreaks more complex. This project will contribute to limiting the SARS-CoV-2 diffusion by providing new tools for rapid diagnosis that can be used in large-scale settings. It will develop a new generation of specific, rapid, accurate and sensitive immuno-diagnostic methods. Compared to currently available methods, the developed diagnostic kits will allow for faster detection of SARS-Cov-2 released in the environment and in human body fluids, and a more accurate identification of the immune response to SARS-CoV-2 structural antigens. The innovative aspects of this project include, but are not limited to, the ability to measure both serum antibodies of human immunoglobulin G (IgG) and immunoglobulin M (IgM) class, specific for structural SARS-CoV-2 virus and viral antigens in biofluids. The immunization procedure that will be used to generate monoclonal antibodies will also provide an immunogenicity preclinical model of a COVID-19 preventing vaccine. The identification of virus-neutralizing antibodies could represent a first step in the development of immuno-therapeutics based on the administration of antibodies to treat infected patients.

PARTICIPATING INSTITUTIONS	
Istituto Superiore di Sanità	The Istituto Superiore di Sanità (ISS) is a public government institution, representing the technical-scientific arm of the Italian National Health Service. Its main activities include research, control, documentation and training in the field of public health. The Institute is also a source of information on public health issues. ISS acts as a consultant for the Italian government, for the Ministry of Health and for local governmental institutions, and provides scientific advice and assessments within the framework of international organizations, such as the European Centre for Disease Prevention and Control, and the World Health Organisation. The ISS Department of Infectious Diseases (DMI) is involved in prevention, diagnosis and treatment of infectious diseases by focusing on mechanisms underlying both protective and harmful immune responses against pathogens, and by providing advice and services in the field of epidemic infections caused by viruses, bacteria, fungi and parasites.
University Hospital of Basel	The University Hospital of Basel is a Swiss public institution. Its Department of Biomedicine (DBM) unites the entire research laboratories of the Faculty of Medicine. Oncology, Immunology, Neurobiology and Stem Cells and Regenerative Medicine are the key research areas of the DBM. The Department's several core facilities, and a joint venture between DBM and the Biozentrum of the Faculty of Natural Sciences, provide the Department access to key technologies, such as genomic micro-arrays and knockout mice.
University Hospital Tor Vergata	The University Hospital Tor Vergata has been designated by the Lazio Region as a COVID-19 Hospital because it hosts a level II Department of emergency assistance, with adapted medical and surgical wards and consultants. It is currently devoted to the management of patients with Severe Acute Respiratory Syndrome caused by SARS-CoV-2. The Infectious Diseases Unit accounted for 70 COVID-19 beds on 13 March 2020, a number that is increasing daily.

ISTITUTO SUPERIORE DI SANITÀ

Universitätsspital Basel

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ABOUT THE SCIENCE FOR PEACE AND SECURITY (SPS) PROGRAMME

The NATO Science for Peace and Security (SPS) Programme has been contributing to the core goals of the Alliance for more than six decades. It is one of the largest and most important NATO partnership programmes addressing 21st century security challenges, particularly cyber defence, advanced technologies, counter-terrorism, energy security, and defence against chemical, biological, radiological and nuclear agents. As part of NATO's Emerging Security Challenges (ESC) Division, the SPS Programme promotes practical scientific cooperation and capacity-building by engaging researchers, experts and officials from NATO and partner countries. By supporting security-relevant civil science activities in the form of grants for multi-year projects, advanced research workshops, advanced training courses, and advanced study institutes, SPS fosters the creation and expansion of networks of international experts, the sharing of best practices, and the exchange of expertise and know-how among scientific communities in NATO and partner countries.

The Programme involves partners across all of NATO's partnership frameworks (including the Partnership for Peace, the Mediterranean Dialogue, the Istanbul Cooperation Initiative, as well as Partners across the Globe), and engages approximately 2000 experts every year. The Programme also invests in the development of the next generations of researchers, by actively supporting the participation and training of young scientists in its activities. As a testament to the scientific excellence supported by SPS, 21 Nobel Laureates have been involved in its activities since its creation.

The Science for Peace and Security Programme also provides the Alliance with separate, non-military communication channels by bringing together experts from NATO and partner countries, often in situations or regions where other forms of dialogue more focused on defence and security are difficult to establish. Accordingly, the Programme enables NATO to become involved in such regions, often serving as the first concrete link between NATO and new partners.

CONTACTS

For more information, please visit the SPS website at www.nato.int/science and follow us on Twitter at @NATO_SPS

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