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15th Ri.MED SCIENTIFIC SYMPOSIUM

PANDEMIC PREPAREDNESS: FROM EMERGENCE TO TRANSLATION

26-27 October 2023

SALA DEI BARONI,
PALAZZO CHIARAMONTE STERI
PIAZZA MARINA 61 - PALERMO - ITALY

UNDER THE PATRONAGE OF

Università degli Studi di Palermo

15th Ri.MED SCIENTIFIC SYMPOSIUM

Paul Duprex, PhD
CHAIR OF THE SYMPOSIUM

Director, Center for Vaccine Research
Professor of Microbiology and Molecular Genetics,
University of Pittsburgh

Dario A. A. Vignali, PhD
SCIENTIFIC DIRECTOR, FONDAZIONE Ri.MED

The Frank Dixon Chair in Cancer Immunology,
Vice Chair and Professor of Immunology,
University of Pittsburgh School of Medicine,
and Co-Leader, Cancer Immunology and
Immunotherapy Program,Co-Director, Tumor
Microenvironment Center, UPMC

PANDEMIC PREPAREDNESS: FROM EMERGENCE TO TRANSLATION

It is our honor and pleasure to welcome you to the 15th Ri.MED Scientific Symposium entitled "Pandemic Preparedness: from emergence to translation".
The last three years have clearly illustrated how devastating infectious diseases can be on both health and social infrastructure. Despite rapid emergence of remarkably effective vaccines against COVID-19, it is clear that we need to be better prepared for the next pandemic. We are fortunate to have gathered leading experts from Italy, Europe and the USA to address the role that current and emerging infectious agents, and the development of effective vaccines and therapies have on pandemic preparedness.
During the Ri.MED Symposium we will take a journey in three movements through pathogen emergence, immune system response and pandemic preparedness with the aim of understanding how state-of-the-art translational approaches are being used to mitigate the scourge of emerging infectious diseases. Finally, we will bring together our panel of experts in a moderated conversation that aims to identify knowledge gaps and to determine how these might be filled, with a strong focus on cross-collaboration.

PATHOGEN EMERGENCE: influenza virus has a complex lifecycle and the dynamics of emergence and host-to-host transmission of this important respiratory pathogen are well understood. In many ways it provides a paradigm for pandemic preparedness. When SARS-CoV-2 jumped species and began to spread from person-to-person and back into animals it was unsurprising that influenza virologists lead the charge into coronavirology. Our keynote speaker Professor **Wendy Barclay** will introduce us to the emergence of not just SARS-CoV-2 but also draw parallels and highlight the differences between SARS-CoV-2 and influenza, the virus

she has studied for nearly thirty years. She will set the scene for a clinician who studies viral ecology with a view to predicting pathogen emergences and a veterinarian who has worked for many years understanding the human-animal interface.

IMMUNE SYSTEM RESPONSE: the complex interplay between the pathogen and the immune system of the host they infect sets the next stage in our journey. The emergence of SARS-CoV-2 was unprecedented. A highly transmissible human-to-human pathogen entered the ecosystem and had access to an 8 billion population of naïve humans. At least 50 million farmed mink and 30 million deer (two of the biggest susceptible species) were seronegative and scores of other species like hamsters and tigers could be naturally infected. Our next keynote speaker made major contributions to our understanding of how the adaptive immune system responds to SARS-CoV-2.
Professor **Alessandro Sette** has spent more than thirty-five years dissecting the immune response, measuring immune activity, and developing disease intervention strategies against cancer, autoimmunity, allergy and infectious diseases. His laboratory is defining epitopes that the immune system recognizes. He uses this knowledge to measure and understand immune responses. In this session, we will see how the body successfully battles infection and conversely, how the pathogens already brought to our attention by the first three speakers escape the immune system, causing the individual to succumb to disease. This will set the scene for our next two speakers. The first will discuss how the analysis of human naive and memory T cell repertoires and high throughput cellular screening of human T cell libraries can be used to dissect the human T cell response to pathogens. The second will focus on Ebola virus, a pathogen of high consequence which continues to emerge in many parts of the world.

PANDEMIC PREPAREDNESS: our final movement brings us to disease mitigation and rapid response to emerging infectious diseases. Professor **Rino Rappuoli** is a world-renowned immunologist/vaccinologist and there is no better person to lead us along the path of pandemic preparedness through translation. He has pioneered genomic approaches to vaccine development known as reverse vaccinology and led the development of a slew of viral and bacterial vaccines. He is actively involved in the research and development of further vaccines against meningococcal disease and avian and pandemic influenza. He will provide a forty-thousand-foot overview of how the field is changing and a ten foot deep dive into his latest vaccine forays. Our final two speakers will dive deep into the immune response against the virus, in particular describing the data related to the study on Sars CoV-2 infected patients admitted to ICU and discuss the data about the immune response in fragile patients, as solid organ transplant recipients, versus immunocompetent healthy donors after vaccination.

COLLABORATIONS THROUGH CONNECTIONS: in our encore we will harness this unique and world class cohort of keynote speakers to gaze into the future in a moderated discussion focusing on the gaps in pandemic preparedness. They will discuss why national and international collaborations are important in addressing emerging infectious diseases. This will be facilitated by **Cristina Cassetti,** Deputy Director of the American Institute of Allergy and Infectious Diseases, and by the Chair of our 2023 Ri.MED Symposium.

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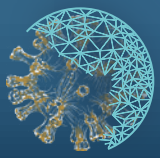

PANDEMIC PREPAREDNESS: FROM EMERGENCE TO TRANSLATION

October 26th
THURSDAY

2.00 PM SYMPOSIUM REGISTRATION

2.30 PM WELCOME AND INSTITUTIONAL GREETINGS
Massimo Midiri
Chancellor of the University of Palermo
Angelo Luca, MD
Ri.MED Vice President, IRCCS ISMETT Director
Paolo Aquilanti
Ri.MED President

3.00 PM CHAIR INTRODUCTION
Paul Duprex, PhD
Professor of Microbiology and Director of the Center for Vaccine Research
University of Pittsburgh, USA

3.15 PM KEYNOTE SPEECH
ANP32: A key host factor for influenza virus replication
Wendy Barclay, PhD
Head of Department of Infectious Disease, Action Medical Research Chair Virology
Medical School, St Mary's Campus, London, United Kingdom

4.00 PM COFFEE BREAK

4.30 PM **Viral ecology: Risk assessments of reservoir-bound viruses**
Felix Drexler, MD, PhD
Professor of Virology
Charité Universitätsmedizin, Berlin, Germany

5.00 PM **Identifying risk factors for the spillover of zoonotic avian influenza viruses**
Massimo Palmarini, DVM, PhD
Professor of Virology and Director
MRC-University of Glasgow Center for Virus Research, United Kingdom

5.30 PM KEYNOTE SPEECH
Building strategies for future pandemic preparedness based on the SARS CoV2 experience
Alessandro Sette, Dr. Biol. Sci.
Professor and Member
La Jolla Institute for Immunology, Division of Vaccine Discovery
Center for Infectious Disease and Vaccine Research
Center for Autoimmunity and Inflammation
University of California, School of Medicine, La Jolla, California, USA

6.15 PM CLOSING REMARKS
and where we are going tomorrow
Dario A. A. Vignali, PhD
Ri.MED Scientific Director

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ANP32: A key host factor for influenza virus replication

Like all viruses, influenza replies on host cell factors to support its replication. But some of these are different in different species and this can affect the host range of the virus.
ANP32A protein is shorter in mammals by 33 amino acids than in birds, and avian influenza polymerase cannot efficiently co-opt the mammalian ANP32 proteins.
The virus can adapt. It acquires mutations in polymerase that allow it to match with the shorter mammalian host proteins and this is why influenza viruses can infect humans.
Understanding the virus host interface can lead to new ways of controlling the virus and new understanding of how influenza polymerase is regulated.

Wendy Barclay, PhD

Head of Department of Infectious Disease, Action Medical Research Chair Virology
Medical School, St Mary's Campus, London, United Kingdom

Prof Wendy Barclay began her scientific career at what was then the Common Cold Unit in Salisbury and later trained in molecular virology at the University of Reading and Mount Sinai Medical Center, New York. Professor Barclay's research has focused on respiratory viruses and the factors affecting how they are transmitted and cause disease. She has contributed to the understanding of how these viruses cause pandemics, and how we can best develop strategies to combat them. Her lab's most prominent discovery is the identity of a host factor that is hijacked by the influenza virus when it replicates in our cells. She showed how differences in this factor between birds and humans explains why we don't get frequently infected by bird flu viruses.

Throughout the COVID-19 pandemic, her collaborations with the UK Health Security Agency and roles on several government advisory committees provided critical evidence on emerging threats from SARS-CoV-2 and its variants. Her lab pivoted to work on the newly emerged SARS-CoV-2 virus, in projects that spanned basic virology and immunology as well as analysis of environmental samples for traces of the virus.

Her laboratory's work continues to inform scientific discourse and public health policy on the potential pandemic threat of influenza strains and a host of other respiratory viruses. She is a key collaborator in numerous national scientific groups, including a national consortium established to tackle bird flu outbreaks in the UK, as well as leading the UK's Genotype to Phenotype Virology (G2P) Consortium, established to study the impact of mutations in the SARS-CoV-2 coronavirus and help UKHSA risk assess novel variants in real time as they arise.

Viral ecology: Risk assessments of reservoir-bound viruses

Understanding wildlife-associated viral EIDs, their origin, the zoonotic potential of reservoir-bound pathogens is of major importance to prevent spillover to humans and potential epidemics. I will give an overview on emerging reservoir-bound viruses affecting human health, and explore the difficulties regarding the estimation of unknown viruses. I will discuss why we are potentially entering an age of pandemics with a focus on anthropogenic change, including globalisation, land-use, biodiversity loss, animal-human interface, and climate change. Preparedness for pandemics must include prevention at the source, timely detection, and rapid response mechanisms.

Felix Drexler, MD, PhD

Professor of Virology
Charité Universitätsmedizin, Berlin, Germany

Jan Felix Drexler is Head of the Virus Epidemiology laboratory and an Associate Professor at Charité - Universitätsmedizin Berlin. Following medical education in Germany and Brazil, he worked as a staff scientist and professor in Brazil, Germany and the Netherlands. His group focuses on the evolution and epidemiology of emerging viruses at the animal-human interface. Since 2006, he has published >230 peer-reviewed papers, accumulating >10000 citations, an h-index of 50 (Web of Science) and >22 million € extramural funding.

Identifying risk factors for the spillover of zoonotic avian influenza viruses

Influenza A viruses (IAV) cause a major global health burden and circulate both in humans and several animal species. Wild aquatic birds are the main reservoir of IAV infection. IAV from wild birds can infect chickens and other domestic birds, which in turn expose other mammals including humans. Avian IAV can also exchange viral genome segments (reassort) with mammalian viruses. Indeed all human influenza pandemics of the last century were caused by viruses containing at least some genomic segments of avian origin.

Occasionally, spillover of avian IAV into humans have resulted in severe respiratory disease. H7N9 for example, has caused more than six hundred human deaths. These outbreak are not associated normally with human-to-human transmission, but they are a risk to global health as they could be the first step of a future pandemic.

Over the last two decades, multiple factors have been identified that hamper the replication of avian IAV in mammalian and human cells. However, there are still many gaps in our understanding that can allow us to readily risk-assess which avian IAV lineages are more prone to cross the species barrier and cause disease in humans. In this talk, I will describe our recent study which identified human BTN3A3 (butyrophilin subfamily 3 member A3) as a restriction factor for avian, but not human IAV[1]. We determined that BTN3A3, a protein normally expressed in the human respiratory tract, evolved in primates. We showed that BTN3A3 inhibits primarily avian IAV RNA replication soon after entry of viral ribonucleoprotein in the nucleus. We identified the genetic determinants in the viral nucleoprotein that allow sensitivity or evasion to BTN3A3. Importantly, avian viruses that spilled over into humans (such as H7 and H9), evade BTN3A3 restriction for compensatory mutations in NP. IN conclusion, sensitivity, or resistance to BTN3A3 is a key factor to consider in the risk assessment of the zoonotic potential of avian influenza viruses.

1 Pinto, R. M. et al. BTN3A3 evasion promotes the zoonotic potential of influenza A viruses. Nature (2023). https://doi.org:10.1038/s41586-023-06261-8

Massimo Palmarini, DVM, PhD

Professor of Virology and Director
MRC-University of Glasgow Center for Virus Research, United Kingdom

Massimo Palmarini is the Director of the MRC-University of Glasgow Centre for Virus Research (CVR) and Chair of Virology at the University of Glasgow. A veterinarian by training, his research programmes have spanned diverse areas including virus pathogenesis, the host innate immunity to virus infections and the mechanisms of viruses cross-species transmission, focusing lately on avian influenza viruses. His work has been published in major research journals including Nature, Science, PNAS and others. Palmarini's research programme is funded by the UK Medical Research Council and the Wellcome Trust. Massimo Palmarini has been elected Fellow of the Academy of Medical Sciences, of the Royal Society of Edinburgh and of the Royal Society of Biology and he was a Wolfson-Royal Society Research Merit Awardee. He is a Wellcome Trust Investigator and received an OBE for services to Public Health in 2021.

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OCTOBER 26th | 5.30 pm

The identification and validation of epitopes conserved in viral pathogen families with pandemic potential

The SARS-CoV-2 pandemic highlighted the need to be better prepared against potential future viral pandemics. We will describe our efforts related to the identification and validation of epitopes conserved in viral pathogens from several viral families of pandemic potential (VFPP). for each VFPP we selected a prototype virus utilized in epitope identification identification efforts: Coronaviridae (SARS-CoV-2), Flaviviridae (DENV2), Togaviridae (CHIKV)), Paramyxoviridae (Measles), Arenaviridae (Lassa), and Picornaviridae (Poliovirus). For the discovery of epitopes, we use panels of overlapping peptides and bioinformatics-based predictions of HLA-peptide binding, along with high-throughput assays, to address T cell immunity in the general worldwide population. Our approach further characterizes the identified epitopes based on their conservation across different viral taxonomic groups and viral variants of the VFPP. Finally, we validate these epitopes by experimentally addressing the capability of human prototype-specific T cells to recognize variants representative of phylogenetic diversity. Importantly, the antigen regions from which the conserved, immunogenic, and validated epitopes are included could be considered as a component of pan-viral-family vaccine constructs.

Alessandro Sette[1,2] and Alba Grifoni1

[1]La Jolla Institute for Immunology (LJI), La Jolla, CA, USA
[2] University of California, San Diego (UCSD), La Jolla, CA, USA

Alessandro Sette, Dr. Biol. Sci.

Professor and member
La Jolla Institute for Immunology, Division of Vaccine Discovery
Center for Infectious Disease and Vaccine Research
Center for Autoimmunity and Inflammation
University of California, School of Medicine, La Jolla, California, USA

Dr. Alessandro Sette has devoted more than 35 years in biotech and academia to understanding and measuring immune responses, and developing disease intervention strategies against cancer, autoimmunity, allergy, and infectious diseases. Dr. Sette's laboratory is the world leader in the study of the specific structures, called epitopes, that the immune system recognizes. Dr. Sette has overseen the design and curation efforts of the national Immune Epitope Database (IEDB), a freely available, widely used bioinformatics resource. The IEDB catalogs all epitopes for humans and experimental animals for allergens, infectious diseases, autoantigens and transplants, and includes epitope prediction tools to accelerate immunology research around the world. Dr. Sette's lab uses knowledge of epitopes to define the hallmarks of a beneficial immune response associated with effective vaccines, as opposed to immune responses that are ineffective or that cause harm. The laboratory's infectious disease interests include SARS CoV2, dengue, Zika Chikungunya, herpesviruses, poxviruses, lassa fever, HIV and hepatitis viruses, and bacterial pathogens such as tuberculosis and bordetella pertussis. Our investigations outside infectious disease include allergic asthma and Parkinson's disease.

Dr. Sette is a Doctor in Biological Sciences from the University of Rome and did postdoctoral work at the National Jewish Center for Immunology and Respiratory Medicine in Denver, Colorado. In 1988, Dr. Sette joined the newly founded company Cytel, in La Jolla, and was also appointed adjunct assistant professor at The Scripps Research Institute. He founded Epimmune in 1997, where he served both as Vice President of Research and Chief Scientific Officer until 2002, when he joined LJI as Head of the Division of Vaccine Discovery. He also heads the Center for Infectious Disease at LJI.

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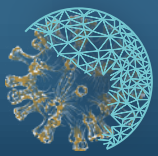

PANDEMIC PREPAREDNESS: FROM EMERGENCE TO TRANSLATION

October 27th
FRIDAY

8.30 AM SYMPOSIUM REGISTRATION

9.00 AM CHAIR INTRODUCTION

Paul Duprex, PhD
Professor of Microbiology and Director of the Center for Vaccine Research
University of Pittsburgh, USA

9.15 AM **Spillover of high consequence emerging viruses in West Africa**

Miles Carroll, PhD
Professor of Emerging Viruses
Pandemic Sciences Institute, Nuffield Department of Medicine,
University of Oxford, United Kingdom

9.45 AM **Bacterial vaccines to tackle antimicrobial resistance, the "invisible" pandemics**

Mariagrazia Pizza, PhD
Professor of Microbiology
Imperial College, South Kensington Campus, London, United Kingdom

10.15 AM COFFEE BREAK

10.45 AM KEYNOTE SPEECH

Pandemic preparedness through translation

Rino Rappuoli, PhD
Scientific Director
Fondazione Biotecnopolo di Siena, Italy

11.30 AM **Immune response to SARS-CoV-2 induced by infection or vaccination**

Monica Miele, PhD
Head of Production
Senior scientist in immunology
Fondazione Ri.MED, Palermo Italy

Matteo Bulati, PhD
Immunologist
Department of Research IRCCS-ISMETT,
Palermo, Italy

12.00 PM **Collaborations through connections**

Cristina Cassetti, PhD
Deputy Director
Division of Microbiology and Infectious Diseases
National Institute of Allergy and Infectious Diseases, NIH, USA

Paul Duprex, Wendy Barclay, Rino Rappuoli, Alessandro Sette

13.00 PM SYMPOSIUM CLOSURE

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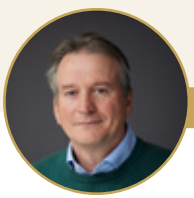
Spillover of high consequence emerging viruses in West Africa

The 2013-2016 Ebola virus (EBOV) epidemic in west Africa highlighted the need to understand the processes of zoonotic spillover events of filoviruses and other high consequence emerging viruses. Furthermore, the reports of subsequent outbreaks of Zaire and Bombali Ebola viruses in addition to Marburg virus, in the region, suggests numerous known and unknown emerging viruses have been circulating in animal reservoirs before the initial spillover event of EBOV in 2013. The evidence of EBOV virus persistence in male survivors provides additional threats of sexual transmission associated outbreaks.

We have been studying EBOV disease survivors and bushmeat hunters in the forested region of Guinea since 2014. The forest, which straddle the borders with Liberia and Sierra Leonne, have extensive biodiversity and are home to an array of bat species as well as other small mammals previously identified as reservoirs for emerging viruses.

I will discuss the evidence of prior spillover of emerging viruses in the region as well as the impact of deforestation, and other human factors, on the threat of future outbreaks.



Miles Carroll, PhD

Professor of Emerging Viruses

Pandemic Sciences Institute, Nuffield Department of Medicine, University of Oxford, UK

Prior to establishing the High Consequence Emerging Viruses Group within University of Oxford's Pandemic Sciences Institute, Miles was head of Research at the National Infections Service at Public Health England, Porton Down from 2008-2022. His current research portfolio includes: naturally acquired immunity to EBOV & other high consequence pathogens, understanding the host response to infection, high consequence emerging disease vaccines, and the application of molecular epidemiology to outbreaks. He is also involved in ongoing infectious disease research in west Africa which supports capacity building for the region.

Miles gained his PhD on HIV vaccine research from the Medical Faculty at the University of Manchester which enabled him to obtain a fellowship to continue his studies on recombinant poxviruses at the National Institutes of Health, USA. On his return to the UK, Miles joined Oxford Biomedica (OBM) as Vice President of Immunotherapy.

Miles has authored >250 publications primarily in the fields of recombinant vaccines, host pathogen interactions and molecular epidemiology, and is the recipient of >15 granted patents. Miles serves on a variety of Scientific Advisory Boards including the UK Animal and Plant Health Agency, Defence Science & Technology Laboratories, UK Vaccines Network and the WHO R&D Road Map for Priority Pathogens. He has been awarded various honorary awards in recognition of his research contributions to the field of infectious diseases.

Bacterial vaccines to tackle antimicrobial resistance, the "invisible" pandemics

The COVID-19 pandemic had a significant economic and health impact worldwide. It also reinforced the misperception that only viruses can pose a threat to human existence, overlooking that bacteria (e.g. plague and cholerae) have severely haunted and shaped the course of human civilization. While the world is preparing for the next viral pandemic, it is overlooking a silent one: antimicrobial resistance (AMR). It is of paramount importance to remind examples of how quickly bacteria can mutate, increasing the risks of global spread with devastating outcomes also on the prophylactic and therapeutic measures. Vaccines and antibiotics have limited so far the global dissemination and the risk of pandemics caused by bacterial pathogens. However, AMR is dramatically increasing and if the trend is not reversed, it has the potential to quickly turn into the most important health problem worldwide. Therefore, there is the need to build an arsenal of antibacterial agents with different targeting capabilities able to slow the emergence of resistance and its spread. Vaccines could reduce the use and misuse of antibiotics, prevent infection and disease caused by AMR pathogens, and limit the spread of resistance mechanisms. Important discoveries in the fields of chemistry, microbiology and immunology, and the development of new and sophisticated technologies have driven the design of improved/novel vaccines against infections for which preventive measures do not exist. The novel technologies may provide affordable solutions to tackle AMR.

Mariagrazia Pizza, PhD

Professor of Microbiology

Imperial College, South Kensington Campus, London, UK

Mariagrazia Pizza received her degree in Chemistry and Pharmaceutical Technologies at the University of Naples, Italy. Following a period at the EMBO laboratories in Heidelberg, Germany Mariagrazia moved to Siena, Italy where she has led many bacterial vaccine projects for more than 35 years. She has contributed to the discovery of a pertussis vaccine based on a genetically detoxified toxin, shown to be able to protect children from disease and to the discovery of new vaccine antigens by genome mining (reverse vaccinology), which are the basis of a new MenB vaccine now licensed in more than 40 countries worldwide.

Mariagrazia has been Senior Scientific Director for Bacterial Vaccines at GSK Vaccines, and Head of Preclinical at GVGH, the GSK Vaccine Institute for Global Health until December 2022. She is currently Professor of Microbiology at the Imperial College, London. She has received many awards and is elected member of EMBO, of the European Academy of Microbiology and Academia Europaea, Fellow of the American Academy of Microbiology and Vice Chair of the Bacteriology Division of IUMS (International Unit of Microbiology Societies). She has over 200 publications in international peer-reviewed journals and is co-inventor of many patents.

15th Ri.MED SCIENTIFIC SYMPOSIUM

PANDEMIC PREPAREDNESS: FROM EMERGENCE TO TRANSLATION

OCTOBER 27th | 10.45 am

Pandemic preparedness through translation

The Anthropocene, now characterized by 8 billion people, travel, deforestation, urbanization, and climate change, increased the spread and the appearance of emerging infections and pandemics. The last one, known as Covid-19, found the planet completely unprepared and caused devastating losses of freedom, lives, health and economy. A global effort to prepare the world to the inevitable increased frequency of emerging infections is absolutely necessary.
Fortunately, today we are rich in technologies to develop vaccines, antibodies, diagnostics, and drugs for infectious diseases, however technologies alone cannot solve the problem without appropriate investment, and a global, coordinated strategy. A global network of Institutes dedicated to Pandemic Preparedness founded by international, national, or philanthropic organizations can help the planet to be better prepared to face multiple diseases. The Biotecnopolo di Siena is a new Institute, dedicated to pandemic preparedness which intends to be part of the global network preparing Europe and entire planet, to better face future pandemics. The Institute is mostly founded by the Italian Government and will be dedicated to the discovery and early clinical development of vaccines and human monoclonal antibodies for emerging viral infections and antibiotic resistant bacteria.

Rino Rappuoli, PhD

Scientific Director
Fondazione Biotecnopolo di Siena, Italy

Rino Rappuoli is Scientific Director of the Biotecnopolo di Siena Foundation and head of MAD Lab Toscana Life Sciences, Italy. He is also Honorary Professor of Vaccinology at Imperial College, London, and Senior Professor of Molecular Biology at the University of Siena. Prior positions held: Head R&D and Chief Scientist at GSK Vaccines, head of Vaccine R&D at Novartis, CSO at Chiron Corporation, head R&D at Sclavo.
He earned his PhD in Biological Sciences at the University of Siena, Italy, and was visiting scientist at Rockefeller University and Harvard Medical School. He is elected member of US National Academy of Sciences (NAS), the American Academy of Arts & Sciences (AAAS), the European Molecular Biology Organization (EMBO), the Royal Society of London, the Accademia Nazionale dei Lincei, and the American Institute for Medical and Biological Engineering (AIMBE). Awards received: Gold Medal by the Italian President, Albert B Sabin Gold Medal, Canada Gairdner International Award, European Inventor Award for Lifetime Achievement, Paul Ehrlich and Ludwig Darmstaedter Prize and the Robert Koch Award. He is President of the International Union of Microbiological Societies. He was nominated third most influential person worldwide in the field of vaccines (Terrapin). He has published 794 works in peer-reviewed journals and an H-index of 157.
He introduced novel scientific concepts: genetic detoxification; cellular microbiology; reverse vaccinology; pangenome. Developed licensed vaccines: acellular pertussis containing a non-toxic mutant of pertussis toxin; first conjugate vaccine against meningococcus C; MF59-adjuvanted seasonal and pandemic influenza. MF59 was the first vaccine adjuvant approved for human use after the aluminum salts; meningococcus B; respiratory syncytial virus, CRM 197 as carrier of most conjugate vaccines. Founder of the GSK Vaccines Institute for Global Health (GVGH). Dr. Rappuoli is among the world scientific leaders dedicated to the sustainability of global health.

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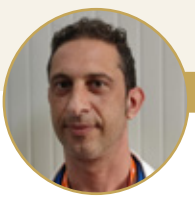
PANDEMIC PREPAREDNESS: FROM EMERGENCE TO TRANSLATION

OCTOBER 27th | 11.30 am

Immune response to SARS-CoV-2 induced by infection or vaccination

Vaccination is the main weapon in the global fight against the coronavirus disease 2019 (COVID-19) pandemic. The protective role of the mRNA-based SARS-CoV-2 BNT162b2 Pfizer/BioNTech vaccine has been asserted in several studies. Solid organ transplant recipients (SOTRs) show higher rates of COVID-19 breakthrough infection than the general vaccinated population. The emergence of new SARS-CoV-2 variants of concern (VOCs) has highlighted the need to improve vaccine-induced immune responses by the administration of repeated booster doses. Besides, at present, there is a lack of clinical evidence about the impact and long-term durability of the immune response induced by the booster doses of mRNA vaccines. We conducted a comprehensive immune profiling, including humoral and cellular response, in correlation with clinical data, of SOTRs and Healthy donors, as control group, enrolled in ISMETT hospital, and we followed them from the first vaccine cycle to the fourth or third dose, respectively. We also explores the immunological aspects of critically ill COVID-19 patients managed with extracorporeal membrane oxygenation (ECMO), a life-saving intervention for severe respiratory failure. We investigated patient outcomes based on a comprehensive analysis of clinical, laboratory, and immune parameters collected at baseline. ECMO patients were compared to those managed with invasive mechanical ventilation (IMV). ECMO patients exhibited distinct clinical and biochemical profiles, including a cytokine signature linked to myeloid-driven immune responses and lymphocyte suppression. T-cell exhaustion and cytokine deregulation emerged as potential predictors of patient survival. A machine-learning model was used to create a predictive score based on exhausted CD8 T-cells, IFNα and calprotectin levels, indicating a 5.56-fold reduction in the risk of death for certain ECMO patients.



Matteo Bulati, PhD

Immunologist
Department of Research
IRCCS-ISMETT, Palermo, Italy

Matteo has been working since 2018 as Immunologist researcher at the Research Department at IRCCS-ISMETT in Palermo, focusing his research activity on the study of the immunomodulatory properties of placenta-derived MSC, and the deep immune profiling of solid organ transplant recipients during infections (COVID-19, HHV8). He published 63 papers in PubMed/Scopus indexed Journal, reaching an h-index of 24, and, recently, he received two PNRR grants in Emerging Infectious Diseases (INF-ACT, project no. PE00000007) and medical application of the MSC secretome (SUIT-PNRR MAD-2022-12376354).

Monica Miele, PhD

Head of Production
Senior scientist in immunology
Fondazione Ri.MED, Palermo Italy

Monica has been working since 2008 for RIMED Foundation as Head of Production in the ISMETT Cell Factory as well as Senior Scientist in Immunology. She was graduated in Biological Science, has a specialization in Clinical Pathology and a Ph.D in Biopathology (University of Palermo). Her main focus are:

- Research and development of Advanced Therapies Medicinal Products, mainly GMP production of multivirus- specific T lymphocytes to treat post transplant viral infection
- Immune profiling after SARS-CoV2 infection and studies of specific immune response after vaccination in Solid Organ Transplant recipients

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OCTOBER 27th | 12.00 pm

PANEL DISCUSSION

Cristina Cassetti, Paul Duprex, Wendy Barclay, Rino Rappuoli, Alessandro Sette

Collaborations through connections

Pandemic Preparedness research is a complex and costly activity that requires significant and sustainable long-term support from government and philanthropic funders and close collaboration and exchange among interdisciplinary researchers from the government, academia, and the private sector worldwide. There are several large institutions currently involved in Pandemic preparedness Research. The goal of this panel discussion is to exchange ideas on how to best connect and coordinate these research efforts and secure long-term support so that the international public health and research communities can most effectively respond to the next infectious disease emergency. Participants to this panel will be asked to share their lessons learned during the COVID 19 pandemic and share their thoughts on how to best build solid collaborations and foster a mindset of preparedness research during the interepidemic period.

Cristina Cassetti, PhD

Deputy Director
Division of Microbiology and Infectious Diseases
National Institute of Allergy and Infectious Diseases, NIH, USA

Dr. Cristina Cassetti is the Deputy Director of the Division of Microbiology and Infectious Diseases (DMID) at the National Institutes of Allergy and Infectious Diseases (NIAID), a component of the US National Institutes of Health (NIH).
DMID, the largest extramural Division at NIAID, supports basic, translational, and clinical biomedical research for all human infectious diseases other than HIV/AIDS. DMID is responsible for preparing and responding to infectious disease outbreaks/pandemics, including COVID-19, influenza viruses, zika, and Ebola; supporting research to combat antimicrobial resistance; and developing medical countermeasures against old foes such as tuberculosis and malaria.
As Deputy Director, Dr. Cassetti shares responsibility with the Director for providing scientific and operational leadership in planning, conducting, and evaluating DMID's extramural research program of national and international scope. Dr. Cassetti has a Ph.D. in virology from the University of Rome, Italy. Prior to her work in extramural NIAID she conducted research in virology in academia and vaccine R&D in the pharmaceutical sector.
Dr. Cassetti received several recognitions for her work on pandemic response including a personally signed letter from President Biden and knighthood from the President of the Republic of Italy

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