



COVID-19: Lessons to be Learned and the Role of the Global Virus Network
Prof. Christian Brechot, MD, PhD, President, Global Virus Network
A Webber Training Teleclass




COVID-19 : Lessons to be Learned and the Role of the Global Virus Network



Christian Brechot, MD, PhD
 Senior Associate Dean for Research in Global Affairs
 Associate Vice President for International Partnerships and Innovation Professor
 in the Division of Infectious Disease, Department of Internal Medicine Morsani
 College of Medicine, University of South Florida
 President, Global Virus Network




Hosted by Martin Kiernan
 martin@webbertraining.com

www.webbertraining.com April 15, 2021

Mapping Emerging Viral Diseases

- How to anticipate?
 - Preparedness
- How to react?
 - Task forces
- How to build for the future?
 - Education
 - Training
 - Talent Development



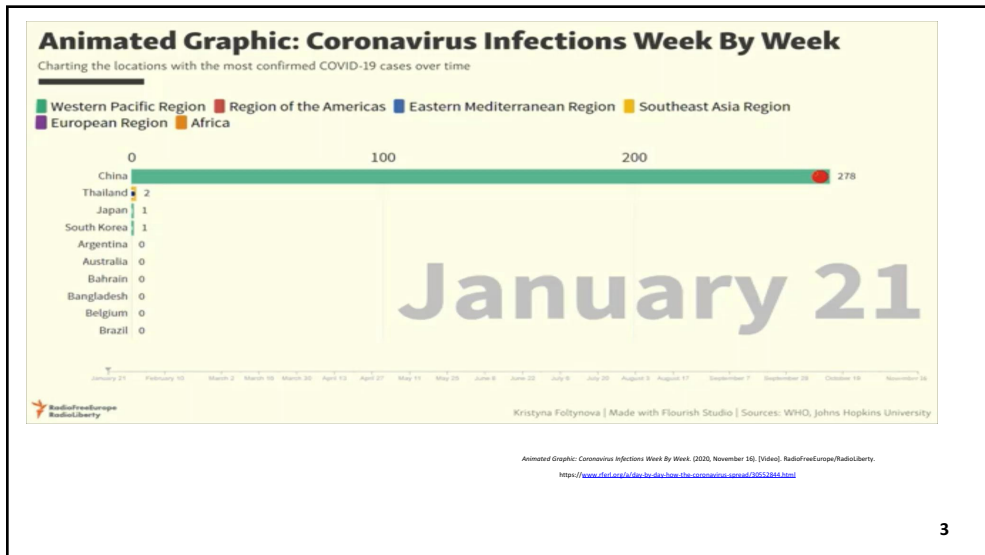
<ul style="list-style-type: none"> ● Newly emerging ● Re-emerging 	<p>Developments facilitating spread</p> <ul style="list-style-type: none"> • Commercial air travel • Global trade • Urbanization • Unchecked population growth • Climate change 	<p>Advances facilitating control</p> <ul style="list-style-type: none"> • Genome sequencing to identify emerging viruses • Global communication networks • Rapid diagnostics • New approaches to vaccine and therapeutic design
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Marston HD, Folkers GK, Mores DM, Fauci AS. Emerging viral diseases: confronting threats with new technologies. *Sci Transl Med.* 2014 Sept 10;6 (253)

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Why Coronaviruses?

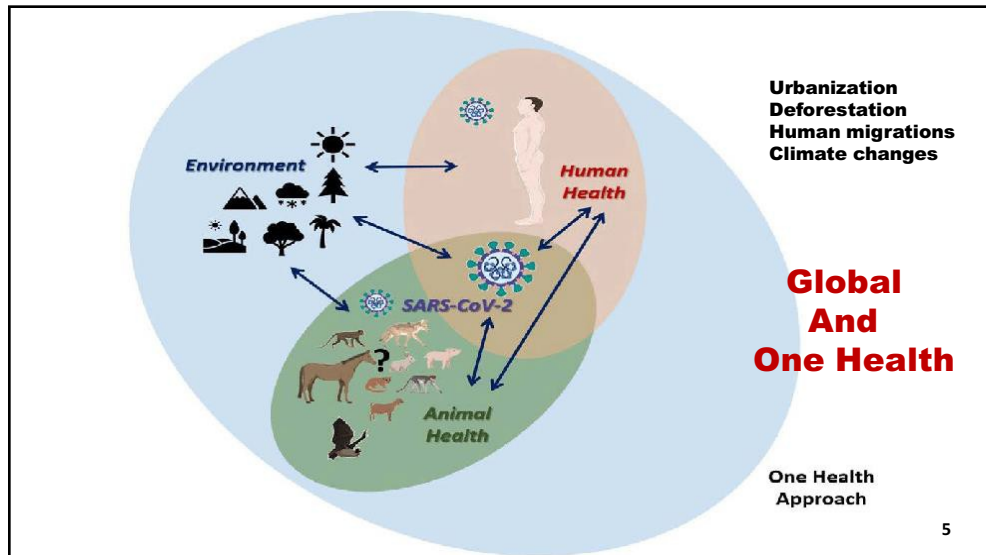
- SARS-CoV-2 is the 7th documented human coronavirus
- Four cause common colds (229E, HKU1, NL63, OC43); three cause severe disease (SARS-CoV, MERS-CoV, SARS-CoV-2)
- **Five** have emerged the last 20 years (SARS-CoV, MERS-CoV, HKU1, NL63, SARS-CoV-2)
- Bats are involved in the emergence of five (SARS-CoV, MERS-CoV, NL63, 229E, SARS-CoV-2)

Hantaviruses: sporadic host jumping

Coronaviruses: Frequent host jumping

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Novel Modes of Global Health Governance

- **Gavi**, The Vaccine Alliance (formerly Global Alliance for Vaccines and Immunization)
- International AIDS Vaccine Initiative (**IAVI**)
- Drugs for Neglected Diseases Initiative (**DNDI**)
- Africa Centers for Disease Control and Prevention (**Africa CDC**)
- Foundation for Innovative New Diagnostics (**FIND**)
- **PATH** (formerly the Program for Appropriate Technology in Health)
- **Coalition for Epidemic Preparedness Innovation: CEPI**

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COVID-19 World Preparedness and Response: Lessons Learned

- **It is not a crisis – it is a new era.**
- **Multidisciplinary pandemic response networks**
 - Collaborations are needed among university, industry, government and communities to merge the efforts and find solutions together.
 - Viral Pandemic Readiness Alliance (VPRA)
- **Global and One Health**
 - The true international collaborations, can support future pandemic preparedness with distribution of diagnostics, vaccine and therapeutics and other interventional measures.
- **Training the next generation of virologists**
- **Reliable channels for dissemination of scientific knowledge and information sharing**

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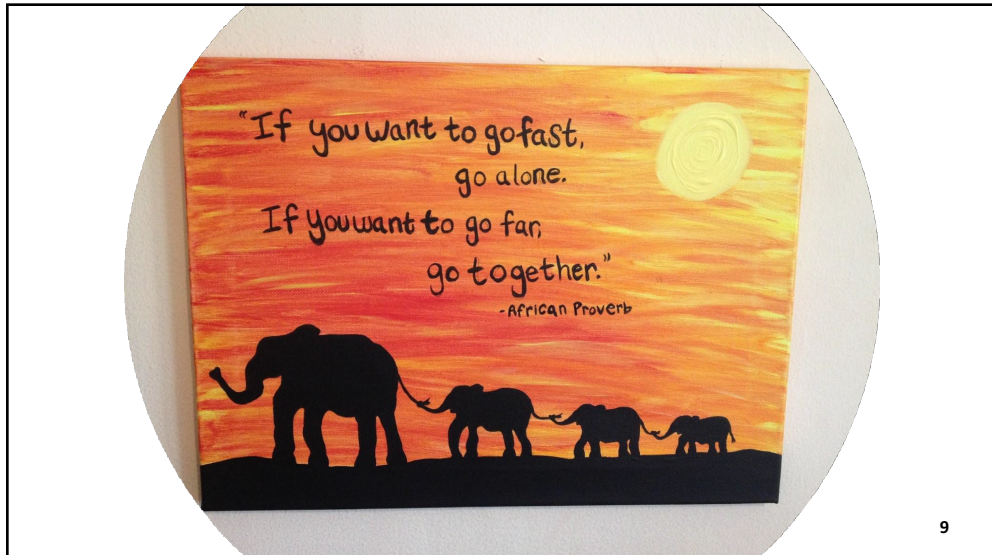
The Importance of Surveillance and Alert Networks

- Assist countries in their efforts to fight against diseases, by providing an appropriate technical support to populations in a timely manner
- Investigate and characterize sanitary events and analyze the risks of a rapidly-emerging threat
- Support the national authorities' efforts to prepare for sanitary crises



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Global Virus Network

- The GVN was co-founded in 2011
- A non-profit global organization based in Baltimore, Maryland, USA
- A coalition comprised of leading virologists working to:
 - Advance discovery and knowledge on how viruses cause disease
 - Develop drugs and vaccines to prevent illness and death



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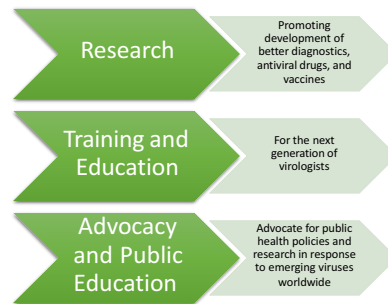
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Vision

“A world prepared to prevent, contain and control viral epidemic threats, through the collaboration of a global network of expert virus laboratories.”

Mission

“To strengthen medical research and response to current viral cases of human disease and to prepare for new viral pandemic threats.”



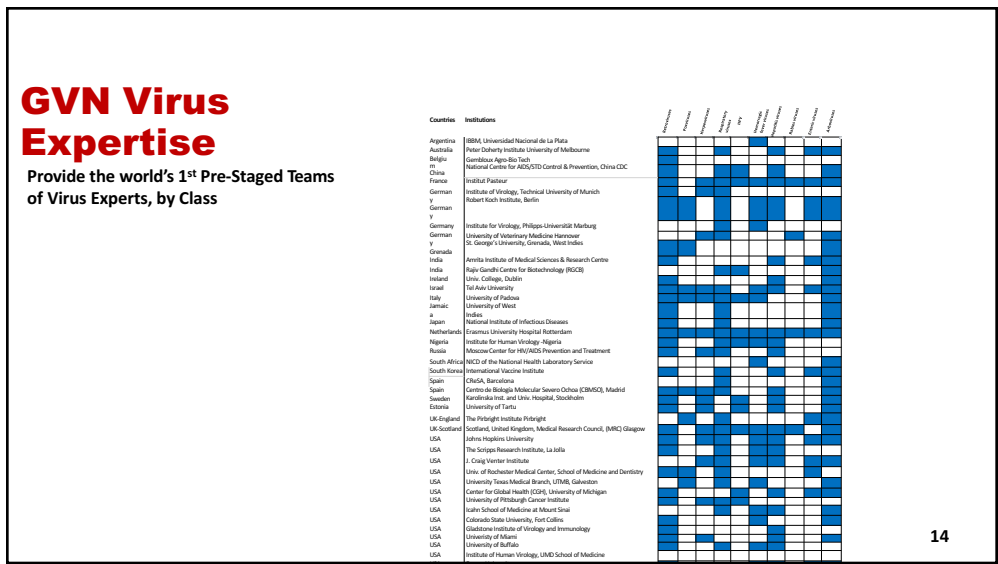
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GVN Centers of Excellence

- **Centers of Excellence** are the **KEY COMPONENT** of the GVN
- Criteria for a GVN Center of Excellence:
 - The Director is a noted medical virologist
 - The Center is currently productive, and has deep expertise in 2-3 viral areas
 - Commit to capacity building in weaker institutes especially in resource-poor nations.
 - Support GVN’s central operation through inclusion on grant and contract applications, fundraising events, direct donations or other means.

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GVN International Meetings

2011 Washington DC, USA & Dublin, Ireland

2012 Naples, Italy & Baltimore, USA

2013 Munich, Germany & Moscow, Russia

2015 Beijing, China

2016 Sapporo, Japan

2017 Melbourne, Australia

2018 Ancey, France

2019 Barcelona, Spain

2020 Virtual Special Annual Meeting

10th International Global Virus Network Meeting
 Veyrier-du-Lac, November 28-30th, 2018

2020 GVN Special Annual Meeting
 Epidemics & Pandemics in the Modern Era
 September 22-23
 Media Conference on the 24th

GVN GLOBAL VIRUS NETWORK

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GVN
 GLOBAL VIRUS NETWORK

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Can We Predict Disease Emergence?

a

H1N1/09 influenza Ebola Zika MERS COVID-19

“Hotspots” of Emergence

Distribution of zoonotic pathogens emerging in humans from wildlife

Jones *et al.* *Nature* 451, 990-994 (2008)

SPillover
 Ranking Comparison

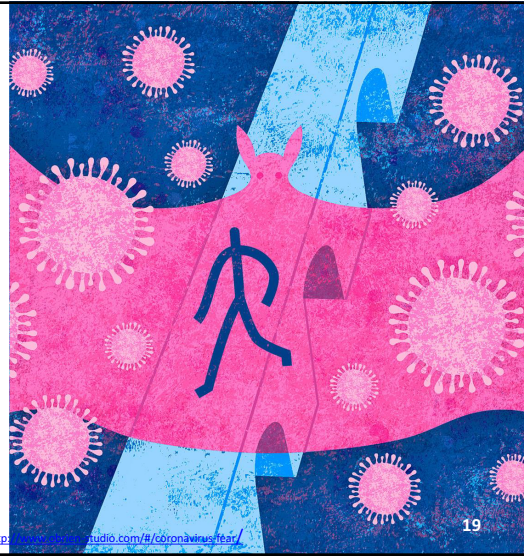
- Online tool – “spillover”:
<https://stage.spillover.global/ranking-comparison/>
- Machine learning?

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Surveillance

- We cannot predict future pandemics but we can improve preparedness and reactivity
- Humans are modifying ecosystems & accelerating transmission events.
- Major risk factors for the next epidemics and pandemics: Animal viruses .
- **Humans are the best sentinels.**
- **Focus on the surveillance efforts to the human populations who interface with animals**
- **Establish global data sharing mechanisms.**

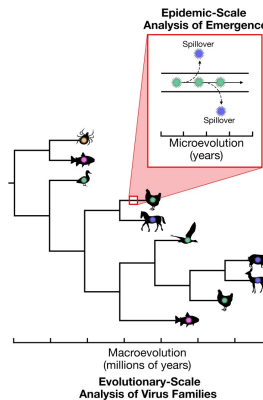


O'Brien, J. (2020, March 24). Coronavirus Fear, Retrieved November 11, 2020, from <http://www.pexels.com/photo/coronavirus-fear>

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Why Genomic Prediction Won't Work

- Huge number of possible viruses
- Genome sequencing of viruses does not identify those that can infect or spread epidemically in humans
- Testing whether these viruses can infect human cells will take a huge number of person hours
- RNA viruses evolve so rapidly that regular surveys are needed (and human adaptation may be needed)
- Phylogenetic comparisons consider evolutionary time-scales (millions of years) while emergence occurs on epidemiological time-scales (decades)



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How to do Things Better

- Fight climate change
- Reduce our exposure to wildlife – deforestation, wildlife trade, wet markets, zoning (e.g. planting trees)
- Establish global genomic, serological (VirScan) and social media surveillance of people living and working at the **human-animal interface**

Huanan seafood market, Wuhan

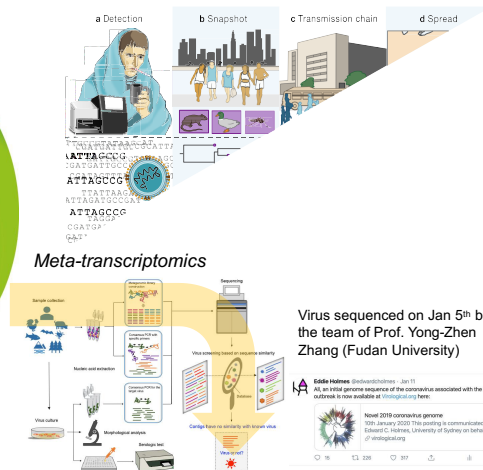
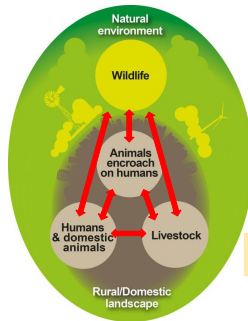


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Modern Genomic Epidemiology

- Now have the tools for the real-time genomic investigation of infectious disease outbreaks

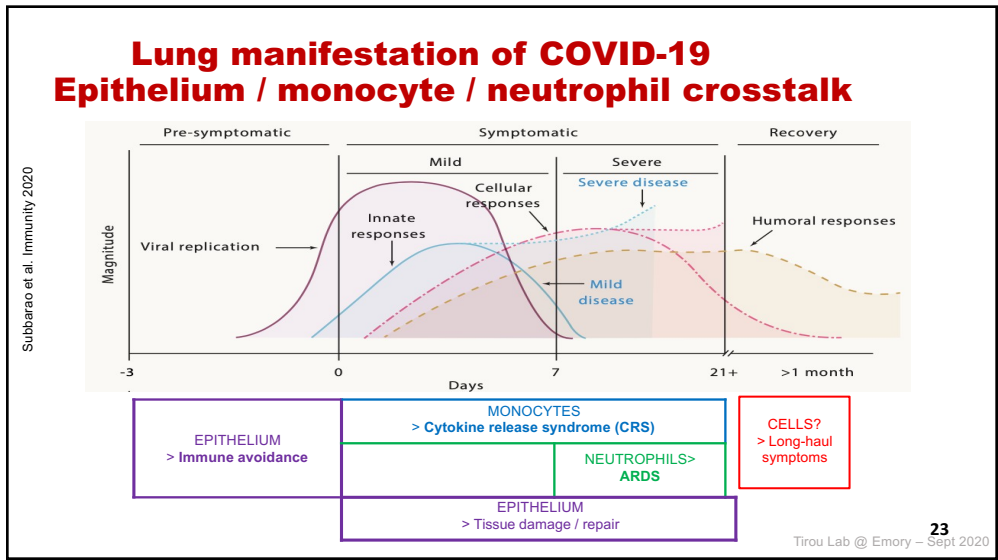
The zoonotic interface



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Receptors: Angiotensin Converting Enzyme (ACE)2 and Neuropilin-1

CORONAVIRUS

Neuropilin-1 facilitates SARS-CoV-2 cell entry and infectivity

Ludovico Cantuti-Castelvetri et al

Neuropilin-1 (NRP1), known to bind furin-cleaved substrates, significantly potentiates SARS-CoV-2 infectivity, an effect blocked by a monoclonal blocking antibody against NRP1.

Pathological analysis of olfactory epithelium obtained from human COVID-19 autopsies demonstrates that SARS-CoV-2 infects NRP1-positive cells facing the nasal cavity.

Neuropilin-1 is a host factor for SARS-CoV-2 infection

James L. Daly1 et al

Science 11/2020

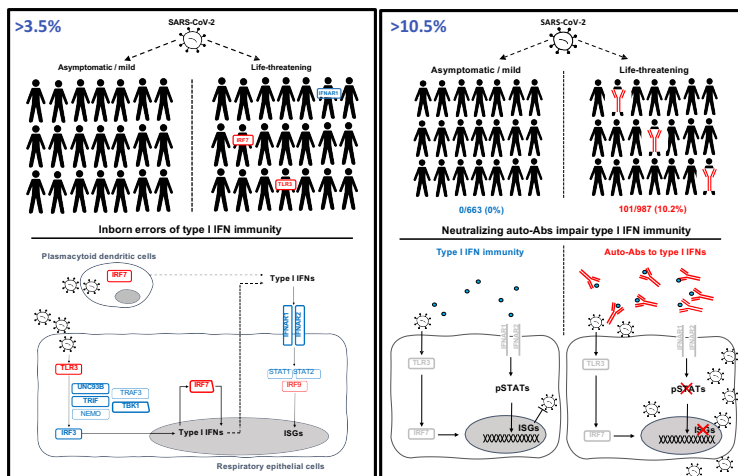
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The impact of the host human genetics

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Impaired type I IFN immunity: two mechanisms

Casanova
 et al
 Science
 2020



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THE MAJOR GENETIC RISK FACTOR FOR SEVERE COVID-19 IS INHERITED FROM NEANDERTHALS

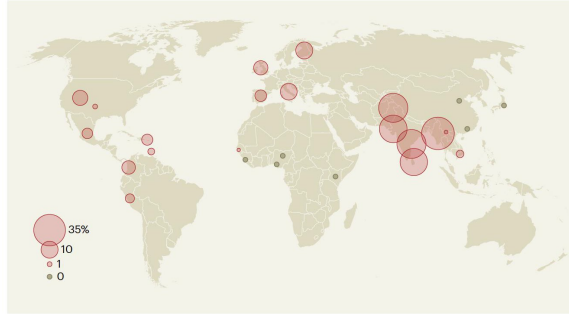


Figure 1 | Uneven global spread of a genetic risk factor for COVID-19. Zeberg and Pääbo² report that a long sequence of DNA that is associated with severe COVID-19 infection and hospitalization is derived from Neanderthals. The sequence is unevenly distributed across modern human populations. This map shows the frequency at which the risk factor is found in various populations from around the world. The sequencing data for these populations were gathered by the 1000 Genomes Project¹⁰. (Adapted from Fig. 3 of ref. 2.)

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COVID-19
Therapeutics

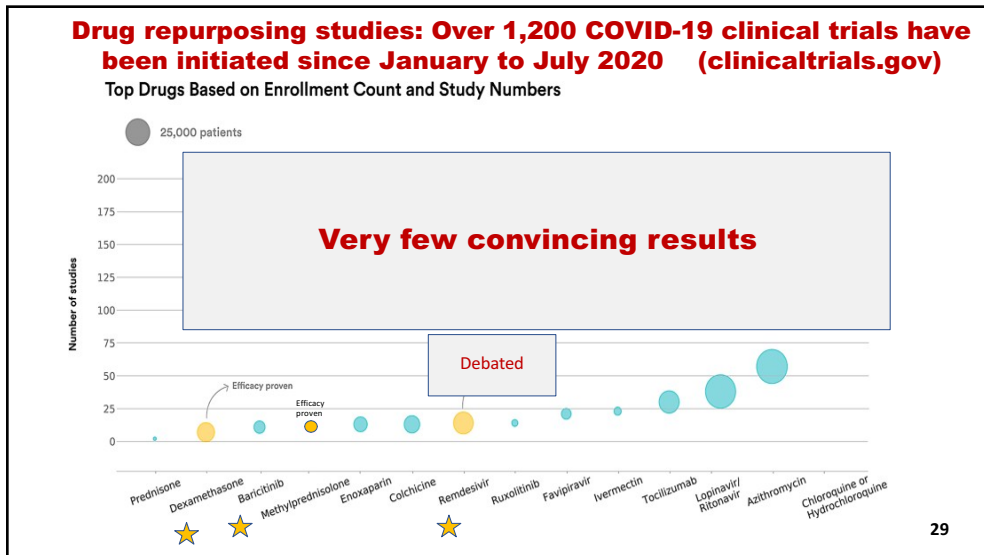
- Drug repurposing **and** drug discovery
- Targeting multiple pathways and combining antivirals and immunomodulatory molecules.
- The possibility of developing broad spectrum antivirals: effective against coronaviruses, influenza and filoviruses.



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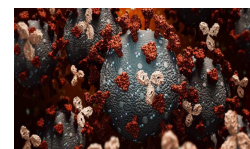
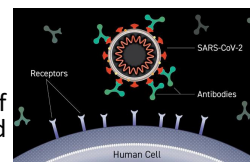
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Therapeutic Monoclonal Antibodies Targeting the Spike Protein of SARS-CoV-2

- Preventing viral entry to the cell by binding to the receptor-binding domain (RBD) of the spike protein or blocking the interaction between RBD and the ACE2 receptor
- FDA's approval: Bamlanivimab (LY-CoV555, Eli Lilly); cocktail of casirivimab and imdevimab (Regeneron) for treatment of mild to moderate COVID-19 patients
- Experimental approaches: use of cocktail monoclonal antibodies targeting different epitopes of the S protein
- Effective for early stages of mild and moderate COVID-19
- Required continuous evaluation of safety and effectiveness of these treatments



Therapeutic Monoclonal Antibodies for curving the COVID-19 Cytokine Storm

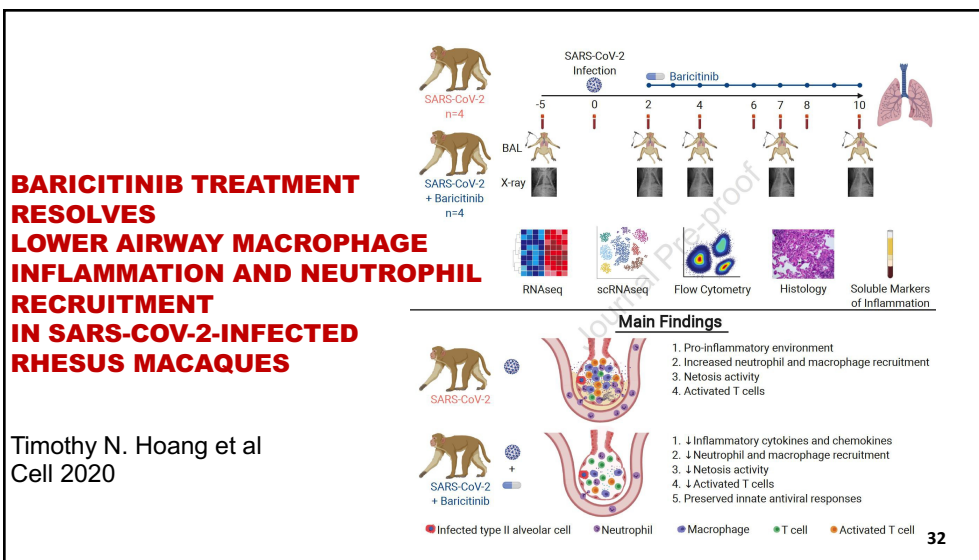
- Blocking the biological activity of IL-1 and IL-6;
 Inhibiting JAK signal transducer and activator of transcription pathway
- Clinical outcomes: contradictory
 Required continuous evaluation of safety and effectiveness for COVID-19 treatment

Randomized clinical trials ongoing on promising inflammatory strategy

Target	Drug Type	Drug (Monoclonal Antibody)
IL 6 signaling	Anti-IL 6	Clazakizumab, Siltuximab
	Anti-IL6 receptor	Sarilumab, Tocilizumab
IL 1 signaling	Anti-IL1 β	Canakinumab
	Anti-IL1 receptor	Anakinra
JAK-STAT signaling	JAK1/JAK2 inhibitors	Baricitinib, Ruxolitinib
	JAK1/JAK3 inhibitors	Tofacitinib

JAK-STAT: The Janus kinase/signal transducer and activator of transcription; IL: Interleukin

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COVID19 Treatment When high through put screenings and serendipity helps

- **Nitazoxanide: anti-parasitic drug with excellent safety profile and in vitro and in vivo(?) activity against SARS-CoV-2 (Jean-Francois Rossignol, Romark LLC)**
- **The Nicotine-Nicotinic Acetyl Choline Receptor-COVID19 Connection (Jean-Pierre Changeux, Institut Pasteur)**
- **Antiviral sigma-1 receptor ligands: antihistamines in the histamine-1 receptor binding class : diphenhydramine, hydroxyzine and azelastine (David Ostrov, University of Florida)**

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Nitazoxanide and COVID19

An anti-parasitic agent with excellent safety profile

- Protozoa: *Cryptosporidium parvum*, *Giardia intestinalis*, *Entamoeba histolytica*, *Blastocystis hominis* & *Balantidium coli*
- Nematodes: *Enterobius vermicularis*, *Ascaris lumbricoides*, *Necator americanus*, *Ancylostoma duodenale*, *Trichuris trichiura*, *Strongyloides stercoralis*
- Cestodes: *Taenia saginata*, *Hymenolepis nana*
- Trematode: *Fasciola hepatica*

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Nicotine-Nicotinic Acetyl Choline Receptor-COVID19

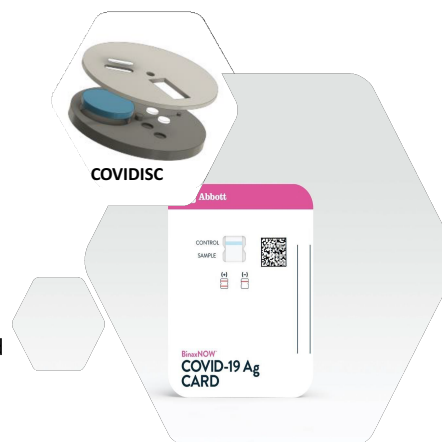
- Nicotinic acid receptor as an immunomodulator
- Decreased prevalence of COVID19 in smokers
- Nicotinic acetyl receptor binding to SARS-CoV2 ?
- The impact of smoking? Nicotine patches as treatments?

A nicotinic hypothesis for Covid-19 with preventive and therapeutic implications
Jean-Pierre Changeux , Zahir Amoura *et al.*
Proceedings of French Academy of Sciences (Comptes Rendus Biologies)
2020, 343, no 1

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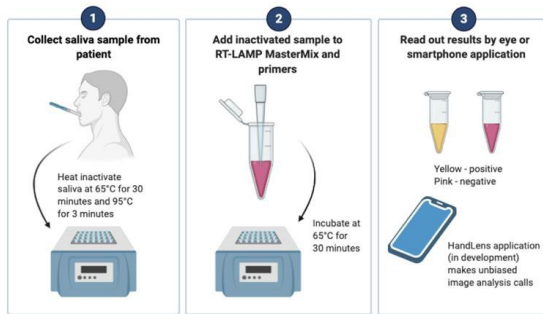
COVID-19 Diagnostic:

- The most needed: **Rapid diagnostic tests**, whether molecular or immune-based
- **Salivary sampling** can be used instead of nasal swabs, i.e. RT-LAMP test
- **Serological assays**: offering major insights both epidemiology and neutralization capacity of detected antibodies.
- **Novel organizational schemes**: rapid translation from technology-driven research to routine testing, and partnerships between academic and industrial partners should be reinforced in an international context.



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Viral surveillance using colorimetric tests like RT-LAMP



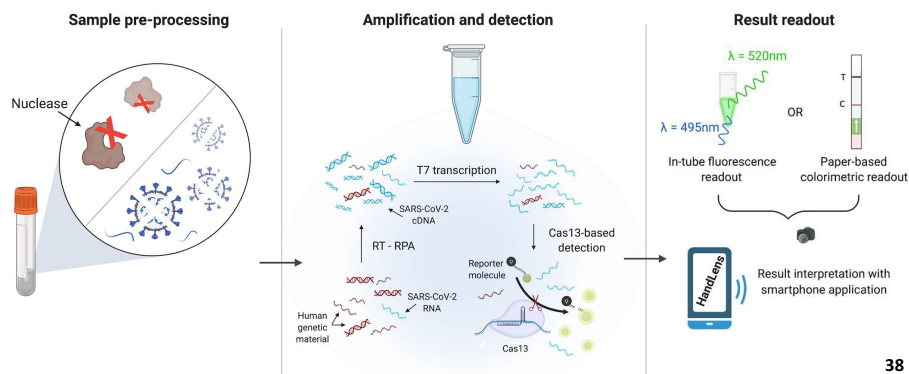
- Single-temperature SARS-CoV-2 RNA detection
- Rapid turnaround time of ~65 minutes
- Low cost of ~\$5-10 a test

Dr Pardis Sabeti, Harvard Medical School; Broad Institute

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CRISPR-based technologies for point-of-care testing

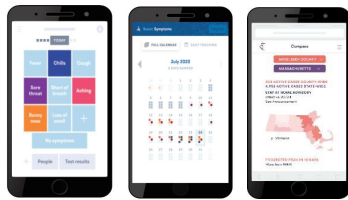
SHINE (Streamlined Highlighting of Infections to Navigate Epidemics)



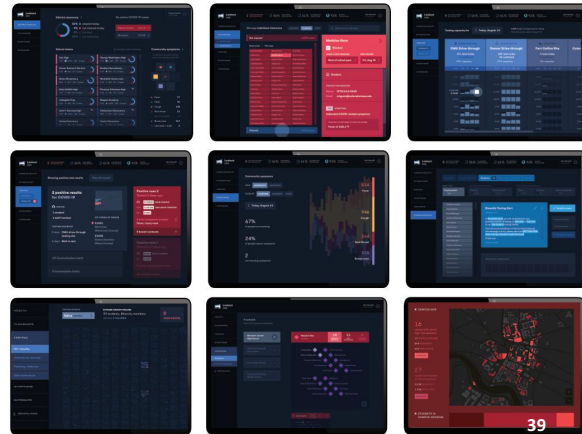
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Scout App & LookOut Dashboard



- Full suite for viral surveillance, including daily user attestation, diagnostic integration, and administrator dashboard
- Live at Colorado Mesa University, Sarasota Military Academy, with more sites in the onboarding process



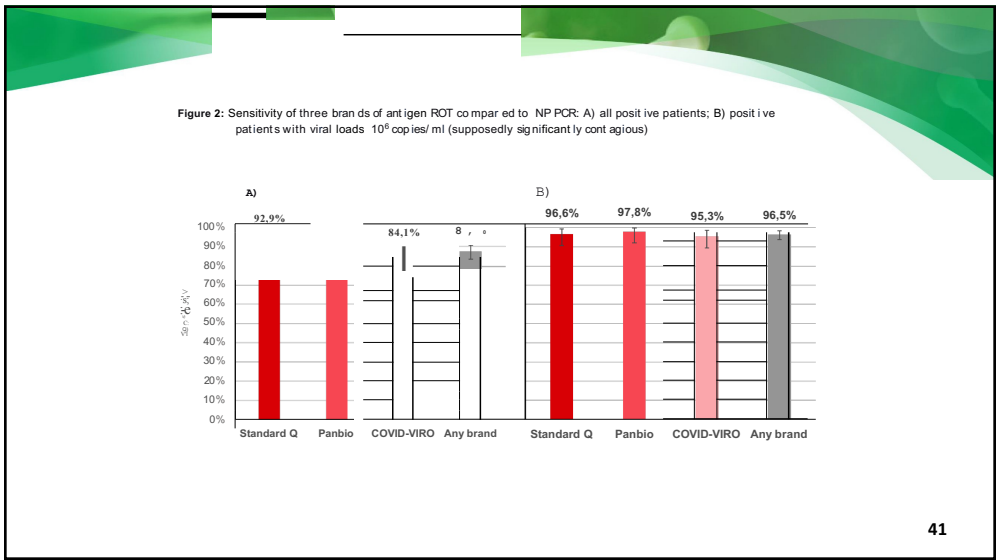
ANTIGEN RAPID TESTS, NASOPHARYNGEAL PCR AND SALIVA PCR TO DETECT SARS-COV-2: A PROSPECTIVE COMPARATIVE CLINICAL TRIAL

Jean Marc Schwob MD, Alix Miauton MD, Dusan Petrovic PhD, Jean Perdrix MD, Nicolas Senn MD PhD,
Katia Jaton MD PhD, Opota Onya PhD, Alain Maillard MD, Gianni Minghelli MD, Jacques Cornuz MD MPH,
Gilbert Greub MD PhD, Blaise Genton MD PhD, Valérie D'Acremont MD PhD

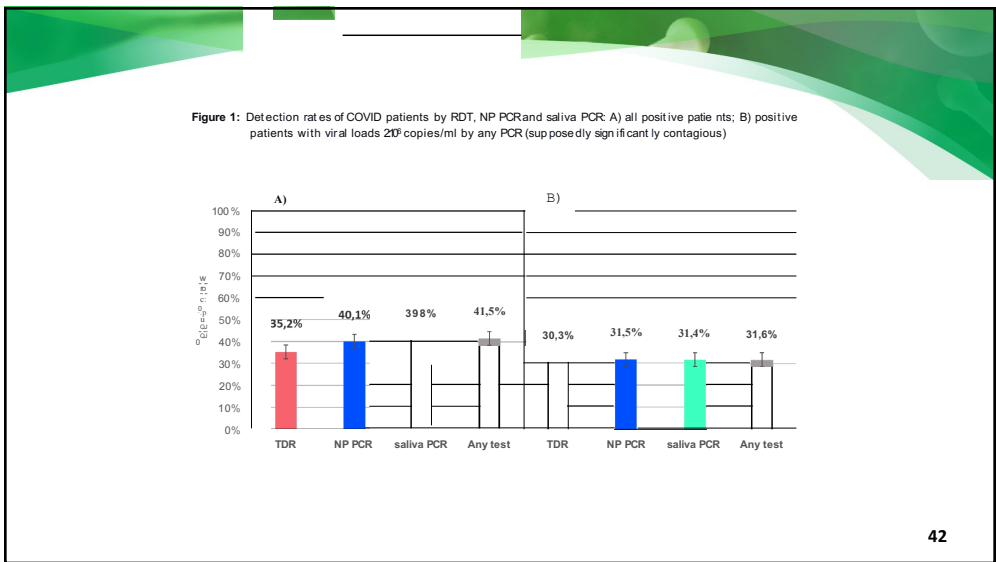
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CAN DOGS SMELL COVID?



Research groups around the world are testing whether dogs can detect COVID-19 by smell.

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The COVID vaccine race

Twelve vaccines have progressed to Phase III of the trial process. Here's a look at them all.

- Candidate 1** 🇺🇸
American company Moderna developing vaccine in partnership with National Institute of Health. The company has made deals with countries including Canada, Japan and Qatar to supply the vaccine if approved.
- Candidate 2** 🇬🇧 🇸🇪
AstraZeneca, a **British-Swedish** company in cooperation with the University of Oxford in the **UK** backed by \$1.2 billion in **US** funding.
- Candidate 3** 🇨🇳
Wuhan Institute of Biological Products developed a vaccine put into clinical trials by **China** and several other companies. Phase III trials have been carried out in the **USA**, **Peru** and **Malaysia**.
- Candidate 4** 🇨🇳
Protein **Chinese** company Sinovac Biotech has been preparing to distribute vaccine globally.
- Candidate 5** 🇺🇸
US based Johnson & Johnson in cooperation with **South** based South African Dabchick Medical Center.
- Candidate 6** 🇮🇳
Indian company Bharat Biotech designed a vaccine in cooperation with the Indian Council of Medical Research. Phase III trials began in October.

Subscribe to our global politics newsletter Signal at signal@gvni.com
Source: New York Times

Chinese trial of experimental coronavirus vaccine on groups of thousands of people and results are compared with people who receive a placebo drug. These trials aim to determine if the vaccine is effective and safe – and detect side effects that may have been missed.

COVID-19 Vaccine Race

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Debinski, G., & Winkelman, A. (2020, November 9). The Graphic Truth: The COVID vaccine race [Digital Image]. Retrieved November 19, 2020, from <https://www.fox.com/eromed/> <https://www.fox.com/eromed/> <https://www.fox.com/eromed/>

COVID-19 Vaccines (1):

- **Different types/formulas**
 - Virus-Based Vaccines
 - RNA/DNA (Nucleic Acid) Based Vaccines
 - Viral Vector Vaccines
 - Protein-Based Vaccines
 - Others

Questions:

- Duration of protection?
- Efficacy in elderly, diabetes etc..?
- Protection against asymptomatic infections?, severe infections?
- Correlates of protection?
- Safety?
- Risk in anti-SARS-CoV2 positive individuals?



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COVID-19 Vaccines (2):

- **Priorities? : Healthcare workers, Diabetes, etc.**
- **Mass vaccination: Logistics, Storage, etc..**
- **Nonspecific immunization procedures: Bacille Calmette-Guérin (BCG); Oral Polio Virus**
- **Second-generation vaccines?: Cell immune response**



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The impact of SARS-CoV-2 mutations ?

- Overall low rate of mutations
 - Several variants of concerns:
 - B117: the “UK”
 - B1351: the “South African”
 - P1: the “Brazilian”
 - California, NY others...
 - No demonstrated impact on infection severity?
 - Enhanced contagiousness: D614G, N501Y(UK; South African? Brazilian?)
 - Impact on Neutralization capacity??
- D614G, N501Y (UK): No
 E484K (South African, Brazil): yes; in vivo? (severe COVID19)
 SARS-CoV2 transmitted by infected minks and reinfection by humans

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The circulating SARS-CoV-2 spike variant N439K maintains fitness while evading antibody-mediated immunity

Emma C. Thomson, et al

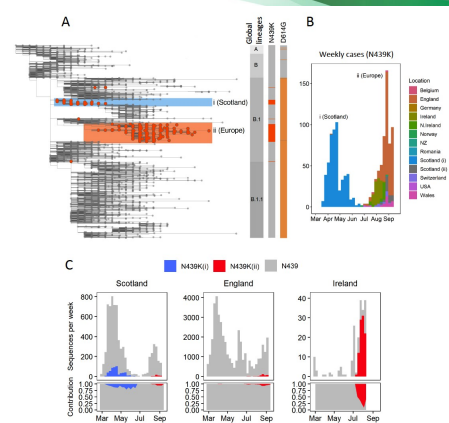


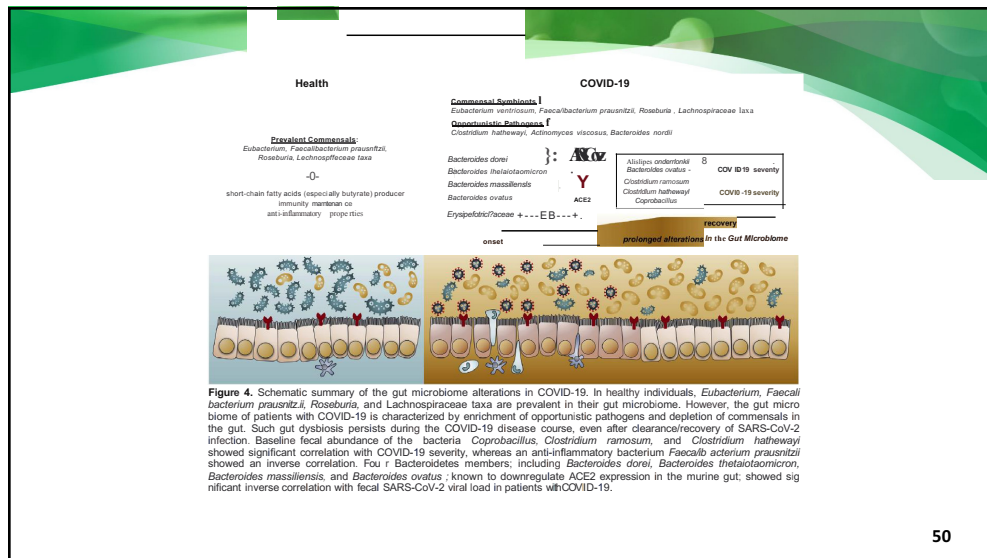
Figure 2. The N439K RBM variant has arisen independently multiple times, twice forming significant lineages

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Gastroenterology 2020

Alterations in Gut Microbiota of Patients With COVID-19 During Time of Hospitalization

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Modulation of gut microbiota with NBT-NM108 for the early treatment of COVID-19 in patients with prediabetes or type 2 diabetes (COVGUT20)

Co-Principal Investigators:

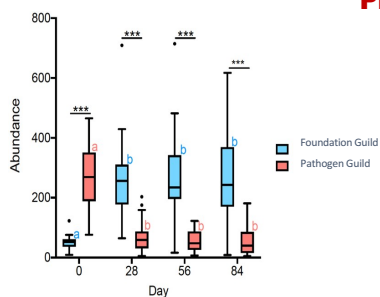
Dr. Asa Oxner (University of South Florida)

Dr. Liping Zhao (Rutgers University)

November 2020

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Modulation of Gut Microbiota by NBT-NM108 for the Early Treatment of COVID-19 in Patients with Type 2 Diabetes and Prediabetes



NBT-NM108 (Investigational New Drug)



Promotion of Acetate and butyrate producers

- Improve glycemic control
- Suppress opportunistic pathogens
- Boost antiviral immunity



Reduce the severity of COVID-19-related illness

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Study design

- **Two-armed randomized controlled trial**
 - Intervention group: take NBT-NM108 in the form of drinks 4 times a day for 28 days; follow up for another 28 days.
 - Control group: drink 500 ml of water 4 times a day for 28 days; follow up for another 28 days.
- **n = 100, home-based intervention**
 - Intervention group N=50,
 - Control group N=50

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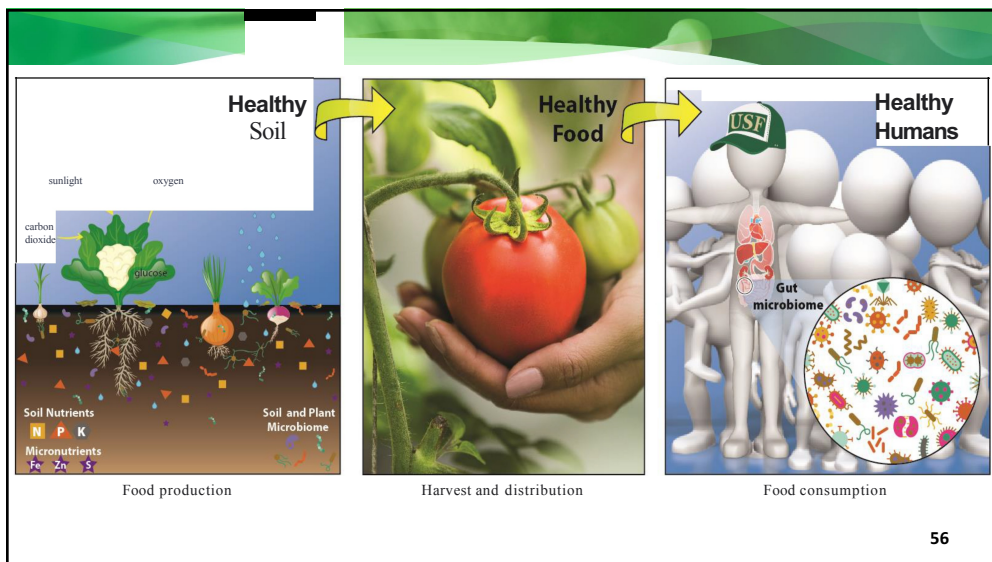
Research Hub Microbiome, Immunology and Infection Mitigation

Leaders:
Christian Brechot, USF Health;
and
Shyam S Mohapatra, Morsani College of Medicine and Taneja College
of Pharmacy

 UNIVERSITY of
SOUTH FLORIDA

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How can we translate the progress to Global and One health?

The role of Global Virus Network



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Programs & Initiatives

RESEARCH

- Hepatitis B Database
- Joint Grant Applications
- Annual Meetings
- Regional Meetings
- Zika Serum Bank
- Chikungunya Task Force
- Anticipation & Preparedness Task Force & Virus Watch Group
- HTLV-1 Task Force
- Zika Task Force
- SARS-CoV-2 Task Force
- SARS-CoV-2 Biobank

TRAINING AND EDUCATION

- GVN Short Course
- Hepatitis C Provider Training
- GVN Regional Chapters
- GVN Academy
- GVN Postdoctoral Fellowship
- GVN Online Medical Virology Class
- GVN Microbiome & Viral Infection Online Course

ADVOCACY, PUBLIC EDUCATION AND COMMUNICATIONS

- Ebola FAQs
- GVN Intranet
- Forefront COVID-19 Online Seminars
- GVN Viral Infection Preparedness Education and Resilience (VIPER) Advisory Group
- GVN Perspectives
- Weekly GVN Newsletter
- Press releases and Op-eds

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COVID-19: Lessons to be Learned and the Role of the Global Virus Network
Prof. Christian Brechot, MD, PhD, President, Global Virus Network
A Webber Training Teleclass

GVN SARS-CoV-2 Activities

Dr. Brechot's Health and Care Blog

Biobanking Project

Research & Clinical Trials

GVN: Forefront of Virology COVID-19 Webinar Series

GVN Center and Member Spotlights

SARS-CoV-2 Task Force

GVN SARS-CoV-2 Perspectives

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COVID-19: GVN CoEs Scientific Collaboration Highlights

- SARS-CoV-2 Task Force
 - Representatives from 30 GVN centers in 12 countries.
 - Meet virtually biweekly-monthly to share the most recent and advanced research findings, and to discuss developments in diagnostic, serological tests, and vaccines
- Distributed Biobanking Project
 - Participants from 16 CoEs
 - Contain the results of genome sequence and immunological analyses and clinical data (i.e., sample type, collection date and location, patient disease status, and prior exposure and treatment history).
- Research & Clinical Trials
 - Translate research into practical applications to improve diagnostics, disinfectants and effective therapy and to develop vaccines

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GVN Short Course for Emerging leaders in Virology

- Partner with John Hopkins University, National Institutes of Health and University of Maryland
- 1-week intensive course designed to address the need in trained virologists
- To broaden the skill sets and knowledge bases of junior scientists
- Trained a total of 90 scientists from around the world in the past 6 years.



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GVN Academy Program

- **YOUNG RISING STAR**
 - To expand GVN's alumni group of emerging virologists with a view toward creating and nurturing a community of virology scholars for the future
 - To provide personalized mentorship and guidance to junior virologists
 - To broaden skills sets and knowledge bases for junior and mid-level scientists and physicians working on virology or potentially interested in the field
 - To grow the next generation of global leaders in virology
 - To provide guidance to increase entrepreneurship



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COVID-19: GVN Industry Partners Highlights

- GVN supports the development of vaccines, therapeutics and disinfectants by coordinating research programs between the industrial partners and academia.
- Research projects and Clinical trials with many corporations
 - Regeneron
 - Abbott
 - Sanofi
 - Pfizer
 - Nektar



REGENERON



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COVID-19: GVN Public Education

GVN: AN information hub for the dissemination and sharing of COVID-19 updates for scientists and the general public

- GVN SARS-CoV-2 Perspectives
 - GVN scientific column about the latest scientific progress surrounding SARS-CoV-2.
 - To date, 21 posts
- GVN: Forefront of Virology COVID-19 Webinar Series
 - COVID-19 related science sharing, featuring expert virologists from GVN CoEs around the world.
 - To date: 7 seminars
 - **Next Seminar:** 8am EDT, December 3, 2020



Presenter: Dr. Yiming Shao
Chief Expert on AIDS, Chinese Center for Disease Control and Prevention
Director of the Division of Research on Virology and Immunology,
National Center for AIDS/STD Control and Prevention, China

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**COVID-19: Lessons to be Learned and the Role of the Global Virus Network
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COVID-19: GVN Public Education Continue

- Dr. Brechot's Health and Care Blog
 - Continuously updated resource by Dr. Brechot for novel insights into the current pandemic. To date: 23 posts
- GVN Weekly Brief
 - Distribute the new insights of COVID-19 to the GVN scientists and the general public
- GVN Center and Member Spotlights
 - Highlight of our prominent GVN scientists are working on to curb the pandemic. To date, 22 posts
- Global Health Conversation Series with USF Health International



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GVN & USF Online Course: Microbiomes and their Impact on Viral Infections

- World-renowned Speakers
- 2 certificated noncredit courses
 - Introduction on the Microbiomes, 11 modules
 - Symbiotic Evolutions in the Microbiome World, 9 modules
- Self-paced, Online format



Expert Speakers From Around the World

JACQUES RAVEL, PhD Professor, Microbiology and Immunology Assistant Director, Center for Genome Sciences Assistant Director for Genomics, Institute for Genome Sciences University of Maryland School of Medicine	WHA BRITTAIRE, PhD Professor, College of Marine Science University of South Florida
LARRY DISHAW, PhD Assistant Professor, College of Medicine, Pediatrics Assistant Professor, College of Medicine Molecular Medicine University of South Florida	MARIA CARLA SALES, PhD Professor, Immunology, Virology and HIV Unit Department of Microbiology, Institut Pasteur Paris
SAROO K. MALWANIAN, PhD Associate Chief, Professor of Microbiology Investigative, Strategic, Medical Research Institute Director of Energy and Biological Engineering California Institute of Technology	SARAH E. CLARK, PhD Assistant Professor, Department of Otolaryngology University of Colorado School of Medicine
CARLOS ZALAMA, PhD Assistant Professor, Department of Integrative Biology University of South Florida	RAMESH AKHIA, DVM, PhD Professor, Department of Microbiology, Immunology and Pathology Colorado State University
KARINE CLEMENT, MD, PhD Assistant Professor, INSERM UMRS 1163, INSERM Faculty of Medicine	NICHOLE KLATZ, PhD Professor Director, Surgical Outcomes and Precision Medicine Research Center University of Minnesota Medical School and Department of Surgery
BENJAMIN CHASSANG, PhD Team Leader Research Microbiome in Chronic Inflammatory Diseases INSERM UMRS	MATTHEW SENDRON, PhD Junior Research Scientist, Microbiome of Insect Virology Group United States Army, Ft. Detrick
JOHN E. PARSONSON, PhD Assistant Professor, Department of Integrative Biology University of South Florida	MAUREEN GREEN, PhD, RN, FAAN Senior Staff Professor, Nursing Research Director, Biomedical Research Laboratory Professor, College of Nursing University of South Florida
LAURENCE ZITVOGEL, MD, PhD Chief, Clinical, Tumor Immunology and Immunotherapy of Cancer Staff, Cancer Research European Academy of Tumor Immunology	LIPING ZHANG, PhD Professor Emerge-Auxiliary Chair of Applied Microbiology Department of Biochemistry and Microbiology School of Environmental and Biological Sciences Peking University

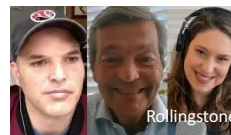
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COVID-19: GVN Advocacy & Communication

- GVN serves as a world-wide resource to governments and international organizations seeking advice regarding the current COVID-19 outbreak as well as other viral disease threats, prevention and response strategies, research and training on viral infections.
- 2020 Year to Date: GVN has been featured in
 - 106 News Articles
 - 28 TV Appearances
 - 10 Radio Appearances



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THANKS
Linman Li
USF Friends
All GVN Friends



Please contact Christian Brechot cbrechot@usf.edu or
 Linman Li at linman1@usf.edu for any questions.





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www.webbertraining.com/schedulep1.php	
April 21, 2021	<i>(South Pacific Teleclass)</i> RETURNING TO WORK DURING COVID-19 Speaker: Crystal Polson , University of Melbourne, Australia
April 27, 2021	<i>(FREE European Teleclass ... Denver Russell Memorial Teleclass Lecture)</i> HYGIENE BEHAVIOUR IN OUR HOMES AND EVERYDAY LIVES TO MEET 21ST CENTURY NEEDS Speaker: Prof. Sally Bloomfield , International Scientific Forum on Home Hygiene, UK
May 5, 2021	<i>(FREE WHO Teleclass for May 5 Events)</i> SECONDS SAVE LIVES: CLEAN YOUR HANDS Speaker: Prof. Didier Pittet , University of Geneva Hospitals, Switzerland
May 11, 2021	<i>(European Teleclass)</i> THE NORWAY EXPERIENCE CONTROLLING THE CORONAVIRUS PANDEMIC Speaker: Prof. Bjørg Marit Andersen , Faculty of Health and Social Science, Department of Nursing and Health Science, University of South-Eastern Norway

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