

Webinar on  
**Coronavirus  
& Cancer  
Research**

Day **1**

**29 - 30 March 2021**

**Day 1**

# Keynote

## Session 1

Webinar on

**CORONAVIRUS & CANCER RESEARCH**

29 - 30 March 2021



## Characteristics of new-onset pediatric type 1 diabetes in the COVID-19 pandemic – A multicentre perspective

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### Abstract

#### Objectives

To characterize the features of children diagnosed with new onset type 1 diabetes in the COVID -19 pandemic exploring the incidence of Diabetic Ketoacidosis (DKA) and investigating any association with SARS-CoV-2.

#### Methods

We analyzed data of new onset type 1 diabetes in children aged 6 months-17 years presenting from January to July 2020 to 12 Pediatric Diabetes Units (PDUs) in the UK. Data from the same time period in 2019 was compiled for comparison. We compared the characteristics of 178 children presenting with new-onset type 1 diabetes between January and July 2020 (time period of interest) with those of 150 children who presented during the same period in 2019.

#### Results

There was a statistically significant increase in the number of children with new-onset type 1 diabetes presenting with DKA in 2020 when compared to 2019 (76 versus 49,  $p < 0.05$ ). There was also an increase in the number of children presenting in severe DKA in 2020 when compared to 2019 (33 versus 16). The incidence of new onset type 1 diabetes from January to July 2020 was similar to the previous 4 years in 10 units. An apparent increase in 2020 was noted in two units, who were both from inner city localities with a highly diverse ethnic mix, 15 cases in 2020, versus 4-9 cases from the same time period in the previous 4 years in PDU1 and 12 cases in 2020, versus 5-9 cases from the same time period in the previous 4 years in PDU2. Association with COVID-19 could not be ascertained from the children tested for SARS-CoV-2 by NPA RT PCR and serology. There were two index cases who developed symptoms of COVID-19 were NPA RT-PCR positive and presented with severe DKA, new onset diabetes, shock illustrating the association with SARS - CoV-2 and severe DKA and the acceleration in the diagnosis of new onset T1DM. In 2019 35% of children had symptoms of less than 2 weeks (of which 43% were in DKA), 46% of children in 2020 presented with symptoms less than 2 weeks (of which 47% were in DKA). The short period of type 1 diabetes symptoms before presenting in DKA in 2020 does not suggest that delay was a significant factor. The short period of symptoms of type 1 diabetes at presentation during the study period and the severity of DKA raises the possibility that infection with SARS-CoV-2 may have been a trigger resulting in a rapid loss of  $\beta$ -cells contributing to the rise in incidence and severity of DKA also accelerating the development of new-onset diabetes.

#### Conclusion

There was increased incidence and severity of DKA during the study period in 2020. It is vital to emphasize the early recognition of DKA in children with new-onset diabetes particularly in view of the increased incidence in the pandemic. Our study did not provide evidence that the COVID-19 pandemic is leading to a marked increase in incidence of pediatric type 1 diabetes. However, there were pockets of unusual increased incidence in 2 units. This may have been isolated clusters in a high incidence area from specific geographical area with a multiethnic population

### Biography

Caroline Ponmani is a consultant in pediatric emergency medicine with a dual interest in pediatric diabetes and endocrinology. She noticed a trend of unusual incidence of increased DKA and children presenting with new onset T1DM, 2-3 per week in June 2020. There were variations in presentation (shorter duration of symptoms) and severe DKA. It led the regional network project we now plan to extend the project to cover the second wave of the pandemic.



## Overview of the possible role of vitamin C in management of COVID-19

**Anis Abobaker**

*Spire Fylde Coast Hospital, UK*

### Abstract

The mainstay of management of coronavirus disease 2019 (COVID-19) is mainly supportive as to date there is no effective antiviral treatment, apart from remdesivir which has been approved by Food and Drug administration (FDA) for treatment of COVID-19, or vaccine. Supplementation with micronutrients, such as vitamins and minerals, has gained an increasing interest as part of the supportive management of COVID-19. Vitamin C levels in serum and leukocytes are depleted during the acute stage of infection owing to increased metabolic demands. High dose vitamin C supplement helps to normalise both serum and leukocytes vitamin C levels. Vitamin C has multiple pharmacological characteristics; anti-viral, anti-oxidant, anti-inflammatory and immunomodulatory effects, which make it a potential therapeutic option in management of COVID-19. The use of high dose of intravenous vitamin C for management of COVID-19 in China and the United States has shown promising results. There were no reported adverse reactions with the short-term use of high dose of vitamin C. Given the fact that vitamin C is cheap, available and safe drug with beneficial effects in management of viral infections and critically-ill patients reported in previous clinical trials, it is sensible to add it to COVID-19 management protocol particularly if the current ongoing clinical trials testing the effect of vitamin C in management of COVID-19 show positive results.

### Biography

Dr Anis Abobaker is currently working as faculty in Spire Fylde Coast Hospital, UK.

# Speaker Session 1

Cancer Biomarkers | Epidemic outbreak of Covid 19 | Treatment & Cure |  
Symptoms & Transmission | Coronavirus disease 2019 (COVID-19)

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## Evaluating the efficacy of tasquinimod in COVID-19

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<sup>2</sup>Hospital Universitario Santa Lucía, Spain

### Abstract

#### Context

Quite disturbing is the huge public health impact of COVID-19: As at today [10th March 2021], the COVID-19 global burden shows over 117 million cases and over 2.6 million deaths worldwide.

#### Rationale

The available evidence shows calprotectin's potential as a therapeutic target, stating that tasquinimod, from the quinoline-3-carboxamide family is capable of blocking the interaction between calprotectin and TLR4. Hence preventing the cytokine release syndrome, that heralds the functional exhaustion in COVID-19. Early preclinical studies showed that tasquinimod inhibit tumor growth and prevent angiogenesis/cytokine storm. Phase I – III clinical studies in prostate cancer showed it has a good safety profile with good radiologic progression free survival but no effect on overall survival.

#### Purpose/Hypothesis

Strategic endeavors have been amplified globally to assess new therapeutic interventions for COVID-19 management – thus the clinical and antiviral efficacy of tasquinimod in COVID-19 remains to be explored. Hence the primary objective of this trial will be to evaluate the efficacy of tasquinimod in the treatment of adult patients with severe COVID-19 infections. Therefore, I hypothesise that among adults with COVID-19 infection, tasquinimod will reduce the severe respiratory distress associated with COVID-19 compared to placebo, over a 28-day study period.

#### Method

The setting is in Europe.

#### Design

A randomized, placebo-controlled, phase II double-blinded trial. Trial lasts for 28 days from randomization, Tasquinimod capsule given as 0.5mg daily 1st fortnight, then 1mg daily 2nd fortnight. IO outcome - assessed using six-point ordinal scale alongside eight 20 outcomes. 125 participants to be enrolled, data collection at baseline and subsequent data points, and safety reporting monitored via serological profile.

#### Significance

This work could potentially establish tasquinimod as an effective and safe therapeutic agent for COVID-19 by reducing the severe respiratory distress, related time to recovery, time on oxygen/admission. It will also drive future research – as in larger multi-centre RCT.

### Biography

Ralph Udeh is a COVID-19 researcher and a clinician with interest in the epidemiology of COVID-19, COVID-19 clinical trials, molecular virology, biostatistics, other infectious diseases and cancer. He is particularly interested in understanding the molecular underpinnings of COVID-19 and virology at large. His most recent work is focused on developing a clinical trial protocol for tasquinimod in COVID-19 [The TASQ-COVID trial]. With great enthusiasm, he looks forward to advancing his career in this field.

# Comprehensive profiling of circular RNA expressions reveals potential diagnostic and prognostic biomarkers in multiple myeloma

Fan Zhou\*, Dongjiao Wang, Wei Wei, Haimin Chen, Haotian Shi, Nian Zhou, Lixia Wu and Rong Peng

Zhabei Central Hospital, China

## Abstract

### Background

This study aimed to explore the heterogeneity of circRNA expression pattern via microarray, and further evaluate the potential of 10 specific circRNAs as diagnostic and prognostic biomarkers in Multiple Myeloma (MM).

### Methods

In exploration stage (stage I), circRNA expression profiles were detected by the microarray in bone marrow plasma cells from 4 MM patients and 4 Healthy Controls (HCs), and bioinformatic analyses were performed. In validation stage (stage II), top 10 upregulated and top 10 downregulated circRNAs identified in stage I were detected in 60 MM patients and 30 HCs for further validation; the diagnostic and prognostic values of these circRNAs in MM patients were analyzed.

### Results

In stage I, 122 upregulated and 260 downregulated circRNAs were identified in MM patients compared with HCs. GO, KEGG and pathway enrichment analyses revealed that these circRNAs were implicated in neoplastic pathways such as MAPK and VEGF signaling pathways. In stage II, circ-PTK2, circ-RNF217, circ-RERE, circ-NAGPA and circ-KCNQ5 were validated to be upregulated and circ-AFF2, circ-WWC3, circ-DNAJC5, circ-KLHL2, circ-IQGAP1 and circ-AL137655 were validated to be downregulated in MM compared with controls. Circ-PTK2 and circ-RNF217 were correlated with poor treatment response and survival, while circ-AFF2 predicted good treatment response and survival in MM patients.

### Conclusions

This study provides valuable reference for profound understanding about circRNA expression patterns in MM, and validates that circ-PTK2, circ-RNF217 and circ-AFF2 might serve as potential prognostic biomarkers in MM.

## Biography

Fan Zhou is good at the diagnosis and treatment of multiple myeloma with more than 1000 cases every year. In recent years, she has undertaken 19 scientific research projects, including 1 National Natural Science Foundation and 6 provincial and ministerial level projects. She has published more than 40 papers in core journals at home and abroad, including 5 SCI papers and 1 monograph.

## Intravenous thrombolysis for stroke in a COVID-19 positive Filipino patient – A case report

Lina C Laxamana\*, Chistian Oliver C Co, Jeryl Ritzi T Yu and Deborah Ignacia A David-Ona

*St. Luke's Medical Center, Philippines*

### Abstract

The WHO declared Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) or COVID-19 as a global emergency. Management and administration of intravenous alteplase in eligible covid stroke patients has its challenges and risks among health care workers. We report the first intravenous thrombolysis in a recently diagnosed COVID-19. A 62- year old female, known hypertensive, prediabetic, dyslipidemic with past history of TIA presented to the emergency department with cough and colds for 2 weeks associated with shortness of breath. She was admitted at the Medical Intensive Care Unit of our hospital, and presented with sudden onset of severe dysarthria and right upper and lower extremity weakness, NIHSS of 4, on the first hospital day. Brain CT scan showed subtle hypodensity in the left centrum semiovale and corona radiata and CT-angiography revealed significant stenosis in the left M1 segment of the Middle Cerebral Artery. Intravenous thrombolysis (IV rTPA) was initiated at a dose of 0.9mg/kg bodyweight 3.4 hours post ictus. Apart from RT PCR and chest CT scan findings significant for Covid 19, inflammatory mediators were elevated. On her third month, patient could speak fluently, able to walk with minimal deficit on the right arm. A direct link between Covid 19 and stroke has yet to be established but possible mechanisms include cardiovascular compromise in the setting of infection, reduced oxygenation in the setting of acute respiratory distress syndrome, and systemic inflammation causing thrombosis or plaque disruption. Management with antithrombotic drug, balancing hemodynamic status is paramount in treating such patients pre and post thrombolysis. Limitation of a more rapid response of the stroke team to evolving stroke problems early in the pandemic period include extrinsic factors including inadequate Personal Protective Equipment (PPE), lack of imaging modalities solely dedicated for COVID-19 patients, and inadequate staffing which predictably should improve over time.

### Biography

Lina C Laxamana is currently working as an associate professor of Neurology serves as head of the Institute for Neurosciences of St Luke's Medical Center, Global City, Philippines. She is a clinician, neurologist, and scientist, and has held prestigious leadership positions throughout the Neuroscience Department at St. Luke's Medical Center. She heads the Neurocritical Care Unit and an active member of the Stroke Team. She is a board member of the Stroke Society of the Philippines and the Philippine Neurocritical Care Society. She has published scientific papers and abstracts on stroke, cerebral edema and a frequent invited lecturer at national meetings.



## Medicine repurposing and the treatments for COVID-19

**Fengming Huang**

*Peking Union Medical College, China*

### Abstract

The novel coronavirus (CoV) Severe Acute Respiratory Syndrome (SARS)-CoV-2 outbreak spread worldwide. Angiotensin-Converting Enzyme 2 (ACE2), a well-known negative regulator of the Renin–Angiotensin–Aldosterone System (RAAS), reported play co-receptor role for SARS-CoV-2 entry into human cells. We found that the angiotensin II level from the plasma samples of COVID-19 patients was markedly elevated and strongly associated with viral load and lung injury, indicating ACE Inhibitor (ACEI) and Angiotensin Receptor Blockers (ARB) might contribute to COVID-19 treatment. A multicenter retrospective study including thousands of adult COVID-19 patients was design to examine the potential association between clinical outcomes (the mortality), disease severity and clinical characteristics with the use of ACEI and ARB. We found that prior used ARB among elderly patients with comorbid hypertension shown significantly improvement for the clinical outcome, dyspnea, fatigue, and many clinical indexes including C-reactive protein, lymphocyte count, procalcitonin D dimer, and hemoglobin. The disease severity were significantly reduced among ACEI users. Our studies indicate the antihypertensive drugs ARB and ACEI might be beneficial for COVID-19 patients, especially elderly patients with hypertension comorbidity.

SARS-CoV-2 could cause cytokine storm, we found that thirty-eight out of the 48 measured cytokines levels were significantly increased from the plasma of COVID-19 patients. Seventeen cytokines were linked to SARS-CoV-2 viral load, fifteen cytokines linked to lung injury. The elevated of IP-10, MCP-3 associated to disease mortality and might as biomarkers for the outcomes of COVID-19 patients. Based on the medicine repurposing platform we established previously for highly pathogenic avian influenza viruses, which also cause cytokine storm and lead to severe acute lung injury, we found several medicines including ifenprodil could effectively inhibit cytokine storm, alleviate lung injury and improve survival rate in mouse. Ifenprodil was used for RCT for COVID-19 in hospital. Further study could explore more for COVID-19 treatment.

### Biography

Fengming Huang is an associate professor at School of Basic Medicine at Peking Union Medical College and Chinese Academy of Medical Sciences (PUMC/CAMS), Beijing, China. She obtained a B.S degree in Pharmacy from Perking University, Beijing, China in 2010, and gained her PhD in Biochemistry and Molecular Biology at PUMC/CAMS in 2015. Her research focuses on the diseases related to acute lung injury, especially acute respiratory distress syndrome, associated with highly pathogenic infection, such as SARS-CoV-2 and avian Influenza A virus H5N1/H7N9 infection. She published peer-reviewed journals including National Science Review, Molecular Psychiatry, Nature Communications, Journal of Allergy and Clinical Immunology, Cell discovery, Scientific Reports, Plos Pathogens, mSystems, Science China Life Sciences.

# Five rapid scoring systems for predicting the mortality of severe novel coronavirus disease patient

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<sup>1</sup>Sichuan University, China

<sup>2</sup>China International Emergency Medical Team, China

<sup>3</sup>Wuhan University, China

## Abstract

### Objective

Rapid scoring systems are needed to assess the severity of the disease at admission, hence we do some research to evaluate its effectiveness of five rapid scoring methods, Quick Sequential Organ Failure Assessment (qSOFA), Modified Early Warning Score (MEWS), Rapid Emergency Medicine Score (REMS), Hamilton Early Warning Score (HEWS), National Early Warning Score (NEWS).

### Method

We collected demographics, clinical manifestations and laboratory results to calculate these scoring systems together, and then we used SPSS to perform a Receiver Operating Characteristic curve (ROC curve) analysis to determine and compare.

### Result

It shows that the maximum area under the curve (AUC) was REMS, which is 0.831, followed by NEWS, HEWS, qSOFA. Respectively, they are 0.793, 0.766, 0.734.

### Conclusion

We draw a conclusion that REMS is the most accurate and valuable score among them. The performance in predicting mortality such patients of HEWS, NEWS, MEWS is accepted as well but less effective to that of REMS.

## Biography

Longping Yan was a lively girl that born in Chongqing on November. 25, 2000 become a student from West China Medical School of Sichuan University in Chengdu City, Sichuan Province, China in 2019. Her mother was very strict with her. She speaks Chinese and English, and she is a proactive and social person. When she was young, she showed great interest in medicine, hence she studied hard to become a medical student and she is willing to contribute to it, therefore, she has published an article about novel coronavirus in the American Journal of Emergency Medicine during the epidemic in December 2020.

# Are glucagon-like peptide 1 analogues effective and safe in severe COVID-19 patients with type 2 diabetes? — A case report

Shuqian Chen<sup>1\*</sup>, Wei Lin<sup>1</sup>, Junping Wen<sup>1</sup>, Baosong Xie<sup>2</sup>, Lizhou Chen<sup>2</sup> and Gang Chen<sup>1</sup>

<sup>1</sup>Shengli Clinical Medical College of Fujian Medical University, Fujian Provincial Hospital, China

<sup>2</sup>Fuzhou Pulmonary Hospital of Fujian Province, China

## Abstract

Many cases of novel coronavirus 2019 (COVID-19) have confirmed in many countries around the world. Due to the disorders of the immune system, diabetic patients are more likely to suffer from severe COVID-19. Glucagon-Like Peptide 1 analogues (GLP-1 analogues) commonly can be used to reduce blood sugar. We show a case to prove GLP-1 analogues may be safely and effectively used in patients with diabetes merged severe COVID-19. In this case, we described a 65-year-old male with hypertension and diabetes was diagnosed with severe COVID-19, he took liraglutide at doses ranging from 0.8mg to 1.8mg. After treatment, the patient's blood glucose was under control, and his liver function, renal function, white blood cells, lymphocytes and other indicators were normal and chest CT also improved. Diabetic patients have immune dysfunction. High blood glucose promotes the synthesis of Advanced Glycation End Products (AGEs) and pro-inflammatory cytokines. SARS-CoV2 may cause diabetes by binding to ACE2 present in islet cells. In uncontrolled hyperglycemia, potential hyperglycosylated ACE2 in lungs, nasal airways, tongue and oropharynx may also increase SARS-CoV2 virus binding sites, resulting in higher COVID-19 tendency. As a safe hypoglycemic drug, GLP-1 analogues have been shown to have other beneficial effects in addition to hypoglycemic effects, such as anti-inflammatory effects. Elevated IL-6 level is an independent predictor of type 2 diabetes, and studies have shown that liraglutide could reduce IL-6 level. And GLP-1 is seldom associated with hypoglycemia. There is another important point, compared with intensive insulin therapy, anti-hyperglycemia therapy with daily injection of such as liraglutide reduces the frequency of contact between nurses and COVID-19 patients, thus it can reduce the risk of transmission from patients to nurses.

## Biography

Shuqian Chen is a postdoctoral fellow of Joslin Diabetes Center of Harvard University. He is the member of Endocrinology Branch of Chinese Medical Association, member of American Internal Endocrinology, member of American Diabetes Society, member of American Thyroid Society. He passed the ESAP Endocrinology specialist examination of the American Society of Endocrinology and obtained the certificate. He is also AMEE member of European Union for Medical Education, Editor-in-Chief of Endocrine system and Disease PBL case Base, deputy Editor-in-Chief of Endocrine system and Disease, deputy Editor-in-Chief of Endocrine Endocrinology, and Editorial Board of National Thirteenth five-year plan textbook Clinical Diagnostics. He won one third prize in the Chinese Medical Science and Technology Award (ranking first).

# Keynote

## Session 2

Webinar on

**CORONAVIRUS & CANCER RESEARCH**

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## 2019 novel coronavirus (COVID-19) pneumonia complications: The importance of lung ultrasound

Letizia Consoli\*, Vittorio Bendotti, Sara Cicchinelli, Federico Gaioni, Paola Prandolini, Monica Bettonagli and Paolo Terragnoli

*Fondazione Poliambulanza, Italy*

### Abstract

In December 2019, a novel coronavirus (SARS-Cov-2) was first reported in Wuhan, China, and rapidly spread around the world, leading to an international emerging public health emergency. As reported from Chinese experiences, approximately 20% of patients had a severe course, requiring intensive care, with an overall case fatality rate of 2.3%. In diagnosis, chest computed tomography most commonly showed ground-glass opacity with or without consolidative patterns.

Herein, we report a case of a patient affected by COVID-19 pneumonia referred in the emergency department of our institution on April 4, 2020, with peculiar lung ultrasound findings.

### Biography

Dr Letizia Consoli attended Università degli Studi di Brescia's School of Medicine and Surgery and she graduated with honors in 2006. Afterward, she attended a postgraduate school in Internal Medicine at Università degli Studi di Verona. She began her career at the Emergency Department of Fondazione Poliambulanza, in Brescia, where she has been working for 9 years. Her primary research interests are in emergency ultrasound in critical ill patient. She is a member of Italian Society of Medicine and Biology and she is involved in an educational project concerning emergency ultrasound. She has presented various educational courses concerning ultrasounds.



## Co-delivery of molecular-targeted drugs using tumor-seeing nanoparticles for improving synergistic therapy in head and neck cancer

Yong Teng<sup>1\*</sup>, Tiffany Lam<sup>1</sup>, Liwei Lang<sup>1</sup>, Caleb Jensen<sup>1</sup> and Chay Shay<sup>2</sup>

<sup>1</sup>Augusta University, USA

<sup>2</sup>Emory University, USA

### Abstract

Head and Neck Squamous Cell Carcinoma (HNSCC) is the most common malignancies of the head and neck region with increasing global incidence, constituting a serious public health concern. Compared with other solid tumors, HNSCC carries a poor prognosis with minimal improvement in survival trends in decades. Besides surgery, drug treatment is a mainstay of HNSCC patient treatment, which improves local tumor control and preserves normal tissues. However, developments of drug resistance frequently result in treatment failures. Despite Src has been implicated as a key promoter in tumor progression and metastasis of HNSCC, the clinical benefit of anti-Src drugs is significantly dampened by low response rate and therapeutic resistance. In this study, the Src inhibitor saracatinib loaded into the novel multifunctional nanoparticles exhibited superior effects on suppression of HNSCC compared with the free drug, which is mainly attributed to highly specific and efficient tumor-targeted drug delivery system. Moreover, we identified that upregulation of the AKT/S6 is the critical mechanism for HNSCC cells to develop saracatinib resistance. Capivasertib is the selective and potent AKT inhibitor and inactivating the AKT signaling can reverse saracatinib resistance and improve the efficacy of saracatinib in 3D cell culture and preclinical animal models. Most important, Cathepsin B-sensitive NPs for co-delivering saracatinib and capivasertib significantly improved the efficacy of tumor repression without increasing side effects. These data demonstrate that addition of AKT blockade improves anti-HNSCC efficacy of anti-Src therapy, and co-delivery of capivasertib and saracatinib by tumor-targeting NPs has the potential to achieve better treatment outcomes than the free drug combination.

### Biography

Yong Teng is an assistant professor of the Department of Oral Biology & Diagnostic Sciences at Augusta University and a Member of Georgia Cancer Center. He has a wide variety of expertise ranging from cellular and molecular biology to translational research, striving to bridge multiple major research themes (including tumor microenvironment, metabolism and metastasis) with an emphasis on several molecular determinants in cancer progression and treatment resistance and develop novel therapeutic strategies by targeting them. He is well supported by DOD, NIH and other funding sources, and has authored over 100 original papers and book chapters. He also serves on grant review panels, editorial boards, and International conference committees frequently.



## Low-dose lung radiotherapy as a treatment for severe Covid-19 induced pneumonia

**Dimitri Alex Dimitroyannis**

*Edward Hines Jr., VA Hospital, USA*

### Abstract

COVID-19 lung disease exhibits an acute, hyper-inflammatory state, the severity of which correlates with morbidity and mortality. The characteristic lung pathology and associated systemic deterioration are consistent with ARDS and cytokine release syndrome, respectively.

The early efficacy data for dexamethasone support the concept of hyper-inflammation as a critical pathological process, and the pulmonary focus of this immune response indicates that a lung-specific immunosuppressive intervention may have therapeutic value.

Numerous case series from the early 20th century indicate the successful use of Low-Dose Radiotherapy (LDRT) to the lungs to treat pneumonia of various aetiologies. That LDRT acts primarily by curbing inflammation is supported by multiple pre-clinical and clinical studies that illustrate efficacy in a broad range of inflammatory (non-malignant) pathologies. We review the renewed interest in the use of LDRT to treat COVID-19-related pneumonitis, as it is reflected by more than one dozen international clinical trials, and show some early results from our own work (ClinicalTrials.gov, NCT04572412)

### Biography

Dimitroyannis earned a doctorate in experimental high-energy physics and currently serves as chief of radiotherapy physics at Hines VA hospital with interests in the cost-effective uses of modern radiotherapy for cancerous and for non-neoplastic indications.

# Video Presentation Session 1

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# How has COVID-19 modified training and mood in professional and non-professional football players?

**Abraham García-Aliaga**

*INEF de la Universidad Politécnica de Madrid, Spain*

## Abstract

### Background

Coronavirus disease 2019 (COVID-19) has restricted freedom of movement with several countries 'locked down' worldwide. During this isolation period or quarantine, habits have been modified. This might have had negative effects on physiological variables but also influenced numerous emotional aspects, especially in elite athletes, which can have a negative impact on training and sleep quality, affecting their performance.

### Methods

175 Spanish professional and non-professional association football players answered an online survey about demographic and training habits, as well as two validated questionnaires to assess psychological variables (POMS and WLEIS-S).

### Results

The results showed that the confinement period reduced the load of training ( $p < 0.01$ ), and modified the sleeping behaviour (both, sleep time ( $p < 0.05$ ) and quality ( $p < 0.001$ )) across soccer players. Higher Emotional Intelligence (EI) values were positively related to training variables and strongly correlated with the mood. Interestingly, athletes' mood was affected differently depending on gender.

### Conclusion

We found that confinement period affects both, training load and recovery process and that mood states and EI could predict the training variables and performance of top-level football players.

# Speaker

## Session 2

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## Biodistribution of fluorescence-labelled EGF protein from slow release nano-zolid depots in mouse

Stefan Gruden<sup>1,2\*</sup>, Charlott Brunmark<sup>3</sup>, Bo Holmqvist<sup>4</sup>, Erwin D Brenndorfer<sup>2</sup>, Martin Johansson<sup>2</sup>, Jian Liu<sup>3</sup>, Ying Zhao<sup>1,5</sup>, Niklas Axen<sup>2</sup> and Moustapha Hassan<sup>1,5</sup>

<sup>1</sup>LIDDS AB, Sweden

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<sup>3</sup>Truly Labs AB, Sweden

<sup>4</sup>ImaGene-iT AB, Sweden

<sup>5</sup>Karolinska University Hospital Huddinge, Sweden

### Abstract

#### Aim

The study was designed to evaluate the ability of the calcium sulfate based NanoZolid® drug delivery technology to locally release the Epidermal Growth Factor (EGF) protein while maintaining its biological activity.

#### Methods

NanoZolid-formulated EGF protein labelled with a near infrared dye (EGF-NIR) depots or EGF-NIR dissolved in PBS were injected subcutaneously into mice bearing EGF receptor (EGFR) positive human A549 lung cancer tumors inoculated subcutaneously. The release and biodistribution of the EGF-NIR were investigated in vivo longitudinally up to 96 hours post administration, utilizing whole body fluorescence imaging. In order to confirm the in vivo findings, histological analysis of tumor cryosections was performed to investigate EGF-NIR fluorescent signal and EGFR expression level by immunofluorescence labelling.

#### Results

The in vivo fluorescence imaging showed a controlled release profile of the EGF-NIR loaded in the NanoZolid depots compared to free EGF-NIR. Histological analysis of the tumors further demonstrated a prevailing distribution of EGF-NIR in regions with high levels of EGFR expression.

#### Conclusion

Calcium sulfate based depots can be used to formulate EGF while maintaining its biological activity, e.g. receptor binding capability. This may have a good clinical potential for local delivery of biomolecules to enhance treatment efficacy and minimize systemic adverse effects.

### Biography

Stefan Gruden occupies the position of director-Pharmaceutical Research & Development at LIDDS AB. He is also principal at Formulationwise AB. In the past, he occupied the position of pharmacy manager at Galenica AB and pharmacy manager at Orexo AB. He received a graduate degree from the University of Uppsala.

# Aircraft cabin optimized smart phone technologies to ensure safe aircraft boarding during pandemic situations

Oliver Michler\*, Paul Schwarzbach and Michael Schultz

*Dresden University of Technology (TUD), Germany*

## Abstract

With the emergence of COVID-19, the sustainability of air travel is a major challenge as space in aircraft cabins is extremely tight and limited. To detect possible chains of infection, technology-enabled smart phone-based corona tracing apps are already being used for social distancing as well as tracking. Important for the indication of corona apps are distance undershoots (e.g. less than 2 metres) as well as time duration (e.g. greater than 15 minutes).

These corona apps measure the received signal strengths of all neighbouring smart phones with time reference for distance estimation. However, the distance estimation is very inaccurate because the individual environment (e.g. clothing, device positions) as well as the external environment (wall reflections, obstacle penetrations) have a great influence on the distance accuracy. In an aircraft, the radio environment is even more challenging than in other environments (e.g. supermarket) due to the small airframe and the round outer metal shell of the aircraft. Instead of level-based methods, only radio standards with time-of-flight measurement or phase measurement similar to GPS can be used meaningfully. Younger and many future smart phones have suitable integrated technology for this and, as a next generation Corona app, can also enable these challenges in terms of contact tracking in the aircraft cabin. The context for this as well as metrological expertise and the logistically protective adaptations will be presented.

The boarding process plays a major role in the risk of contagion in the aircraft, which is why efficient passenger handling with pandemic-optimised boarding strategies are used. In the presentation, standard boarding strategies are analysed under consideration of the quantity and quality of passenger interactions and evaluated with a virus transmission model. Simulatively, it can be shown that the use of precise contact distances extends conventional boarding, which makes an optimisation between economic efficiency (seat occupancy) and process duration (end of boarding) important. The boarding strategies discussed in the presentation using a reduced number of passengers sitting close to the aisle or time- and seat-selective boarding of passenger groups.

## Biography

Dr Oliver Michler is currently working as director of TU Dresden of Institute of Traffic Telematics in Germany and as well as full professor at TU Dresden in Systems Information Technology, Faculty of Transportation and Traffic Sciences. He worked as head of department of TUD-Researchgroup at Fraunhofer Institute of Traffic- and Infrastructure Systems Dresden in Germany. Earlier, he was working professor at University of Applied Sciences Dresden in Signal Processing and Electronic Measurement Techniques. He also worked as scientific staff at Fraunhofer Institute for Transportation and Infrastructure Systems Dresden, Germany in 2000 – 2005. From 1997 – 2000, he worked at Video-Audio-Design GmbH as a Telcom-Partner as scientific project manager. From 1993 – 1997, he worked as scientific staff and PhD-Research of TU Dresden, Faculty of Electrical and Computer Engineering.

## COVID-19 and resuscitation: Exploration of strategies to reduce aerosol-spread

Matthias Ott<sup>1\*</sup>, Alfio Milazzo<sup>2</sup>, Stefan Liebau<sup>2</sup>, Christina Jaki<sup>3</sup>, Tobias Schilling<sup>1</sup>, Alexander Krohn<sup>1</sup> and Johannes Heymer<sup>1</sup>

<sup>1</sup>*Interdisciplinary Emergency and Intensive Care Medicine, Germany*

<sup>2</sup>*Eberhard Karls University Tuebingen, Germany*

<sup>3</sup>*Simulation Center STUPS, Germany*

### Abstract

The Coronavirus Disease 2019 (COVID-19) spread all over the world and became pandemic. There is a high risk of infection with Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) during patient care for medical professionals, particularly in aerosol-generating procedures, such as endotracheal intubation and Cardiopulmonary Resuscitation (CPR). An alarming amount of lately reported COVID-19 cases are healthcare workers.

Protection especially during aerosol-generating procedures is of utmost importance. We saw a lack of data regarding safety precautions during cardiopulmonary resuscitation and evaluated aerosol-spread in Cardiopulmonary Resuscitation (CPR) using different methods of airway management. To evaluate aerosol-spread we nebulized ultraviolet sensitive detergents into the artificial airway of a resuscitation dummy and performed CPR. The spread of the visualized aerosol was documented by a camera. In a further approach we applied nebulized detergents into the airways of human cadavers and detected the simulated spread on the same way. Among others we did recordings with undergoing compression-only-CPR, with a surgical mask or an oxygen mask on the patients face and with an inserted supraglottic airway device with and without a connected airway filter. We also evaluated different strategies of endotracheal intubation.

Most aerosol-spread at the direction of the provider was visualized during compression-only-CPR. The use of a surgical mask and of an oxygen mask on the patients face deflected the spread. Inserting a supraglottic airway device connected to an airway filter lead to a remarkable reduction of aerosol-spread. The early insertion of a supraglottic airway device connected to an airway filter before starting chest compression may be beneficial for staff protection during CPR. As a result, we changed our strategy of resuscitation in our hospital and at prehospital emergency care developing a modified advanced life support algorithm. At the moment we enlarge our research on resuscitation of potential COVID-19 cases by further experiments.

### Biography

Matthias Ott is working at the department of Interdisciplinary Emergency and Intensive Care Medicine at Klinikum Stuttgart. Located in the southern part of Germany, the hospital of the city of Stuttgart is one of the biggest in the country. He gained expertise in trauma care and resuscitation during clinical training at R Adams Cowley Shock Trauma Center and Mount Sinai Hospital of Baltimore, US. As a member of the German Resuscitation Council, his main topic of research is cardiopulmonary resuscitation. He also researches on point of care ultrasound and teaches prehospital and clinical ultrasound in different settings.

## Usage of whole Genome K-mer analysis in determining the origin of SARS-CoV-2

Matyas Cserhati

*Independent Scholar, USA*

### Abstract

The origin of SARS-CoV-2 (SC2) has been a tricky question for researchers trying to get a handle on the ongoing pandemic. Two main viewpoints exist as to the identity of the transmitting species of SC2 from bats to humans: pangolin or dog. In this study an improved version of the Whole Genome K-mer Signature (WGKS) algorithm [1] was applied to coronavirus Whole Genome Sequences (WGS), 92 isolated from human, 48 from bats, and 20 from six other mammalian hosts.

These 160 WGS were analyzed for hexamers, allowing one mismatch. A correlation matrix was calculated comparing the WGKS for all possible species pairs, visualized in the heatmap below. The results show two large coronavirus clusters: one highly uniform cluster consisting of mainly SC2 genomes from human hosts, and the other a more diversified cluster of coronavirus WGS from bats.

This demonstrates that the SC2 pandemic has a single, very recent origin as opposed to other coronavirus WGS from bats, which have had time to diversify. A detailed examination of the phylogenetic tree shows that the coronavirus WGS from pangolin is less correlated with the SC2 clade from human. On the other hand, two early branches in the human SC2 clade shows that SC2 was transmitted from bats via by dog to humans. Colored arrows show the spread of SC2 from human to cat, tiger, and mink, but these strains are interspersed with the other SC2 WGS isolated from human.



Figure 1. Heatmap of the whole genome k-mer signature correlation values for all 160 species in the study. Red colors indicate high correlation values between two virus strains. Yellow colors denote lower correlation values. Colored arrows designate non-human and non-bat hosts which have SARS-CoV-2. Two major clades are visible, one including SARS-CoV-2, and another covering various coronavirus genomes from bats and pangolin.

### Biography

Dr Matyas (Matthew) Cserhati has a PhD in molecular biology and a BSc in software development. He has been studying SARS-coV-2 for half a year, and has studied the origin of the virus. He is currently working at a company, but has held several positions at academic institutions.

## Corticosteroid immunomodulation in COVID-19

Edison J Cano\* and Zelalem Temesgen

*Mayo Clinic, USA*

### Abstract

A novel coronavirus disease (COVID-19) due to SARS-CoV-2 infection has presented unprecedented challenges to healthcare worldwide. Corticosteroids have been widely used during this pandemic yet their benefits were not always clear. Early experience with other coronaviruses (SARS and MERS) was not all encouraging and detrimental effects were described that warranted caution. As the pandemic evolved a hyper-inflammatory phenotype in severe COVID-19 cases was characterized and immunomodulation took a lead role in the management of the disease. Early reports with few cases of corticosteroid use were not favorable either, yet in few months as the literature built-up, other larger and more robust studies started to show benefit that was later confirmed by randomized control trials and sustained their claims in large meta-analysis.

In this presentation, we will review key literature on corticosteroid use in COVID-19 cases covering immunopathology of COVID-19, a brief history of corticosteroid use, indications, clinically relevant outcomes, side effects, and lastly, international recommendations.

### Biography

Edison Cano MD obtained a medical degree from Universidad Católica de Santiago de Guayaquil in Ecuador. He completed his Internal Medicine residency at BronxCare Health System/Mount Sinai School of Medicine in the Bronx, NY and he is currently an Infectious Diseases fellow and assistant professor of Medicine at Mayo Clinic School of Medicine. His current academic interests include in immunocompromised hosts, immunomodulation during infectious diseases, transplant infectious diseases, biofilm-associated infections and phage therapy.

# Wastewater-based epidemiology to rapidly diagnose and map the COVID-19 pandemic

Timothy B Erickson\*, Peter R Chai, Mariana G Matus and Eric J Alm

*Mass General Brigham Health, Harvard Medical School, Harvard Humanitarian Initiative, Massachusetts Institute of Technology, USA*

## Abstract

The ability to test large populations for levels for SARS-CoV-2, the virus that causes COVID-19, is critical to understanding and mitigating the spread of disease during the current pandemic. Access to widespread, timely clinical test results is important to inform public health decisions (when to restrict public movement to control an outbreak, or when it is safe to relax restrictions). Since the first documented case of COVID-19 illness in the United States in January, to the current second surge in December 2020, SARS-CoV-2 testing has been inconsistent and delayed, with results returning days to weeks after testing. These limitations have greatly hampered efforts to control the pandemic. As a supplement to in-person testing, wastewater analysis can provide an efficient, aggregate-level early warning system to alert public health officials to the presence and rising levels of SARS-CoV-2 in a community. Wastewater analysis can also be used to understand viral dynamics over time, thereby informing important decisions such as phased reopening, hospital preparedness, and strategic location of testing centers. To this end, we were able to (1) measure the presence of SARS-CoV-2 in wastewater in the City of Boston and its suburbs; (2) use this wastewater-based information to monitor and map the concentration of SARS-CoV-2 in the City of Boston and adjoining neighborhoods; and (3) anonymously detect SARS-CoV-2 in communities, rapidly and unobtrusively. This is especially important in helping trigger public health responses prior to clinical cases of COVID-19 cases emerging in vulnerable communities. We developed interactive user-friendly maps to track SARS-CoV-2 as a method to visualize the impact of policies surrounding the pandemic (such as shelter-in-place and reopening phases), and assessments to eventually return individuals safely back to their everyday activities, including work and school. We have previously deployed special analytical robots in the sewer systems of Boston and surrounding neighborhoods. Data from this investigation informs the COVID command center regarding epidemiological trends of SARS-CoV-2 within a major city and its adjoining communities. Wastewater-based epidemiology and analysis will enable public health officials to make evidence-based, informed decisions at the population level during this and future pandemics.

## Biography

Dr Timothy B Erickson is a new HHI Core Faculty member with expertise in environmental toxicology and crisis in climate change. He also has active humanitarian health projects in conflict regions of Ukraine and Syria. He is an emergency medicine physician at the Brigham and Women's Hospital in Boston where he serves as the Chief of Medical Toxicology in the Department of Emergency Medicine. He earned his MD degree from The Chicago Medical School in 1986. He completed emergency medicine residency training at the University of Illinois and his medical toxicology fellowship at Cook County Hospital in Chicago. He is a fellow of the American College of Emergency Physicians, American College of Medical Toxicology, American Academy of Clinical Toxicology, and the prestigious National Geographic Explorers Club. Previously, he served as the director for the UIC Center for Global Health and professor of Emergency Medicine and Medical Toxicology at the University of Illinois at Chicago. He also served as the associate dean for Faculty Affairs, Graduate Medical Education, and Continuing Medical Education at the UIC College of Medicine. He was an acting and interim head in the Department of Emergency Medicine and has held other multifaceted appointments ranging from EM Residency Program director to chief of Medical Toxicology. He has been a member of multiple Editorial Boards and has a prolific academic history including publishing over 120 original journal articles and book chapters as well as editing 4 major textbooks. He has presented over 100 national and international invited lectures related to emergency medicine, toxicology, humanitarian global health, and wilderness/expedition medicine.



## Provision of advanced respiratory support for COVID-19 associated ARDS in a ward-based setting: A retrospective review

Katherine J Millington, Christina J Baggott, Fraser M Easton, Stuart Winearls, Niall Brown, James Morgan and Katrina J Curtis\*

*University Hospitals Bristol and Weston NHS Foundation Trust, UK*

### Abstract

#### Introduction

The pandemic of COVID-19 has strained Intensive Care (ICU) resources. The British Thoracic Society recommends use of ward-based Continuous Positive Airway Pressure (CPAP) or Non-Invasive Ventilation (NIV) only when ICU resources are limited or this is the ceiling of therapy. We established a COVID-19 high-care unit led by the Respiratory team with daily input from an ICU physician. Patients were only transferred to ICU for Invasive Mechanical Ventilation (IMV).

#### Methods

A retrospective observational analysis of patients requiring CPAP/NIV for COVID-associated Acute Respiratory Distress Syndrome (ARDS) was conducted. Case notes were reviewed and an anonymised secure database established. CPAP/NIV was indicated if arterial oxygen saturations were maintained <94% despite oxygen therapy.

#### Results

From 24th March – 7th May 46 patients required CPAP/NIV for COVID-19 associated ARDS. 65% of this cohort survived to discharge. 27 of this group were appropriate for IMV; of these 11 were intubated, 8 within the first 24 hours. Both moderate (16/27) and severe ARDS (5/27) was managed, with a 31% and 80% intubation rate respectively. Of the subgroup appropriate for IMV 1 patient refused and 3 died following intubation, giving a mortality rate of 15%. In those patients suitable for IMV but managed with CPAP/NIV alone the mean length of therapy was 8±5 days, with 56% undertaking prone positioning. Of the 19 patients in whom CPAP/NIV was the ceiling of therapy the average age was 71±12 years and clinical frailty score was 4±2, with an overall mortality of 63%.

#### Discussion

We were able to manage patients with COVID-19 associated ARDS appropriate for IMV safely on a dedicated high-care unit. Our reported mortality in this group was lower than that reported by the intensive care national audit and research centre (15% vs. 20%). In those with severe ARDS there was a high rate of intubation and protocols must be in place to ensure appropriate management. Mild-moderate ARDS was often successfully managed without intubation. Although the mortality was higher in those not suitable for IMV over a third of this group survived to discharge, suggesting centres should not be nihilistic about the benefit of advanced respiratory support in this group.

### Biography

Katrina Curtis is a consultant Respiratory Physician based at University Hospitals Bristol where she is the lead for the acute non-invasive ventilation service and organised the respiratory response to the Covid pandemic. As part of this she established a 32 bedded respiratory high care unit specifically for patients affected by coronavirus. She has an interested in acute and chronic ventilatory failure and was awarded a PhD by Imperial College London in 2016.

# Diet and breast cancer: Curcumin defend PhIP induced cytotoxicity in breast epithelial cells via multiple molecular pathways

**Ashok Jain**

*Albany State University, USA*

## Abstract

Cooking of meat at high temperature such as frying or barbeque causes production of Heterocyclic Amines (HCAs). At least a dozen of HCAs are found in cooked meat. The 2-amino-1-methyl-6-phenylimidazo[4-5-b]pyridine (PhIP) is abundant and most potent HCA in cooked meat. Several studies have shown that PhIP can induce tumors in breast, prostate and colon cells and in rodent models. It is shown that PhIP causes DNA mutation, promote tumor growth and promote invasiveness of cancer cells. PhIP metabolites are known to produce DNA adduct and DNA strand breaks. Phytochemicals are known to inhibit cytotoxic and genotoxic effects. Therefore, we hypothesized that the right combination of antioxidants and or phytochemical (naturally present in fruits, vegetables and spices) along with grilled meat should be capable of suppressing the PhIP induced cytotoxicity and breast cancer.

Curcumin found in turmeric is known for antioxidant and tumor suppressing properties. Therefore, a model system using human breast epithelial cells (MCF 10A) was developed to test and understand the interaction of curcumin and PhIP. The protective effect of curcumin was evaluated using cell viability assay, DCF assay to quantify ROS production, Comet assay to quantify the DNA damage and DNA adduct formation by immunofluorescence method. Results indicate that presence of these compounds improves cell viability as compared to PhIP treated group. However, curcumin co-treated cells showed significant differences and PhIP induced cell cytotoxicity was consistently reverted to normal. Gene expression analysis indicates that curcumin interact via multiple molecular targets, suggesting that curcumin appears to be an effective anti-PhIP food additive.

## Biography

Ashok Jain is a professor of Biology at Albany State University, GA, USA and program coordinator for Biotechnology program. He enjoys helping students with their journey to medical college and biomedical area. Recently, he is named as 'Leadership Fellow – University System of Georgia'. He has received research funding from several federal agencies such as NIH, DOD, and congressional funding, which helped developing an epigenetic breast cancer research program and biotech core research facility. He is the recipient of 'Researcher of the Year' twice in 2012 and 2018. He also served as a director, Center for Undergraduate Research.

## Effects of Vitamin-D<sub>3</sub>, vitamin-A and steroids combination on *in - vitro* human melanoma (BLM and 1205Lu) cell growth and its implication

Pandurangan Ramaraj

A. T. Still University, USA

### Abstract

Though UV rays in the sun light are essential for vitamin-D<sub>3</sub> formation, yet UV rays can also lead to skin cancer. Lack of vitamin-D<sub>3</sub> also can lead to cancer. Hence, we decided to study the effect of vitamin-D<sub>3</sub> on human melanoma cell growth. Our aims were to study the *in-vitro* effects of vitamin-D<sub>3</sub> and vitamin-A on human melanoma (BLM, 1205Lu) cell growth. Initially dose-curve (100 nM to 100 μM concentration) study was carried out with vitamin-D<sub>3</sub> and vitamin-A (retinoic acid) on BLM cells to determine the optimal concentrations of vitamins-D<sub>3</sub> and A for co-incubation with progesterone (50 μM) and RU-486 (50 μM). Supernatants from the treated cells were subjected to Elisarray. Vitamin-D<sub>3</sub> and vitamin-A showed a dose-dependent decrease in cell growth. Based on the dose-curve, it was decided to use 25 μM (at 57% cell growth) of vitamin-D<sub>3</sub> and 50 μM (at 55% cell growth) of vitamin-A for co-incubation studies. Co-incubation of vitamin-D<sub>3</sub> with vitamin-A showed an additive effect on the decrease of BLM cell growth (20%). Similarly co-incubation of vitamin-D<sub>3</sub> with progesterone (33% cell growth) and with RU-486 (28% cell growth) as well as co-incubation of vitamin-A with progesterone (31% cell growth) and RU-486 (18% cell growth) showed an additive effect on the decrease of BLM cell growth. Based on the co-incubation studies on BLM cell growth, it was decided to repeat the studies on 1205Lu cells. So, 25 μM (at 34% cell growth) of vitamin-D<sub>3</sub> and 50 μM (at 44% cell growth) of vitamin-A were used for co-incubation studies. Co-incubation of vitamin-D<sub>3</sub> with vitamin-A showed an additive effect on the decrease of cell growth (22%). Though co-incubation of vitamin-D<sub>3</sub> with progesterone did not show any difference in cell growth (51%), yet co-incubation with RU-486 showed a decrease in 1205Lu cell growth (21%). Similarly co-incubation of vitamin-A with progesterone (25% cell growth) and with RU-486 (23% cell growth) showed a synergistic effect on the decrease of 1205Lu cell growth.

### Conclusion

Co-incubations of vitamins and steroids were effective in decreasing melanoma cell growth *in-vitro*, suggesting a combo drug effect. Hence, various combinations of vitamins and steroids will be tested for their effect on melanoma cell growth in vitro in order to facilitate a combo drug cocktail for melanoma treatment.

### Biography

Pandurangan Ramaraj currently working as an associate professor in the Dept. of Biochemistry at Kirksville College of Osteopathic Medicine, A.T. Still University, Kirksville, Missouri, USA. He is teaching medical biochemistry to medical, dental and master's students. He also mentor of M.S. and D.O. students in research work. His research focuses on sex steroid hormones effects on cancer, using melanoma cell lines as model system. He has been invited to give key-note talks at various International Meetings. His research work has been published as peer-reviewed articles and as book chapters.

Webinar on  
**Coronavirus  
& Cancer  
Research**

Day **2**

**29 - 30 March 2021**

**Day 2**

# Keynote

## Session 3

Webinar on

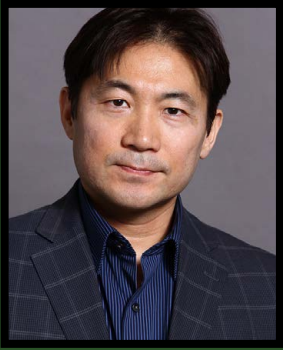
**CORONAVIRUS & CANCER RESEARCH**

29 - 30 March 2021

## Artificial intelligence in diagnosis of cancer with medical images

**Kenji Suzuki**

*Tokyo Institute of Technology, Japan*



### Abstract

Deep learning in Artificial Intelligence (AI) has become one of the most active areas of research in the biomedical imaging field including medical image analysis and Computer-Aided Diagnosis (CAD), because “learning from examples or data” is crucial to handling a large amount of data (“Big data”) coming from medical imaging systems. Deep learning, including our original Massive-Training Artificial Neural Networks (MTANNs), is an end-to-end machine learning model that enables a direct mapping from the input images to the desired outputs, eliminating the need for handcrafted features in feature-based machine learning. Deep learning is a versatile, powerful framework that can acquire medical image-processing and analysis functions through training with image examples. In this talk, deep learning in medical imaging and computer-aided diagnosis is overviewed, including 1) CAD for lung cancer detection in chest radiography and thoracic CT, 2) distinction between benign and malignant nodules in CT, 3) polyp detection and classification in CT colonography in colorectal cancer screening, 4) separation of bones from soft tissue in chest radiographs, and 5) radiation dose reduction in CT and mammography.

### Biography

Kenji Suzuki has been actively researching deep learning in medical imaging and AI-aided diagnosis for over 25 years. Prior faculty experiences include University of Chicago and Illinois Institute of Technology. He has published 14 books and over 340 papers and is an inventor on a dozen of licensed and commercialized patents, including one of the earliest deep learning patents. He has been awarded numerous grants, including grants from NIH, NEDO, and JST, chaired 98 International conferences, and served as editor of over 40 leading International journals. He has been professor at Institute of Innovative Research at Tokyo Institute of Technology, where he explores the possibilities of explainable AI.

# Speaker

## Session 3

Webinar on

**CORONAVIRUS & CANCER RESEARCH**

29 - 30 March 2021

## Walk-through screening system for COVID-19

Ji Yong Lee\* and Sang Il Kim

*H Plus Yangji Hospital, Korea*

### Abstract

With the ongoing novel coronavirus disease 2019 (COVID-19) pandemic, the number of individuals that need to be tested for COVID-19 has been rapidly increasing. We developed a negative pressured booth that is inspired by the biosafety cabinet class 3 and named it the Safe Assessment and Fast Evaluation Technical booth of the H Plus Yangji Hospital (SAFETY) and implemented a Walk-Through (WT) screening center using 4 SAFETYs for safe and efficient COVID-19 screening in our hospital. Our hospital's WT screening system increased patient access to the screening clinic, protected healthcare personnel adequately, and reduced personal protective equipment consumption while testing more than 9–10 folds of people than the conventional method. By increasing the numbers of SAFETY, adequate ventilation, using an effective, harmless, and certified environmental disinfectant, automatic disinfecting the inner surface of SAFETY, and mobile questionnaire system, we had been overcoming the risk of cross-infection and adverse effects of disinfectant. Daily environmental monitoring was performed on the booth surface by the real-time polymerase chain reaction method, and no virus was detected during four months of operating. In the COVID-19 pandemic, WT screening center enables safe and efficient treatment while maintaining accessibility to the healthcare system even in resource-limited situations.

### Biography

Ji Yong Lee received Medical Degree from the Eulji University. He completed internship and residency training in Internal Medicine at Kangbuk Samsung Hospital, Sungkyunkwan University and fellowship training in Division of Infectious Disease, Department of Internal Medicine at Samsung Medical Center, Sungkyunkwan University. Now, he is the director of the Division of Infectious Disease, Department of Internal Medicine, and the manager of infectious control team of H Plus Yangji Hospital since 2016.



# Modulated electro hyperthermia inhibits tumor progression and optimizes systemic immune-response in a triple negative mouse breast cancer model

Csaba Andras Schvarcz\*, Lea Danics, Pedro Leroy, Zoltan Benyo, Tamas Kaucsar and Peter Hamar

*Semmelweis University, Hungary*

## Abstract

### Introduction

Effective therapy of Triple-Negative Breast Cancer (TNBC) has not yet been achieved. Modulated Electro-Hyperthermia (mEHT) is a novel therapeutic option, based on the selective heating and energy transfer to the tumor tissue by electromagnetic field.

### Aims

Our aim was to investigate the effects of repeated mEHT treatment in a triple-negative mammary carcinoma bearing mouse model.

### Method

4T07 cells were inoculated orthotopically in female BALB/c mice. Tumor growth was monitored by caliper and ultrasound (Phillips Sonos 5500). Treatments started 7 days after inoculation and were repeated 3 or 5 times, every other day. Tumor and blood samples were taken 24 hours after last treatment. Tumor destruction rate was evaluated on H&E and cleaved caspase-3 stained immunohistochemical sections. HSP70 and Ki67 expression were analyzed on immunohistochemical sections. Circulating immune cells (CD4+, CD8+ T lymphocytes, granulocytes, Myeloid-Derived Suppressor Cells (MDSCs)) were analyzed with flow cytometry. Expression of Granulocyte-Colony Stimulating Factor (G-CSF) mRNA, isolated from the tumor was evaluated with qPCR.

### Results

Ratio of both CD4+ and CD8+ lymphocytes increased significantly after repeated treatments. Ratio of granulocytes, MDSCs in the circulation and the G-CSF expression of tumor cells decreased significantly after repeated mEHT treatments. mEHT caused 6.1 fold higher HSP70 elevation in the tumor tissue, compared to the sham group ( $p < 0.001$ ). Tumor size significantly decreased (tumor weight sham:  $288.3 \pm 58.1$  mg vs mEHT:  $85.3 \pm 21.3$  mg,  $p < 0.05$ ) with the elevation of tissue destruction and reduction of Ki67 positive nuclei number (sham:  $2823.4 \pm 211.9$  pcs/mm<sup>2</sup> vs mEHT:  $1736.7 \pm 315.3$  pcs/mm<sup>2</sup>,  $p < 0.05$ ) in treated tumors.

### Conclusion

Our findings suggest, that repeated mEHT could optimize systemic immune-response with the elevation of effector T lymphocytes and the decrease of tumor-promoting MDSCs. The treatment reduced tumor growth with heat-shock-mediated tissue destruction and impaired cell proliferation. Thus, mEHT could be a possible alternative adjuvant therapeutic strategy for TNBC cancer patients.

## Biography

Csaba Andras Schvarcz born in 1989.06.24-en, Zalaegerszeg, Hungary. He graduated at Semmelweis University, in 2016, at Faculty of Medicine, as general doctor. After graduation, he started to work at Honved Hospital, Oncological Department. He started his PhD in 2018, February at Institute of Translational Medicine, Semmelweis University. His PhD topic is "Role of tumor immunology in the pathomechanism and treatment of breast cancer", his supervisor is Dr Peter Hamar. Currently, his research focuses at the mechanisms of action and usability of electro-hyperthermia treatment in triple negative breast cancer in vivo models.

# Poster Presentation

Webinar on

**CORONAVIRUS & CANCER RESEARCH**

29 - 30 March 2021

## Remote rehabilitation for patients with COVID-19 infection

Tomoko Sakai\*, Chisato Hoshino, Masanobu Hirao, Reiko Nakahara, Rui Nakahara and Jun Seki, Atsushi Okawa

*Tokyo Medical and Dental University, Japan*

### Abstract

#### Objective

To describe the effectiveness and risk management of remote rehabilitation for coronavirus disease (COVID-19) patients.

#### Design

Single-centre, retrospective, observational study

#### Patients

COVID-19 patients who underwent rehabilitation (24 April–24 May 2020)

#### Methods

In the COVID-19 general wards, we installed four Wi-Fi-connected iPad terminals (two in the infected zone: red zone, two in the clean zone: green zone) for communication between a physical therapist in the clean nurses' station (green zone) and a patient or nurse wearing PPE in the patient's room (red zone). Using these terminals, the physical therapist in the green area could get a full-body view of the patient in the red area and speak with him or her. We investigated remote rehabilitation performed for patients in the red area by the physical therapist in the green area using an iPad for communication via audio and video. We assessed all general ward COVID-19 inpatients undergoing rehabilitation. Data on age, sex, physical ability, rehabilitation modality (remote/direct), and rehabilitation-related complications were collected. We measured the Activities of Daily Living (ADLs) using the Barthel Index.

#### Results

78 patients (male/female: 49/29, age: 54.5 years [range, 20~96]) initially underwent direct rehabilitation. Twenty-six patients switched from direct to remote rehabilitation. Patients who underwent remote rehabilitation were significantly younger than those who underwent direct rehabilitation. Of the 12 patients requiring intubation, three underwent remote rehabilitation, and one extracorporeal membrane oxygenation survivor underwent direct rehabilitation. All remote rehabilitation patients were discharged, and were situated at home or in a hotel; 35/52 patients were transferred to a rehabilitation hospital owing to a delayed recovery of ADLs even after the treatment regimen for COVID-19 was completed. No serious adverse events, nor did any case of hospital-acquired infections occur among the medical staff during this period.

#### Conclusion

Effective and safe remote rehabilitation was performed in 33.3% of COVID-19 patients, reducing the duration of the medical staff's stay in the COVID-19 isolated area.

### Biography

Tomoko Sakai specializes in rehabilitation medicine. He was an orthopedic surgeon before, who shifted to this discipline five years ago. He loves this area of medicine, as he can feel the patients' minds directly every day. He experienced the impact of COVID-19 in his University Hospital in Japan this year, as many other doctors have worldwide that profoundly impacted him to avoid doing regular patient interaction to avoid infection transmission. He believes that we can overcome this challenging situation through wisdom and ingenious attempt.

# The clinical efficacy of PEI combined with HIFU for small liver cancer in the special or high-risk location

Xiaoli Zou\*, Xiaobei Liu and Changzhi Zhao

*Dalian Municipal Friendship Hospital of Dalian Medical University, China*

## Abstract

### Objective

To explore the short-term effect, postoperative complications and energy efficiency relationship of ultrasound-guided Percutaneous Ethanol-Lipiodol Injection (PEI) combined with High Intensity Focused Ultrasound (HIFU) in the treatment of small liver cancer in the special or high-risk location.

### Methods

40 cases with small liver cancer in the special or high-risk location were randomly divided into two groups: 20 cases were treated with PEI combined with HIFU, and 20 cases were treated with HIFU alone. There were no significant differences in average age, liver function, tumor location, tumor numbers and sizes between the two groups ( $P>0.05$ ).

### Results

There were significant differences in ablation volume, ablation rate and ablation parameters between the two groups ( $P<0.05$ ). Under the same power, ablation volumes of PEI combined with HIFU group were significantly greater than those in HIFU group, the average exposure time and total power were significantly lower than those in HIFU group, postoperative complications were significantly lighter than those in HIFU group.

### Conclusion

The combination of PEI and HIFU has better clinical application value for small liver cancer in the special or high-risk location.

## Biography

Xiaoli Zou completed Bachelor degree from 2000 to 2005 at Dalian University- China, she did Clinical Internship at The second affiliated hospital of Dalian Medical University- China from 2005 to 2008, Master Degree from 2008 to 2012 at Dalian Medical University. She is a sonographer from 2012 to 2020 at Dalian Municipal Friendship Hospital of Dalian Medical University and she did Short-term study from March, 2015 to September, 2015 at Fuwai Hospital- Beijing, China.

## Targeted modification of the surface of tumor cells with heat shock protein HSP70

Leonid Kanevskiy\*, Olga Ovsyanikova, Maria Grechikhina, Olga Shustova, Elena Kovalenko, Sergey Deev and Alexander Sapozhnikov

*Shemyakin–Ovchinnikov Institute of Bioorganic Chemistry, Russia*

### Abstract

One of the promising approaches to antitumor immunotherapy is the targeted modification of the surface of tumor cells with molecular structures that are well recognized by killer cells and induce the cytolytic activity of these effectors of the immune system. In recent years, studies have appeared indicating that heat shock proteins with a molecular weight of 70 kDa (HSP70) are among such endogenous markers of tumor cells recognized by the immune surveillance system. In this regard, we are conducting research aimed at creating molecular constructs that can be used to carry out targeted delivery of HSP70 to malignant neoplasms in order to attract and activate cytotoxic effectors of the immune system. We have previously shown that targeted delivery of exogenous HSP70 molecules or their C-terminal (16 kDa) fragment (HSP70/16) to tumor cells using recombinant mini-antibodies to the tumor-specific antigen HER2/neu as part of a supramolecular complex (based on the barnase-barstar connecting module) initiates NK cell cytotoxic reaction to the target cells. These results demonstrated the promise and relevance of the development of molecular structures capable of targeted delivery of heat shock proteins HSP70 and HSP70/16 to malignant neoplasms for antitumor immunotherapy. The aim of this work was to continue our studies aimed at assessing the efficiency of targeted delivery of HSP70 to cancer cells using a two-module molecular construct, in which mini-antibodies to the HER2/neu antigen were replaced with a recombinant protein DARPin specific to this antigen. We also analyzed the activating effect of this construct on the antitumor activity of cytotoxic cells of the immune system in in vitro culture. The results demonstrated the selective binding of the developed construct to tumor cells expressing the HER2/neu antigen and showed a significant antitumor effect of the tested preparation in in vitro models of the cytolytic action of cytotoxic effectors isolated from the population of human peripheral blood mononuclear cells.

This work was supported by the Russian Science Foundation, grant number 19-75-10120.

### Biography

Leonid Kanevskiy graduated from Moscow State University, biology faculty. He did his PhD in Immunology. He is a researcher in Lab of Cell Interactions in Shemyakin–Ovchinnikov Institute of Bioorganic Chemistry, Moscow, Russia.

## Microbial metabolites alter breast cancer aggressiveness

Tunde Kovacs<sup>1\*</sup>, Edit Miko<sup>1</sup>, Zsanett Sari<sup>1</sup>, Patrik Kovacs<sup>1</sup>, Gyula Ujlaki<sup>1</sup>, Tamas Csonka<sup>2</sup>, Gabor Mehes<sup>1</sup>, James J. Goedert<sup>2</sup>, Anna Sebestyen<sup>3</sup>, Eva Sebo<sup>4</sup>, Judit Toth<sup>1</sup> and Peter Bai<sup>1</sup>

<sup>1</sup>University of Debrecen, Hungary

<sup>2</sup>National Cancer Institute, USA

<sup>3</sup>Semmelweis University, Hungary

<sup>4</sup>Kenezy Gyula County Hospital, Hungary

### Abstract

The human body harbors numerous bacteria, called the microbiota. Increasing evidence support a complex interaction between the microbiota and the host. However, the number of directly tumorigenic bacteria is extremely low, microbial dysbiosis - changes in the composition or function of the microbes - has recently been associated with a large set of diseases, breast cancer (BC) among them. It is very likely, that some bacterial metabolites are transported through the circulatory system, accumulate and exert their effects on cancer cells located far from the GI tract.

We successfully identified 4 bacterial metabolites: Lithocholic Acid (LCA), Cadaverine, Indoxyl Sulphate (IS) and Indolpropionic Acid (IPA), that had significant effects on BC development. However, all metabolites reduced cell proliferation and Epithelial-Mesenchymal-Transition (EMT) *in vitro*, LCA also inhibited  $\beta$ -catenin signaling pathway, reduced VEGF mRNA expression, altered cell metabolism via FOXO1 and AMPK pathways, as well as induced glycolysis and mitochondrial respiration. The effect of cadaverine was the most expressive in reducing cell movements and diapedesis, and reducing stem cell-ness of 4T1 BC cells. LCA, IS and IPA was also able to disrupt cellular protecting mechanisms against oxidative stress and lipid peroxidation. We revealed specific receptors responsible for metabolite effects: TGR5 and CAR for delivering the effects of LCA, TAARs for cadaverine, AHR and PRX for IPA and IS-evoked effects. Our histopathological examination showed similar effects in the case of all four metabolites with reduced tumor mass, fewer numbers of metastases and lower infiltration of primary tumors *in vivo*. Experiments using our human biobank revealed significant changes in the abundance of specific DNA regions – responsible for the production of these metabolites –, the expression level of the aforementioned receptors, or the serum level of metabolites altered not only in samples from BC patients compared to healthy individuals, but between stages of BC as well.

### Biography

Tunde Kovacs completed her doctoral (PhD) scientific degree at Doctoral School of Molecular Medicine in the University of Debrecen from 2014-2019, and biologist (laboratory operator specialization) bachelor degree from 2008-2011 at University of Debrecen. She did her master degree from 2011-2013 at University of Debrecen as a molecular biologist (Medical Biology-Pharmacology specialization). Her Language skills: English Complex (C), Comparative level (2006), Spanish Complex (C), Basic level (2017).

Grants and supports:

1. New Nation Excellence Program (UNKP fellowship, Hungary) 2020
2. Szent-Gyorgyi Young Investigator Award 2019
3. EMBO/EMBL symposia fellowship of EMBO/EMBL Advancer Training Center Corporate Partnership Program 2018
4. Best Poster of Young Investigator Award, MET-MFT Conference 2017 (Hungary)
5. Cancer Webinar 2021 (UNKP-20-4-II-DE-68, UNKP-19-4-DE-79, K123975, FK128387, PD124110, GINOP-2.3.2-15-2016-00006, Z01CP010214, NKFIH-1150-6/2019)

# Speaker

## Session 4

Webinar on

**CORONAVIRUS & CANCER RESEARCH**

29 - 30 March 2021

## Early conscious prone positioning on CPAP in patients with COVID-19 outside the Intensive Care Unit: A retrospective review

Emma L Swingwood, Stuart Winearls, Charlotte L Hardaker, Amy M Smith, Fraser M Easton, Katherine J Millington, Rebecca S Hall and Katrina J Curtis\*

University Hospitals Bristol and Weston NHS Foundation Trust, UK

### Abstract

#### Introduction & Objectives

COVID-19 has challenged the management of hypoxaemic respiratory failure. Whilst Prone Positioning (PP) is an established therapy in mechanically ventilated patients with Acute Respiratory Distress Syndrome (ARDS), its role in conscious patients is less defined. We adopted early conscious PP in patients with COVID-19 associated ARDS requiring Continuous Positive Airway Pressure (CPAP) in a designed respiratory high-care unit. We retrospectively reviewed our experience, reporting the physiological changes, along with the duration and complications of PP.

#### Methods

Between 8th April and May 31st 2020, 28 patients admitted with ARDS due to COVID-19 required CPAP to maintain adequate oxygenation. Physiological parameters were recorded immediately prior to CPAP initiation; whilst on CPAP prior to PP; during PP on CPAP (15 minutes after PP initiation); and 1 hour post PP whilst on CPAP. The ROX score, a composite measure of oxygenation and work of breathing (ROX index =  $[\text{SpO}_2/\text{FiO}_2]/\text{respiratory rate}$ ), and  $\text{PaO}_2:\text{FiO}_2$  ratio were recorded. The duration of attempted PP in the first 24 hours, number of consecutive days of PP and any complications were noted. Patient outcomes were reviewed 28 days post admission.

#### Results

4 of the 28 patients were excluded due to contraindications to PP. 2 patients failed to tolerate PP due to worsening oxygenation and pain. PP was initiated a median of 30 (IQR 7-99) hours after the commencement of CPAP. The mean duration in the first 24 hours was  $8 \pm 5$  hours and PP was continued for a mean of  $10 \pm 5$  days. The use of PP alongside CPAP significantly increased both the ROX index and  $\text{PaO}_2:\text{FiO}_2$  ratio from baseline (ROX index:  $7.0 \pm 2.5$  baseline vs.  $11.4 \pm 3.7$  CPAP+PP,  $p < 0.0001$ ;  $\text{PaO}_2:\text{FiO}_2$  ratio:  $143 \pm 73$  mmHg baseline vs.  $252 \pm 87$  mmHg CPAP+PP,  $p < 0.01$ ), with the changes remaining significant 1 hour post PP (Figure 1). At 28 days post admission 19 patients had been weaned off CPAP and 18 discharged; 1 patient proceeded to mechanical ventilation, and 4 had died.

#### Conclusion

From our experience early and prolonged PP alongside CPAP was feasible, tolerated, safe, and improved oxygenation. This may form part of the treatment strategy in COVID-19 associated ARDS and warrants further investigation in randomised controlled trials.

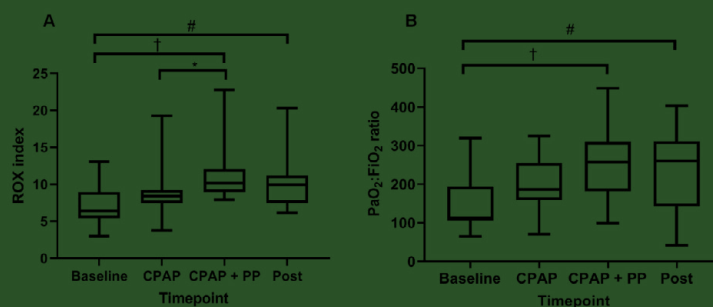


Figure 1: A) ROX index and B)  $\text{PaO}_2:\text{FiO}_2$  ratios prior to CPAP ('baseline'), following CPAP initiation ('CPAP'), prone positioning on CPAP ('CPAP + PP') and 1 hour after cessation of proning whilst on CPAP ('post'). Analysis of variance (ANOVA) with correction for multiple testing was used to compare each time point; \*significantly different from CPAP  $p < 0.05$ ; †significantly different from baseline  $p < 0.001$ ; #significantly different from baseline  $p < 0.01$ .

### Biography

Katrina Curtis is a consultant respiratory physician based at University Hospitals Bristol where she is the lead for the acute non-invasive ventilation service and organised the respiratory response to the covid pandemic. As part of this she established a 32 bedded respiratory high care unit specifically for patients affected by coronavirus. She has an interested in acute and chronic ventilatory failure and was awarded a PhD by Imperial College London in 2016.



## Modern Russian and foreign methods of healthcare personnel protection from COVID-19

**Nadia Vosheva**

*Research Institute for Healthcare Organization and Medical Management, Russian*

### Abstract

On December 31, 2019, the World Health Organization announced the coronavirus (COVID-19) outbreak and medical workers appeared on the frontline in combating the new threat. Daily interactions with infected patients, extended working hours and psychological overload: all this makes healthcare professionals extremely vulnerable to a new danger. Therefore, the actual priority is to prevent the nosocomial spread of the disease and the protection of medical personnel.

This presentation aims exploration and generalization of Russian and international experience of COVID-19 pandemic combating in terms of creating the most efficient system of health workers' protection against the infection, caused by a new virus SARS-CoV-2. Through the prism of World Health Organization recommendations, the presentation describes six major ways to prevent or limit COVID-19 transmission within the medical organization: safe hospital logistics, standard and additional precautions (including the use of personal protective equipment), efficient administration, environmental and engineering tools, as well as psychological support for medical personnel. The speaker believes that the balanced use of the described protective measures can minimize the risk of healthcare workers' infection with the coronavirus.

The presentation provides a comprehensive picture of existing approaches to medical staff protection from new coronavirus infection, and may be useful in developing strategies of infection prevention and control in order to prevent or limit the transmission COVID-19 or potentially any other respiratory infection.

### Biography

Nadia Vosheva graduated from Higher School of Economics in 2011. She formerly worked as head of the Financial and Economic Department of the Ministry of Health of the Russian Federation. Since 2020, she works as a head of International Department in Research Institute for Healthcare Organization and Medical Management (Russian Federation), which is responsible for developing international academic networks. She is currently working on the scientific projects with the World Bank and London School of Economics.

# The biphasic pattern of the virulence curve of the first and second wave of COVID-19

**Kayode Oshinubi\*, Jacques Demongeot and Mustapha Rachdi**

*Université Grenoble Alpes, France*

## **Abstract**

We propose the estimation of daily reproduction rates of Covid-19 outbreak using the method of deconvolution. While estimating the daily reproduction rates throughout the infective period, a biphasic pattern was observed which looked like the shape of the virulence curve observed in coronavirus patients. It is common to see this pattern during the clinical course of patients with seasonal influenza which is sometimes called “V-fever” due to two distinct peaks. We compared this pattern for various countries for the first and second wave of Covid-19 outbreak.

## **Biography**

Mr Kayode Isaac Oshinubi is currently working in Université Grenoble Alpes, France.

# Keynote

## Session 4

Webinar on

**CORONAVIRUS & CANCER RESEARCH**

29 - 30 March 2021



## Early assessment of knowledge, attitudes and behavioral responses to COVID-19 among Connecticut residents in the US

Toan Ha<sup>1\*</sup> and Stephen Schensul<sup>2</sup>

<sup>1</sup>University of Pittsburgh, USA

<sup>2</sup>University of Connecticut, USA

### Abstract

#### Introduction

This study assessed knowledge, attitudes, and preventive behavioral responses for COVID-19.

#### Methods

A cross-sectional survey was conducted among non-healthcare-related residents in Connecticut from March 23 to March 29, 2020. Multivariate logistic regression analysis identified factors associated with anxiety, self-perceived seriousness of COVID-19 and loneliness. Multiple linear regression analysis examined factors associated with adoption of prevention behaviors controlling for age, gender, education, marriage, employment and ethnicity.

#### Results

A total of 464 participants responded to the survey. Most participants recognized cough, shortness of breath and fever as primary symptoms of COVID-19. Nearly 50% reported high levels of anxiety to COVID-19 and 48% reported loneliness during the social isolation period. Higher levels of COVID-19 knowledge were associated with higher levels of anxiety. Married respondents had 1.79 times higher levels of anxiety about COVID-19. Higher levels of self-perceived seriousness of COVID-19 and high anxiety levels about COVID-19 were significantly associated with adopting prevention behaviors. Women were more likely to adopt prevention behaviors and less likely to report loneliness than men. Older age was associated with taking the pandemic seriously, adopting prevention behaviors and loneliness during the social isolation.

#### Conclusions

Accurate and scientific knowledge is an important foundation for prevention behaviors during the COVID-19 pandemic. However, messages also need to be tailored to address issues of gender, age, and how to increase awareness of the seriousness of the disease and reduce anxiety. Further research should systematically explore how levels of anxiety facilitate preventive behaviors as well as the role of anxiety in mental health responses.

### Biography

Dr Toan Ha, MD, DrPH, is an assistant professor of infectious diseases of the Infectious Diseases and Microbiology Department at Graduate School of Public Health, University of Pittsburgh, USA. His primary research interests are in the prevention, theory-based intervention and social, mental and behavioral aspects of infectious diseases including COVID-19, HIV/AIDS and STIs. He is particularly interested in studying risk behaviors, depression and developing theory-based and culturally appropriate interventions for reducing the risk and burden of infectious diseases including COVID-19, HIV/STIs among vulnerable populations. He holds an MD from Tay Nguyen University, Vietnam, a Master of International Health from University of Copenhagen, Denmark and a Doctor of Public Health (Dr.PH) from the University of Texas at Houston, USA.



## Operation Outbreak: Preventing outbreaks through interactive, experiential real-life simulations

Todd Brown<sup>1\*</sup>, Pardis Sabeti<sup>2</sup>, Andres Colubri<sup>2</sup>

<sup>1</sup>*Sarasota Military Academy, USA*

<sup>2</sup>*Harvard University, USA*

### Abstract

Operation Outbreak (OO) is a simulation platform that teaches students how pathogens spread and the impact of interventions, thereby facilitating the safe re-opening of schools. In addition, OO generates data to inform epidemiological models and prevent future outbreaks. Before SARS-CoV-2 was reported we repeatedly simulated a virus with similar features, correctly predicting many human behaviors later observed during the pandemic. We present a new way to address both problems in an integrated manner. Operation Outbreak (OO) is an educational curriculum and simulation platform that uses Bluetooth to spread a virtual “pathogen” in real-time across smartphones in close proximity. Students engage with OO by first learning about key topics in outbreak prevention and response. They then participate in an app facilitated outbreak simulation designed to vividly illustrate what they have learned. Finally, we administer post-simulation reflection and analytical exercises to reinforce key points that can inform students’ future responses to real outbreaks.

### Biography

Dr Todd Brown is the co-creator of educational platform Operation Outbreak that has been featured in WIRED Magazine and National Geographic. He is the winner of multiple Teacher of the Year Awards, the U.S. Congressional Teacher of the Year, the United States Henry Ford Innovator Award, the Education Foundation Innovator of the Year, and the Air Force Association STEM Teacher of the Year Award. He is also an Education Ambassador for the United Nations as well as an Educational Ambassador of the Center for Disease Control (CDC), and on the Advisory Board to Faulu Academy in Kenya, Africa.

# Speaker

## Session 5

Webinar on

**CORONAVIRUS & CANCER RESEARCH**

29 - 30 March 2021

# Do mobile indoor aircleaners reduce the risk of infection with SARS-CoV-2? Results of an investigation in a surgical examination room with limited ventilation options

**Michael Oberst**

*Kliniken Ostalb, Germany*

## **Abstract**

### **Objective**

Due to the airborne transmission of the coronavirus disease (Covid 19) via aerosols, we investigated the effect of a mobile air filter system in a surgical examination room.

### **Methods**

A mobile air filter (AP 90, DEMA-airtech, Germany) was run during regular surgical consulting hour in our outpatients clinic. Aerosol concentration was measured by Fidas Frog fine dust monitoring system (Palas, Germany) by constantly recording PM1.0, PM2.5, PM4, PM10 and the total particle load PMtot.

### **Results**

The use of the air filter system led to a significant reduction of aerosols in the room despite the fact that there were various numbers of persons in the room constantly.

### **Conclusion**

The use of a high efficiency air filtration device, especially in examination rooms with poor ventilation, e.g., lack of windows or local exhaust is recommendable.

## **Biography**

Prof Dr med Michael Colonel is currently working as head of the Clinic for Orthopedics, Trauma and Spinal Surgery in University of Freiburg in Germany. His research interests are Traumatology, navigation, medullary canal endoscopy.

## Effect of COVID 19 pandemic on maternal mental health

Phalguni Kotabagi<sup>1\*</sup>, Fortune L<sup>1</sup>, Nauta M<sup>2</sup>, Yoong W<sup>1</sup> and S. Essein<sup>1</sup>

<sup>1</sup>North Middlesex University Hospital, UK

<sup>2</sup>Camden Health Improvement Practice – Margarete Centre, UK

### Abstract

Most recent studies on SARS-Cov-2 in pregnancy have focused on physical effects of the pandemic on infected mothers and the possibility of vertical transmission rather than the equally pertinent maternal mental wellbeing. There is little doubt that pregnant women express greater levels of anxiety and depression during the pandemics.

Generalised Anxiety Disorder Questionnaire-7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9) to objectively assess maternal anxiety and depression were evaluated for 14 Covid positive mothers and controls matched for age, parity, gestation and ethnicity.

Anxiety and depression scores peaked at the duration of peak in deaths; steadily decreasing as guidelines were published by Royal College of Obstetricians and Gynaecologists. Both COVID positive and Control were found to have similar scores of GAD7 and PHQ9, implying positive mothers are no more likely to be anxious.

### Biography

She graduated in Obstetrics and Gynaecology from Mumbai, Sion Hospital. She worked in Bangalore in a teaching Institute as Senior Resident. She is currently Registrar in London, North Middlesex Hospital.



## Potent neutralization of clinical isolates of SARS-CoV-2 by monomeric nanobodies

**Alejandro Rojas-Fernandez**

*Austral University of Chile, Chile*

### Abstract

We describe the fast-tracked development of an alpaca nanobody specific for the Receptor-Binding-Domain (RBD) of the SARS-CoV-2 Spike protein with potential therapeutic applicability. We developed a rapid method for nanobody isolation that includes an optimized immunization regimen coupled with VHH library E. coli surface display, which allows single-step selection of Nanobodies using a simple density gradient centrifugation of the bacterial library. The selected single and monomeric Nanobody, W25, binds to the SARS-CoV-2 S RBD with sub-nanomolar affinity and efficiently competes with ACE-2 receptor binding. Furthermore, W25 potently neutralizes SARS-CoV-2 wild type and the D614G variant with IC50 values in the nanomolar range, demonstrating its potential as antiviral agent.

### Biography

Alejandro Rojas-Fernandez is working as an assistant Professor Austral University of Chile since 2016. Previously, he worked as postdoctoral researched assistant at the MRC-PPU in UK, and before that he did PhD at the University of Konstanz in Germany. He is now director of a platform for the generation of recombinant antibodies in Alpacas, a source of simple and high affinity antibodies. His team works in several topics regarding emergent pathogens and cancer. He have been honours with the medal of the state of los Rios for innovation and local contributions against Hantavirus, and the medal of the City of Valdivia for our contributions against SARS-CoV-2.

# The fears of being infected by the COVID-19 virus in Canada: A look at germophobes, crowd-averse, fearless and other population segments

**Fernando Mata**

*University of Ottawa, Canada*

## Abstract

The fear of being infected by the COVID-19 virus is widespread in the Canadian population. This study examined the COVID-19 virus infection fears in a survey sample of 4,200 adult Canadians aged 15 years old and over during the confinement period of June 21-26, 2020 and collected by Statistics Canada. A marketing segmentation analysis was carried out using a roster of 13 perceived health risks items leading to the identification of typical fears and the profiling of five major segments present in the Canadian adult population: "Germophobes" (7%), "Crowd-Averse" (34%), "Fearless" (17%), "Outside "Bubble"-Averse" (18%), and "Nursing Homes-Averse" (24%). Health risk items included a wide range of preoccupations such as visiting retirement homes, travelling by car or airplane, attending public events, shopping, eating out, seeing doctors and/or participating in sports or gyms. The five population segments were identified using a combination of principal component and k-means cluster statistical analysis. Marketing segmentation is a useful tool for decision makers to categorize population members and, by doing so, facilitate better public campaigns, help design messages, and implement changes that can promote more efficient ways to deal with the various societal consequences of the COVID-19 confinement.

## Biography

Fernando Mata is a social demographer and associate faculty member of the School of Sociological and Anthropological Studies and the School of Public and International Affairs (University of Ottawa). In the last thirty years, he worked as a senior research officer for various Canadian federal government departments such as Canadian Heritage, Citizenship and Immigration Canada, Human Resources and Social Development and Justice Canada. He has numerous publications in both Canadian and international journals and books in topics related to multiculturalism, immigration and ethnic & race relations. He is currently member of the Canadian Population Society and the Metropolis Project.

# Video Presentation Session 5

Webinar on

**CORONAVIRUS & CANCER RESEARCH**

29 - 30 March 2021

## **Impact of anemia and fatigue among breast cancer patients on their Quality of Life (QOL)**

**Bassam Abdul Rasool Hassan**

*AL-Rafidain University College, Iraq*

### **Abstract**

According to the World Health Organization (WHO) anemia is defined as a medical condition where the hemoglobin level is less than 12 g per dL in female and less than 13 g per dL in male. While, fatigue it is the most common and distressing symptom experienced by cancer survivors, specifically for those who are treated with systemic treatments.

Regarding Quality of Life (QOL), the World Health Organization has defined the quality of life as a person's notion of life, values, targets, standards, and interests inside the framework of tradition.

Incidence of anemia and/or fatigue among solid cancer patients found to be high mainly among breast cancer patients treated with chemotherapy 10-40%. Several factors can play a role in incidence and severity of anemia and/or fatigue among breast cancer patients like; age of the patient, type of cancer, stage, metastasis, and chemotherapy type and dose.

Their incidence is associated with various critical issues such as delay and/or reduce doses of chemotherapy treatment, impair cancer response to chemotherapy, and negative impacts on cancer patients QOL, which found to be the most crucial thing and because of it cancer patient may wish to die.

Therefore, it is very important for clinicians to evaluate the negative effects of anemia and/or fatigue on the cancer patients QOL and to treat them accordingly. This is mainly because the negative effects are often neglected while these patients are being treated.

### **Biography**

Bassam Abdul Rasool Hassan is a senior lecturer at Department of Pharmacy, Alrafidain University College- Baghdad, Iraq. His areas of expertise include: Clinical pharmacy, genomics, chemotherapy and cancer treatment, and supportive and palliative care in cancer patients.

# Speaker

## Session 6

Webinar on

**CORONAVIRUS & CANCER RESEARCH**

29 - 30 March 2021

# Impacts of COVID-19 on illicit substance users: Analysis of illicit drug transaction data

Andreeanne Bergeron<sup>1\*</sup>, David Decary-Hetu<sup>1</sup> and Luca Giommoni<sup>2</sup>

<sup>1</sup>University of Montreal, Canada

<sup>2</sup>University of Cardiff, United Kingdom

## Abstract

The COVID-19 pandemic has had unprecedented consequences on the world economy. While much attention has been given to how COVID-19 patients are treated (or fail to be treated), the impact of the pandemic on illicit drug users remains largely undiscussed. We expose the potential consequences the COVID-19 pandemic could have on the ability of people who use drugs to source their illicit drugs via cryptomarkets. DrugRoutes.com is an open-source intelligence platform on illicit drug transactions on the darkweb. The platform is unique for it uses self-reports by illicit drug buyers and dealers to measure the success rate of transnational illicit drug transactions. As the COVID-19 pandemic swept across most Western industrialized countries, DrugRoutes.com registered the outcome of illicit transactions. It enables us to evaluate, through a sample of darkweb transactions, how a pandemic impacts drug use in different countries. This presentation is based on 600 and counting self-reported illicit drug transactions spread over the 2020. For each transaction, the self-reports include the date of transaction, the types of illicit drugs bought/sold, and whether the shipment of the illicit drugs was delivered, had issues (ex. unusually long delivery, an error in the type of drug shipped, quantity or concentration of the drug), or failed. Our results show that between January 1<sup>st</sup>, 2020 and March 21<sup>st</sup>, 2020, unsuccessful deliveries represented between 0% to 40% of transactions on any given day. Starting on March 21<sup>st</sup> however, the share of transactions that had issues or failed increased rapidly and reached almost 80% of all transactions. This suggests that illicit drug transactions on the darkweb were disrupted at the same time as lockdowns were put in place in the United States and in the United Kingdom. The correlation suggests that lockdowns could have disrupted drug cryptomarkets activities. We discuss the market disruption in light of the literature.

## Biography

Andréanne Bergeron is a PhD candidate at the School of Criminology of the Université de Montréal and holder of the prestigious Vanier scholarship. She teaches, as a lecturer, cybercrime classes. She is also involved in her community as a president of the annual Workshop on Research on Police Investigations (CREP) and as the coordinator for the Trans-National Organized Crime research project of the Darkweb and Anonymity Research Center (DARC). She focuses in her thesis on the dynamic interactions during police interrogation of online sex offenders. She explores and explains the cooperation and power relationships between police officers and suspects.

# Computational identification of cancer immunotherapy targets using combinatorial peptide libraries

**Barbara Szomolay**

*Cardiff University, UK*

## Abstract

The interaction between T-Cell Receptors (TCRs) and peptides is highly degenerate: a single TCR may recognize about one million different peptides in the context of a single MHCI molecule. On the other hand, TCR recognition is fundamentally peptide- and/or MHC-specific: the functional sensitivity, which can be viewed as experimental realization of the TCR triggering rate, is large enough only for minute fraction of all possible ligands. TCR triggering rate and degeneracy are mathematical concepts that are fundamental for an approach that uses length-matched Combinatorial Peptide Library (CPL) scan data to search protein databases and to rank peptides in order of likelihood recognition. This CPL-based database screening can, to a large extent, accurately identify self-peptides that triggered the CD8 T-cell. The computational time required for peptide searching can be significantly reduced by using Graphics Processing Units (GPUs). Adoption of GPU-accelerated prediction of T-cell agonists has the capacity to revolutionise our understanding of cancer immunity by identifying potential targets for tumor-specific T-cells.

## Biography

Barbara Szomolay is a lecturer in the School of Medicine at the Cardiff University, United Kingdom. She has various degrees and experience in medical related-courses.

## What is needed for breast CT to reduce breast cancer deaths?

Richard Gordon<sup>1\*</sup>, Tony Svahn<sup>2</sup> and Chengxiang Wang<sup>3</sup>

<sup>1</sup>Wayne State University, USA

<sup>2</sup>Gavle Hospital, Sweden

<sup>3</sup>Chongqing Normal University, China

### Abstract

We were promised a cure for breast cancer by last year, yet cases and deaths increase, despite a percent or so decline in rates per annum. Breast cancer CT (computed tomography) requires high resolution to detect lesions before they metastasize, at low x-ray dose. Achieving this goal may require new CT algorithms and new CT hardware configurations. A few possibilities are suggested.

### Biography

Richard Gordon is a “retired” theoretical biologist who has spent half his career developing algorithms for CT, starting with the ART algorithm. His emphasis has been on detecting premetastasis breast tumours at low dose.



## Prostate ACE phenotyping: Early detection of prostate cancer?

Sergei M Danilov<sup>1,2\*</sup> and Armais A Kamalov<sup>2</sup>

<sup>1</sup>University of Illinois at Chicago, USA

<sup>2</sup>Moscow University, Russia

### Abstract

#### Objectives

We performed detailed characterization of ACE status in prostate biopsies from patients with Benign Prostate Hyperplasia (BPH) and Prostate Cancer (PC) using ACE phenotyping, which includes evaluation of: 1) ACE activity with two substrates (HHL and ZPHL); 2) the ratio of the rates of their hydrolysis (ZPHL/HHL ratio); 3) immunoreactive ACE protein; 4) the pattern of binding of monoclonal antibodies (mAbs) to different epitopes on ACE – ACE conformational fingerprint - to reveal conformational changes in prostate ACE due to prostate pathology.

#### Results

ACE activity dramatically decreased in all PC tissues. The catalytic parameter, ZPHL/HHL ratio, significantly increased in 4 (out of 6) patients with PC, but was not changed in most BPH patients. However, prostate tissues of 3 (out of 18) patients with BPH also increased ZPHL/HHL ratios, and one showed both - decreased ACE activity and increased ZPHL/HHL ratio - as in PC.

The novel parameter for ACE phenotyping, ratio of immunoreactive ACE protein (determined with mAb 9B9) to ACE activity was increased dramatically (233.7% + 64.9,  $p=0.001$ ) for ACE from all patients with PC in comparison to controls, while not all these patients exhibited increased PSA. One patient with BPH has ACE characteristics as in patient with PC. Therefore, it seems that ACE-related new parameters for prostate tissue ACE better correspond to PC histology than PSA in the blood.

#### Conclusions

ACE phenotyping in biopsy tissues from patients with BPH and PC showed that ACE activity, kinetic characteristic of ACE and surface conformation of ACE in PC tissues differ from that of patients with BPH. Thus, ACE phenotyping of prostate biopsies has a potential to be an effective approach for early diagnostics of prostate cancer or for differential diagnostics of BPH and PC.

### Biography

Sergei M Danilov has completed his PhD at the age of 28 years from National Cardiology Center, Moscow, Russia and in 1994 became Doctor of Science (Full Professor Rank) in the same institution. He is an associate professor of University of Illinois at Chicago, USA. He has over 170 publications that have been cited over 5000 times, and his publication H-index is 41. His laboratory generated over 40 monoclonal antibodies to ACE (Angiotensin-Converting Enzyme) and performed full epitope mapping of these mAbs. Actually, he established new discipline –immunochemistry of ACE and demonstrated enormous diagnostic, research and even therapeutic potential of these mAbs to ACE.

# Accepted Abstracts

Webinar on

**CORONAVIRUS & CANCER RESEARCH**

29 - 30 March 2021

## Reopening strategies following pandemic lockdown: A novel index-based decision-support toolkit for low and middle-income countries

**Abu S Shonchoy**

*Florida International University, USA*

### Abstract

While the effectiveness of lockdowns to reduce coronavirus disease-2019 (COVID-19) transmission is well established, key uncertainties remain on the lifting principles of these restrictive interventions. World Health Organization recommends case positive rate of 5% or lower – continuing for two weeks – as a threshold for safe reopening. However, inadequate testing capacity limits the applicability of this recommendation, especially in the Low-income and Middle-income Countries (LMIC). To develop a practical reopening strategy for LMICs, in this study, we first identify the optimal timing of safe reopening by exploring complementary and accessible epidemiological indicators during the initial COVID-19 surge. Then we address major determinants of successful reopening in various economic settings. Finally, we develop an easily interpretable Large-Scale Reopening (LSR) index, which is an evidence-based toolkit – to guide/inform the reopening decision for LMIC.

Our novel LSR index is a function of the corresponding dynamics between infection and recovery rates. We developed this toolkit by using empirical data from 24 worldwide countries (including 16 countries that had safely reopened the economies) during the initial wave of the COVID-19 pandemic, and recalibrated the indices by relevant local socioeconomic and governance factors. We validated the LSR index with epidemiologic Susceptible-Infected-Recovered-Mortality (SIRM) compartmental model.

Our analyses demonstrate median safe reopening for LMIC is a two-week waiting period, after the crossover of daily infection and recovery rates – coupled with post-crossover continuous negative trend in daily new cases – ensuring the virus reproduction rate becomes substantially lower. SIRM model-based simulation analysis supports our findings – indicating the danger of shorter waiting period and untimely reopening. This toolkit could be adapted for LMIC (and other similar settings), where: 1) complex, resource-intensive approaches to monitor real-time epidemic growth are unfeasible, and 2) an easily interpretable decision-guiding instrument can help facilitate efficient reopening of the economy, while reducing the likelihood of a rapid resurgence.

## The relevance of oxytocin & dynorphin in COVID-19: Towards a prophylactic treatment

**Adam Dixon**

*Phenomorphology Ltd., UK*

### Abstract

With more than 72 million worldwide recorded cases of COVID-19 so far in 2020, 1.2 million deaths and more than 43 million people recovering from the virus, there is a huge risk of further viral spread and mortalities, as well as severe health issues emerging in many survivors. This paper explores the COVID-19 infection mechanism and pathology from a dynorphin and oxytocin neuropeptide framework, and explores the angiotensin system,  $\mu$ -opioid receptor, post viral pathology, and seasonal depression in a literature review and analysis. We detail the many factors leading to the well documented elevated pre-infection levels of dynorphin surrounding COVID-19 which may predispose individuals to the virus and detail how oxytocin could be used as prophylactic antiviral, as well as treatment for during and after COVID-19 infection to reduce mortality and residual pathology. Vitamin D and dynorphin suppressants that reduce PDYN expression by REST-1 protein activation are identified as possible candidates for co-application with oxytocin in a synergistic manner. Furthermore, the paper identifies possible oxytocic routes for the treatment of HIV, a virus that down-regulates the oxytocin receptor and suppresses the immune system, as well as multiple sclerosis. Lastly, the neuropeptides oxytocin and dynorphin are raised as potential biomarkers surrounding immune system health and disease risk. Low-cost assays that could rapidly screen populations for oxytocin and dynorphin levels are proposed to help in the response to COVID-19.

## Application of ECMO in patients with new coronary pneumonia

**Zhu Haiyan**

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### Abstract

We conducted research on patients with new coronavirus pneumonia in severe acute respiratory syndrome who received ECMO treatment, combined with treatment experience, summarized and explored the application of ECMO in patients with new coronavirus pneumonia. Including indications for ECMO treatment; relative contraindications; mechanical complications; catheter placement, monitoring during ECMO, setting of ventilator during ECMO, precautions related to catheter tubing, precautions related to management, etc. We hope to provide a reference for the follow-up ECMO treatment of new coronavirus pneumonia.

## COVID-19: The impact of restrictions upon psychological well-being and happiness

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### Abstract

COVID-19 restrictions include full or partial lockdown, partial lockdown or complete self-isolation. Research shows that where COVID-19 restrictions have been implemented, over a third of the general public experienced significant psychological distress, including intense fear, anxiety and a reduced feeling of general well-being. The current study extends the focus by assessing what impact these restrictions have upon psychological well-being and happiness. Psychological wellbeing refers to a set of constructs including feelings of personal satisfaction, optimism, self-acceptance and engagement in prosocial activities. Happiness is a related construct focusing upon positive mood states arising from a positive outlook on life, as well as feeling safe and secure. An online study using Qualtrics assessed 332 UK adults. Twenty of these were in full lockdown, 33 were in partial lockdown and 279 were in full lockdown. The World Health Organisation- Five Well-Being Index measured psychological well-being and the Oxford Happiness Questionnaire measured how positively one feels about life. Results revealed that, after controlling for age and sex, those in self-isolation reported significantly lower levels of psychological well-being and happiness when compared to those in lockdown or those in partial-lockdown, with no difference between the last two groups. The findings suggest that self-isolation reduces psychological well-being and has a negative impact upon feelings of happiness and optimism about the future. Humans are essentially “social animals” and our large brains have developed to survive and prosper. Social isolation breaks many of these forms of communication and interactions, leading to psychological distress, fear and anxiety.

# Measuring geographical disparities in England at the time of COVID-19: Results using a composite indicator of population vulnerability

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## Abstract

### Objectives

The growth of COVID-19 infections in England raises questions about system vulnerability. Several factors that vary across geographies, such as age, existing disease prevalence, medical resource availability and deprivation, can trigger adverse effects on the National Health System during a pandemic. In this paper, we present data on these factors and combine them to create an index to show which areas are more exposed. This technique can help policy makers to moderate the impact of similar pandemics.

### Design

We combine several sources of data, which describe specific risk factors linked with the outbreak of a respiratory pathogen, that could leave local areas vulnerable to the harmful consequences of large-scale outbreaks of contagious diseases. We combine these measures to generate an index of community-level vulnerability.

### Setting

Clinical Commissioning Groups (CCGs) in England.

### Main outcome measures

We merge 15 measures spatially to generate an index of community-level vulnerability. These measures cover prevalence rates of high-risk diseases; proxies for the at-risk population density; availability of staff and quality of healthcare facilities.

### Results

We find that 80% of CCGs that score in the highest quartile of vulnerability are located in the North of England (24 out of 30). Here, vulnerability stems from a faster rate of population ageing and from the widespread presence of underlying at-risk diseases. These same areas, especially the North-East Coast areas of Lancashire, also appear vulnerable to adverse shocks to healthcare supply due to tighter labour markets for healthcare personnel. Importantly, our index correlates with a measure of social deprivation, indicating that these communities suffer from long-standing lack of economic opportunities and are characterised by low public and private resource endowments.

### Conclusions

Evidence-based policy is crucial to mitigate the health impact of pandemics such as COVID-19. While current attention focuses on curbing rates of contagion, we introduce a vulnerability index combining data that can help policy makers identify the most vulnerable communities. We find that this index is positively correlated with COVID-19 deaths and it can thus be used to guide targeted capacity building. These results suggest that a stronger focus on deprived and vulnerable communities is needed to tackle future threats from emerging and re-emerging infectious disease.

## The impact of the COVID -19 pandemic on maternity service: A review of service delivery and maternal and neonatal outcomes before, during and after the pandemic

**Michael P O'Connell\*, Sarah McDonnell, Emma McNamee and Stephen W Lindow**

*Coombe Women and Infant's University Hospital, Ireland*

### **Abstract**

The study reviews the service delivery changes implemented by the hospital to address the pandemic and analyses the trends in maternal and neonatal during the pandemic by comparing the outcomes before, during and after the pandemic.

The Coombe Women and Infant's University Hospital is a large tertiary referral Centre in Dublin, Ireland that delivers over 8000 babies per annum. The time span analysed is from 01/01/2020 to 31/07/2020, which represents the months prior to, during the peak and following the pandemic in Ireland.

There was no correlation between the monthly numbers regarding perinatal deaths, preterm births or hypertensive pregnancies.

Compared to the combined numbers in 2018 and 2019 there were no significant changes in perinatal deaths or preterm births when Covid was at its peak.

While service delivery adapted significantly, there was no negative impact of the Covid -19 pandemic on maternity services as demonstrated by maternal and neonatal outcomes.

## A plastic surgery trauma service in the time of COVID-19

**Jennifer Mason\*, Emily West and Phillipa Jackson**

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### **Abstract**

During the COVID-19 pandemic single contact care has become the gold standard, in order to avoid repeated trips to hospital and to minimise the risk of exposure to both patients and staff. At the onset of the pandemic we set up a one-stop Plastic Surgery Trauma Clinic in anticipation of high volumes of hand trauma and a concurrent increase in demand related to directly seeing all minor trauma from our Emergency Department. Within our one-stop Plastic Surgery Trauma Clinic setting we built in the ability to assess patients on the day of referral, image injuries using a Mini C-arm fluoroscope, and ensured open access to a day case theatre. In reality, during the lockdown period we actually saw a significant reduction in hand trauma.

Following the easing of restrictions and the return to a 'new normal' we have seen a surge in hand trauma and are continually having to adapt our trauma service accordingly. This is influenced by the needs of the regional population as well as those of the hospital, whilst respecting new Infection Control guidelines including social distancing. Particular challenges include theatre availability as the elective surgery programme restarted, bed capacity within amber 'COVID-unknown' pathways, physical space for seeing increasing numbers of patients, and personnel issues where doctors and specialist nurses may be required to self-isolate for prolonged periods at short notice and are returned to normal elective activity.

As the presence of COVID-19 within our healthcare systems becomes the new reality we cannot expect to return to our old systems and infrastructure. We must rapidly expand our same day emergency care models to relieve pressure on our Emergency Departments, who are working with a reduction in capacity. We must find new ways of working alongside the presence of COVID-19 and the constant threat of a second wave.

## Changes in burn referrals and injuries during COVID-19

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### Abstract

Our experiences within the Southwest at Southmead Hospital, Bristol, United Kingdom of patients with burns presenting to our regional burns service during the lockdown of the UK CoVid-19 pandemic.

On the 23rd March, the government announced new measures to limit the spread of the SARS-CoV-2 (CoVid-19) pandemic. These included a nationwide closure of all schools, advising that the public should avoid non-essential travel and to work from home if able.

As a result of the pandemic in 2020 and due to public engagement to avoid undertaking risk-related activities, we have seen a 28% reduction in patients presenting for review in our acute outpatient service from the previous year.

Secondary to the enforced restrictions in 2020 an increase in home-related injuries has occurred, equating to 85% compared to 60% seen in 2019, with the highest number since 2015. Similarly, there has also been a reduction in work-related injuries presenting to our service.

We found a global reduction in patients presenting to our burns unit likely secondary to a reduction in activities which may have occurred outside of enforced lockdown. However, the general reduction in the public attending the emergency department would have played a role.

At the time of analysis we found no changes to our referral pathway for burn injuries and upon review of data of the same week over the previous years, the figures from 2020 show that we have had the lowest presentation of injuries to our services and the highest number of injuries occurring at home.

## Chest CT images for COVID-19: Radiologists and computer-based detection

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### Abstract

#### Rationale and Objectives

Characteristic chest Computed Tomography (CT) manifestation of 2019 novel coronavirus (COVID-19) was added as a diagnostic criterion in the Chinese National COVID-19 management guideline. Whether the characteristic findings of Chest CT could differentiate confirmed COVID-19 cases from other positive Nucleic Acid Test (NAT)- negative patients has not been rigorously evaluated. We aim to test whether chest Computed Tomography (CT) manifestation of 2019 novel coronavirus (COVID-19) can be differentiated by a radiologist or a computer-based CT image analysis system.

#### Materials and Methods

We conducted a retrospective case-control study that included 52 laboratory-confirmed COVID-19 patients and 80 non-COVID-19 viral pneumonia patients between 20 December, 2019 and 10 February, 2020. The chest CT images were evaluated by radiologists in a double blind fashion. A computer-based image analysis system (uAI system, Lianying Inc., Shanghai, China) detected the lesions in 18 lung segments defined by Boyden classification system and calculated the infected volume in each segment. The number and volume of lesions detected by radiologist and computer system was compared with Chi-square test or Mann-Whitney U test as appropriate.

#### Results

The main CT manifestations of COVID-19 were multi-lobar/segmental peripheral groundglass opacities and patchy air space infiltrates. The case and control groups were similar in demographics, comorbidity, and clinical manifestations. There was no significant difference in eight radiologist identified CT image features between the two groups of patients. There was also no difference in the absolute and relative volume of infected regions in each lung segment.

#### Conclusion

We documented the non-differentiating nature of initial chest CT image between COVID-19 and other viral pneumonia with suspected symptoms. Our results do not support CT findings replacing microbiological diagnosis as a critical criterion for COVID-19 diagnosis. Our findings may prompt re-evaluation of isolated patients without laboratory confirmation.



## Hydroxychloroquine reduces fatality of critically ill patients with COVID-19

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### Abstract

Coronavirus disease 2019 (COVID-19) is a pandemic with no specific drugs and high fatality. The most urgent need is to find effective treatments. We sought to determine whether Hydroxychloroquine (HCQ) application may reduce the death risk of critically ill COVID-19 patients. In this retrospective study, we included 550 critically ill COVID-19 patients who need mechanical ventilation (63.5%) and oxygen therapy (35.6%) in Tongji Hospital, Wuhan, from February 1, 2020 to April 4, 2020. All 550 patients received comparable basic treatments including antiviral drugs and antibiotics, and 48 of them were treated with oral HCQ treatment (200 mg twice a day for 7–10 days) in addition to the basic treatments. Primary endpoint is fatality of patients, and inflammatory cytokine levels were compared between HCQ and non-hydroxychloroquine (NHCQ) treatments. We found that fatalities are 18.8% (9/48) in HCQ group, which is significantly lower than 47.4% (238/502) in the NHCQ group ( $P < 0.001$ ). The time of hospital stay before patient death is 15 (10–21) days and 8 (4–14) days for the HCQ and NHCQ groups, respectively ( $P < 0.05$ ). The levels of inflammatory cytokine IL-6 were significantly reduced from 22.2 (8.3–118.9) pg mL<sup>-1</sup> at the beginning of the treatment to 5.2 (3.0–23.4) pg mL<sup>-1</sup> ( $P < 0.05$ ) at the end of the treatment in the HCQ group but there is no change in the NHCQ group. These data demonstrate that addition of HCQ on top of the basic treatments is highly effective in reducing the fatality of critically ill patients of COVID-19 through attenuation of inflammatory cytokine storm. Therefore, HCQ should be prescribed as a part of treatment for critically ill COVID-19 patients, with possible outcome of saving lives.

## Detection of SARS-CoV-2-Specific humoral and cellular immunity in COVID-19 convalescent individuals

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### Abstract

The World Health Organization has declared SARS-CoV-2 virus outbreak a worldwide pandemic. However, there is very limited understanding on the immune responses, especially adaptive immune responses to SARS-CoV-2 infection. Here, we collected blood from COVID-19 patients who have recently become virus-free, and therefore were discharged, and detected SARS-CoV-2-specific humoral and cellular immunity in eight newly discharged patients. Follow-up analysis on another cohort of six patients 2 weeks post discharge also revealed high titers of immunoglobulin G (IgG) antibodies. In all 14 patients tested, 13 displayed serum-neutralizing activities in a pseudotype entry assay. Notably, there was a strong correlation between neutralization antibody titers and the numbers of virus-specific T cells. Our work provides a basis for further analysis of protective immunity to SARS-CoV-2, and understanding the pathogenesis of COVID-19, especially in the severe cases. It also has implications in developing an effective vaccine to SARS-CoV-2 infection.



## SARS-CoV-2 infection induces lymphocytopenia and T cell functional exhaustion in patients with coronavirus disease 2019 (COVID-19)

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### Abstract

The outbreak of coronavirus disease 2019 (COVID-19) caused by SARS-CoV-2 has posed a great threat to human health. T cells play a critical role in antiviral immunity but their numbers and functional state in critically ill COVID-19 patients are unclear. We here found that lymphocytopenia was common in COVID-19 patients, especially among elderly patients ( $\geq 60$  years) and in severe patients. The counts of total T cells, CD8+ T cells or CD4+T cells lower than 800/ $\mu\text{l}$ , 300/ $\mu\text{l}$ , or 400/ $\mu\text{l}$ , respectively, are negatively correlated with patient survival. Increasing PD-1 and Tim-3 expression on T cells could be seen as patients progressed from prodromal to overtly symptomatic stages, suggesting T cells are functional exhaustion. The spleen and lymph node (LN) tissues from six cases of COVID-19 postmortem examinations manifested severe tissue damage and lymphocyte reductions, transmission electronic microscope confirmed that SARS-CoV-2 viruses-like particles are visible in the LNs, demonstrating SARS-CoV-2 induces lymphocytopenia via directly neutralizes human spleen and LNs. Additionally, some severe COVID-19 patients still carried detectable levels of SARS-CoV-2 even after prolonged ICU treatment, these COVID-19 patients with delayed virus clearance (CDVC) have persistent inflammation, augmentation of the frequency of circulating Treg, severe lymphocytopenia, and functional exhaustion of T cells. Finally, Thymosin alpha 1 (Ta1) supplement reverses T cell exhaustion and recovers immune reconstitution through promoting thymus output during SARS-CoV-2 infection, therefore, reduce mortality of severe COVID-19 patients. Collectively, our data illustrate that enhancing lymphocyte counts and reversing T cell exhaustion might be key methods to eliminate SARS-CoV-2 in patients.