A. Medicine and Health

November 6, 2020 (Science)
Free fatty acid binding pocket in the locked structure of SARS-CoV-2 spike protein
Christine Toelzer, Kapil Gupta, Sathish K.N. Yadav et. al.
https://doi.org/10.1126/science.abd3255

Many efforts to develop therapies against SARS-CoV-2 are focused on the spike (S) protein trimer that binds to the host receptor. Toelzer et al. produced SARS-CoV-2 S in insect cells and determined the structure by cryo-electron microscopy. In their dataset, the closed-form was predominant and was stabilized by binding linoleic acid, an essential fatty acid. A similar binding pocket appears to be present in previous highly pathogenic coronaviruses, and past studies suggested links between viral infection and fatty acid metabolism. The pocket could be exploited to develop inhibitors that trap S protein in the closed conformation.

November 2, 2020 (PNAS)
Rapid identification of a human antibody with high prophylactic and therapeutic efficacy in three animal models of SARS-CoV-2 infection
Wei Li, Chuan Chen, Aleksandra Drelich et al.
https://doi.org/10.1073/pnas.2010197117

The authors identified a fully human monoclonal germline-like antibody (ab1) from phage-displayed libraries that potently inhibited mouse ACE2-adapted SARS-CoV-2 replication in wild-type BALB/c mice and native virus in transgenic mice expressing human ACE2 as well as in hamsters when administered before virus challenge. It was also effective when administered after virus infection of hamsters, although at lower efficacy than when used prophylactically. Ab1 was highly specific and exhibited good developability properties making it a good potential for use as prophylaxis and therapy of COVID-19.

October 26th, 2020 (E Clinical Medicine)
Diagnosis of COVID-19 by analysis of breath with gas chromatography-ion mobility spectrometry – a feasibility study
Dorota M Ruszkiewicz, Daniel Sanders, Rachel O'Brien et al.
https://doi.org/10.1016/j.eclinm.2020.100609

Two independent observational prevalence studies were conducted in the UK and Germany to test the feasibility of using breath-analysis with near-patient gas chromatography-ion mobility spectrometry (GC-IMS) to distinguish between COVID-19 and other respiratory illnesses. Participants gave a single breath-
sample for VOC analysis by GC-IMS. COVID-19 infection was identified by RT-qPCR of oral/nasal swabs together with the clinical review. A COVID-19 breath-score based on the relative abundance of a panel of volatile organic compounds was proposed and tested against the cohort data. The results showed that patients with COVID-19 can be rapidly distinguished from patients with other conditions at first healthcare contact. The authors postulate that the development and validation of this approach may allow rapid diagnosis of COVID-19 in the coming endemic flu seasons.

October 8th, 2020 (Cell Systems)
Large-Scale Multi-omic Analysis of COVID-19 Severity
Katherine A. Overmyer, Evgenia Shishkova, Ian J. Miller et. al.
https://doi.org/10.1016/j.cels.2020.10.003

The authors performed RNA-seq and high-resolution mass spectrometry on 128 blood samples from COVID-19-positive and COVID-19-negative patients with diverse disease severities and outcomes. They found 219 biomolecules strongly associated with COVID-19 status and severity, many of which were involved in complement activation, dysregulated lipid transport, and neutrophil activation. The authors present a web-based tool (covid-omics.app) enabling interactive exploration of their data.

September 18, 2020 (Biosensors and Bioelectronics)
Array-based analysis of SARS-CoV-2, other coronaviruses, and influenza antibodies in convalescent COVID-19 patients
Daniel J. Steiner, John S. Cognetti, Ethan P. Luta et al.
https://doi.org/10.1016/j.bios.2020.112643

Detection of antibodies to COVID-19 is critical to surveillance, assessment of the immune status of individuals, vaccine development, and basic biology. The authors report a multiplex label-free antigen microarray on the Arrayed Imaging Reflectometry (AIR) platform for detection of antibodies to SARS-CoV-2, SARS-CoV-1, MERS, three circulating coronavirus strains (HKU1, 229E, OC43) and three strains of influenza. They found that the array is readily able to distinguish the uninfected from convalescent COVID-19 subjects, and provides quantitative information about total Ig, as well as IgG- and IgM-specific responses.

B. Science and Engineering

October 25, 2020 (Journal of Telemedicine and Telecare)
Impact of a large-scale telemedicine network on emergency visits and hospital admissions during the coronavirus disease 2019 pandemic in Brazil: Data from the UNIMED-BH system
Bruno R Nascimento, Luisa CC Brant, Ana Cristina T Castro et al.
https://doi.org/10.1177/1357633X20969529
This paper is on assessing the impact of a large-scale COVID-19 telemedicine system on emergency department visits and all-cause and cardiovascular hospital admissions in Brazil. They evaluated the database of cooperative private health insurance. The COVID-19 telemedicine system consisted of mobile app, which redirects to teleconsultations if indicated; telemonitoring system, with regular phone calls to COVID-19 cases to monitor progression; and emergency ambulance system with internet phone triage and counselling. The most frequently utilized tool was telemonitoring, followed by teleconsultation.

October 22, 2020 (Materials Chemistry and Physics)
Review on 3D printing: Fight against COVID-19
Bankole I. Oladapo, Sikiru O. Ismail, Temitope D. Afolalu et al.
https://doi.org/10.1016/j.matchemphys.2020.123943

This study reviews work done on solving COVID-19 with 3D printing. The researchers printed a bio-cellular face shield with relative comfortability made of bio-macromolecules polymerized polyvinyl chloride (BPVC) and other biomaterials are produced with 3D printers. They concluded that this could reduce effects on the economy.

October 19, 2020 (Environmental Pollution)
Links between air pollution and COVID-19 in England
Marco Travaglio, Yizhou Yu, Rebeka Popovic et al.
https://doi.org/10.1016/j.envpol.2020.115859

The authors studied links between major fossil fuel-related air pollutants and SARS-CoV-2 mortality in England. They compared current SARS-CoV-2 cases and deaths from public databases to both regional and subregional air pollution data monitored at multiple sites across England. The results show positive relationships between air pollutant concentrations, particularly nitrogen oxides, and COVID-19 mortality and infectivity. They conclude that a small increase in air pollution leads to a large increase in the COVID-19 infectivity and mortality rate in England. This study serves as a basis to guide health and emissions policies.

October 8, 2020 (Computers in Biology and Medicine)
Multi-task deep learning-based CT imaging analysis for COVID-19 pneumonia: Classification and segmentation
Amine Amyar, Romain Modzelewski, Hua Li et al.
https://doi.org/10.1016/j.compbiomed.2020.104037

This paper presents an automatic classification segmentation tool for helping screening COVID-19 pneumonia using chest CT imaging. The segmented lesions can help to assess the severity of pneumonia and follow-up the patients. In this work, They propose a new multitask deep learning model to jointly identify COVID-19 patient and segment COVID-19 lesion from chest CT
images. The model is evaluated and compared with other techniques using a
dataset of 1369 patients. The results show a dice coefficient higher than 0.88
for the segmentation and an area under the ROC curve higher than 97% for
the classification.

C. Social Sciences, Humanities and Public Policies

November 14, 2020 (Medical Anthropology)
Plague Masks: The Visual Emergence of Anti-Epidemic Personal Protection
Equipment
Christos Lynteris
https://doi.org/10.1080/01459740.2017.1423072

Lynteris examines face masks through a historical anthropological approach
of their invention during the 1910–11 Manchurian plague outbreak. He argues
that they should be taken seriously and shows that their emergence was
rooted in their role as transformative agents of medical reason.

October 29, 2020 (Vaccine)
The public’s role in COVID-19 vaccination: human-centered recommendations
to enhance pandemic vaccine awareness, access, and acceptance in the
United States
Monica Schoch-Spana, Emily K. Brunson, Rex Long et al.
https://doi.org/10.1016/j.vaccine.2020.10.059

Vaccine uptake and wide acceptance are a social endeavour that requires
consideration of several human factors. To prepare for COVID-19 vaccination
campaign in the United States, a 23-person Working Group on Readying
Populations for COVID-19 Vaccines was formed. One outcome is a
compilation of the major challenges and opportunities associated with a future
COVID-19 vaccination campaign and empirically-informed recommendations
to advance public understanding and acceptance of vaccines. The
recommendations provided are essential for a successful vaccination
program.

October 28, 2020 (Journal of Contingencies and Crisis Management)
The COVID-19 crisis and complexity: A soft systems approach
Ola G. El-Taliawi & Kris Hartley
https://doi.org/10.1111/1468-5973.12337

The authors utilise complexity science approach to study increasingly
divergent ideological and epistemological perspectives about the crisis. They
examine which of the seven stages of soft systems methodology contributes
to deeper understandings of COVID-19 as a policy issue. The discussion
outlines implications for practice and places them within the broader debates
about tensions between science and politics.
National policy and containment measures require significant consideration of issues facing migrant workers. Before COVID-19 outbreak, migrant workers in Malaysia were already living in cramped accommodation and unsanitary conditions, with poor access to healthcare. The implementation of various phases of Malaysia’s Movement Control Orders has significant negative consequences on their already precarious living and working conditions. Andika aims to generate initial findings for further in-depth research and provides short-term policy recommendations such as making COVID-19 containment measures a legal commitment and implementing a nation-wide regularization programme to legalize the immigration status of undocumented migrant workers.

In the spring of 2020, US public schools closed their campuses due to an emerging public health crisis caused by the COVID-19 virus, however, the delivery of educational services continued. This included the provision of services mandated by federal law under the Americans With Disabilities Act (ADA) and the Individuals With Disabilities Education Act (IDEA), which establish educational protections, processes, and rights for students with disabilities and their families to ensure educational equity. The authors describe the potential legal implications of COVID-19 for schools, students with disabilities and their families.