COVID Reference Top 10

Daily Science

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Preface

The pandemic continues, Europe enters lockdown again. We will need this second volume.

Christian Hoffmann & Bernd Sebastian Kamps
1 November 2020

Preface to Volume 1

Here we publish in a single PDF the daily Top 10 scientific papers we have presented ever since COVID Reference’s first edition on 29 March 2020. There is no secret to our procedure: the daily scanning of the literature helps us to stay afloat in the never-ending waves of new publications about SARS-CoV-2 and COVID-19. Many papers discussed in the Top 10 will eventually make it into subsequent editions of COVID Reference.

We dedicate this book to our students. May this selection of approx. 1,000 fine articles and full-text links deepen their understanding of the new coronavirus and prepare them for the challenges ahead.

Christian Hoffmann & Bernd Sebastian Kamps
15 July 2020
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1 November

Virology

Accessory proteins play important roles in the interaction between coronaviruses and their hosts. The authors developed a standardized genome annotation tool for coronavirus (CoroAnnoter) by combining open reading frame prediction, transcription regulatory sequence recognition and homologous alignment. This tool builds a comprehensive profile for coronavirus accessory proteins covering their composition, classification, evolutionary pattern and host interaction.

Transmission

The authors investigated the dependence of airborne viral load on the size distributions of the human expelled particles from coughing and speaking. Of note, differentiating “aerosols” and “droplets” using a specific size, e.g., 5 μm, did not reflect the actual evolution of virus-containing particles over time and space, because a large number of particles above 5 μm remained airborne after an extended period of time. Simulation showed that after ten seconds of a cough, although most evaporated particles are larger than 5 μm, 59.5% of the original virus-containing particles were still able to remain airborne. Simulation also showed that wearing a mask can effectively reduce the spread of the viruses. The results challenge the false dichotomy of using aerosols and droplets to separate the modes of disease transmission.
Vaccine

Important comment: see title. According to the authors, human challenge studies (HCS) to address SARS-CoV-2 face unacceptable ethics challenges, and, further, undertaking them would do a disservice to the public by undermining already strained confidence in the vaccine development process. Ultimately, the social value of these HCS (in terms of deaths averted) hinges on the premise that people at greatest risk of COVID-19-related mortality will receive a safe and efficacious vaccine sooner than they would without HCS. Read why this will be probably not the case and why HCS would do more harm than good.

Diagnostics

Not yet peer reviewed, but important data. Results from the large, nationwide REACT (real time assessment of community transmission) antibody study which was led by Imperial College London, show that the national antibody prevalence in the UK was 6% around 12 weeks after the epidemic’s April peak. Since then, the rates had fallen to 4.4% 24 weeks after the peak. These data suggest that antibodies induced by natural infection may be short lived, as is the case for other seasonal coronaviruses.


Do previous coronavirus infections protect from severe courses? Lisa Henss and colleagues from Frankfurt University analyzed the humoral immune response of a cohort of 143 COVID-19 patients, using ELISA and neutralization assays. Disease severity correlated with the amount of SARS-CoV-2 specific IgG and IgA and the neutralization activity of the antibodies. Neutralizing titers of patients with mild disease were very low and higher titers
were only detected in severe cases. Of note, compared to patients with mild-moderate disease, patients with severe disease had only weakly neutralizing antibodies against coronavirus-NL63. Although the numbers of severe cases were low, it remains tempting to speculate that preexisting immunity to NL63 or other common cold coronaviruses might reduce the risk of severe disease.

Clinical


Last Monday, we published data from the 20 most affected European countries and the USA and Canada, showing that during the first wave of the pandemic, the variance of crude CFR of COVID-19 was predominantly (80-96%) determined by the proportion of older individuals who are diagnosed with SARS-CoV-2 (Hoffmann 2020).

Here we show that our model might apply to other countries. In Hong Kong, for example, a very low CFR of only 0.4% has been reported during the first weeks (Lui GC 2000). In contrast to the authors, we believe that this was mainly due to the low number of older persons among the confirmed SARS-CoV-2 cases. We also show that the overall CFR in Hong Kong has increased since then, paralleling the increasing proportion of older persons among confirmed cases. Thanks to the incredible speed of Clinical Infectious Diseases’ publishing policies (contrasting many other journals), the authors from Hong Kong have been already able to respond (in some points they agree, in other points they don’t). Please read the discussion (Lui GC 2000).

Why is this important? In many countries facing a low CFR during the first wave, there is a widespread feeling that this was mainly due to a good health care system such as ICU or testing capacities. We believe that this perception can be deceptive and that the picture in these countries will change immediately when more elderly people are infected.


Lui GC, Yip TC, Wong VW, et al. Significantly Lower Case-fatality Ratio of Coronavirus Disease 2019 (COVID-19) than Severe Acute Respiratory Syndrome (SARS) in Hong Kong-A Territory-Wide Cohort Study. Clin In-


Definitive hospital outcome on 13,120 patients receiving invasive mechanical ventilation. Among studies where age-stratified CFR was available, pooled CFR estimates ranged from 47.9% (95% CI 46.4-49.4%) in younger patients (age ≤40) to 84.4% (95% CI 83.3-85.4) in older patients (age >80). CFR was also higher in early COVID-19 epicenters.


Filling the missing link in the natural history of COVID-19, from first (usually milder) symptoms to hospitalization and/or death, the authors characterized a huge number of COVID-19 patients at the time at which they were diagnosed in outpatient settings and estimated 30-day hospital admission and fatality rates. In the month after diagnosis, 14.8% (14.6–15.0) were hospitalized, with a greater proportion of men and older people, peaking at age 75–84 years. Thirty-day fatality was 3.5%, higher in men, increasing with age and highest in those residing in nursing homes (24.5%).


Risk factor obesity. In total, 10,861 COVID-19 patients admitted to the Northwell Health system hospitals during March and April, were classified according to their BMI: underweight (2%), normal (only 23%), overweight (38%), obesity class I (22%), II (9%), and III (7%). Patients who were overweight (OR=1.27), obesity class I (OR=1.48), obesity class II (OR=1.89), and obesity class
III (OR=2.31) had increased risk of requiring invasive mechanical ventilation. Overall, underweight and obesity classes II and III were statistically associated with death (OR=1.25-1.61). However, once mechanically ventilated, all patients regardless of BMI had similar odds of death.

Treatment


Aspirin may help (a little bit). In this retrospective, observational cohort study of 412 adult patients admitted with COVID-19 to multiple US hospitals between March and July, 98 (24%) received aspirin within 24 hours of admission or 7 days prior to admission. Aspirin use had a crude association with less mechanical ventilation (36% vs. 48%, p=0.03) and ICU admission (39% vs. 51%, p=0.04), but no crude association with in-hospital mortality (26% vs. 23% p=0.51). After adjusting for 8 confounding variables, aspirin use was independently associated with decreased risk of mechanical ventilation (adjusted HR 0.56, 95% CI 0.37-0.85, p=0.007), ICU admission (adjusted HR 0.57, 95% CI 0.38-0.85, p=0.005), and in-hospital mortality (adjusted HR 0.53, 95% CI 0.31-0.90, p=0.02). According to the authors, a sufficiently powered randomized controlled trial is needed.

2 November

Virology


This group from Israel has analyzed 212 SARS-CoV-2 sequences, in order to perform a comprehensive analysis to trace the origins and spread of the virus. Travelers returning from the US significantly contributed to viral spread in Israel. The basic reproduction number of the virus was initially around 2.5, dropping by more than two-thirds following the implementation of social distancing measures. Transmission heterogeneity in SARS-CoV-2 spread was high, with between 2-10% of infected individuals resulting in 80% of secondary infections.
To understand the genetic characteristics of SARS-CoV-2 in Beijing, the authors collected pharyngeal swabs and sputa samples from 126 patients to perform viral genome sequencing after admission and consent procedures. Here they present genomic surveillance data on 102 imported cases, which account for 17.2% of the total cases in Beijing. Genomic comparisons reveal higher genomic diversity in the imported group compared to both the Wuhan exposure and local transmission groups, indicating continuous genomic evolution during global transmission.

Here, the authors track the geotemporal spread of a SARS-CoV-2 variant with a mutation (D839Y) in a potential host-interacting region involving the Spike fusion peptide, which is a target motif of anti-viral drugs that plays a key role in SARS-CoV-2 infectivity. The Spike Y839 variant was most likely imported from Italy in mid-late February and massively disseminated in Portugal during the early epidemic. Between March 14th and April 9th (covering the exponential epidemic phase) the relative frequency of the Spike Y839 variant increased at a rate of 12.1% every three days, being potentially associated with 24.8% of all COVID-19 cases in Portugal during this period. The data supports population/epidemiological (founder) effects contributing to the Y839 variant superspread. This variant was likely one of the first SARS-CoV-2 to be introduced in Portugal, so it might have had more opportunity to spread. Its introduction is strongly linked to an international trade fair in Milan with many Portuguese attendees. The potential existence of selective advantage is also discussed, although experimental validation is required.

**Diagnostic**

Clarence W. Chan and colleagues from Chicago evaluated the analytical and clinical performance of the Truvian Easy Check COVID-19 IgM/IgG antibody test. This test was designed to detect the nucleocapsid and S1 spike protein RBD epitopes of SARS-CoV-2. Results are available at 10 minutes after test initiation for serum and possibly fingerstick blood samples. The Easy Check device showed excellent clinical and analytical performance; the test compares well with the Roche Elecsys anti-SARS-CoV-2 antibody assay. Of 99 patient samples that were positively confirmed by PCR for SARS-CoV-2, antibodies against the virus were detected by both tests in 88 of the samples, whereas 9 of the 99 samples eluded detection by both testing modalities. All samples from 41 prepandemic volunteers remained negative.

Clinical


Brief overview for clinicians. In patients with moderate disease, dexamethasone is not efficacious (and may be harmful) and data are insufficient to recommend for or against routine use of remdesivir. Efforts center on personal protective equipment for health care workers, social distancing, and testing.


This multicenter cohort study (7 hospitals in New York City and Milan) analyzed hospitalized COVID-19 patients who had undergone transthoracic echocardiographic (TTE) and electrocardiographic evaluation during their index hospitalization. Myocardial injury was defined as any elevation in cardiac troponin at the time of clinical presentation or during the hospitalization. Overall, myocardial injury was observed in 190 patients (62.3%). Among patients with COVID-19 who underwent TTE, cardiac structural abnormalities were present in nearly two-thirds of patients with myocardial injury. Rates of in-hospital mortality were 5.2%, 18.6%, and 31.7% in patients without myocardial injury, with myocardial injury without TTE abnormalities, and with myocardial injury and TTE abnormalities.
Collateral damage

No damage in this area: Compared with the previous year, the cumulative numbers of deceased organ donors and transplants showed no significant reduction in Germany. Kidney transplantation numbers were stable, while the numbers of heart, lung, and liver transplantations from deceased donors even increased from January to April, 2020, when compared with the same period of the previous year. In contrast, transplant activities in Italy and Spain were reduced by 30–50%.


We have eagerly awaited this news for decades: spectators can significantly contribute to determine the dynamics and the outcomes of professional football matches (home advantage and referee bias are two well-documented phenomena in professional sports). COVID-19 has made it possible: focusing on the first and second divisions of the top four UEFA countries, the authors analyzed 841 matches behind closed doors during the pandemic. This extremely important work revealed that observed frequencies for home victories, draws and away victories were significantly different from the expected frequencies calculated based on the last three complete seasons with spectators. The absence of a referee bias in favor of the home teams for yellow cards indicated that this factor might be particularly affected by the presence/absence of social pressure by spectators. Various parameters were considered, and the analyses revealed a reduction of home advantage and the absence of referee bias. They’ll walk alone now.

Pregnancy
Huge prospective cohort from Turkey: Of 533 cases, 509 (95.5%) had mild disease, 7 (1.3%) were admitted to the intensive care unit (ICU), and invasive mechanical ventilation was necessary in 2 (0.4%) patients. Maternal mortality was observed in 2 (0.4%) cases. In total, 66 (12.4) had pregnancy complications (preterm delivery 4.1%). All neonates were negative for COVID-19. The rate of admission to the neonatal ICU was 9.9%. One specimen of breast milk was positive for the infection.

**Pediatrics**


Steroids may help in MIS-C: 18 patients admitted before 1 May received immune globulins (IVIG 2g/Kg once) as first line treatment, and the 22 patients admitted after this date received a combination of IVIG and intravenous methylprednisolone (0.8mg/kg/day during 5 days). These two populations had similar clinical, cardiac and biological characteristics at baseline. The main finding was the reduction of time to recovery of left ventricle ejection fraction (LVEF) and isovolumic relaxation time (IVRT), as well as pediatric intensive care unit (PICU) stay in the group receiving a combination of IVIG and steroids compared to the group receiving only IVIG: respectively 2.9 vs. 5.4 days, 6.4 vs. 20.6 days, and 3.4 vs. 5.3 days (p<0.05).

**3 November**

**Transmission**


Excellent retrospective cohort study by Vernon Lee, Oon Tek Ng and colleagues. Between Jan 23 and April 3, 2020, the authors identified 7,518 close contacts (1779 [23%] household contacts, 2231 [30%] work contacts, and 3508 [47%] social contacts) linked to 1114 PCR-confirmed index cases. The secondary clinical attack rate:
**Household contacts:** 5.9% (95% CI 4.9–7.1).

Particular risk factors:
1. Sharing a bedroom (multivariable odds ratio [OR] 5.38)
2. Being spoken to by an index case for 30 min or longer (7.86)

**Non-household contact:** Work contacts, 1.3% (0.9–1.9); social contacts, 1.3% (1.0–1.7).

Particular risk factors:
1. Exposure to more than one case (3.92)
2. Being spoken to by an index case for 30 min or longer (2.67)
3. Sharing a vehicle with an index case (3.07).

Among both household and non-household contacts, indirect contact, meal sharing, and lavatory co-usage were not independently associated with SARS-CoV-2 transmission.

**Immunology**


Assays to measure naturally acquired immunity and test the efficacy of immune interventions are key to the development of novel prophylactic and therapeutic interventions. Here, Miles Davenport, David Khoury and colleagues analyze a selection of existing assays for measuring antibody-mediated virus neutralization and animal models of infection with SARS-CoV-2. Their message: identify what you want to measure and match these goals to your experimental design.


Reinhold Förster, Berislav Bošnjak and colleagues performed a surrogate virus neutralization test (sVNT) and SARS-CoV-2 S protein-pseudotyped vesicular stomatitis virus (VSV) vector-based neutralization assay (pVNT) to assess the degree to which serum antibodies from coronavirus disease 2019 (COVID-19) convalescent patients interfere with the binding of SARS-CoV-2 S to ACE2. They analyzed 40 patients with mild SARS-CoV-2 infection, 10 patients with
severe infection and 12 healthy controls. Both tests revealed neutralizing anti-SARS-CoV-2 S antibodies in the sera of approximately 90% of mildly and 100% of severely affected COVID-19 convalescent patients. Levels of neutralizing antibodies correlated with the duration and severity of clinical symptoms but not with patient age. The authors conclude that that sVNT is technically less complicated, cheaper, and much faster than pVNT, making it more suitable for the rapid screening of a large number of samples.

Meffre E, Iwasaki A. **Interferon deficiency can lead to severe COVID.** Nature 2020, published 2 November. Full-text: https://www.nature.com/articles/d41586-020-03070-1

In this News & Views articles, the authors highlight the possible key role for the signaling pathway mediated by type I interferon proteins in the development of severe COVID-19. The authors discuss the papers by Bastard et al. and Zhang et al. we presented on September 25:


**Clinical**


Besides common respiratory symptoms, some patients with COVID-19 experience gastrointestinal symptoms, such as diarrhea, nausea, vomiting, and loss of appetite. In this review, Yangbai Sun, Peijie Zhong and colleagues highlight the manifestations and potential mechanisms of gastrointestinal and hepatic injuries in COVID-19.
(Future?) Treatment

Sokolowska M. Outsmarting SARS-CoV-2 by empowering a decoy ACE2. Sig Transduct Target Ther 5, 260 (2020), published 3 November. Full-text: https://doi.org/10.1038/s41392-020-00370-w

There are currently a few therapeutic approaches which focus on blocking SARS-CoV-2 binding to its key receptor, an angiotensin-converting enzyme 2 (ACE2), or on inhibition of virus spike cleavage. Milena Sokolowska discusses soluble recombinant human ACE2 (rhACE2) and a paper we presented on August 4: Chan KK, Dorosky D, Sharma P, et al. Engineering human ACE2 to optimize binding to the spike protein of SARS coronavirus 2. Science 2020, published 4 August. Full-text: https://science.sciencemag.org/content/early/2020/08/03/science.abc0870

Abd El-Aziz TM, Al-Sabi A, Stockand JD. Human recombinant soluble ACE2 (hrsACE2) shows promise for treating severe COVID-19. Sig Transduct Target Ther 5, 258 (2020). Full-text: https://doi.org/10.1038/s41392-020-00374-6


Pediatrics


In June 2020, immunologists and clinicians met to identify key questions surrounding the ‘multi-system inflammatory syndrome in children’ (MIS-C). This Meeting Report describes the main findings from the workshop. Read about B cell immunity, T cell immunity, innate immunity, genetics and epigenetics.
Spanish


Una cuarta parte de las UCI españolas están ocupadas por pacientes con covid-19. EL PAÍS entra en dos unidades, en Madrid y Barcelona, que bordean el colapso

French


Au printemps, en Ile-de-France, le virus a d’abord fauché les plus de 65 ans dans les communes où les revenus sont les plus bas et les logements les plus exigus, selon une étude universitaire qu’a pu se procurer « Le Monde ».


Le directeur de la santé publique de l’agence régionale de santé d'Ile-de-France, Luc Ginot, évoque la surmortalité dans les villes pauvres de la région et les moyens mis en œuvre pour y faire face.

4 November

Epidemiology


The age distribution of deaths in younger age groups (<65 years) is consistent across different settings. This is the result of a study by Henrik Salje, Megan
O’Driscoll and colleagues who used age-specific COVID-19 death data from 45 countries and the results of 22 seroprevalence studies to investigate the fatality patterns across multiple countries. The authors also demonstrate how outbreaks in nursing homes can drive overall population IFRs infection-to-fatality ratio, through both increased attack rates and increased vulnerability. They estimate that around 5% of the populations had been infected by the 1st of September 2020, with much higher transmission likely to have occurred in a number of Latin American countries.


SARS-CoV-2 infection was more frequent in communities with high proportions of Latino/a residents, those living below the federal poverty line and with high household densities. This is the conclusion of a study by Tara Vijayan et al. in Los Angeles County (LAC) after analyzing more than 800,000 SARS-CoV-2 tests. The overall positivity rate was 10.2%.

Immunology

Both IgA and IgM evolve rapidly across all levels of disease severity, but rapid and potent IgG class switching is linked to survival. This is the key message of a paper by Galit Alter, Tomer Zohar and colleagues who analyzed the early evolution of the humoral response in 193 hospitalized individuals with moderate to severe COVID-19. The data highlight distinct humoral trajectories associated with resolution of SARS-CoV-2 infection.


A prolonged period of immune dysregulation may follow SARS-CoV-2, both in hospitalized and non-hospitalized patients. This is the result of a study by Nathaniel Erdman, Jacob Files and colleagues who analyzed samples and data from 46 hospitalized and 29 non-hospitalized patients as well as 20 controls.
The authors also report that the dysregulation of T-cell activation and exhaustion markers in non-hospitalized individuals appears to be more pronounced in the elderly.


Biobanked venous blood contains T cells reactive to SARS-CoV-2 S-protein even before the outbreak in Wuhan, suggesting that there is a preformed T cell memory towards structural proteins in individuals not exposed to SARS-CoV-2. Here, Ulrik Stervbo et al. utilize a combination of epitope prediction and similarity to common human pathogens to identify potential sources of the SARS-CoV-2 T cell memory. Their data suggests that the observed SARS-CoV-2 pre-formed immunity to structural proteins is not driven by near-identical epitopes.


After SARS-CoV-2 infection, some individuals maintain stable or increased SARS-CoV-2 IgG, displaying an immune phenotype that connects rapid symptom clearance to differential antibody durability dynamics. Those who sustain virus-specific IgG production might tend to have shorter disease courses despite similar distribution of initial anti-SARS-CoV-2 IgG levels, and their anti-S memory B cells harbor increased levels of somatic hypermutation (SHM) shortly after disease resolution. This is a result of an analysis by Duane Wesemann, Yuezhou Chen and colleagues who charted longitudinal antibody responses to SARS-CoV-2 in 76 subjects after symptomatic COVID-19 followed longitudinally to ~100 days.


Traditional antibody production is hampered by long development times and costly production. Here, Christian Löw, Tânia Custódio and colleagues report the rapid isolation and characterization of nanobodies that target the receptor-binding domain (RBD) of the SARS-CoV-2 spike protein. Several of the 85
binders isolated by the authors had low nanomolar affinities and efficient neutralization activity.

Severe COVID


Ronald Evans and Scott Lippman propose repurposing paricalcitol (vitamin D analog) infusion therapy to restrain the COVID-19 cytokine storm, reasoning that vitamin D deficiency and the failure to activate the vitamin D receptor can aggravate this respiratory syndrome by igniting a wounding response in stellate cells of the lung. Find out what could be the appropriate dose and the potential complications.

Pediatrics


Children ages 6-13 years are frequently asymptomatic (39%) and have respiratory symptoms less often than younger children (29% vs. 48%) or adolescents (29% vs. 60%). However, Matthew Kelly, Jillian Hurst and colleagues found no differences in nasopharyngeal viral load by age or between symptomatic and asymptomatic children.

<table>
<thead>
<tr>
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<th>6-13 years</th>
<th>14-20 years</th>
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<tr>
<td>Respiratory symptoms</td>
<td>29%</td>
<td>60%</td>
</tr>
<tr>
<td>Influenza-like symptoms</td>
<td>39%</td>
<td>61%</td>
</tr>
<tr>
<td>Gastrointestinal symptoms</td>
<td>9%</td>
<td>27%</td>
</tr>
<tr>
<td>Sensory symptoms</td>
<td>9%</td>
<td>42%</td>
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<tr>
<td>Disease duration</td>
<td>4 (IQR 3,8)</td>
<td>7 (4,12)</td>
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Society


During the SARS-CoV-2 pandemic, many States have taken harsh and unprecedented measures against migrants, refugees, and other displaced persons. These have included border closures, quarantines, expulsions, and lockdowns of migrant worker communities and refugee camps. Read about

- Equal treatment and non-discrimination
- Right to health
- State obligations to combat stigma, racism and xenophobia
- Restrictions on movement between and within States
- Enforcement of immigration law, including detention
- Right to protection of life and health for persons in camps, collective shelters, and settlements
- Right to information and protection of privacy
- Gender considerations and labor rights of workers

Spanish


Afectados por la covid sufren pérdidas de memoria o problemas de concentración meses después de erradicar la infección

French

Les jeunes démocraties de Taïwan et de Corée du Sud font face à l'épidémie bien mieux que la dictature chinoise et sans attenter aux libertés. C'est d'elles que l'Occident doit s'inspirer, souligne le politiste Christophe Gaudin, maître de conférences à Séoul, dans une tribune au « Monde ».

Selon une étude menée au printemps sur plus de 4 200 malades, le taux de mortalité est passé de 42 % à 25 %. Ces cas graves sont surtout des hommes, souvent en surpoids. Un quart a moins de 54 ans.

Une étude internationale évalue à 15 % la part de décès dus au nouveau coronavirus liée à l'exposition aux particules fines.

**5 November**

**Epidemiology**

Air pollution might be an important cofactor increasing the risk of mortality from COVID-19. Jos Lelieveld, Andrea Pozzer and colleagues characterized global exposure to fine particulates based on satellite data and estimate that particulate air pollution contributed around 15% to COVID-19 mortality worldwide (East Asia, 27%; Europe, 19%; North America, 17%).

**Virology**

Zhang Q. Chen, CZ, Swaroop M, et al. **Heparan sulfate assists SARS-CoV-2 in cell entry and can be targeted by approved drugs in vitro.** Cell Discov 6, 80 (2020). [https://doi.org/10.1038/s41421-020-00222-5](https://doi.org/10.1038/s41421-020-00222-5)
The authors report that entry of SARS-CoV and CoV-2 requires the cell surface heparan sulfate (HS) as an assisting cofactor and that ablation of genes involved in HS biosynthesis or incubating cells with a HS mimetic inhibit Spike-mediated viral entry. After screening of approved drugs they identified various inhibitors: Mitoxantrone, Sunitinib and 7-benzylidenenaltrexone (BNTX).


Transmission


Published more than three months ago but still instructive.


The estimated risk of infection from touching a contaminated surface was less than 5 in 10,000 in a study by Amy Pickering, Abigail Harvey and colleagues. From April to June 2020, they repeatedly sampled 33 surfaces in public places like liquor and grocery stores, banks, gas stations, laundromats, restaurants and on metro doors and crosswalk buttons. Twenty-nine of 348 (8.3 %) surface samples were positive for SARS-CoV-2. The authors suggest that fomites might play only a minimal role in SARS-CoV-2 community transmission.

A second, not less important point: The weekly percentage of positive samples in one postal district peaked about 7 days before a spike in new SARS-CoV-2 cases. Surveillance on high-touch surfaces might therefore provide precious early warning clues.
Immunology


Children and adults have distinct immune responses after SARS-CoV-2 infection. Here, Donna Farber, Stuart Weisberg and colleagues present data from two adult (n=32) and two pediatric cohorts (n=47). They show that adult COVID-19 cohorts had anti-spike (S) IgG, IgM and IgA antibodies, as well as anti-nucleocapsid (N) IgG antibody, while children with and without MIS-C had reduced breadth of anti-SARS-CoV-2-specific antibodies, predominantly generating IgG antibodies specific for the S protein but not the N protein. The authors present possible explanations for these findings.


Pseudotyped particles have significant importance and use in virology as tools for studying the biology of highly pathogenic viruses in a lower biosafety environment. Here, Ritesh Tandon et al. report a third generation lentiviral pseudotyping system for SARS-CoV-2 (pLV-S) and its efficacy in detecting neutralizing antibody titers in convalescent patient serum. The authors conclude that these pseudoparticles could be utilized for screening of potential vaccine candidates as they represent SARS-CoV-2 Spike glycoprotein on their surface in its native confirmation.

Treatment


Another study that does not support the use of tocilizumab for the management of cytokine storm in patients with COVID-19. In this single-center propensity-score matched cohort study, 132 patients were included in the matched dataset (tocilizumab = 66; no tocilizumab = 66). Approximately 73% of the patients were male. Hypertension (55%), diabetes mellitus (31%), and chronic pulmonary disease (15%) were the most common co-morbidities pre-
sent. There were 18 deaths (27.3%) in the tocilizumab group and 18 deaths (27.3%) in the no tocilizumab group.

Collateral Effects


Non-pharmaceutical interventions (NPIs) implemented to slow the spread of SARS-CoV-2 have led to the decline in the incidences of highly transmissible respiratory infections. This is the result of a study by Ji-Man Kang, Kyungmin Huh and colleagues from the Children’s Hospital, Yonsei University College of Medicine, Seoul. Comparing the period February–July 2020 to the previous 4 years, the authors found that the incidences of chickenpox and mumps were significantly lower than in the prediction model (chickenpox: 36%, mumps: 63%).

Spanish


Un ensayo clínico identifica un compuesto que activa el sistema inmunitario y mitiga la gravedad de la covid. Attention: small numbers!

French


6 November

Diagnostics


Megan Zilla and colleagues from Pittsburgh have compared six SARS-CoV-2 antibody assays, namely Beckman Coulter, Euroimmun (IgG, IgA), Roche, and Siemens (Centaur, Vista). Assays were assessed for specificity (n=184), sensitivity (n=154), and seroconversion in a defined cohort with clinical correlates and molecular SARS-CoV-2 results. Assay specificity was 99% or greater for all assays except the Euroimmun IgA (95%). Sensitivity at more than 21 days from symptom onset were 84%, 95%, 72%, 98%, 67%, and 96% for Beckman Coulter, Centaur, Vista, Roche, Euroimmun IgA, and Euroimmun IgG, respectively. These finding raises concerns that seroprevalence studies may vary significantly based on the serologic assay utilized, even when the assays are from reliable manufacturers with proven methodologies and have similar targets and initial specificity and sensitivity measures.

Clinical


What to do with athletes after recovery? The clinical implications of asymptomatic to mild COVID-19 still remain undetermined. Pulmonary and cardiac fibrosis are potentially the most relevant for athletes, which may lead to reduced lung capacity or cardiac dysfunction, malignant arrhythmias, and sudden death. Complications from the disease must be excluded prior to returning to play. According to the authors, those with suspected or confirmed COVID-19 (including mild or complicated disease) or presenting with suggestive signs or symptoms should undergo additional investigations according to presentation and disease severity. These may include blood tests, electrocardiography, echocardiography, 24-hour and/or 48-hour Holter monitoring, exercise testing, or lung function tests.
Nathaniel R. Smilowitz and colleagues have analyzed myocardial injury at admission and during hospitalization in a large cohort of 2163 patients with COVID-19 from a high-volume health care system in New York. Nearly a third (32%) had myocardial injury at presentation, and nearly half had injury detected during the course of their hospitalization. Regardless of when it was first detected, myocardial injury was associated with increased odds of mortality and critical illness, with higher cardiac Troponin (cTn) measurements associated with worse outcomes.

Comorbidities


This population-based cohort study using national primary care data and linked death registrations in the OpenSAFELY platform, which covers approximately 40% of the general population in England, UK. Between September 1, 2019, and March 1, 2020, of 194,637 people with rheumatoid arthritis or systemic lupus erythematosus, 30,569 (16%) received two or more prescriptions of HCQ. Between March 1 and July 13, 2020, there were 547 COVID-19 deaths, 70 among HCQ users. Estimated standardized cumulative COVID-19 mortality was 0.23% among users and 0.22% among non-users. These findings are not surprising given the mounting body of literature suggesting no clinical benefit for HCQ. However, this study is the largest to date and adds further evidence to the lack of any preventive effect.

Treatment


An early inhalation of nanobodies - the future treatment? V_HH antibodies or nanobodies (Nbs) are minimal, monomeric antigen-binding domains derived from camelid single-chain antibodies. Unlike IgG antibodies, Nbs are small, highly soluble and stable, readily bioengineered into bi/multivalent forms,
and are amenable to low-cost, efficient microbial production. They can also be administered by inhalation, making their use against respiratory viruses very appealing. The authors discovered several Nbs with picomolar to femtomolar affinities that inhibit viral infection at sub-ng/ml concentration and determined a structure of one of the most potent in complex with RBD. Multivalent Nb constructs achieved ultra-high neutralization potency and may prevent mutational escape. While the research is still preliminary, it is hoped that Nbs might someday be the key ingredient in an antiviral drug that could be easily delivered via nasal spray.


Michael Schoof and colleagues from San Francisco focused on such an ultrapotent Nb. Nb6 binds Spike in a fully inactive conformation with its receptor binding domains (RBDs) locked into their inaccessible down-state, incapable of binding ACE2. Affinity maturation and structure-guided design of multi-valency yielded a trivalent nanobody, mNb6-tri, with femtomolar affinity for Spike and picomolar neutralization of SARS-CoV-2 infection. mNb6-tri retains function after aerosolization, lyophilization, and heat treatment, which enables aerosol-mediated delivery of this potent neutralizer directly to the airway epithelia.


Another new way to combat COVID-19. Thomas W. Linsky and colleagues from Seattle and other US cities developed a computational protein design strategy that enables the rapid and accurate design of hyperstable de novo protein “decoys”. The decoys replicate the protein receptor interface that a virus binds to in order to infect a cell. Thus, they out-compete viral interaction with the cell. The best ACE2 decoy, CTC-445.2, did bind with low nanomolar affinity and high specificity to the RBD of the spike protein. Because the decoy replicates the spike protein target interface in hACE2, it is intrinsically resilient to viral mutational escape. A bivalent decoy, CTC-445.2d, showed 10-fold improvement in binding. CTC-445.2d potently neutralizes SARS-CoV-2 infection of cells in vitro and a single intranasal prophylactic dose of decoy protected Syrian hamsters from a subsequent lethal SARS-CoV-2 challenge.
Pregnancy


The Surveillance for Emerging Threats to Mothers and Babies Network (SET-NET) collects information on pregnancy and infant outcomes in 16 US jurisdictions. Among 3912 infants with known gestational age born to women with SARS-CoV-2 infection, 12.9% were preterm (< 37 weeks), higher than a national estimate of 10.2%. Among 610 (21.3%) infants with testing results, 2.6% had positive SARS-CoV-2 results, primarily those born to women with infection at delivery. Among the infants with positive test results, one half were born preterm, which might reflect higher rates of screening in the ICU.


In an analysis of approximately 400,000 women aged 15–44 years with symptomatic COVID-19, the absolute risks for severe COVID-19–associated outcomes among women were low. However, pregnant women were at significantly higher risk for severe outcomes: Compared with non-pregnant women, pregnant women more frequently were admitted to ICU (10.5 versus 3.9 per 1000 cases; aRR = 3.0; 95% CI = 2.6–3.4), received invasive ventilation (2.9 versus 1.1 per 1,000 cases; aRR = 2.9; 95% CI = 2.2–3.8) and received ECMO (0.7 versus 0.3 per 1,000 cases; aRR = 2.4; 95% CI = 1.5–4.0). Thirty-four deaths (1.5 per 1000 cases) were reported among 23,434 symptomatic pregnant women, and 447 (1.2 per 1000 cases) were reported among 386,028 nonpregnant women, reflecting a 70% increased risk for death associated with pregnancy (aRR = 1.7; 95% CI = 1.2–2.4).

9 November

Epidemiology

Mathematical models show that these are not good times for travel. When a reduction in travel is coupled with other control measures, the travel reduction will not only delay the spread of the outbreak but in some cases will also be the determining factor in whether or not the outbreak is eliminated.


No single mitigation strategy is likely to be effective alone: state-mandated stay-at-home orders and public mask mandates coupled with case investigations and contact tracing contributed to an 82% reduction in COVID-19 incidence, 88% reduction in hospitalizations, and 100% reduction in mortality in Delaware during late April–June.

Virology

SARS-CoV-2-infected K18-hACE2 mice developed dose-dependent lung disease with features similar to severe human COVID-19, including diffuse alveolar damage, inflammatory cell infiltration, tissue injury, lung vascular damage, and death. Remarkably, K18-hACE2 mice also support SARS-CoV-2 replication in the lung and associated with this pathology develop anosmia, a common feature of human disease.

Immunology

Another (important) piece in the puzzle: Saborni Chakraborty and colleagues from Stanford show that specific pro-inflammatory antibody forms are elevated in more patients with severe COVID-19, in contrast to those with mild symptoms and seropositive children. The unique serologic signature is characterized by IgG3 and IgG1 with F0N0 glycoform modification and includes an increased likelihood of IgG1 with afucosylated Fc glycans. This Fc modification on SARS-CoV-2 IgGs enhanced interactions with the activating Fcγ receptors.
tor FcγRIIIa; when incorporated into immune complexes, Fc afucosylation enhanced production of inflammatory cytokines by monocytes, including interleukin-6 and tumor necrosis factor. This may explain why some patients develop severe COVID-19.


Using multiple independent assays (including flow cytometry-based assay for SARS-CoV-2-binding antibodies), the authors demonstrated the presence of pre-existing antibodies recognizing SARS-CoV-2 in at least some uninfected individuals. SARS-CoV-2 spike glycoprotein (S)-reactive antibodies were particularly prevalent in children and adolescents. They were predominantly of the IgG class and targeted the S2 subunit. By contrast, SARS-CoV-2 infection induced higher titers of SARS-CoV-2 S-reactive IgG antibodies, targeting both the S1 and S2 subunits, and concomitant IgM and IgA antibodies, lasting throughout the observation period.


Roberta Angioni and colleagues analyzed the cytokine and leukocyte profile of COVID-19 patients at hospital admission and identified distinctive immunological signatures that characterize younger or older severe patients. They found that severe patients under the age of 60 did not show major leukocyte alterations and expressed high levels of IL-1RA, IL-6, CCL2, CXCL1, CXCL9, CXCL10, and EGF. In contrast, older patients expressed high levels of CXCL8, IL-10, IL-15, IL-27, and TNF-α, presented a significant reduction in the total T lymphocyte number and an increased expression of T cell exhaustion markers as compared to those younger.

**Clinical**

Immunocompromised patients may shed infectious virus for longer durations than previously recognized: Victoria Avanzato and colleagues describe an interesting case of a female immunocompromised patient with chronic lymphocytic leukemia and acquired hypogammaglobulinemia. Shedding of infectious SARS-CoV-2 was observed for up to 70 days.

Collateral damage


Forty-four papers, involving a total of 54,231 participants from 13 countries, contributed to this systematic review and meta-analysis of sleep problems during COVID-19. The global pooled prevalence rate of sleep problems among all populations was 35.7%. COVID-19 patients appeared to be the most affected group, with a pooled rate of 74.8%. Healthcare workers and the general population had comparative rates of sleep problems with rates of 36.0% and 32.3%, respectively.

Dyer O. **Covid-19: Denmark to kill 17 million minks over mutation that could undermine vaccine effort.** BMJ 2020; 371:m4338. Full-text: https://doi.org/10.1136/bmj.m4338

Among 5102 samples of virus taken from Danish patients since June, five infection clusters affecting 214 people involved mink variant virus. One of these, known as cluster 5, seems to be a problematic variant which could be less susceptible to some antibodies and/or vaccines (unproven). This variant has been detected with four simultaneous changes in the genes for the Spike protein (for nerds: H69del/V70del, Y453F, I692V and M1229I) and has affected 11 people in North Jutland. Conclusion: 17 million minks will be culled.

Severe COVID


It's mucus: this great work may potentially explain the silent hypoxia that has emerged as a unique feature of COVID-19. Yuying Liu and colleagues from Beijing, China show that mucins are accumulated in the bronchoalveolar lavage fluid and are up-regulated in the lungs of severe SARS-CoV-2-infected
mice and macaques. They also found that induction of either interferon (IFN)-β or IFN-γ on SARS-CoV-2 infection results in activation of aryl hydrocarbon receptor (AhR) signaling through an IDO-Kyn-dependent pathway, leading to transcriptional upregulation of the expression of mucins, both the secreted and membrane-bound, in alveolar epithelial cells. Consequently, accumulated alveolar mucus affects the blood-gas barrier, thus inducing hypoxia and diminishing lung capacity, which can be reversed by blocking AhR activity.

10 November

Epidemiology


In this cohort study that included 78,607 residents of 618 nursing homes in Ontario, Canada, 5218 (6.6%) developed COVID-19 infection and 1452 (1.8%) died of COVID-19 infection as of May 20, 2020. The case fatality rate was 27.8% (1452/5218). Of note, COVID-19 mortality in homes with low crowding (number of occupants per room and bathroom across an entire home) was less than half (1.3%) than that of homes with high crowding (2.7%).

Virology

Relman DA. Opinion: To stop the next pandemic, we need to unravel the origins of COVID-19. PNAS first published November 3, 2020. Full-text: https://doi.org/10.1073/pnas.2021133117

Important comment. According to David A. Relman from Stanford, “a more complete understanding of the origins of COVID-19 clearly serves the interests of every person in every country on this planet. It will limit further recriminations and diminish the likelihood of conflict; it will lead to more effective responses to this pandemic, as well as efforts to anticipate and prevent the next one. It will also advance our discussions about risky science. And it will do something else: Delineating COVID-19’s origin story will help elucidate the nature of our very precarious coexistence within the biosphere.”
Vaccine


Yesterday, Pfizer and BioNTech announced that their mRNA-based vaccine candidate, BNT162b2, demonstrated “evidence of efficacy“, based on the first interim efficacy and safety analysis conducted on November 8, 2020 by an external, independent Data Monitoring Committee from the Phase III clinical study.

- BNT162b2 was found to be “more than 90% effective” in preventing COVID-19 in participants without evidence of prior SARS-CoV-2 infection
- Analysis evaluated 94 confirmed cases of COVID-19 in trial participants
- Study enrolled 43,538 participants, with 42% having diverse backgrounds, and no serious safety concerns have been observed
- Clinical trial to continue through to final analysis at 164 confirmed cases in order to collect further data and characterize the vaccine candidate’s performance against other study endpoints

That’s what we know. Read how scientists welcome the first compelling evidence that a vaccine can prevent COVID-19. But many questions remain about how much protection it offers, to whom and for how long.


In this randomized, double-blinded Phase II trial, 742 healthy adults received a medium (MD) or a high dose (HD) of an inactivated vaccine at an interval of either 14 days or 28 days. Neutralizing antibody (NAb) and anti-S and anti-N antibodies were detected at different times, and adverse reactions were monitored for 28 days after full immunization. The seroconversion rates of NAb in MD and HD groups were 89% and 96% at day 14 and 92% and 96% at day 28 after immunization. Of note, the vaccine was safe (still an issue with inactivated vaccines), and no severe adverse effects were reported.
Clinical
Who will be re-admitted? In a cohort of 106,543 patients discharged after an index COVID-19 hospitalization, 9% experienced at least one readmission to the same hospital within 2 months of discharge. Multiple readmissions occurred in 1.6% of patients. Not very surprising: risk factors for readmission included age ≥ 65 years, presence of certain chronic conditions (chronic obstructive pulmonary disease, heart failure, diabetes with chronic complications, chronic kidney disease, and obesity), hospitalization within the 3 months preceding the first COVID-19 hospitalization, and discharge to a skilled nursing facility or with home health care.

Comorbidities
Survivors of COVID-19 appear to be at increased risk of psychiatric sequelae. Here, Maxime Taquet and colleagues used a global federated network that captures anonymized data from electronic health records in 54 health care organizations in the US, totaling 69.8 million patients and 62,354 patients diagnosed with COVID-19. In patients with no previous psychiatric history, a diagnosis of COVID-19 was associated with increased incidence of a first psychiatric diagnosis in the following 14 to 90 days compared with six other health events (i.e., hazard ratio [HR] 2.1 vs influenza). The HR was greatest for anxiety disorders, insomnia, and dementia. The incidence of a first diagnosis of dementia in the 14 to 90 days after COVID-19 diagnosis was 1.6% in people older than 65 years. A psychiatric diagnosis in the previous year was associated with a higher incidence of COVID-19 diagnosis (relative risk 1.65).
Treatment


Timothy Hoang and colleagues investigated the immunologic and virologic efficacy of baricitinib (approved JAK1/2 inhibitor) in rhesus macaques. Viral shedding measured from nasal and throat swabs, bronchoalveolar lavages and tissues was NOT reduced with baricitinib and type I IFN antiviral responses and SARS-CoV-2-specific T cell responses remained similar between the two groups. However, animals treated with baricitinib showed reduced inflammation, decreased lung infiltration of inflammatory cells, reduced NFTosis activity, and more limited lung pathology. Importantly, baricitinib-treated animals had a rapid and remarkably potent suppression of lung macrophage production of cytokines and chemokines responsible for inflammation and neutrophil recruitment.


No, there was no effect of HCQ in this RCT among 479 adults hospitalized with respiratory illness from COVID-19. Do we need more clinical studies?


Nice comment on the HCQ story. According to Michael Saag, the clear, unambiguous, and compelling lesson from the hydroxychloroquine story for the medical community and the public is that science and politics do not mix.

Pediatrics

A prospective UK population-based cohort study of 66 babies with confirmed SARS-CoV-2 infection in the first 28 days of life who received in-patient care between March and April. Of these, 28 (42%) had severe neonatal SARS-CoV-2 infection and 16 (24%) were born preterm. Only half were of white ethnic groups. Of 17 (26%) babies with confirmed infection who were born to mothers with known perinatal SARS-CoV-2 infection, only two (3%) were considered to have possible vertically acquired infection. As of July 28, 2020, 58 (88%) babies had been discharged home, seven (11%) were still in hospital, and one (2%) had died of a cause unrelated to SARS-CoV-2 infection.

11 November

Epidemiology


Google might see a nascent epidemic two weeks before the first reported cases. This is the result of a study by Mohamad Bydon, Shyam J. Kurian and colleagues from Mayo Clinic, Rochester after developing a digital surveillance model using Google Trends. The authors searched the following keywords: COVID symptoms, coronavirus symptoms, sore throat+shortness of breath+fatigue+cough, coronavirus testing center, loss of smell, Lysol (sanitizer), antibody, face mask, coronavirus vaccine, and COVID stimulus check. Find out which one did best. The authors suggest that this information could enable better preparation and planning for health care systems.

Transmission


A small minority of “superspreader” events account for a large majority of infections. What we have known for a long time is now being confirmed by a mobility network model which mapped the hourly movements of 98 million people from neighborhoods to points of interest (POIs) such as restaurants and religious establishments. Jure Leskovec, Serina Chang and colleagues, connected 57,000 neighborhoods to 553,000 POIs and found that restricting
maximum occupancy at each POI would be more effective than uniformly reducing mobility. Their model also correctly predicted higher infection rates among disadvantaged racial and socioeconomic groups: disadvantaged groups cannot reduce mobility as sharply as other groups and the POIs they visit are more crowded.

See also the comment by Ma KC, Lipsitch M. Big data and simple models used to track the spread of COVID-19 in cities. Nature 2020, published 10 November. Full-text: https://www.nature.com/articles/d41586-020-02964-4


Vaccine


Are self-assembling protein nanoparticles that display 60 SARS-CoV-2 spike receptor-binding domains (RBDs) and induce neutralizing antibody titers comparable to those produced by people after SARS-CoV-2 infection? That’s what Neil King and David Veesler and colleagues from University of Washington, Seattle, US, report. The authors anticipate that manufacture of the nanoparticle vaccines might be very scalable.


The need for COVID-19 vaccines has prompted thousands of otherwise healthy people to volunteer to be infected with the virus to test candidate vaccines. Seán O’Neill McPartlin, Abie Rohrig, and Josh Morrison urge us to embrace the altruism of volunteers, but Charles Weijer argues that it would be dangerous and unjustified.
Treatment

Results from a small non-randomized study might suggest a benefit from ruxolitinib in patients with severe COVID-19 pneumonia not requiring mechanical ventilation at baseline. D’Alessio et al. report an analysis of 32 patients (Group A) who received ruxolitinib, a JAK 1/2 (Janus Kinase) inhibitor, and 43 patients who served as a control group (Group B). Ruxolitinib was administered orally at a dose of 5 mg twice daily for 7 days and then tapered to 5 mg daily to complete a 10-day course of treatment. All patients received methylprednisolone. Concomitant administration of hydroxychloroquine, lopinavir/ritonavir or remdesivir was not permitted during treatment with ruxolitinib. Kaplan–Meier estimates of the percentage of patients who were alive and clinically recovered at the end of follow-up were 89% for group A and 57% for group B (SE ± 6.1). As always: to be confirmed in larger trials.

Severe COVID
Wang F, Huang S, Gao R. **Initial whole-genome sequencing and analysis of the host genetic contribution to COVID-19 severity and susceptibility.** Cell Discov 6, 83 (2020). Full-text: https://doi.org/10.1038/s41421-020-00231-4

HLA-A*11:01, B*51:01, and C*14:02 alleles might predispose to severe COVID-19. This is the result of a host genetic study deeply sequencing and analyzing 332 COVID-19 patients categorized by varying levels of severity. Lei Liu, Fang Wang and colleagues conducted single-variant and gene-based association tests among five severity groups: asymptomatic, mild, moderate, severe, and critically ill patients. Find out more about genes involved in the interleukin-1 (IL-1) signaling pathway and the stability of the TMPRSS2 protein.

Collateral Effects

Lockdown causes domicile discord which in turn causes more penetrating trauma? Jose Pascual, Hatem Abdallah and colleagues tested the hypothesis that intentional injury might have increased during stay-at-home-orders (SAHO) and assessed injury patterns from 6 weeks pre- to 10 weeks post-
statewide stay-at-home order. 357 and 480 trauma patients presented pre- and post-SAHO, respectively. Pre- and post- groups demonstrated differences in sex, age, and race. Post-SAHO mechanism of injury (blunt vs. penetrating) revealed more intentional injury.

Lee PH, Marek J, Nálevka P. **Sleep pattern(s) in the US and 16 European countries during the COVID-19 outbreak using crowdsourced smartphone data.** Eur J Public Health 2020, published 10 November. Full-text: [https://doi.org/10.1093/eurpub/ckaa208](https://doi.org/10.1093/eurpub/ckaa208)

When you sleep, your smartphone is taking notes and you may end up in a scientific publication. Here Paul Lee and colleagues utilized a large crowdsourced database (Sleep as Android) and analyzed the (your?) sleep behavior of 25,217 users with 1,352,513 sleep records between 1st January and 29th April 2020 in 16 European countries (Germany, United Kingdom, Spain, France, Italy, the Netherlands, Belgium, Hungary, Denmark, Finland, Norway, Czech, Sweden, Austria, Poland, and Switzerland) and in the US. The unsurprising result: during lockdown, people delayed their bedtime and slept longer than usual.

12 November

Transmission


A two-week quarantine at home is not sufficient to prevent SARS-CoV-2 from entering into a closed college campus. That’s one of the results of a study by Stuart Sealfon, Andrew Letizia and colleagues who investigated SARS-CoV-2 infections among US Marine Corps. Around 2% of recruits who had had negative results for SARS-CoV-2 at the beginning of a supervised quarantine tested positive within two weeks. Most recruits who tested positive were asymptomatic, and no infections were detected through daily symptom monitoring. The author’s short conclusion: “Transmission clusters occur within platoons.”

See also the comment by Michael NL. **SARS-CoV-2 in the U.S. Military — Lessons for Civil Society.** N Engl J Med 2020, published 11 November. Full-text: [https://doi.org/10.1056/NEJMe2032179](https://doi.org/10.1056/NEJMe2032179)

Do you remember March 30? SARS-CoV-2 is spreading aboard the aircraft carrier **USS Theodore Roosevelt.** The ship’s commanding officer, Captain Brett Crozier, sends an email to three admirals in his chain of command, recommending that he be given permission to evacuate all non-essential sailors, to quarantine known COVID-19 cases, and sanitize the ship. “We are not at war. **Sailors do not need to die,**” writes Crozier in his four-page memo. The letter leaks to the media and generates several headlines. Three days later, 2 April, Captain Crozier is sacked.

You can now read the final report of the outbreak. A total of 1271 crew members (26.6% of the crew) tested positive for SARS-CoV-2. Among the crew members with laboratory-confirmed infection, 76.9% (978 of 1271) had no symptoms at the time that they tested positive and 55.0% had symptoms develop some time during the clinical course. Among the 1331 crew members with suspected or confirmed COVID-19, 23 (1.7%) were hospitalized, 4 (0.3%) received intensive care, and 1 died. Crew members who worked in confined spaces appeared more likely to become infected. The conclusion: transmission of SARS-CoV-2 is facilitated by close-quarters conditions and by asymptomatic and pre-symptomatic infected crew members.


Detection of coronavirus RNA, including SARS-CoV-2, in hospital and other ventilation systems has been reported. Here, Erik Salaneck, Karolina Nissen and colleagues present further evidence for SARS-CoV-2’s ability to disperse from patients to ward vent openings. They detected viral RNA in ventilation exhaust filters located at least 50 m from patient room vent openings. Although the authors did not isolate infectious virus, they suggest that there may be a risk for airborne dissemination and transmission, especially at much closer distances to contagious persons in confined spaces, both in and outside hospital environments.
Immunology


Children can mount an immune response to SARS-CoV-2 without virological confirmation of infection. This is the exciting result from a study by Shidan Tosif et al. who describe clinical features, virology, longitudinal cellular, and cytokine immune profile, SARS-CoV-2-specific serology and salivary antibody responses in a family of two parents with PCR-confirmed symptomatic SARS-CoV-2 infection and their three children, who tested repeatedly SARS-CoV-2 PCR-negative. These findings raise the possibility that immunity in children can prevent the establishment of SARS-CoV-2 infection.


A widespread variant of SARS-CoV-2 which has been identified in 12 countries might have the potential to evade recently acquired immunity. That’s the result of a study by David Robertson, Gyorgy Snell, Emma Thomson and colleagues who examined the N439K mutation in the receptor binding motif (RBM) of the SARS-CoV-2 spike (S) protein. The authors found that the N439K mutation resulted in immune escape from a panel of neutralizing monoclonal antibodies (including some that are currently being developed for treatment of SARS-CoV-2 infection) as well as from polyclonal sera from a sizeable fraction of persons recovered from infection. The authors conclude that their findings might have consequences for the efficacy of emerging vaccines and antibody therapeutics.

Vaccine


The most severe COVID-19 outbreaks in the US are no longer occurring in nursing homes or meat packing plants, but in correctional facilities. Find an audio interview (19:26) with Holly Taylor on the ethical issues involved in conducting COVID-19 vaccine research in correctional facilities (19:26).
Teerawattananon Y, Dabak SV. **COVID vaccination logistics: five steps to take now.** Nature 2020, published 9 November. Full-text: https://www.nature.com/articles/d41586-020-03134-2

The authors point out that creating a safe and effective vaccine is just Act 1 of the 2021 Vaccine Play. Developing a comprehensive and strategic plan for vaccine roll-out is Act 2.

**Severe COVID**

Ledford H. **Why do COVID death rates seem to be falling?** Nature 2020, published 11 November. Full-text: https://www.nature.com/articles/d41586-020-03132-4

Hard-won experience, changing demographics and reduced strain on hospitals are all possibilities — but no one knows how long this change will last. By Heidi Ledford.

**Education**


A tracheostomy is a surgically created airway that is kept open with a breathing tube, or tracheostomy tube. It can take place in the operating room or at the patient’s bedside. Find out more about indications and contraindications; procedural modifications in patients with COVID-19; equipment and preparation; patient and provider positioning; identification of anatomical landmarks; and, finally, procedure, aftercare and complications.

**Spanish**


Una encuesta a 2000 contagiados en España muestra la persistencia del coronavirus y sus secuelas.
Los fundadores de BioNTech, la empresa alemana que trabaja en una inmunización contra la COVID, son un matrimonio de expertos en cáncer.

French
Peu reposés depuis le printemps, en manques de moyens et de reconnaissance, les soignants témoignent de leur lassitude et de leurs craintes face au nouveau pic épidémique.

Quels sont les lieux les plus à risque pour attraper le Covid-19 ? Pour le savoir, de nombreux chercheurs mènent des études afin d’identifier les contextes les plus propices à la propagation du coronavirus. Parmi elles, une étude, publiée en septembre 2020 dans le revue JAMA Internal Medicine...

13 November
Epidemiology
In April-June 2020, the crude prevalence of anti–SARS-CoV-2 IgG among blood donors in Kenya was 5.6% (174/3098). It was highest in urban counties, Mombasa (8.0%), Nairobi (7.3%) and Kisumu (5.5%). Of note, Kenya reported only 341 deaths by the end of that period. The authors conclude that the sharp contrast between the reported COVID-19 cases and deaths suggests that the disease might be attenuated in Africa.


Fatigue, gastrointestinal symptoms and changes in sense of smell or taste were the symptoms most strongly associated with SARS-CoV-1 antibody positivity in children. Thomas Waterfield et al. report 68/992 (6.9%) children aged 2-15 years with positive SARS-CoV-2 antibody tests. Of these, 34/68 (50%) reported no symptoms prior to testing. Four independent variables were identified as significantly associated with SARS-CoV-2 seropositivity: known infected household contact OR=10.9; fatigue OR=16.8; gastrointestinal symptoms OR=6.6; and changes in sense of smell or taste OR=10.0.


One month into the outbreak and more than 2 weeks after social distancing and lockdown interventions were implemented, the proportion of SARS-CoV-2 antibody-positive individuals in the Dutch population tested was 2.7%. Hans Zaaijer, Ed Slot and colleagues also demonstrate that the hardest-hit areas had a seroprevalence of up to 9.5%; the seroprevalence was sex-independent throughout age groups (18–72 years); and antibodies were significantly more often present in young people aged 18–30 years.

Transmission

The pre-print paper we presented on October 25 has been published in Science: Hou YJ, Chiba S, Halfmann P, et al. SARS-CoV-2 D614G variant exhibits efficient replication ex vivo and transmission in vivo. Science 2020, published 12 November. Full-text: https://doi.org/10.1126/science.abe8499
This paper is a milestone work: Ralph Baric and colleagues (among the leading labs in the world) provide the possible explanation for the exploding numbers of SARS-CoV-2 infections. Engineering SARS-CoV-2 variants harboring the D614G substitution (the most prevalent SARS-CoV-2 strain circulating globally), they show that the D614G variant replicates more efficiently in primary human proximal airway epithelial cells and is more fit than wildtype virus in competition studies. Infection of human ACE2 transgenic mice and Syrian hamsters with the wildtype or D614G viruses produced similar titers in respiratory tissue and pulmonary disease. However, the D614G variant exhibited significantly faster droplet transmission between hamsters than the WT virus, early after infection. No more doubts that the SARS-CoV2 D614G substitution enhances infectivity, replication fitness, and early transmission.


Manli Wang, Jia Liu and colleagues from Wuhan Institute of Virology describe skin autopsy samples from five patients with COVID-19. Immunofluorescence and immunohistochemical analyses detected SARS-CoV-2 spike proteins in three of the five patients. In these cases, the virus resided primarily in the sweat glands and sweat ducts with apparently higher amounts in the former than in the latter; in contrast, the virus was rarely detected in the epidermis or sebaceous glands. The authors conclude that “it is important to further assess the potential risk of viral transmission via perspiration and skin contact.” Editor’s note: This paper will not change my standard protection measures.

Clinical


Clinical spectrum and outcomes of neurological manifestations associated with SARS-CoV-2 infection may be broad and heterogeneous, suggesting different underlying pathogenic processes. This is the conclusion of a French multicenter study describing 222 patients. The most common neurological diseases were COVID-19 associated encephalopathy (30,2%), acute ischemic cerebrovascular syndrome (25,7%), encephalitis (9,5%), and Guillain-Barré Syndrome (6,8%). Neurologic manifestations appeared after the first COVID-19 symptoms with a median (IQR) delay of 6 (3-8) days in COVID-19 associated
encephalopathy, 7 (5-10) days in encephalitis, 12 (7-18) days in acute ischemic cerebrovascular syndrome and 18 (15-28) days in Guillain-Barré Syndrome.

Treatment


Fluvoxamine (a potent agonist of the sigma-1 receptor (σ1R)), is an antidepressant which functions pharmacologically as a selective serotonin reuptake inhibitor. In this small randomized trial that included 152 adult outpatients with COVID-19 and symptom onset within 7 days, Eric Lenze et al. found that clinical deterioration occurred in 0 patients treated with fluvoxamine vs 6 (8.3%) patients treated with placebo over 15 days. The authors acknowledge the limitations of their study: a small number of endpoint events, which makes the findings fragile; 20% of study participants stopped responding to surveys during the 15-day trial; the follow-up duration was short and did not measure the effect of fluvoxamine on persistent symptoms or late deterioration. The potential advantages of fluvoxamine for outpatient treatment of COVID-19 would include its safety, widespread availability, low cost, and oral administration. Note that fluvoxamine can cause drug-drug interactions, particularly via inhibition of cytochromes P450 1A2 and 2C19. Eagerly awaiting data from larger trials. See also the comment by Seymour CW, Bauchner H, Golub RM. COVID-19 Infection—Preventing Clinical Deterioration. JAMA 2020, published 12 November. Full-text: https://doi.org/10.1001/jama.2020.21720


SNG001 is a formulation of recombinant interferon beta for inhaled delivery by nebuliser that is in development for the treatment of virus-induced lower respiratory tract illnesses. In this pilot trial, Tom Wilkinson, Phillip Monk and colleagues show that patients randomly assigned to SNG001 (n = 48) had greater odds of improvement versus placebo on the WHO Ordinal Scale for Clinical Improvement (OSCI) and more rapid recovery to a point where pa-
Patients were no longer limited in their activity, with a greater proportion of patients recovering during the 28-day study period. Note that there was no significant difference between treatment groups in the odds of hospital discharge by day 28 – so await results from larger trials before drawing any conclusions.

See also the comment by Peiffer-Smadja N, Yazdanpanah Y. **Nebulised interferon beta-1a for patients with COVID-19.** Lancet Respir Med 2020, published 12 November. Full-text: [https://doi.org/10.1016/S2213-2600(20)30523-3](https://doi.org/10.1016/S2213-2600(20)30523-3)

**Education**


The editors discuss the pace of discovery in the US response to COVID-19.

**Spanish**


Varios estudios observan que la inmunización refuerza las defensas contra el SARS-CoV-2 y disminuye la mortalidad por COVID.

**French**


L’étude des communications de 98 millions d’Américains suggère qu’un petit nombre de lieux publics favorise la majorité des infections.
Epidemiology


“We usually prefer peer-reviewed studies and seldom present pre-published papers. We are even less readily inclined to present a PDF with just the technical details of an unpublished study. Today we make an exception. In a cross-sectional survey in Mumbai, India, Ullas Kolthur-Seetharam and colleagues estimated the prevalence of SARS-CoV-2 infection in three Mumbai areas (called ‘wards’) in July 2020. The authors found, on average, a prevalence of around 57% in the slum areas of Chembur, Matunga and Dahisar, and 16% in neighboring non-slums. If these data are confirmed, some Mumbai areas would soon reach herd immunity and could return to a pre-COVID way of life.”


Prevention


To mitigate transmission of aerosolised SARS-CoV-2 coronavirus, we are all following one or more of three key principles: minimize time of exposure to virus (by limiting interactions), maximize distance from sources of virus (social distancing), and/or shield yourself from the virus (wear PPE). Here, the
authors propose using narrow bandwidth, short wavelength UVC (207–222 nm) to mitigate further SARS-CoV-2 transmission. Their model shows that disinfection rates are increased by a further 50-85% when using far UVC within currently recommended exposure levels compared to the room’s ventilation alone. [Unlike typical UVC, which has been used to kill microorganisms but is carcinogenic and cataractogenic, recent evidence has shown that far UVC is safe to use around humans.]

**Immunology**

Schulien I, Kemming J, Oberhardt V, et al. *Characterization of pre-existing and induced SARS-CoV-2-specific CD8+ T cells.* Nat Med (2020). Full-text: [https://doi.org/10.1038/s41591-020-01143-2](https://doi.org/10.1038/s41591-020-01143-2)

Are differences in pre-existing and induced SARS-CoV-2-specific CD8+ T cell responses linked to different courses of infection? We don’t know yet. In particular, little is known about the abundance, phenotype, functional capacity and fate of pre-existing and induced SARS-CoV-2-specific CD8+ T cell responses during the natural course of SARS-CoV-2 infection. In this study, Robert Thimme, Maike Hofmann, Christoph Neumann-Haefelin and colleagues established experimental tools for high-resolution *ex vivo* analyses of SARS-CoV-2-specific CD8+ T cells. Find out what they discovered about heterogeneous and functionally competent cross-reactive and induced memory CD8+ T cell responses in cross-sectionally analyzed individuals with mild SARS-CoV-2 disease.

**Clinical**


Under special circumstances, for example in an immunocompromised state, SARS-CoV-2 has the potential for persistent infection and accelerated viral evolution. This is the result of a case report by Manuela Cernadas, Jonathan Li, Bina Choi and colleagues who describe the clinical course of a 45-year-old man with long-standing antiphospholipid syndrome, an autoimmune disorder. Before his death five months after the initial COVID-19 diagnosis, SARS-CoV-2 infection subsided and came back twice.
Wong CKH, Wong JY, Tang EHM, et al. **Clinical presentations, laboratory and radiological findings, and treatments for 11,028 COVID-19 patients: a systematic review and meta-analysis.** Sci Rep 10, 19765 (2020). Full-text: [https://doi.org/10.1038/s41598-020-74988-9](https://doi.org/10.1038/s41598-020-74988-9)

Meta-analysis of 76 studies published from January-March 2020 on clinical presentation, laboratory findings and treatments of COVID-19 patients, accounting for a total of 11,028 COVID-19 patients. The most common co-morbidities were hypertension (18%), followed by cardiovascular disease (12%) and diabetes (10%). The most frequently identified symptoms were fever (72%) and cough (56%). Notably, 62% and 20% of in-patients received oxygen therapy and non-invasive mechanical ventilation, respectively. In this review, radiological findings of SARS-CoV-2 pneumonia were non-specific.

**Severe COVID**

Zietz M, Zucker J, Tatonetti NP. **Associations between blood type and COVID-19 infection, intubation, and death.** Nat Commun 11, 5761 (2020). Full-text: [https://doi.org/10.1038/s41467-020-19623-x](https://doi.org/10.1038/s41467-020-19623-x)

This next study is about the association between ABO and Rh blood types and infection, intubation, and death. Here, the authors used observational healthcare data on 14,112 individuals tested for SARS-CoV-2 with known blood type in the New York Presbyterian hospital system. Risk of intubation was decreased among A and increased among AB and B types, compared with type O, while risk of death was increased for type AB and decreased for types A and B. Rh-negative blood type might have a protective effect for all three outcomes.

Gude F, Riveiro V, Rodríguez-Núñez N, et al. **Development and validation of a clinical score to estimate progression to severe or critical state in COVID-19 pneumonia hospitalized patients.** Sci Rep 10, 19794 (2020). Full-text: [https://doi.org/10.1038/s41598-020-75651-z](https://doi.org/10.1038/s41598-020-75651-z)

Five predictors determined within 24 h of hospital admission may identify patients at risk for COVID-19 disease progression: diabetes, higher age, a low lymphocyte count, decreasing SaO₂, and any pH alteration. This is the outcome of a study by Lucía Ferreiro, Francisco Gude and colleagues who analyzed 229 patients who were admitted for pneumonia. The prediction model showed a good clinical performance, including discrimination (AUC 0.87 CI 0.81, 0.92) and calibration (Brier score = 0.11). In total, 0%, 12%, and 50% of
patients with severity risk scores ≤ 5%, 6–25%, and > 25% exhibited disease progression, respectively.

Comorbidities


Patients with diabetes mellitus are at increased risk of severe COVID-19. The authors discuss potential pathogenetic links between COVID-19 and diabetes mellitus; tight control of glucose levels; explain that insulin and dipeptidyl peptidase 4 inhibitors can be used safely in patients with diabetes mellitus and COVID-19; and caution that metformin and sodium–glucose co-transporter 2 inhibitors might need to be withdrawn in patients at high risk of severe disease.

Spanish


El 70% de la población española vive en localidades que superan los 250 casos por 100.000 habitantes. El virus ha crecido en las últimas dos semanas en 1.400 de ellas.

French


De nouveaux indicateurs permettent une compréhension à la fois plus fine et plus exhaustive des inégalités au niveau mondial, détaille l’économiste Thomas Piketty dans sa chronique.


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**15 November**

**Epidemiology**

Brotons P, Launes C, Buetas E, et al. **Susceptibility to Sars-COV-2 Infection Among Children And Adults: A Seroprevalence Study of Family Households in the Barcelona Metropolitan Region, Spain.** Clinical Infectious Diseases, November 12, 2020. Full-text: [https://doi.org/10.1093/cid/ciaa1721](https://doi.org/10.1093/cid/ciaa1721)

Children have similar probability as adults to become infected by SARS-CoV-2 in quarantined family households. Pedro Brotons and colleagues from Barcelona performed a large cross-sectional seroprevalence study, enrolling 381 family households including 381 first-reported PCR-positive adult cases and 1084 contacts (672 children, 412 adults). SARS-CoV-2 infection seroprevalence rates were 18% (118/672) in children and 19% (77/335) in adult contacts. Nearly all positive pediatric contacts were asymptomatic or had mild symptoms.

Examples of religious congregations that resulted in seeding or surging of domestic and international COVID-19 outbreaks include events in Daegu, South Korea; Qom, Iran; Albany, Georgia; Arkansas + Maine, USA; and Mulhouse, France. Read how the science-driven steering of the 2020 Hajj with vastly reduced pilgrim numbers allowing for full compliance of the mitigation strategies avoided the cancellation of the event.

Immunology


Cellular and humoral immune response to SARS-CoV-2 were analyzed in 34 donors from Moscow who had recently recovered from COVID-19, as well as in two small control cohorts of healthy donors sampled before or during the pandemic. Some of the 14 healthy donors examined during the pandemic exhibited increased numbers of SARS-CoV-2-specific T cells, but no humoral response. It therefore seems possible that some people are protected by a pre-existing cross-reactive T cell response induced by other coronaviruses or had developed an asymptomatic infection that was cleared without the help of the humoral response. But can we believe this? The numbers were low and there is no doubt that his hypothesis needs to be validated in a larger cohort of donors.

Diagnostics


Many patients who recovered from COVID-19 may still be positive (albeit at lower levels) for SARS-CoV-2 RNA, but only a minority of the patients may carry replicating SARS-CoV-2 in the respiratory tract. Flora Marzia Liotti and colleagues from Rome, Italy analyzed nasal/oropharyngeal swab samples of
176 recovered patients with no fever and with 2 negative RT-PCR results for SARS-CoV-2 RNA 24 hours apart. In total, 32 of 176 samples (18%) tested positive for total SARS-CoV-2 RNA. All had low viral loads and only one of the 32 samples (3.1%) had replicative SARS-CoV-2 RNA.

Clinical


More on “Long COVID-19”. In this study, 172 survivors (33 with severe COVID-19) underwent high resolution CT of the thorax and pulmonary function tests at three months after hospital discharge. An abnormal pulmonary function was found in 11 (6%), and abnormal small airway function (FEF25-75%) in 12 (7%) patients. Obstructive and restrictive ventilation impairment was observed in six (3.5%) patients each. Lung function parameters did not differ between non-severe and severe cases. Of 142 CT scans, 122 (86%) showed residual CT abnormalities and 52 (37%) showed chronic and fibrotic changes.

Comorbidities


Vitamin D might have beneficial potential due to its immunomodulatory and anti-inflammatory properties. But is a deficiency associated with disease severity? Perhaps. In this cross-sectional study, 335 COVID-19 patients admitted to the Wuhan Tongji Hospital were retrospectively analyzed. A vitamin D deficiency (< 30 nmol/L) was significantly associated with COVID-19 severity (OR 2.7). Prospective studies have to confirm these results.

Collateral damage


Good question. We don’t know yet. After summarizing various determinants that may result in either an increase or, inversely, a decrease in antimicrobial
resistance (AMR), the authors found them to be balanced. The truth is that the impact of the COVID-19 pandemic on AMR will only become clear in the coming months and years as data gradually become available. Changes in AMR will most likely vary depending on the setting—e.g., ICUs vs other hospital units, hospital vs community settings—and possibly between countries.


What is the association between the SARS-CoV-2 pandemic and out-of-hospital cardiac arrest (OHCA) outcomes in the US? This large registry study of 19,303 cases in 2019 and 2020 showed that the return of spontaneous circulation (ROSC) for OHCA was 18% lower overall than before the pandemic. Although the decrease was more prominent in counties most affected by the COVID-19 pandemic, lower rates of sustained ROSC and higher rates of termination of resuscitation were also observed in counties with low COVID-19 mortality rates. Delays in seeking medical care during the lockdown may not entirely explain the findings. The authors speculate that the interim recommendations for emergency medical service during this pandemic (for protecting frontline health care workers from unnecessary exposure) may also have decreased the likelihood of a successful resuscitation.

Treatment


The secondary humoral deficiency induced by anti-CD20 monoclonal antibodies such as rituximab may prevent the elicitation of a specific SARS-CoV-2 antibody response. Thomas Hueso and colleagues from France report on 17 consecutive patients with profound B cell lymphopenia and prolonged COVID-19 symptoms, negative SARS-CoV-2 serology, and positive RNAemia who were treated with four units of convalescent plasma. Within 48 hours of transfusion, all but 1 patient experienced an improvement of clinical symptoms. The inflammatory syndrome abated within a week. Of note, SARS-CoV-2 RNAemia decreased to below the sensitivity threshold in all 9 evaluated patients. This small series indicates that convalescent plasma could be promising at least in patients unable to mount a specific humoral response.

How to select donors of convalescent plasma (CP)? The answer: take older males with blood group AB and with severe disease – and don’t wait too long. In this study from the UK, 275/330 donors had detectable neutralizing antibodies against SARS-CoV-2. For these 275 donors, median levels of neutralizing antibodies were higher in men compared with women, in those hospitalized compared with non-hospitalized, in those with blood group AB compared with other groups. Neutralizing antibody levels decreased as the time between SARS-CoV-2 diagnosis and donation increased. According to the authors, their data will be of value in the timely recruitment of CP donors most likely to have high levels of neutralizing antibodies for ongoing studies investigating its effectiveness.

French

Ugur Sahin et Ozlem Türeci, aujourd’hui classés parmi les 100 personnes les plus riches d’Allemagne, sont des enfants d’immigrés turcs.


Le nombre de patients atteints par le Covid-19 a considérablement augmenté en quinze jours dans ce centre hospitalier parisien où les personnels font face à la détresse des malades et, parfois, à la défiance des familles.
La vaccinologue Marie-Paule Kieny estime que les premiers vaccins pourraient être proposés en France début 2021. Selon elle, même si le virus ne pourra être éradiqué, la situation sanitaire devrait être meilleure d’ici quelques mois.

16 November

Immunology


T follicular help (TFH) cells, a subset of T cells, have been identified as professional B helper T cells in past decades and are required for T-dependent antibody production. Convalescent individuals who experienced severe COVID-19 showed higher neutralizing antibody titers, a faster increase in lymphocyte counts and a higher frequency of CXCR3+ TFH cells compared with COVID-19-convalescent individuals who experienced non-severe disease. Circulating TFH cells were spike specific and functional, and the frequencies of CXCR3+ TFH cells were positively associated with neutralizing antibody titers in COVID-19-convalescent individuals.


Severe COVID-19 and dengue hemorrhagic fever (DHF) are two diseases that can associate with an altered immune response to the infecting virus. In both infections, a cytokine storm is thought to play a role in disease pathogenesis. Shashika Dayarathna and colleagues from Sri Lanka found similarities between the cytokines that are elevated in early illness in those who progress to severe illness but also many differences. Those who developed severe pneumonia in COVID-19 had high levels of many inflammatory cytokines and chemokines but low IFN-γ levels. Patients who proceeded to develop DHF also
had high cytokine and chemokine levels, but most strikingly very high IL-10 levels. Low IFN-γ response to SARS-CoV-2 and high levels of immunosuppressive cytokines such as IL-10 in both COVID-19 and dengue during early illness is likely to result in an altered antiviral response.

**Vaccine**


Scott B. Halstead and Leah Katzelnick say no. Antibody-dependent enhanced (ADE) breakthrough infections are unlikely because coronavirus diseases in humans lack the clinical, epidemiological, biological, or pathological attributes of ADE disease exemplified by dengue viruses (DENV). In contrast to DENV, SARS and MERS CoVs predominantly infect respiratory epithelium, not macrophages.

**Diagnostics**


Using Abbott’s SARS-CoV-2 IgG assay and the Panbio™ COVID-19 IgG/IgM device, the authors found that serum IgG detection alone is insufficient for the diagnosis of active or cured COVID-19, with sensitivity values that range between 60 and 75%, respectively. Detection of IgM adds limited value to the performance of serological strategies.


Pooled nucleic acid amplification tests (NATs) could increase availability of testing at a decreased cost. However, it is not that trivial, and the effect of dilution on analytical sensitivity through sample pooling has not been well characterized. Hannah Wang and colleagues from Stanford tested 1648 prospectively pooled specimens by using 3 different NATs. Positive percent agreement (PPA) of pooled versus individual testing ranged from 71,7% to 82,6% for pools of 8 and from 82,9% to 100,0% for pools of 4. PPA was depend-
ent on the proportion of tests with positive results, cycle threshold distribution, and assay limit of detection. False negative results occurred exclusively in pools containing samples with low estimated viral load (Ct > 34).


In their viewpoint, Yukari C. Manabe, Joshua S. Sharfstein and Katrina Armstrong argue that it is more accurate to consider testing less of a prevention strategy than a mitigation strategy. Testing in the absence of other proven prevention strategies is unable to prevent outbreaks. Even as tests become faster with higher sensitivity and specificity, social distancing, mask wearing, and avoidance of large indoor and outdoor gatherings must remain central to any public health strategy. Even the perfect test cannot go it alone.

Clinical


The toll of COVID-19 extends well beyond hospitalization. In this cohort study of 1648 patients with COVID-19 admitted to 38 hospitals in Michigan, 398 (24%) died during hospitalization and 1250 (76%) survived. Of these, 975 (78%) went home whereas 158 (13%) were discharged to a skilled nursing or rehabilitation facility. By 60 days after discharge, an additional 84 patients (7% of hospital survivors and 10% of ICU-treated hospital survivors) had died. Within 60 days of discharge, 189 patients (15% of hospital survivors) were rehospitalized. Of patients alive 60 days after discharge, 488 (41.8%) completed a telephone survey. For most patients who survived, ongoing morbidity, including the inability to return to normal activities, physical and emotional symptoms, and financial loss, was common.


Numerous observational studies have attempted to identify risk factors for infection with SARS-CoV-2 and COVID-19 disease outcomes. Studies have used datasets sampled from patients admitted to hospital, people tested for active infection, or people who volunteered to participate. Here, Gareth J. Griffith
and colleagues from Bristol highlight the challenge of interpreting observational evidence from such non-representative samples. Read how the collider bias (a variable that is influenced by two other variables, for example when a risk factor and an outcome both affect the likelihood of being sampled) can have a dramatic impact on the results and what approaches are available to explore and mitigate this problem.

**Treatment**


Julia Schwaiger and colleagues from Baxter AG tested 54 intravenous immunoglobulin preparations, produced from plasma collected in Europe and the US. Although highly potent neutralization of a seasonal coronavirus HCoV-229E was seen, there was no cross-neutralization of the new SARS-CoV-2.

**Pediatrics**


A case of fetal death associated with intrauterine transmission of SARS-CoV-2 in a 42 yr old woman at 27 weeks’ gestation. Placenta and fetal tissue showed chronic histiocytic intervillousitis, maternal and fetal vascular malperfusion, microglial hyperplasia, and lymphocytic infiltrates. Placenta and umbilical cord blood tested positive for the virus by PCR, confirming transplacental transmission.

**17 November**

**Epidemiology**

Do you have a niece who, despite all the warnings, is unwaveringly sticking to her plans to get married in January? Who says that only 50 guests (ok, 55) will come and that temperature checks for all guests will be conducted at the facility entrance? That there will be enough space, with 10 tables, with 4–6 guests seated around each table? That signs posted at the entrance will instruct visitors to wear masks? Then give her this paper to read. A wedding reception in a small rural town in Maine was the likely source of COVID-19 outbreaks in the local community, a long-term care facility, and a correctional facility. Outcome: 177 cases, seven hospitalizations, and seven deaths. Read here why people should avoid large gatherings, practice physical distancing, wear masks, stay home when ill, and self-quarantine after exposure to a person with confirmed SARS-CoV-2 infection.

(If your niece doesn’t want to read a scientific paper, provide her with “15 Benefits of A Summer Wedding”: https://www.nichemarket.co.za/blog/extravaganza/benefits-summer-wedding. Benefit No. 16 is found probably below, in the vaccine section.)


How social gatherings likely contributed to rapid transmission of SARS-CoV-2 in an Amish community. In May, after a cluster of seven COVID-19 cases was identified, 23/30 (77%) additional residents tested by RT-PCR received positive test results. Rapid and sustained transmission of SARS-CoV-2 was associated with multiple social gatherings. Although Amish communities might be experiencing challenges with preventing and mitigating SARS-CoV-2 transmission, the authors conclude that leveraging Amish cultural beliefs of communal responsibility could help limit the spread of SARS-CoV-2.


By August 2020, 90 of the largest 100 cluster outbreaks in the United States had occurred in prisons and jails. Reducing the incarcerated population (“decarceration”) is an important and urgent strategy for mitigating viral transmission in prisons and jails. In their courageous viewpoint, Emily Wang and colleagues argue that decarceration in the service of both public health
and safer communities will require sustained engagement from clinicians, health systems, and Medicaid authorities.

**Immunology**


Using mass spectrometry, Michael D Knierman and colleagues from Lilly performed a precise and comprehensive immunopeptidomic investigation with SARS-CoV-2 spike glycoprotein. They identified 526 unique sequences from SARS-CoV-2 spike glycoprotein extracellular domain in a complex with HLA class II molecules on antigen presenting cells from a panel of healthy donors. The identified sequences spanned the entire spike protein and several sequences were isolated from a majority of the donors sampled, indicating promiscuous binding. This is good news, as both the depth and breadth of the HLA-II peptides indicate that mutational drift is not expected to dramatically alter the ability of an infected individual to mount a new B cell response.

**Vaccine**

Callaway E. COVID vaccine excitement builds as Moderna reports third positive result. Nature NEWS November 16, 2020. Full-text: [https://doi.org/10.1038/d41586-020-03248-7](https://doi.org/10.1038/d41586-020-03248-7)

Moderna’s vaccine comprises RNA instructions for cells to produce a modified form of the coronavirus spike protein, the immune system’s key target against coronaviruses. Of note, the vaccine remains stable in conventional refrigerators for a month and ordinary freezers for six months. Ewen Callaway summarizes preliminary data showing that the immunization is 94% effective and seems to prevent severe infections.

**Diagnostics**


A new microsphere-based flow cytometry assay that quantifies the ability of plasma to inhibit the binding of spike protein to ACE2. Plasma from 22 pa-
tients who had recovered from mild COVID-19 and expressed anti-spike protein trimer immunoglobulin G (IgG) inhibited ACE2–spike protein binding to a greater degree than controls. The degree of inhibition was correlated with anti–spike protein IgG levels, neutralizing titers in a pseudotyped lentiviral assay, and the presence of fever during illness. This inhibition assay may be broadly useful to quantify the functional antibody response of patients recovered from COVID-19 or vaccine recipients in a cell-free assay system.

Clinical


Isolated reports of new-onset diabetes in COVID-19 cases have led to the hypothesis that SARS-CoV-2 is directly cytotoxic to pancreatic islet β cells. Katie Coate and colleagues show here that it’s not that easy. In pancreatic sections, ACE2 and TMPRSS2 protein (the main cell entry factors) were not detected in β cells from donors with and without diabetes. Instead, ACE2 protein was expressed in islet and exocrine tissue microvasculature and in a subset of pancreatic ducts, whereas TMPRSS2 protein was restricted to ductal cells. Contrasting with previous reports, this careful investigation suggests that the interaction of diabetes and SARS-CoV-2 is mediated by systemic inflammation and/or metabolic changes in other organs such as liver, muscle or adipose tissue (and not by a direct infection of β cells in the pancreas).


This study focused on the diaphragm, the main muscle of respiration. Consecutive diaphragm muscle specimens from 26 deceased COVID-19 patients were compared with autopsy diaphragm specimens of 8 patients who had been critically ill without COVID-19. There was an increased expression of genes involved in fibrosis and histological evidence for the development of fibrosis in the diaphragm. Of note, this myopathic phenotype was distinctly different from that of control ICU patients, with comparable duration of mechanical ventilation and ICU length of stay. It is hypothesized that severe myopathy may lead to diaphragm weakness and might contribute to ventilator weaning failure, persistent dyspnea, and fatigue in COVID-19 survivors.

Interesting discussion about in-person medical student involvement during the COVID-19 pandemic. Some authors argue for it, others against it. Both sides have good arguments.

Collateral Damage

Do suicide rates increase during infectious disease outbreaks? Probably not (at least in Australia). In this study, analyzing suspected suicide rates in 2020 relative to 2015–19 to assess any early effects of the COVID-19 pandemic in Queensland, no evidence of a change in suspected suicide rates was seen.

18 November

Epidemiology

Test them all? In fall 2020, Duke University’s COVID-19 prevention strategy included risk reduction behaviors, but also frequent testing using pooled SARS-CoV-2 PCR testing, and contact tracing. Of 10,265 students who received testing 68,913 times, 84 had positive results. Of these, 51% were asymptomatic, and some had high viral loads. This plan allowed campus to remain open for 10 weeks of classes without substantial outbreaks among residential or off-campus populations. Importantly, no evidence from contact tracing linked transmission with in-person classes. Pooled testing permitted a nearly 80% savings in use of reagents and laboratory resources compared with testing each individual specimen.
Immunology


Finasteride for COVID-19? Ryan M. Samuel and colleagues from San Francisco identified a link between male sex hormone signaling and regulation of the SARS-CoV-2 receptor ACE2 and co-receptor TMPRSS2, possibly explaining the higher complication rates in men. Target analysis of hit compounds revealed androgen signaling as a key modulator of ACE2 levels. Of note, treatment with anti-androgenic drugs such as finasteride reduced ACE2 expression and protected hESC-derived lung organoids against SARS-CoV-2 infection. Finally, clinical data on COVID-19 patients demonstrated that prostate diseases, which are linked to elevated androgen, are significant risk factors and genetic variants that increase androgen levels are associated with higher disease severity.


Ang Li and colleagues from Shanghai examined early responses of IL-37, a powerful anti-inflammatory cytokine, in 254 SARS-CoV-2-infected patients prior to any clinical intervention and determined its correlation with clinical prognosis. Higher early IL-37 responses correlated with earlier viral RNA negative conversion, chest CT image improvement and cough relief, consequently resulting in earlier hospital discharge. Further assays showed that higher IL-37 was associated with lower IL-6 and IL-8 and higher IFN-α, and facilitated biochemical homeostasis. Low IL-37 responses predicted severe clinical prognosis in combination with IL-8 and CRP. Moreover, IL-37 administration was able to attenuate lung inflammation and alleviate respiratory tissue damage in hACE2-transgenic mice infected with SARS-CoV-2.

Bezawit A. Woldemeské and colleagues from Baltimore used the ELISPOT assay to characterize the T cell responses against peptide pools derived from the spike protein of 3 common cold coronaviruses and SARS-CoV-2 in 21 healthy donors seronegative for SARS-CoV-2. An *in vitro* expansion culture assay was also used to analyze memory T cell responses. Responses to the spike protein of the 3 common cold coronaviruses were found in many of the donors. T cell responses to SARS-CoV-2 spike and nucleocapsid proteins were present in only 1 participant and were potentially the result of cross-recognition by T cells specific for the common cold coronaviruses.

**Vaccine**


Phase I/II study of an inactivated vaccine candidate against COVID-19. In total, 743 participants at the Suining County of Jiangsu province, China, received at least one dose (n = 143 for Phase 1 and n = 600 for Phase 2; safety population). At day 28 after the days 0 and 28 vaccination schedule, seroconversion of neutralising antibodies was seen for 109 (92%) of 118 participants in the 3 μg group which is the suggested dose for efficacy assessment in future Phase III trials. Adverse events such as mild injection-site pain, occurred in 81 (17%) of 480 vaccine recipients.


According to this detailed comment, like all Phase II trials, the results must be interpreted with caution until Phase III results are published. Neutralising titers were substantially lower than those seen in 117 convalescent patients who previously had COVID-19 tested in the same laboratory. A demonstration
of longevity of response and of empiric protection from this vaccine candidate will be important.

Clinical


What are the underlying mechanisms of cardiac complications? This small, but detailed histopathologic, immunohistochemical, ultrastructural and molecular cardiac series of 15 COVID-19 cases showed no definitive evidence of direct myocardial infection. COVID-19 cases frequently had cardiac fibrin microthrombi (12/16), without universal acute ischemic injury. Moreover, myocarditis was present in 33.3% of active and cleared COVID-19 patients, but is usually limited in extent. Histologic features of resolved infection are variable. Cardiac amyloidosis may be an additional risk factor for severe disease.


Interesting case report of a patient who presented with anosmia persisting for more than three months after infection. MRI did not reveal any pathological findings: the olfactory bulb and clefts were of normal volume, without signal anomalies. However, the biopsy demonstrated significant disruption of the olfactory epithelium. This shifts the focus away from invasion of the olfactory bulb and encourages further studies of treatments targeted at the surface epithelium.


Retrospective analysis of 6439 patients admitted for COVID-19 at 5 hospitals in New York City between February 27 and June 26, 2020. Compared with patients without heart failure (HF), those with previous HF experienced longer
length of stay (8 days vs. 6 days; p < 0.001), increased risk of mechanical ventilation (22.8% vs. 11.9%), and mortality (40.0% vs. 24.9%). Outcomes among patients with HF were similar, regardless of LVEF or renin-angiotensin-aldosterone inhibitor use.

Collateral damage

A total of 6609 patients underwent primary percutaneous coronary intervention (PPCI) in 77 centers, located in 18 countries. In 2020, during the pandemic, there was a significant reduction in PPCI as compared with 2019 (incidence rate ratio: 0.81; 95% confidence interval: 0.78 to 0.84). Furthermore, the pandemic was associated with a significant increase in “door-to-balloon” and total ischemia times, which may have contributed to higher mortality during the pandemic.

Comorbidities

Gunjan L. Shah from Memorial Sloan Kettering Cancer Center and colleagues retrospectively investigated 77 patients with SARS-CoV-2 who were recipients of cellular therapy (Allo, 35; Auto, 37; CAR T, 5; median time from cellular therapy, 782 days). Overall survival at 30 days was 78%. Mortality was largely driven by patients with active malignancy, especially relapsed leukemia, in whom the goals of care were affected both by COVID-19 severity and the decision to forego anti-cancer treatment during an active infection. Immune profiling revealed reductions and rapid recovery in lymphocyte populations across lymphocyte subsets. Many patients were able to recover from COVID-19 infection and mount an antibody response with similar overall survival to the general hospitalized population.
19 November

Epidemiology


Three COVID-19 cases in Qingdao in October: a taxi driver who was admitted to Qingdao Central Hospital for a transient ischemic attack on October 10; his wife who had been working part-time as a nursing assistant at Qingdao Chest Hospital; and a man with pulmonary tuberculosis who was treated at the same hospital. These were the first cases after a 2-month period without local SARS-CoV-2 transmission in China. What would you have done during the next 7 days? The Chinese authorities tested 10.9 million people and identified another 9 cases related to the initial cluster. The outbreak was controlled without a lockdown.

Prevention


Continue wearing face masks!
Immunology

Dan JM, Mateus J, Kato Y, et al. **Immunological memory to SARS-CoV-2 assessed for greater than six months after infection.** bioRxiv 2020, posted 16 November. Full-text: [https://doi.org/10.1101/2020.11.15.383323](https://doi.org/10.1101/2020.11.15.383323)

As we approach the end of Year 1 of the SARS-CoV-2 pandemic, we realize that although millions of people were infected during spring 2020, there is now, 8 months later, no sizeable epidemic of re-infections. This observation suggests that SARS-CoV-2 infection might confer a solid immunity. Now, Shane Crotty, Alessandro Sette, Daniela Weiskopf, Jennifer Dan and colleagues analyzed multiple compartments of circulating immune memory to SARS-CoV-2 in 185 COVID-19 cases, including 41 cases at > 6 months post-infection. The result: Spike IgG was relatively stable over 6+ months. Spike-specific memory B cells were more abundant at 6 months than at 1 month. SARS-CoV-2-specific CD4+ T cells and CD8+ T cells declined with a half-life of 3-5 months. These findings might suggest that after SARS-CoV-2 infection (or after vaccination), the vast majority of people could be protected against severe COVID-19 for years.


Vaccine

Ramasamy MN, Minassian AM, Ewer KJ, et al. **Safety and immunogenicity of ChAdOx1 nCoV-19 vaccine administered in a prime-boost regimen in young and old adults (COV002): a single-blind, randomised, controlled, phase 2/3 trial.** Lancet 2020, published 18 November. Full-text: [https://doi.org/10.1016/S0140-6736(20)32466-1](https://doi.org/10.1016/S0140-6736(20)32466-1)

Phase II results of a single-blind, randomized, controlled trial that describe the safety and immunogenicity of the ChAdOx1 nCoV-19 vaccine in a wide range of participants, including adults aged 70 years and older. The results are encouraging: ChAdOx1 nCoV-19 appears to be better tolerated in older adults than in younger adults and has similar immunogenicity across all age groups after a boost dose.

See also the comment by Andrew MK, McElhaney JE. **Age and frailty in COVID-19 vaccine development.** Lancet 2020, published 18 November. Full-text: [https://doi.org/10.1016/S0140-6736(20)32481-8](https://doi.org/10.1016/S0140-6736(20)32481-8)
Ensuring vaccine safety. Science 2020, published 17 November. Full-text: https://doi.org/10.1126/science.abf0357

Vaccines are among the most successful medical and public health measures ever implemented and prevent ~6 million deaths globally per year. Efficient SARS-CoV-2 vaccines might prevent a similar number of deaths over the coming years. However, caution the authors, the urgent need for COVID-19 vaccines must be balanced with the imperative of ensuring safety and public confidence in vaccines by following the established clinical safety testing protocols throughout vaccine development, including both pre- and post-deployment.


Both the BioNTech/Pfizer and the Moderna/NIH mRNA vaccine reached 95% efficacy in clinical trials of tens of thousands of people. The trials revealed no serious safety concerns. We will learn to accept fever and aches as signs that the vaccine works. Even bone and muscle aches and an almost unbearable 38.9°C fever that lasts 12 hours...


The long-term outcomes in survivors of COVID-19 are unknown at present. As pulmonary thrombosis and thromboembolism occur during clinical SARS-CoV-2 infection, the authors propose a proactive follow-up strategy to evaluate residual clot burden, small vessel injury, and potential hemodynamic sequelae that might affect quality of life for a long time.

The editors discuss both recent vaccine trial results and the state of the pandemic in Europe.

Spanish


La nueva generación de la Roja lo borda con una goleada de época a la selección de Löw y jugará la fase final de la Liga de las Naciones.


Un análisis exhaustivo de 185 personas que han superado la covid muestra una respuesta inmune potente y duradera.


El anuncio de una inyección efectiva en un 90% realizado por Pfizer esta semana deja más preguntas que respuestas.

French


Rappelant que « le vivant est avant tout incertitude », le neurobiologiste Guy Simonnet souligne qu’une « tolérance zéro maladie » ne peut qu’être la source d’une nouvelle vulnérabilité.

Laurence Caramel, journaliste au « Monde Afrique », a répondu à vos questions sur les raisons de l’« exception africaine » face à la pandémie mondiale.


S’il est globalement très difficile de remonter le fil, plusieurs études de cas ont démontré le risque de ces lieux, malgré les démentis des restaurateurs.

20 November

Epidemiology

If you introduce SARS-CoV-2 in mink farms, it spreads and mutates rapidly. This is the result of a study which looked into 239 viral genomes isolated from farmed animals in the Netherlands and Denmark. The authors identified 23 recurrent mutations including three mutations in the Receptor Binding Domain of the SARS-CoV-2 spike protein that independently emerged at least four times but are only rarely observed in human lineages. Reassuringly, the authors state that the low prevalence of mink-adapted mutations in strains circulating in humans to date (November 2020) suggests that they are not expected to increase transmission of SARS-CoV-2 in humans.

Virology

How is the unusually large SARS-CoV-2 genome incorporated into the virion? Find the answer in this paper by Petr Chlanda, Ralf Bartenschläger, Steffen
Klein and colleagues. The authors characterized the viral replication compartment and report critical insights into the budding mechanism of SARS-CoV-2.

Transmission

After this meta-analysis of 79 studies (5340 individuals) on SARS-CoV-2, the authors report that no study detected live virus beyond day 9 of illness, despite persistently high viral loads. Although SARS-CoV-2 RNA shedding in respiratory and stool samples can be prolonged, duration of viable virus is relatively short-lived. Please communicate this finding to state authorities (for example, in Italy) which require negative RT-PCR tests before allowing citizens who recovered from SARS-CoV-2 infection to go back to normal life.


A lay press article going in the same direction. From hospitals and college campuses to remote villages in French Guiana, scientists pit the two approaches against one other.

Immunology

A Nature News and Views article by Xiaojie Yu and Mark Cragg. As the COVID-19 pandemic rages globally, interest in antiviral treatments has never been higher. Antibodies are key defense components and engineering them to better exploit their natural functions might boost therapeutic options.
Vaccine

Editorial. **COVID-19 vaccines: no time for complacency.** Lancet 2020, published 21 November. Full-text: [https://doi.org/10.1016/S0140-6736(20)32472-7](https://doi.org/10.1016/S0140-6736(20)32472-7)

“‘Yes. Yes. Yes.’ That was the response of John Bell, Regius Professor of Medicine at the University of Oxford, when asked whether we could be confident that life will be returning to normal by spring.” Of course, we will not return to normal life within 6 months. Let’s lean back and be satisfied that in less than a year, we have characterized a novel illness, sequenced a new viral genome, developed diagnostics, produced treatment protocols, and established the efficacy of drugs and vaccines in randomized controlled trials. There is no hurry. If we can achieve some kind of pre-COVID-19 ‘normalcy’ by 2022, it would be a feat remembered by generations.

Diagnostics


The authors report a self-collection kit for at-home finger-prick dried blood spot collection. The results suggest 100% sensitivity and specificity. If proven successful at a large scale, such methods could facilitate the conduct of unbiased serosurveys in hard-to-reach populations.

Clinical


No SARS-CoV-2 in tears – that’s the result of a study in 29 hospitalized patients. Ocular symptoms, reported in a third of the patients, included eye burning, foreign body sensation and three reported tearing. Seven patients presented conjunctival hyperemia and/or chemosis, and eleven patients presented blepharitis signs such as lid margin hyperemia and/or telangiectasia, crusted eyelashes, and alterations of the meibomian orifices.
Severe COVID
A higher fatality rate in vitamin D deficient patients (21% vs 3.1%)? Vitamin D levels markedly low in patients with severe COVID-19? These are the conclusions of a study including asymptomatic 91 COVID-19 patients (Group A) and 63 severely ill patients requiring ICU admission (Group B). The prevalence of vitamin D deficiency was 32.96% and 96.82% respectively in Group A and Group B.

The authors summarize evidence pointing to both platelet and endothelial dysfunction as essential components of COVID-19 pathology and highlight the distinct contributions of coagulopathy, thrombocytopenia and endotheliopathy to the pathogenesis of COVID-19. Discover potential therapeutic strategies in the management of patients with COVID-19.

Spanish
México rompe la barrera psicológica de un millón de casos confirmados y 100.000 fallecimientos por coronavirus con hartazgo, desgaste y más dudas que certezas sobre el fin de la pandemia.

Los expertos analizan distintas teorías que explican que las clases en cuarentena sean solo en torno al 1.5% del total.
21 November

Epidemiology


August 2020? Too soon for news about SARS-CoV-2 to have spread through western South Dakota, USA. Unaware of the pandemic, approximately 460,000 persons attended a motorcycle rally with numerous indoor and outdoor events over a 10-day period. The results: 51 confirmed primary event-associated cases, 21 secondary cases, and five tertiary cases. An additional nine likely rally-associated secondary or tertiary cases occurred. Four patients were hospitalized, and one died.


Which government wouldn’t like to have correct estimates of the prevalence of SARS-CoV-2 infection following the release of lockdown restrictions? Here is what happened in Wuhan between May 14 and June 1, 2020, where authorities ordered a city-wide SARS-CoV-2 screening program. All city residents aged six years or older were eligible and 9,899,828 (92.9%) participated. No new symptomatic cases and 300 asymptomatic cases (detection rate 0.303/10,000) were identified. There were no positive tests amongst 1174 close contacts of asymptomatic cases.


Most countries in the Eastern Mediterranean region saw fairly slow transmission of SARS-CoV-2 during the early months of the pandemic but in May, as social measures, such as restrictions and partial or full lockdowns, were relaxed during the holy month of Ramadan, disease transmission accelerated.
Immunology


The innate immune response is the major front line of defense against viral infections. It involves hundreds of genes with antiviral properties whose expression is induced by type I interferons (IFNs) and are therefore called interferon-stimulated genes (ISGs). The authors review the role of the molecular partners of the type I IFNs induction pathway and their implication in the control of viral infections and of their complications. Be prepared: not all mechanisms are yet fully understood.

Meyerholz DK, Perlman S. Does common cold coronavirus infection protect against severe SARS-CoV-2 disease? J Clin Invest 2020, published 20 November. Full-text: https://doi.org/10.1172/JCI144807


Diagnostics


Michael Springer, Jason Qian and colleagues from Harvard Medical School report the development of a molecular diagnostic test for SARS-CoV-2 based on an enhanced recombinase polymerase amplification (eRPA) reaction. eRPA has a detection limit on patient samples down to 5 viral copies, requires minimal instrumentation, and is highly scalable and inexpensive. The protocol reported here was developed and optimized in less than 3 weeks, with an additional 4 weeks for sample preparation optimization, and patient sample acquisition. Good news for future pandemics.
Cameron Myhrvold, Jon Arizti-Sanz and colleagues from Princeton University describe SHINE (Streamlined Highlighting of Infections to Navigate Epidemics), an extraction-free, rapid, and sensitive detection tool for SARS-CoV-2 RNA. The results can be visualized with an in-tube fluorescent readout — reducing contamination risk as amplification reaction tubes remain sealed — and interpreted by a companion smartphone application. Validation on 50 nasopharyngeal patient samples showed 90% sensitivity and 100% specificity with a sample-to-answer time of 50 min.

Clinical


Morbidity from SARS-CoV-2 goes beyond acute infection. Amish Talwar, Deblina Datta and James Lee from the CDC propose a framework of three distinct illness periods associated with SARS-CoV-2 infection: 1) acute infection; 2) a rare post-acute hyperinflammatory illness after roughly two weeks; and 3) a stage of late inflammatory and virological sequelae. These illness periods also capture distinct phases of host-viral interaction.

Severe COVID


Being overweight (and not only obesity) is associated with ICU admission, but is not associated with death. This is the result of a retrospective study from Amiens University Hospital, France. In total, 433 consecutive patients were included, and BMI data were available for 329: 20 were underweight (6.1%), 95 had a normal weight (28.9%), 90 were overweight (27.4%), and 124 were obese (37.7%). The ORs for ICU admission were similar for overweight (3.16) and obesity (3.05).
Epidemiology

During March–May 2020, approximately 203,000 laboratory-confirmed COVID-19 cases were reported to the NYC Department of Health and Mental Hygiene (DOHMH). The crude fatality rate (CFR) among confirmed cases was 9.2% overall and 32.1% among hospitalized patients. Incidence, hospitalization rates, and mortality were highest among Black/African American and Hispanic/Latino persons, as well as those who were living in neighborhoods with high poverty, aged ≥ 75 years, and with underlying medical conditions. Of note, the overall CFR of 9.2% is an overestimate because of under-ascertainment of cases, given the restrictive testing guidance and limited availability of tests during the first 2 months of the epidemic.

Virology

Investigating the hypothesis for positive selection of Spike D614G in more than 25,000 whole genome SARS-CoV-2 sequences from the UK, not all approaches showed a conclusive signal of positive selection. However, population genetic analysis indicated that 614G increased in frequency relative to 614D in a manner consistent with a selective advantage. 614G was also associated with higher viral load and younger age of patients.

Transmission

 Masks work! The governor of Kansas issued an executive order requiring wearing masks in public spaces, effective July 3, 2020, which was subject to county authority to opt out. After July 3, COVID-19 incidence decreased in 24 counties with mask mandates but continued to increase in 81 counties without mask mandates. By August 17–23, 2020, the 7-day rolling average COVID-
19 incidence had decreased by 6% to 16 cases per 100,000 among mandated counties and increased by 100% to 12 per 100,000 among non-mandated counties.

Vaccine


People in the US are ready to move on from the COVID-19 pandemic, but when it comes to a vaccine, many have a wait-and-see attitude. Jarrett Ramos Lewis addresses the reasons. As we move toward having an approved COVID-19 vaccine, it is important to understand that for many, it will take time to feel comfortable and confident in getting the vaccine. While the politicization of the vaccine is to blame for some of that delay, the increased reluctance of people to get a COVID-19 vaccine runs much deeper than politics.

Diagnostics


Serology assays from Roche, Abbott, Diasorin, BioMerieux, Beckman-Coulter, Siemens, and Mt. Sinai ELISA were used to analyze negative samples from 2391 individuals representative of the Israeli population, and 698 SARS-CoV-2 PCR positive patients. Immunoassay sensitivities were between 81,5% - 89,4% while specificities were between 97,7% - 100%, resulting in a profound impact on the expected Positive Predictive Value in low (< 15%) prevalence scenarios. No meaningful increase was detected in the false positive rate in children compared to adults. A positive correlation between disease severity and antibody titers, and no decrease in antibody titers in the first 8 weeks after PCR positivity was observed. The authors also identified a subgroup of symptomatic SARS-CoV-2 positive patients (~5%), who remained seronegative across a wide range of antigens, isotypes, and technologies.
Clinical


More on “long COVID-19”. All patients discharged after COVID-19 from the Radboud University Medical Centre, Nijmegen, The Netherlands, were consecutively invited to a multidisciplinary outpatient facility. Also, non-admitted patients with mild disease but with symptoms persisting > 6 weeks could be referred by general practitioners. Patients underwent a standardized assessment including measurements of lung function, chest CT/X-ray, 6-minute walk test, body composition, and questionnaires. Among 124 patients (27 mild, 51 moderate, 26 severe and 20 critical), lung diffusion capacity was below the lower limit of normal in 42% of discharged patients, and 22% had low exercise capacity. Problems in mental and/or cognitive function were found in 36% of patients. Health status was generally poor, particularly in the domains of functional impairment (64%), fatigue (69%) and quality of life (72%).


In this retrospective cohort study of 817 patients older than 65 years with COVID-19 presenting at emergency departments (ED) of 7 US sites, 28% had delirium at presentation, and delirium was the sixth most common of all presenting signs and symptoms. Among delirious patients, 37% had no typical COVID-19 symptoms or signs, such as cough or fever. Factors associated with delirium (with adjusted relative risk, aRR between 1.1 and 2) were older than 75 years, living in a nursing home or assisted living, had prior use of psychoactive medication, vision impairment, hearing impairment, stroke, and Parkinson’s disease. Not very surprising: delirium was associated with ICU stay (aRR 1.67) and death (aRR 1.24).

Severe COVID-19

Giacomo Fiacchini and colleagues from Pisa, Italy demonstrate a high tracheal complication rate of invasive mechanical ventilation. In their cohort study of 98 patients with COVID-19 and severe respiratory failure, the incidence of full-thickness tracheal lesions or tracheoesophageal fistulas after prolonged (≥ 14 days) invasive mechanical ventilation was significantly higher in patients with COVID-19 (46.7%) than matched controls (2.2%). Attempts to prevent these lesions should be made and quickly recognized when they occur to avoid potentially life-threatening complications in ventilated patients with COVID-19.


Clinicians should also be aware of the possible presence of elevated intraocular pressure from periorbital edema due to direct compression of the eye and orbit, and optic disc edema and retinal hemorrhages, which may be associated with a hypercoagulable state, in patients in prolonged prone position. Lucy Sun and colleagues report on two patients with periorbital edema in the prone position with bilateral findings of optic disc edema and retinal hemorrhages as well as a substantial increase in intraocular pressure.

Pregnancy

Good news from Dallas, USA: in this cohort study of 252 SARS-CoV-2–positive and 3122 negative pregnant women tested in outpatient and inpatient settings at a large county medical center, adverse pregnancy outcomes were similar. Neonatal infection occurred in 3% of infants, predominantly among infants born to asymptomatic or mildly symptomatic women. Placental abnormalities were not associated with disease severity, and the rate of hospitalization was similar to rates among non-pregnant women.
Pediatrics
Antibody titers in children exposed to SARS-CoV-2 remain at a detectable level for at least 62 days.

23 November
Epidemiology
Livestock processing poses a particular public health risk extending far beyond meatpacking companies and their employees. The authors estimate livestock plants to be associated with 236,000 to 310,000 COVID-19 cases (6 to 8% of total US cases) and 4300 to 5,200 deaths (3 to 4% of total US cases) as of July 21. They also illustrate potential contributions of plant size, industrial concentration, plant shutdowns, and policy actions to this phenomenon. High numbers were found among large processing facilities and large meatpacking companies. According to the authors, their results “motivate investigation into supply chains, operating procedures, and labor relations within the meatpacking industry”. They also discuss some implications. Interestingly, one was seemingly beyond the intellectual grasp of the authors: that consumers could abstain from buying meat produced by these large meatpacking companies.

Virology
Anne Sophie Hammer and colleagues describe the outbreaks on three Danish mink farms. A high proportion of mink were infected within a few days, which may provide major virus exposure to persons working with mink. Full-length virus genome sequencing revealed novel viral variants in mink. These variants subsequently appeared within the local human community.
Immunology


More on the cytokine storm: Rajenda Karki and colleagues evaluated the role of pro-inflammatory cytokines that are highly upregulated in patients with COVID-19 in inducing inflammatory cell death, inflammation, tissue and organ damage, and mortality. They show that the specific combination of TNF-α and IFN-γ is critical for these processes. In mice, the combination of anti-TNF-α and anti-IFN-γ neutralizing antibodies protected against death in SARS-CoV-2 infection and models of sepsis, hemophagocytic lymphohistiocytosis (HLH), and cytokine shock.


SARS-CoV-2 infects alveolar epithelial type 2 cells (AT2s), leading to lung injury and impaired gas exchange. As AT2 injury is central to COVID-19 pathogenesis, there is an urgent need to delineate the mechanisms of SARS-CoV-2-driven lung pathology. Primary AT2s are difficult to maintain in culture, but human induced pluripotent stem cell-derived alveolar epithelial type 2 cells (iAT2s) have been developed and extensively characterized. Using these cells, Ryan Hekman and colleagues from Boston performed a quantitative phosphoproteomic survey, demonstrating diverse host responses to infection of alveolar epithelial cells and suggesting a dynamic disease signature that evolves as the virus disrupts host programs and rewires modules. Time course analysis revealed rapid remodeling of diverse host systems, including signaling, RNA processing, translation, metabolism, nuclear integrity, protein trafficking, and cytoskeletal-microtubule organization, leading to cell cycle arrest, genotoxic stress, and innate immunity.


In their brilliant perspective, Annika C. Karlsson and colleagues from Stockholm, Sweden summarize and speculate on a specific set of questions related
to T cell immunity against respiratory viral infections, with a focus on COVID-19 severity, immunity, long-term consequences, and vaccination.


Using immunoassays specific for SARS-CoV-2 spike proteins, Carlo Cervia and colleagues from Zurich, Switzerland determined SARS-CoV-2-specific IgA and IgG in sera and mucosal fluids of PCR positive patients and of negative HCWs. Serum IgA titers in mild COVID-19 cases were often transiently positive, whereas serum IgG titers remained negative or became positive 12-14 days after symptom onset. Conversely, patients with severe COVID-19 showed a highly significant increase of SARS-CoV-2-specific serum IgA and IgG titers after symptom onset. Interestingly, some HCWs with negative SARS-CoV-2-specific serum antibody titers showed SARS-CoV-2-specific IgA in mucosal fluids with virus-neutralizing capacity in some cases.

**Vaccines**


A systematic comparison between two vaccine platforms, nucleoside modified mRNA lipid nanoparticle and recombinant protein formulated with the MF59-like adjuvant AddaVax (rRBD-AddaVax), evaluating quantitatively and qualitatively the germinal center (GC) responses to SARS-CoV-2 upon immunization. The authors found that SARS-CoV-2 mRNA vaccines had a superior capacity, in comparison to rRBD-AddaVax, to elicit potent SARS-CoV-2 specific GC B cell responses after the administration of a single vaccine dose. Importantly, they demonstrated that GC B cells and Tfh cells strongly correlated with the production of nAbs.

**Clinical**

Myalgias and elevated creatine kinase levels are seen in many patients. Whether the elevation in creatine kinase level is caused by viral infection of muscle, toxic effects of cytokines, or another mechanism is unclear. Giovanna S. Manzano and colleagues from Boston describe a COVID-19 patient with myopathy who had a muscle-biopsy specimen showing evidence of virus-induced type I interferonopathy.

**Treatment**


IL-1 receptor antagonist anakinra is one of the cytokine-blocking agents employed for COVID-19 treatment. Of 120 patients with hyperinflammation (33% on mechanical ventilation), 65 were treated with anakinra and methylprednisolone and 55 were untreated historical controls. At 28 days, mortality was 14% in treated patients and 36% in controls (p = 0.005). Unadjusted and adjusted risk of death was significantly lower for treated patients compared to controls (HR 0.33, p = 0.007 and HR 0.18, p = 0.001, respectively). Randomized, controlled trials including use of either agent alone are needed to confirm these results.


The cationically modified chitosan, N-(2-hydroxypropyl)-3-trimethylammonium chitosan chloride (HTCC) is a potent inhibitor of all known human coronaviruses. Using *in vitro* and *ex vivo* models of human airway epithelium, the authors show that HTCC effectively blocks MERS-CoV and SARS-CoV-2 infection.
24 November

Epidemiology


Emergency professionals as a high-risk group. Between February 1, 2020, and April 30, 2020, an overwhelming number greater than 1,000 patients with a diagnosis of COVID-19 presented at an emergency department (ED) in Brooklyn, NY. Results: The overall rate of seroconversion among emergency professionals was incredibly high (46%). Rates for attending physicians, emergency medicine residents, and physician assistants were 64%, 36%, and 29%, respectively.

Prevention


Air-filtering masks, also known as respirators, protect wearers from inhaling fine particulate matter (PM2.5) in polluted air, as well as airborne pathogens. Fibrous medium, used as the filtration layer, is the most essential component of an air-filtering mask. This comprehensive review gives an overview of the development of fibrous media for air filtration.

Vaccine


The Newcastle disease virus vector vaccine has some advantages similar to those of other viral vector vaccines. The NDV vector can be amplified in embryonated chicken eggs, which allows for high yields and low costs per dose. Also, the NDV vector is not a human pathogen, therefore the delivery of the foreign antigen would not be compromised by any pre-existing immunity in humans. Weina Sun and colleagues describe NDV vector vaccines expressing...
the spike protein of SARS-CoV-2 in its wild type format or a membrane-anchored format lacking the polybasic cleavage site. The NDV vector vaccines elicited high levels of antibodies that are neutralizing when the vaccine is given intramuscularly in mice. Importantly, these COVID-19 vaccine candidates protect mice from a mouse-adapted SARS-CoV-2 challenge with no detectable viral titer and viral antigen in the lungs. The results suggested that the NDV vector expressing either the wild type S or membrane-anchored S without the polybasic cleavage site could be used as live vector vaccine against SARS-CoV-2.


Four ethical principles will assist the Advisory Committee on Immunization Practices (ACIP) in formulating recommendations for the initial allocation of COVID-19 vaccine: 1) maximizing benefits and minimizing harms; 2) promoting justice; 3) mitigating health inequities; and 4) promoting transparency. Read how application of ethical principles to four candidate groups for initial COVID-19 vaccine allocation is planned in the US.

Immunology

Even mild COVID-19 elicits memory lymphocytes that persist and display functional hallmarks of antiviral immunity. Lauren Rodda found that three months after mildly symptomatic COVID-19, 15 recovered individuals had formed an expanded arsenal of SARS-CoV-2-specific immune memory B-cells (MBCs) that exhibited protective antiviral functions. Recovered individuals had increased neutralizing antibodies, IgG+ classical MBCs with BCRs that formed neutralizing antibodies, Th1 cytokine-producing CXCR5+ circulating T follicular helper(Tfh) cells and CXCR5- non-Tfh cells, proliferating CXCR3+ CD4+memory cells and IFN-γ -producing CD8+ T cells. These components of immune memory have all been associated with protection from other viruses in humans.

A 46-year-old man from Quito, Ecuador, presenting with a second infection, only 2 months after the first episode. Phylogenetic analysis revealed that the first infection variant belonged to clade 20A and lineage B1.p9, whereas the second infection variant belonged to clade 19B and lineage A.1.1. Of note, the second episode was more severe.

Clinical


The first definitive case of ACPA-positive rheumatoid arthritis developing after SARS-CoV-2 infection (ie, with samples taken before and after arthritis onset) in a 60-year-old woman from Marseille, France, with infection as a potential trigger for epitope spreading and onset of clinical rheumatoid arthritis symptoms.

Comorbidities


Oops! In this retrospective study on 689 patients with COVID-19 and Type 2 diabetes from Wuhan, China, insulin treatment was associated with a significant increase in mortality (27.2% vs. 3.5%; adjusted HR, 5.38). Further analysis showed that insulin treatment was associated with enhanced systemic inflammation and aggravated injuries of vital organs. However, this was a retrospective observation which could not establish a causal effect relationship between insulin treatment and high mortality. Moreover, there were significant differences in several baseline characteristics and laboratory indices at admission (for examples, SpO2, NT-proBNP and albumin), which may contribute to the different severity and outcome observed in patients treated with insulin.
Collateral


Good news (for dogs) from Israel: the stricter the social isolation became during the COVID-19 pandemic, the greater the interest in dog adoption. Dog abandonment has decreased and the rates of dog adoptions improved significantly; the demand for adoptable dogs and the requests to serve as foster families increased significantly, and accordingly, the length of stay of dogs at the shelter was significantly shorter.

Pediatrics


In this large cohort study of 135,794 US pediatric patients, SARS-CoV-2 infection rates were low (5374 = 4% were infected), and clinical manifestations were typically mild. Black, Hispanic, and Asian race/ethnicity; adolescence and young adulthood; and nonrespiratory chronic medical conditions were associated with identified infection. Among the 5374 patients with positive test results, 359 (7%) were hospitalized for respiratory, hypotensive, or COVID-19–specific illness. Of these, 99 (28%) required intensive care unit services, and 33 (9%) required mechanical ventilation. The case fatality rate was 0.2% (8 of 5374). The number of patients with a diagnosis of Kawasaki disease in early 2020 was 40% lower (259 vs 433 and 430) than in 2018 or 2019.

25 November

Epidemiology


In this repeated, cross-sectional study of 177,919 residual clinical specimens, the estimated percentage of persons in a US jurisdiction with detectable
SARS-CoV-2 antibodies ranged from fewer than 1% to 23%. Over 4 sampling periods in 42 of 49 jurisdictions with calculated estimates, fewer than 10% of people had detectable SARS-CoV-2 antibodies.


Mass testing by RT-PCR among 10,304 incarcerated persons in the Connecticut (US) statewide correctional system revealed that by far the strongest risk factor for SARS-CoV-2 infection was dormitory housing (odds ratio, 35.3). Social distancing may be more challenging in such settings than in cells that house one or two inmates.

Liu M, Thomadsen R, Yao S. **Forecasting the spread of COVID-19 under different reopening strategies.** Sci Rep 10, 20367 (2020). Full-text: [https://doi.org/10.1038/s41598-020-77292-8](https://doi.org/10.1038/s41598-020-77292-8)

Using a modified susceptible-infected-recovered (SIR) model in the United States, the authors found that the incidence of COVID-19 spread is concave in the number of infectious individuals, as would be expected if people have inter-related social networks. This concave shape has a significant impact on forecasted COVID-19 cases. The number of COVID-19 cases would only have an exponential growth for a brief period at the beginning of the contagion event or right after a re-opening, but would quickly settle into a prolonged period of time with stable, slightly declining levels of disease spread. In contrast, if social distancing is eliminated, there will be a massive increase in the cases.

**Transmission**


Using detailed information on 1178 SARS-CoV-2 infected individuals along with their 15,648 contacts in Hunan, China, Kaiyuan Sun and colleagues dissected the behavioral and clinical drivers of SARS-CoV-2 transmission. They also evaluated the plausibility of SARS-CoV-2 control through individual and population-based interventions. Of note, 80% of secondary infections traced back to 15% of SARS-CoV-2 primary infections. Transmission risk scales positively with the duration of exposure and the closeness of social interactions and is modulated by demographic and clinical factors. Modeling indicates
SARS-CoV-2 control requires the synergistic efforts of case isolation, contact quarantine, and population-level interventions, owing to the specific transmission kinetics of this virus.

Immunology


Saad B. Omer and colleagues discuss herd immunity in the context of the COVID-19 pandemic and explain the herd immunity threshold as a function of transmissibility (R0), the role of an effective vaccine and vaccination program in sustaining herd immunity, and the risks of an infection-based herd immunity approach. Assuming that less than 10% of the population has been infected so far, with an infection-induced immunity lasting 2 to 3 years (duration unknown), infection-induced herd immunity is not realistic at this point to control the pandemic.

Vaccine


A promising new vaccination approach: Xiancai Ma and colleagues from Guangdong, China developed nanoparticle vaccines by covalently conjugating the self-assembled 24-mer ferritin to the receptor binding domain (RBD) and/or heptad repeat (HR) subunits of spike (S) protein. Compared to monomer vaccines, nanoparticle vaccines elicited more robust neutralizing antibodies and cellular immune responses. hACE2 transgenic mice vaccinated with RBD and/or RBD-HR nanoparticles exhibited reduced viral load in the lungs after SARS-CoV-2 challenge. RBD-HR nanoparticle vaccines also promoted neutralizing antibodies and cellular immune responses against other coronaviruses. The nanoparticle vaccination of rhesus macaques induced neutralizing antibodies, and T and B cell responses prior to boost immunization; these responses persisted for longer than three months.
Clinical


Compared with other countries, the US experienced high COVID-19–associated mortality and excess all-cause mortality into September 2020. After the first peak in early spring, US death rates from COVID-19 and from all causes remained exceptionally high. This may have been a result of several factors, including weak public health infrastructure and a decentralized, inconsistent US response to the pandemic.


More on anosmia: Leon Fodoulian and colleagues from Geneva, Switzerland asked whether specific cells present in the human olfactory neuroepithelium may represent targets for SARS-CoV-2, by looking at the molecular players involved in infection, both at the RNA and protein levels. They found that sustentacular cells, which maintain the integrity of olfactory sensory neurons, express ACE2 and TMPRSS2. These cells represent a potential way in for SARS-CoV-2 in a neuronal sensory system that is in direct connection with the brain.

Treatment


A crushing failure for convalescent plasma (CP): this study from Argentina randomly assigned 338 hospitalized adult patients with severe COVID-19 pneumonia in a 2:1 ratio to receive CP or placebo. No significant differences were observed in clinical status or overall mortality and prespecified subgroup analyses failed to suggest any credible subgroup effects. Moreover, the trial ensured that more than 95% of the transfused CP units had a total anti–SARS-CoV-2 antibody titer of at least 1:800 and that the plasma volume infused had a correction factor according to the participant’s weight. The au-
thors “believe the use of CP as a standard of care in such patients should be reevaluated”. Well said.


Human breastmilk inhibits SARS-CoV-2 virus infection in Vero E6 and A549 cell lines. Huahao Fan and colleagues show for the first time that whey protein from human breastmilk effectively inhibited SARS-CoV-2 by blocking viral attachment and viral replication at entry and even post-entry. Moreover, human whey protein inhibited infectious virus production, as proved by a plaque assay. Whey protein from different species, such as cow and goat, also showed anti-coronavirus properties. Commercial bovine formula milk also showed similar anti-SARS-CoV-2 activity.

26 November

Transmission


In this semi-interview with Kári Stefánsson, the founder and chief executive of deCODE genetics, Megan Scudellari describes how a private company and health authorities worked hand-in-hand, sharing ideas, data, laboratory space and staff. This collaboration, coupled with Iceland’s diminutive size, has put the country in the enviable position of knowing practically every move the virus has made. The teams have tracked the health of every person who has tested positive for SARS-CoV-2, sequenced the genetic material of each viral isolate and screened more than half of the island’s 368,000 residents for infection. A tiny world laboratory.


As yet no evidence for increased transmissibility of SARS-CoV-2. After analyzing 46,723 SARS-CoV-2 genomes isolated from patients worldwide, Lucy van Dorp, François Balloux and colleagues did not identify a single recurrent mu-
tation in this set convincingly associated with increased viral transmission. Instead, recurrent mutations seem to be primarily induced by host immunity through RNA editing mechanisms, and likely tend to be selectively neutral, with no or only negligible effects on virus transmissibility.

Prevention

Do we really need a highly sensitive SARS-CoV-2 test? Yes, if we want to make a diagnosis of SARS-CoV-2 infection. No, if we want to prevent as many transmission events as possible. In this brilliant Perspective, Michael Mina, Roy Parker and Daniel Larremore advocate the massive use of cheap (< 5 US$) and rapid lateral-flow antigen tests which can be produced in the tens of millions or more per week, and could be performed at home. Note that lateral-flow antigen tests have limits of detection that are 100 or 1000 times higher than that of the PCR tests; however, this is largely inconsequential if your goal is to identify people who are currently transmitting SARS-CoV-2. Find out more about ‘COVID filter’, the ‘long tail of RNA positivity’ and the economic burden of thousands of people being sent to 10-day quarantines after positive RNA tests despite having already passed the transmissible stage of infection.


Men, young adults, and White people are more likely than other groups to be too stupid to wash their hands properly. Bridget Kuehn reminds us of a pair of surveys published in MMWR (Haston 2020; Czeisler 2020, presented 21 June) that found serious gaps in hand hygiene practices by race, age, and sex. Hand washing or using an alcohol-based hand sanitizer after touching shopping carts, gas pumps, automated teller machines, etc. – tell your boys, tell your men, tell your white neighbors.

The SARS-CoV-2 pandemic has impacted the delivery of dental care and has led to re-evaluation of infection control standards. After exploring the evidence on bioaerosols in dentistry, the authors conclude that “a risk of contamination (microbiological, visible and imperceptible blood) to patients, dental team members and the clinical environment is present during oral surgery procedures, including routine extractions.” Our recommendation: schedule your dentist appointments between COVID-19 waves.

Immunology


In this model, the authors demonstrate that African green monkeys (AGMs) mimic several aspects of human disease, including pronounced viral replication and pulmonary lesions. SARS-CoV-2 was detected in mucosal samples, including rectal swabs, as late as 15 days after exposure. Marked inflammation and coagulopathy in blood and tissues were prominent features. Antibody and cellular responses contributed to rapid clearance after re-challenge with an identical strain at 35 days after first exposure.

Genetics


To determine whether ABO and Rh blood groups are associated with risk for SARS-CoV-2 infection and severe COVID-19 illness, the authors analyzed 225,556 persons, mean age of 54 years. The O and Rh− blood groups were associated with a slightly lower risk for SARS-CoV-2 infection as well as severe COVID-19 illness or death.
Clinical

Thrombotic complications (myocardial infarction, ischemic stroke, venous thromboembolism, etc.) may occur in up to a third of critically ill patients with COVID-19. After a short discussion of the current evidence, Gregory Piazza and David Morrow conclude that thromboprophylaxis should be considered for all hospitalized patients with COVID-19 in the absence of contraindications.

Pregnancy

Pregnant women with COVID-19 don’t seem to be at increased risk for death, although they may have a higher risk of being admitted to an intensive care unit and of requiring mechanical ventilation. Should that be a reason for postponing pregnancy? Sonja Rasmussen, Anne Lyerly and Denise Jamieson dig into their experience with HIV, H1N1 and Zika and conclude that a recommendation to avoid pregnancy during a public health emergency should meet several criteria. Find out which ones here.

Education

The editors look at new studies of disease transmission in closed closed environments and provide updates on convalescent plasma and hydroxychloroquine.
27 November

Treatment


First nail in the remdesivir coffin. On 20 November, WHO issued a conditional recommendation against the use of remdesivir (brand name: Veklury) in hospitalized patients, regardless of disease severity, as there is currently no evidence that remdesivir improves survival and other outcomes in these patients. Evidence from over 7000 patients across 4 trials suggests no important effect on mortality, need for mechanical ventilation, time to clinical improvement, and other patient-important outcomes. Happy France (see below, *Covid-19 : comment Gilead a vendu son remdésivir à l'Europe*)!

Epidemiology


How will you monitor and forecast regional outbreaks as they happen or even before they happen? By using Google Trends. Amaryllis Mavragani and Konstantinos Gkillas from the University of Stirling in Scotland present a model that exhibits strong COVID-19 predictability. The authors conclude that Google Trends offers a solid foundation for quantitative analysis with respect to the monitoring and predictability of COVID-19 and suggest that these approaches may flatten epidemic curves, help in allocating health resources, and increase the effectiveness and preparedness of health care systems.

Immunology


Marcus Buggert, André Perez-Potti and Joshua Lange comment on the paper by Nelde A, Bilich T, Heitmann JS, et al. who characterized HLA-specific peptide targets from SARS-CoV-2 in convalescent patients and identify cross-reactive epitopes which were probably induced by common cold coronaviruses in non-infected individuals [SARS-CoV-2-derived peptides define heterolo-
gous and COVID-19-induced T cell recognition. Nat Immunol 2020, published 30 September. PubMed: https://pubmed.gov/32999467. Full-text: https://doi.org/10.1038/s41590-020-00808-x]. This was one of the first studies to indicate that a more polyclonal T cell response may be critical in protection against SARS-CoV-2.

Pathogenesis

Could high-density lipoprotein (HDL) scavenger receptor B type 1 (SR-B1) facilitate ACE2-dependent entry of SARS-CoV-2? That is the statement by Hui Zhong, Congwen Wei, finding that the S1 subunit of SARS-2-S binds to cholesterol and possibly to HDL components and facilitates SARS-CoV-2 cellular attachment, entry and infection. SARS-CoV-2 entry is inhibited by silencing SR-B1 expression and by SR-B1 antagonists. Blockade of the cholesterol-binding site on SARS-2-S1 with a monoclonal antibody inhibited HDL-enhanced SARS-CoV-2 infection.

Vaccine

Junzhi Wang comments on a study by Yang J, Wang W, Chen Z et al. [A vaccine targeting the RBD of the S protein of SARS-CoV-2 induces protective immunity. Nature 2020, published 29 July. Full-text: https://doi.org/10.1038/s41586-020-2599-8] we presented on 30 July. The authors show that a recombinant spike receptor-binding domain (RBD) protein of SARS-CoV-2 prepared from insect cells could induce a potent functional antibody response in mice, rabbits and non-human primates as early as 7 or 14 days after a single dose injection. Even one dose of the vaccine generated viral neutralizing activity. The vaccine protected non-human primates from live SARS-CoV-2 challenge 28 days after the first vaccination.
Clinical


In March and April 2020, almost 30% of all patients (504/1697) hospitalized in three hospitals in Northern Italy died. In this 126-author paper by Pier Paolo Sainaghi, Mattia Bellan and colleagues, age, a diagnosis of cancer, and the baseline $\text{PaO}_2/\text{FiO}_2$ ratio were independent predictors of mortality.


In this series of 40 consecutive patients with chilblain-like lesions, Thierry Passeron, Thomas Hubiche and colleagues found that none had a positive RT-PCR test, and only 12 (30%) had positive COVID-19 serologic results. Common findings included increased D-dimers, lymphocytic inflammation, vascular damage on skin biopsy results, and a significant interferon-alpha response compared with patients with PCR-positive, acute COVID-19 infection. The authors conclude that chilblain-like lesions observed during the COVID-19 pandemic represent manifestations of a viral-induced type I interferonopathy.

Education


In this episode, Robert Cento discusses the COVID-19 vaccines under development with Paul Goepfert.

Society


“The global COVID-19 death toll stands at more than 1.3 million. Among the lives lost have been those of healthcare workers, who have had crucial roles throughout the response. As the virus spread, many doctors provided treat-
ment for a disease they little understood, while others contributed to accelerated research on potential treatments and vaccines. An Obituary published in *The Lancet* pays tribute to some of these doctors who died from COVID-19. Whilst it is not possible to honour all of the health workers who have died from COVID-19, the short obituaries serve as a tribute to the many other health workers who have died in the pandemic.”

**French**


Un contrat de 900 millions de dollars a été passé avec la Commission, alors même que le laboratoire Gilead connaissait les résultats négatifs d’un essai clinique de l’OMS. La France est le seul pays à ne pas avoir passé commande.

**28 November**

**Epidemiology**


What is the exact nature of the risks posed by SARS-CoV-2 to healthcare workers? Rupert Muiry, Vaughan Parsons and Ira Madan summarize the current literature, including consideration of broader biopsychosocial morbidities.

**Transmission**


Employers and their occupational health and safety professionals should consider work in cold environments to be an independent occupational risk factor for developing COVID-19. Follow Louise Cunningham et al. on their tour in cold environments.
Vaccine

Large clinical trials of four vaccine candidates are showing remarkable promise, with three exceeding 90% efficacy — all unexpectedly high. None reported worrying safety signals and one has shown promise in older adults who are particularly vulnerable to SARS-CoV-2 but sometimes respond less well to vaccines. But, there remains a lot of work to do for researchers and clinicians.


Callaway E. Why Oxford’s positive COVID vaccine results are puzzling scientists. Nature 2020, published 23 November. Full-text: https://www.nature.com/articles/d41586-020-03326-w

Preliminary data from the AstraZeneca vaccine are puzzling. Two full doses given a month apart would be 62% effective, but a half dose followed by a full dose would be 90% effective. Now researchers are trying desperately to instill meaning into these results. Let Jon Cohen and Ewen Callaway explain, sort of.


If approved, BNT162b2 (BioNTech/Pfizer) and mRNA-1273 (Moderna/NIH), credited in press releases with sky-rocketing efficacy, would be the first messenger RNA (mRNA)-based vaccines to be used in large populations. mRNA vaccines use nanotechnology platforms to deliver the genetic sequence of specific viral proteins to the host cells. Find more about the founding principles of nanomedicine in this short editorial.
Diagnostics

In patients with mild or moderate SARS-CoV-2 infection, a positive RT-PCR test 10 days or more after the onset of symptoms is generally not considered proof of infectiousness. But why do tests continue to be positive? Now, Soren Alexandersen, Anthony Chamings and Tarka Raj Bhatta provide a preliminary answer. Subgenomic RNAs, like virion RNA, are rather stable and are likely protected from nucleases by cellular membranes. This information may pave the way for development of better strategies to define active SARS-CoV-2 infection as opposed to extended presence of what most likely represent highly stable virus genomic and subgenomic RNAs present in, and at least in part protected by, cellular membranes. The message for national Health Services: Don’t lock your citizens down for weeks and weeks.

Clinical

Artificial intelligence (AI) is a significant threat to radiologists and radiology as a specialty. Here, Ramsey Wehbe et al. show that an AI algorithm detected COVID-19 on chest radiographs with a performance similar to a consensus of experienced thoracic radiologists. See also the editorial by van Ginneken B. The Potential of Artificial Intelligence to Analyze Chest Radiographs for Signs of COVID-19 Pneumonia. Radiology. 2020 Nov 24:204238. PubMed: https://pubmed.gov/33236962. Full-text: https://doi.org/10.1148/radiol.2020204238

Collateral Effects
During the 2020 spring lockdown and immediately thereafter, there was an important reduction in systemic anti-cancer treatment initiation in England: 32% in April and 10% in May. In June, the number of registrations for new systemic anti-cancer treatments increased by 15% compared to the 6 pre-COVID months (September, 2019, to February, 2020). James Clark et al. recommend continuing to assess the effects of delaying treatment initiation for advanced cancers and neoadjuvant therapies.

**Society**

Guglielmi G. *Italian labs shape-shift to fight the pandemic*. Nature Italy 2020, published 21 November. Full-text: https://www.nature.com/articles/d43978-020-00026-x

In Italy, one of the early epicenters of the COVID pandemic, scientists from all fields have re-focused expertise and equipment to study the virus. Go on a short trip to this peninsula in the Mediterranean.

**29 November**

**Epidemiology**


A low number of SARS-CoV-2-seropositive HCWs in a low prevalence setting. In this study from Norway, 607 HCW were evaluated pre- and post-the first COVID-19 pandemic wave, using a 2-step ELISA. Exposure history, COVID-19-like symptoms and serum samples were collected. Only 32 HCW (5.3%) had spike-specific antibodies (11 seroconverted with ≥ 4-fold increase, 21 were seropositive at baseline). The infection rate was only 1,7-fold higher in HCW with COVID-19 patient-exposure (2,4%) than in HCW with no exposure (1,4%).

After a large church concert on March 1 and the first detected infection on March 9, the southern German community of Kupferzell in the federal state Baden-Württemberg faced a steep increase of SARS-CoV-2 infections. The cumulative incidence of 1.760 per 100,000 by the end of April was one of the highest in Germany. The authors set out to analyze the SARS-CoV-2 seroprevalence in a random sample of this community from 20 May to 9 June. Results: 12%. This study confirmed that even in areas with high COVID-19 prevalence, only a small proportion of the population is infected.

Prevention

Schools around the world are again the site of a large, and largely uncontrolled, experiment. Scrutiny of school openings in countries where the virus is resurgent paints a complex picture of the risks and how they might be managed. In their well-balanced article, Gretchen Vogel and Jennifer Couzin-Frankel summarize the main questions. How common are school outbreaks? (answer: less common than initially feared, although data are sparse). Do open schools change risk perception? (answer: probably). How much fresh air is enough? (answer: we don’t know, but high-quality carbon dioxide monitors may help) Does testing make a difference? (answer: yes, but it takes up potentially scarce resources and can give a false picture). Should schools stay open as cases surge? (answer: let’s better think about what we need to do to keep schools open).

Immunology

Emily Bowman and colleagues from Cleveland measured serum biomarkers in 14 uninfected individuals and in 44 individuals with mild, moderate, or critical COVID-19 disease. Levels of monocyte activation (sCD14 and FABP4) and inflammation (TNFR1 and 2) were increased in COVID-19 individuals, regardless of disease severity. Among patients with critical disease, individuals who recovered from COVID-19 had lower levels of TNFR1 and TNFR2 at hospital...
admission compared to the levels in patients with critical disease who ultimately died.

**Vaccine**

Wadman M. **Public needs to prep for vaccine side effects.** Science 27 November 2020: Vol. 370, Issue 6520, pp. 1022. Full-text: [https://doi.org/10.1126/science.370.6520.1022](https://doi.org/10.1126/science.370.6520.1022)

Expect a rough night after vaccination: A subset of people may face intense, if transient, side effects, called reactogenicity. In this interesting article, Meredith Wadman argues that transparency is key. Rather than minimizing the chance of fever, vaccine administrators could alert people that they may experience a fever that can feel severe but is temporary.

**Clinical**

Pastor-Barriuso PR, Pérez-Gómez B, Hernán MA, et al. **Infection fatality risk for SARS-CoV-2 in community dwelling population of Spain: nationwide seroepidemiological study.** BMJ 2020, published 27 November. Full-text: [https://doi.org/10.1136/bmj.m4509](https://doi.org/10.1136/bmj.m4509)

In this large study from Spain, SARS-CoV-2 infections were derived from the estimated seroprevalence by a chemiluminescent microparticle immunoassay for IgG antibodies in 61,098 participants in the ENE-COVID nationwide survey between 27 April and 22 June 2020. The overall infection fatality risk (IFR) was 0.8% for confirmed COVID-19 deaths and 1.1% for excess deaths. IFR was higher in men than in women (1.1 versus 0.6%). The IFR increased sharply in the elderly age groups, ranging from 1.5% (60-70 years) to 11.6% (80+) in men, and from 0.53 (60-70) to 4.62 (80+) in women.

**Severe COVID-19**

Knoouhuizen SA, Aday A, Lee WM. **Ketamine-Induced Sclerosing Cholangitis (KISC) in a Critically Ill Patient with COVID-19.** Hepatology 23 November 2020. Full-text: [https://doi.org/10.1002/hep.31650](https://doi.org/10.1002/hep.31650)

Prior reports of recreational ketamine abuse have been associated with findings of secondary sclerosing cholangitis. The authors report here a novel presentation of the syndrome in association with prolonged ketamine use in the intensive care unit.
Collateral damage (and benefits)


The pandemic has had considerable impact on testing for HIV, viral hepatitis and STIs in the WHO European Region. Preliminary results show that 95% of respondents from 34 countries reported testing less than half the expected number of people during the first months of the COVID-19 pandemic between March and May 2020. This continued, although to a lesser degree, between June and August 2020, when measures were less strict in most countries.


In Australia, influenza activity was at an all-time low during the southern hemisphere’s 2020 winter. The 2020 pandemic restrictions may substantially ameliorate winter respiratory pathogen epidemics in 2021 and beyond.

Pediatrics


Women with suspected or confirmed COVID-19 who are separated from their newborns and whose newborns are not feeding directly at the breast might need timely, professional, breastfeeding support. CDC conducted a COVID-19 survey (July 15–August 20, 2020) among 1.344 hospitals to assess current practices and breastfeeding support while in hospital. Among mothers with suspected or confirmed COVID-19, 14.0% of hospitals discouraged and 6.5% prohibited skin-to-skin care; 37.8% discouraged and 5.3% prohibited rooming-in; 20.1% discouraged direct breastfeeding but allowed it if the mother chose; and 12.7% did not support direct breastfeeding, but encouraged feeding of expressed breast milk. In response to the pandemic, 17.9% of hospitals re-
ported reduced in-person lactation support, and 72.9% reported discharging mothers and their newborns < 48 hours after birth.

30 November

Epidemiology

During the first wave of the epidemic in April 2020, overall seroprevalence in the Netherlands was 2.8% (95% CI 2.1 to 3.7), with no differences between sexes or ethnic background, and regionally ranging between 1.3 and 4.0%. This is in striking contrast with the 30-fold lower number of reported cases.

Immunology

Anti-RBD antibody response in 15 CCP donors who donated at least 4 times, during a time interval after symptom onset ranging from 33 to 77 days for the first donation to 66 to 114 days for the last donation. Interestingly, the decrease during a period of about 20 days (considering the mean and median of third and fourth quartiles, both of 76 and 95 days, respectively) was reminiscent of the plasma immunoglobulin G half-life of 21 days. This suggests that de novo synthesis of anti-RBD antibodies stopped between the third and fourth quartiles in all CCP donors.

Among 156 frontline health care personnel who had positive SARS-CoV-2 antibody test results in spring 2020, 94% experienced a decline at repeat testing approximately 60 days later, and 28% sero-reverted to below the threshold of positivity. A higher percentage of those with low baseline antibody levels sero-reverted (65%) than did those with high baseline titers (7%). These results suggest that a substantial proportion of persons infected with SARS-CoV-2 might have negative serologic test results in the months following infection.

Vaccine


If a SARS-CoV-2 vaccine is licensed within 18 months of the start of the pandemic, it will mark an unprecedented achievement for non-influenza viral vaccine development. The authors took a look at other vaccines for emerging and re-emerged viral infectious diseases at ClinicalTrials.gov: in total, 606 clinical trials that formed part of 220 distinct development trajectories were identified. The probability of vaccines progressing from Phase II to licensure within 10 years was 10.0%, with most approvals representing H1N1 or H5N1 vaccines. The average timeline from Phase II to approval was 4.4 years. The probabilities of advancing from Phase I to II, Phase II to III, and Phase III to licensure within the total available follow-up time were 38.2%, 38.3%, and 61.1%, respectively.

Clinical


A retrospective observational cohort from New York City, evaluating 1409 patients with COVID-19 admitted to home health care (HHC) between 1 April
and 15 June 2020 after hospitalization. After an average of 32 days in HHC, 94% of patients were discharged and most achieved statistically significant improvements in symptoms and function. Eleven patients (1%) died, 137 (10%) were re-hospitalized, and 23 (2%) remain hospitalized. Comorbid conditions of heart failure and diabetes, as well as characteristics present at admission (male gender, white ethnicity), identified patients at greatest risk for an adverse event.


In this well-balanced review, Marcelo Merello, Kailash Bhatia, Jose Obeso argue that the causal association of SARS-CoV-2 infection with the development of Parkinson's disease is not supported by robust evidence yet. The authors are concerned about unjustified claims and speculations anticipating a future high incidence of Parkinson's disease, secondary to the SARS-CoV-2 pandemic. A coordinated international effort to investigate viral effects is essential and should be based on well-designed prospective studies.


In this single-center study, the authors describe neurological manifestations in 58 patients, regarding cerebrospinal fluid (CSF) analysis and neuroimaging findings. Protein and albumin levels in CSF were increased in 38% and 23%, respectively. 40% of patients displayed an elevated albumin quotient suggesting impaired blood-brain barrier integrity. A CSF-specific IgG oligoclonal band was found in five (11%) cases, suggesting an intrathecal synthesis of IgG, and 26 (55%) patients presented identical oligoclonal bands in serum and CSF. Only four (7%) patients harbored a positive SARS-CoV-2 RT-PCR in CSF.


Among 88,747 patients tested for SARS-CoV-2 between January and mid-May in the US Veterans Affairs (VA) national healthcare system, cirrhosis was as-
associated with a 1.7-fold increase in mortality in patients with SARS-CoV-2 infection.

Collateral damage

This international cohort study GENEVA investigated the outcomes of bariatric and metabolic surgery (BMS) performed in 2116 adults (≥ 18 years) between May 1 and July 10 from 133 hospitals in 38 countries. Overall, 30-day morbidity and mortality following BMS during the COVID-19 pandemic with locally appropriate perioperative COVID-19 protocols in place seemed to be similar to pre-pandemic levels. Of the ten patients with symptomatic post-operative COVID-19, none needed ventilation and none died.

Treatment

According to this comment by Gyanshankar P Mishra and Jasmin Mulani, corticosteroids seem to be a double-edged sword and need to be used judiciously, considering the risk–benefit ratio, as a short-course (up to 10 days) therapeutic agent in a select group of patients with COVID-19 for whom a survival benefit has been reported. Extended courses of steroids may be detrimental.

German

Ob daheim, im Klassenzimmer oder Restaurant: Unser Rechner zeigt, wann sich Menschen in geschlossenen Räumen infizieren können. Testen Sie, wie sicher Ihre Umgebung ist.
Spanish


Dos de las vacunas más eficaces contra la covid se basan en un compuesto sin el que la vida en la Tierra no podría existir. Su aprobación puede ser el comienzo de una nueva era de tratamientos contra el cáncer, enfermedades raras y vacunas universales.


El universo de la seducción está en peligro con la pandemia, escribe para ‘Ideas’ el filósofo francés Gilles Lipovetsky. Pero prevalecerá: nos gusta demasiado.


Durante los meses más duros de la pandemia Juan Altares sufrió todas las complicaciones de una enfermedad entonces desconocida. Así vivió una familia el día a día de un paciente crítico.


La Agencia Reguladora de Medicamentos y Productos Sanitarios del Reino Unido aún no ha dado luz verde a la inmunización, pero se espera que lo haga la semana que viene.

Selon la Haute Autorité de santé, les personnes âgées résidant en Ehpad doivent être vaccinées en priorité « à l’arrivée des toutes premières doses », « compte tenu du nombre limité de doses qui seront disponibles au démarrage de la campagne de vaccination ».


Sous la pression de la crise épidémique, les hôpitaux ont mis à l’arrêt une partie de leur activité, dans une proportion moindre qu’au printemps, mais suscitant la même anxiété chez les malades concernés par les reports.


Depuis plusieurs semaines, le Serum Institute of India fabrique le vaccin AstraZeneca au rythme de 6 millions de flacons par mois. Reportage chez le plus grand producteur au monde.


Les habitants des pays pauvres risquent d’être les derniers servis en vaccin anti-Covid-19, mais aussi de subir le dramatique retour des maladies «
classiques » induit par cette épidémie, observe Philippe Bernard, éditorialiste au « Monde », dans sa chronique.
December 2020

1 December

Virology


Alexandra Popa, Andreas Bergthaler and colleagues from Vienna identified major SARS-CoV-2 clusters during the first wave of infections in Austria and performed deep whole-genome sequencing of 572 virus samples. Their genomic epidemiology analysis enabled the retrospective identification of SARS-CoV-2 chains of transmission and international hotspots. Taking advantage of a well-described and independently confirmed transmission network with 39 transmission events, the authors also found that the number of viral particles transmitted from one individual to another that contributed productively to the infection was on average higher than 1000. This suggests that social distancing and mask wearing may be effective even when they cannot prevent the spread of all viral particles.

Immunology


Interesting work, arguing against a protective role for CCoV (common cold coronavirus) reactive T cells in SARS-CoV-2 infection. Petra Bacher from UKSH (Kiel, Germany) and colleagues employed antigen-specific T cell enrichment to characterize SARS-CoV-2-specific T cells from 55 healthy donors and 56 COVID-19 patients including their avidity and clonality as well as their cross-reactivity to CCoV and other viruses. First, pre-existing T cell memory was common in humans, correlated with the size of the CD4+ memory repertoire rather than with CCoV-specific memory, and displayed only low functional avidity. Second, robust CD4+ T cell responses against CCoV were prevalent in the population; however, T cells reacting to CCoV were not present among SARS-CoV-2-specific T cells in COVID-19 patients. Third, in severe
COVID-19 patients, SARS-CoV-2-specific CD4+ T cells also displayed low functional avidity and TCR clonality, although their frequencies increased with disease severity.


The distal lung contains terminal bronchioles and alveoli that facilitate gas exchange. This work by Ameen A. Salahudeen, Shannon S. Choi and colleagues from Chicago helps to study these cells. The authors have established a long-term feeder-free, chemically defined culture of distal lung progenitors as organoids derived from single adult human alveolar epithelial type II (AT2) cells. Their culture experiments identified unsuspected basal cell functional heterogeneity and established a facile in vitro organoid model for human distal lung infections including COVID-19-associated pneumonia.

**Vaccine**


Yellow Fever 17D (YF17D) is a small RNA live-attenuated virus with limited vector capacity. The YF17D vaccine is known to rapidly induce broad multifunctional innate, humoral and cell-mediated immune responses that may result in life-long protection following a single vaccine dose in nearly all vaccinees. These favorable characteristics translate also to vectored vaccines based on the YF17D backbone. Consequently, YF17D is used as vector in two licensed human vaccines, generated by swapping genes encoding the YF17D surface antigens for those of Japanese encephalitis or dengue viruses. Here, the authors describe the discovery of a live virus-vectored SARS-CoV-2 vaccine candidate using the YF17D vaccine as vector to express a non-cleavable prefusion form of the SARS-CoV-2 Spike antigen. Safety, immunogenicity and efficacy after a single dose are shown in several animal models such as hamsters, mice and macaques.

**Transmission**

According to this review, existing evidence supports the widely held belief that the risk of SARS-CoV-2 transmission is lower outdoors. Moreover, historical evidence gleaned from influenza outbreaks further support the lower risk of transmission outdoors. However, there are significant gaps in our understanding of specific pathways. It is important to note that infections are possible outdoors and the advantage may be overtaken by relaxed mitigation efforts (think of the White House outbreak on September 26).


An epidemiologic investigation of potential exposure of a presymptomatic child who attended a childcare center in South Korea: a 4-year-old child, probably infected by his grandmother, attended the center during the pre-symptomatic period (February 19–21, 2020). Fever developed on February 22, and he was given a diagnosis of SARS-CoV-2 infection on February 27. At the center, 190 persons were identified as contacts; 44 (23.2%) were defined as close contacts (37 children and 7 adults). All 190 persons were negative for SARS-CoV-2 on days 8–9 after the last exposure. This investigation adds indirect evidence of potentially low infectivity in a childcare setting with exposure to a presymptomatic child.

Clinical


Differences in health care access and exposure risk may be driving higher infection and mortality rates. This systematic review revealed that African-American/Black and Hispanic populations experience disproportionately higher rates of SARS-CoV-2 infection, hospitalization, and COVID-19–related mortality compared with non-Hispanic White populations, but not higher case-fatality rates (moderate- to high-strength evidence). Asian populations experience similar outcomes to non-Hispanic White populations (low-strength evidence). Outcomes for other racial/ethnic groups have been insufficiently studied. Health care access and exposure factors may underlie the observed disparities more than susceptibility due to co-morbid conditions (low-strength evidence).
Treatment

Is there a place for remdesivir? Last week, the WHO said no (https://www.who.int/news-room/feature-stories/detail/who-recommends-against-the-use-of-remdesivir-in-covid-19-patients). In their comment on current data, Barnaby Young and colleagues from Singapore are not that strict. They believe that the natural history of COVID-19 suggests a window of opportunity for antivirals before fulminant inflammation sets in. However, they conclude that “for now, remdesivir is an important COVID-19 treatment option only in selected patient groups”.

Dangerfield TL, Huang NZ, Johnson KA. Remdesivir is effective in combatting COVID-19 because it is a better substrate than ATP for the viral RNA-dependent RNA polymerase. iScience November 27, 2020. Full-text: https://doi.org/10.1016/j.isci.2020.101849

Tyler L. Dangerfield and colleagues compared binding and incorporation parameters for nucleoside analogs such as remdesivir relative to their natural counterparts (ATP). The specificity constant for remdesivir triphosphate incorporation was higher than that for competing ATP. Would be nice to see this effect in vivo.


Jan Rybniker from Cologne and colleagues report the pharmacokinetics of remdesivir and its metabolites and the treatment outcome in a patient on renal replacement therapy without residual renal function suffering from severe COVID-19.
2 December

Epidemiology


In Veneto, Italy, Verona was the province with the most cases and deaths caused by SARS-CoV-2. Massimo Guerriero and colleagues estimated the prevalence of active or past infection among randomly selected participants > 10 years of age from Verona. Of 1515 participants, 2.6% tested positive by a serologic assay and 0.7% by PCR. The total prevalence was 3.0%, suggesting 7051 cumulative cases (4.6 times higher than the official count).

Immunology


A retrospective analysis of 851 SARS-CoV-2-positive patients with at least two positive PCR tests. The mean lower bound of viral RNA shedding was 17.3 days (SD: 7.8), and the mean upper bound of viral RNA shedding from 668 patients transitioning to confirmed PCR-negative status was 22.7 days (SD: 11.8). Some seropositive patients actively shed viral RNA (14 of 90 patients).

Vaccine

Behr MA, Divangahi M, Schurr E. **Lessons from BCG for SARS-CoV-2 vaccine candidates.** J Infect Dis 2020, published 30 November. Full-text: [https://doi.org/10.1093/infdis/jiaa637](https://doi.org/10.1093/infdis/jiaa637)

A note of caution: according to Marcel Behr and colleagues from Montréal, developers of SARS-CoV-2 vaccines should consider some of the lessons from a ‘new’ vaccine introduced in 1921, where BCG introduced to great fanfare had no measurable effect on the global epidemic, despite evidence of protection at the individual level.
Diagnostics


Does an individual exposed to one variant of a virus have cross-reactive memory to the second? Probably yes. Carleen Klumpp-Thomas and colleagues from NIH analyzed the serologic ELISA reactivity of both variants and found that antibodies from 88 donors from a high-incidence population reacted toward both the original spike and the D614 spike variant. This suggests that use of the full spike protein construct should not impact seroassay performance or “miss” seropositive samples. However, the fact that D614 and G614 both elicited seropositivity is perhaps expected, given that the human immune response is polyclonal.

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Myhre PL, Prebensen C, Strand H, et al. **Growth Differentiation Factor 15 Provides Prognostic Information Superior to Established Cardiovascular and Inflammatory Biomarkers in Unselected Patients Hospitalized With COVID-19.** Circulation 2020 Dec;142(22):2128-2137. PubMed: [https://pubmed.gov/33058695](https://pubmed.gov/33058695). Full-text: [https://doi.org/10.1161/CIRCULATIONAHA.120.050360](https://doi.org/10.1161/CIRCULATIONAHA.120.050360)

Growth differentiation factor 15 (GDF-15) is a member of the transforming growth factor β superfamily. Expression in pathological states is highly regulated through several pathways including inflammation, oxidative stress, and hypoxia and elevated concentrations of circulating GDF-15 have been identified in multiple disease entities. Among 123 hospitalized COVID-19 patients from Oslo, Norway, GDF-15 was elevated in the majority of patients. Higher concentrations were associated with SARS-CoV-2 viremia, hypoxemia, and worse outcome. The prognostic value of GDF-15 was additional and superior to established cardiovascular and inflammatory biomarkers.

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Another biomarker. The immunomodulatory protein progranulin (GRN) is a pleiotrophic growth factor and immunoregulatory molecule expressed in a broad range of tissues and cell types such as epithelia, bone marrow and various immune cells including T cells, DCs, monocytes and macrophages. In a
prospective single-center registry, Marina Rieser and colleagues from Freiburg, Germany included 24 SARS-CoV-2 positive patients and 61 patients with “similar symptoms and severity of disease but negative for SARS-CoV-2” (cancer, cardiac disease, and others) admitted to the emergency department and compared their serum protein expression profiles. Of note, no differences in IL-6 expression between SARS-CoV-2-positive and -negative patients were observed. In contrast, a specific upregulation of GRN was found which was associated with COVID-19 severity. Among the proteins showing the most significant positive correlation with GRN were GDF-15, urokinase-type plasminogen activator (uPA) and urokinase-type plasminogen activator receptor (uPAR).

Clinical


See title (“can” respond). The authors report a case series of five patients with severe COVID-19-related encephalitis (impaired consciousness/unresponsive and mechanically ventilated) treated by therapeutic plasma exchanges and corticosteroids. The dramatic improvement in three of five patients “reinforces the hypothesis of an immune-related mechanism”.

Collateral damage


Carbapenem-resistant Acinetobacter baumannii (CRAB) causes health care-associated infections that are challenging to contain and often linked to infection prevention and control breaches. What a mess: colleagues from a New Jersey hospital report on a cluster of 34 CRAB cases (26 isolates harbored the gene encoding the OXA-23 carbapenemase) that peaked during a surge in COVID-19 hospitalizations. The authors conclude that strategies to preserve continuity of care led to deviations in IPC practices; CRAB cases decreased when normal operations resumed.

Richard Armitage and Laura B Nellums comment on the number of antibiotic prescriptions made in UK general practice between April 1, and Aug 31, 2020. The number was 15% lower than in the corresponding period in 2019. However, given the decrease in absolute number of appointments over this time, this number of prescriptions was 7% higher than expected, supporting evidence that antibiotic prescribing rates are higher in remote consultations than during in-person appointments.

Pediatrics


Distribution of race/ethnicity among 223 MIS-C cases reported to the New York City (NYC) Department of Health and Mental Hygiene: compared with White children, the authors observed a higher incidence of MIS-C among Black (IRR, 3.2) and Hispanic (IRR, 1.7) children. Black (IRR, 1.7) and Hispanic (IRR, 2.1) children had higher COVID-19 hospitalization rates compared with White children. It remains unclear whether this finding represents a phenomenon distinct from the increased burden of COVID-19 in Black and Hispanic communities.

3 December

Transmission


No comment.

Vaccine

In this Perspective, the participants in a World Health Organization ad hoc consultation on the next steps for COVID-19 vaccine evaluation recommend on how to proceed clinically as the first commercial vaccines increasingly become available. **Yes**, continue with placebo-controlled trials (the bedrock of modern clinical decision-making) because we still need more data on longer-term safety and duration of protection; on whether waning of vaccine-induced protection may lead to vaccine-enhanced disease if a vaccinee becomes infected after exposure to SARS-CoV-2; on information on protection against clinically severe forms of COVID-19; and knowledge of any associations between the degree of protection and the recipient’s age or co-existing conditions. **No**, refrain from observational studies which are subject to substantial biases and are much less amenable to unambiguous interpretation.


Will 95% efficacy vaccines show the way to a straight road back to Normal-ville? Or will the route back be a meandering country lane with detours and potholes? Pothole 1: Vaccine skepticism. Pothole 2: Pregnant women. Pothole 3: Children. Pothole 4: How to continue important Phase III randomized trials while vaccines are already on the market? Pothole 5: Understanding SARS-CoV-2 transmission by vaccinated individuals. Have enough time before starting this long-read article.

**Diagnostics**

Dugdale CM, Anahtar MN, Chiosi JJ, et al. *Clinical, laboratory, and radiologic characteristics of patients with initial false-negative SARS-CoV-2 nucleic acid amplification test results.* Open Forum Infect Dis 2020, published 24 November. Full-text: [https://doi.org/10.1093/ofid/ofaa559](https://doi.org/10.1093/ofid/ofaa559)

People with COVID-19 symptoms who have a negative PCR test should be re-tested within two weeks, especially in areas with sustained community transmission of SARS-CoV-2. This is the message Caitlin Dugdale and colleagues from the Massachusetts General Hospital, Boston, after finding 60 positives of 2699 subjects (2.2%) on a second test. Most of these subjects had symptoms (52/60; 87%) and chest radiography (19/32; 59%) consistent with COVID-19. A total of 60% had their initial test either ≤ 1 day (n = 18) or > 7 days (n = 18) after symptom onset.
Treatment


Remdesivir, hydroxychloroquine, lopinavir, and interferon regimens had little or no effect on hospitalized patients with Covid-19, as indicated by overall mortality, initiation of ventilation, and duration of hospital stay. This is the interim result of the WHO Solidarity Trial which of 11,330 adults at 405 hospitals in 30 countries. 2,750 were randomly assigned to receive remdesivir, 954 to hydroxychloroquine, 1411 to lopinavir (without interferon), 2063 to interferon (including 651 to interferon plus lopinavir), and 4,088 to no trial drug. Death occurred in 301 of 2,743 patients receiving remdesivir and in 303 of 2,708 receiving the control. In the accompanying editorial, David Harrington, Lindsey Baden, and Joseph Hogan try to save the day for remdesivir; however, it is clear that the drug plays in an altogether different league than the powerful anti-HIV and anti-HCV drugs. Also, in future pandemics we will remember that repurposing old antiviral drugs was not successful.

Drug Development


Molnupiravir (MK-4482/EIDD-2801) is able to mitigate SARS-CoV-2 infection and block transmission when therapeutically administered to ferrets. The drug, initially developed as an inhibitor of influenza viruses, is currently in Phase II/III clinical trials (NCT04405570 and NCT04405739).


Dalbavancin is a once-a-week antibiotic (plasma half-life: 5–7 days) with activity against a broad range of Gram-positive pathogens, including methicil-
lin-resistant *Staphylococcus aureus* (MRSA) and which has been approved for the treatment of acute bacterial skin and skin structure infections. Here, Ren Lai, Gan Wang and colleagues show that the drug effectively prevented SARS-CoV-2 replication in Vero E6 cells with an EC₅₀ of ~12 nM. In both mouse and rhesus macaque models, viral replication and histopathological injuries caused by SARS-CoV-2 infection were significantly inhibited by dalbavancin administration.

**Education**


The editors discuss the WHO’s Solidarity study and the changing recommendations for the care of hospitalized patients.

**Beyond Corona**


Google’s deep-learning program for determining the 3D shapes of proteins might transform biology. Is it truly a game changer? Will it change medicine, research and bioengineering, as suggests Andrei Lupas from MPI Tübingen? Follow Ewen Callaway on this tour around the AI-biology interface.

4 December


5 December

**Epidemiology**

COVID-19 disproportionately affected Hispanic persons in Denver, US. Overall, the proportions of COVID-19 cases (55%), hospitalizations (62%), and deaths (51%) among Hispanic adults were approximately double the proportion of Hispanic adults in the Denver community (24%). Among adults with COVID-19, Hispanic persons reported larger household sizes and more known COVID-19 household exposure, working in essential industries, working while ill, and delays in testing after symptom onset.


Richard Horton, the Lancet Editor-in-Chief, briefly discusses what we have discovered in 2020 and how these discoveries might inform our future.

Transmission


A pre-print paper we presented on 27 July has now been published in Nat Commun. In the final version, Nicola Decaro and colleagues describe SARS-CoV-2 infection in 919 companion animals in northern Italy at the height of the spring 2020 epidemic. Although no animals tested PCR positive, 3.3% of dogs and 5.8% of cats had measurable SARS-CoV-2 neutralizing antibody titers, with dogs from COVID-19 positive households being significantly more likely to test positive than those from COVID-19 negative households. From their experience, the authors conclude that it is unlikely that infected pets play an active role in SARS-CoV-2 transmission to humans. Only under special circumstances, such as the high animal population densities encountered on infected mink farms, might animal-to-human transmission be more likely.

Vaccine


The Pfizer–BioNTech vaccine has passed safety and efficacy tests — but scientists still have many questions about how this and other vaccines will perform as they’re rolled out to millions of people.
Danaiya Usher A. **South Africa and India push for COVID-19 patents ban.** Lancet 2020, published 5 December. Full-text: [https://doi.org/10.1016/S0140-6736(20)32581-2](https://doi.org/10.1016/S0140-6736(20)32581-2)

South Africa and India want the World Trade Organization to temporarily suspend intellectual property rights so that COVID-19 vaccines and other new technologies are accessible for poor countries. Right on.


The correlates of protection against SARS-CoV-2 infection are not yet established. In this short letter, Alicia Widge et al. report the results of immunogenicity studies 3 months after the second vaccination with mRNA-1273. (The 57 days results were published by Jackson et al. in July and Anderson et al. in September.) The data shows that mRNA-1273 produced high levels of binding and neutralizing antibodies that declined slightly over time but they remained elevated in all participants 3 months after the booster vaccination. The authors conclude that mRNA-1273 has the potential to provide durable humoral immunity. Studies of vaccine-induced B cells are ongoing.


Over the coming weeks and months, demand for vaccines will exceed supply. In the initial phase of the COVID-19 vaccination program, both health care personnel and residents of long-term care facilities should be offered priority vaccination.

Severe COVID

Bramante CT, Ingraham NE, Murray TA, et al. **Metformin and risk of mortality in patients hospitalised with COVID-19: a retrospective cohort analysis.** Lancet Healthy Longevity 2020, published 3 December. Full-text: [https://doi.org/10.1016/S2666-7568(20)30033-7](https://doi.org/10.1016/S2666-7568(20)30033-7)
Metformin for women with obesity or type 2 diabetes who are hospitalized for COVID-19? This is the suggestion of a retrospective cohort analysis by Carolyn Bramante from the University of Minnesota. Metformin was associated with decreased mortality in women by Cox proportional hazards (HR 0.785, 95% CI 0.650–0.951) and propensity matching (OR 0.759, 95% CI 0.601–0.960, p = 0.021). If these findings are reproduced in prospective studies, the safe and inexpensive drug might be used for prevention of COVID-19 mortality. There was no significant reduction in mortality among men.

See also the comment by Dardano A, Del Prato S. Metformin: an inexpensive and effective treatment in people with diabetes and COVID-19? Lancet Healthy Longevity 2020, published 3 December. Full-text: https://doi.org/10.1016/S2666-7568(20)30047-7


Laurens Ceulemans from the University Hospitals Leuven, Belgium, report a successful double-lung transplantation from a donor exposed to SARS-CoV-2 who had mild COVID-19-like symptoms 3 months earlier. The lungs were successfully transplanted without viral transmission to the recipient, as shown by repetitive bronchoalveolar lavage and serology after transplantation.


Society


The global capitalist economy has unprecedented productive capacity. Might it also use this capacity to create the conditions that improve and maintain people’s health? If you want to explore key concepts from the ecological, feminist, and Marxist perspectives of the economy, this Personal View by Simon Mair is for you.
**Spanish**


Los países en desarrollo tendrán que esperar dos años más.


Los tres candidatos más avanzados contra la covid se distinguen en factores como su precio, que varía entre tres y 21 euros por dosis, y su temperatura de conservación.


“En una situación en la que no parece que vayamos a peor, en adelantar en una semana o dos la vacunación tendría que haber un beneficio potencial muy grande”, dice César Hernández, jefe del Departamento de Medicamentos de Uso Humano de la Aemps.


Tener la oficina en casa conlleva retos para los que no nos habían preparado. Y quizá haya que ir preparándose para convivir mucho tiempo con ellos.

**French**

On compte aujourd’hui 237 projets de vaccins contre le Covid-19 dans le monde, développés selon des techniques très différentes. Voici comment ils agissent.


Nos réponses à vos questions.

**6 December**

**Virology**

Wang K, Chen W, Zhang Z, et al. **CD147-spike protein is a novel route for SARS-CoV-2 infection to host cells.** Sig Transduct Target Ther 5, 283 (2020). Full-text: [https://doi.org/10.1038/s41392-020-00426-x](https://doi.org/10.1038/s41392-020-00426-x)

Might there be a hitherto clandestine loophole for SARS-CoV-2 to enter into human cells? Here, Zhi-Nan Chen, Ke Wang and co-authors wonder that although angiotensin-converting enzyme 2 (ACE2) – the receptor which mediates the infection of cells by binding to the spike protein – is expressed in the lung, kidney, and intestine, its expressing levels are rather low, especially in the lung. They describe an interaction between the host cell receptor CD147 and the SARS-CoV-2 spike protein. The loss of CD147 or blocking CD147 in Vero E6 and BEAS-2B cell lines by anti-CD147 antibody meplazumab inhibited SARS-CoV-2 amplification. The authors suggest that a novel viral entry route via the CD147-spike protein might provide a new target for developing drugs against SARS-CoV-2.

**Transmission**


Aerosols are emitted from breathing, talking, coughing and sneezing. Over time, normal breathing can generate more viable viral aerosol than even coughing! In this study, Jacob Löhndal, Malin Alsved and colleagues investi-
gated aerosol and droplet emissions during singing, as compared to talking and breathing. As expected, normal singing generated significantly more aerosol particles than normal talking and loud singing produced more particles than normal singing. (Advice of the Editors: Get vaccinated – and then wait 57 days - before you go back to your weekly choir sessions.)

Immunology


Dan Barouch, Katherine McMahan and colleagues from Harvard show that adoptive transfer of purified IgG from convalescent macaques protects naïve recipient rhesus macaques against SARS-CoV-2 challenge in a dose dependent fashion; relatively low antibody titers were sufficient for protection against SARS-CoV-2 in rhesus macaques whereas higher antibody titers were required for therapy of SARS-CoV-2 infection in macaques. Depletion of CD8+ T cells in convalescent animals partially depletes the protective efficacy of natural immunity against SARS-CoV-2 re-challenge.


Jesse Bloom, Tyler Starr and colleagues from the Fred Hutchinson Cancer Research Center in Seattle, US, mapped SARS-CoV-2 mutation that could prevent binding by the three monoclonal antibodies LY-CoV016 (Eli Lilly; which is different from bamlanivimab [LY-CoV555]) and casirivimab and imdevimab (REGN-COV2). They identified a single amino-acid mutation that fully escapes the REGN-COV2 cocktail. Please note: these findings have not yet been peer reviewed.

Pathogenesis


COVID-19 is a multi-organ disease causing characteristic complications. In this mini-review, Camille Simoneau and Melanie Ott from the Gladstone Institute of Virology, San Francisco, show that stem cell models of various organ systems—most prominently, lung, gut, heart, and brain—are at the forefront
of studies aimed at understanding the role of direct infection in COVID-19 multi-organ dysfunction. A perfect reading for the weekend!

Diagnostics

The authors describe an inexpensive amplification-free nucleic acid immunoassay for the fluorescence detection of SARS-CoV-2 RNA in less than an hour. In a multi-hospital randomized double-blind trial involving 734 samples (593 throat swabs and 141 sputum), the assay achieved sensitivities of 100% and specificities of 99% for both types of sample.

Larremore DB, Toomre D, Parker R. Modeling the effectiveness of olfactory testing to limit SARS-2-CoV transmission. medRxiv 2020, posted 2 December. Full-text: https://doi.org/10.1101/2020.11.30.20241174

Olfactory dysfunction – hyposmia or anosmia – occurs in up to 80% of SARS-CoV-2 infected individuals if standardized olfactory dysfunction test is performed, even in those who remain otherwise asymptomatic. Here, the authors from the University of Colorado Boulder suggest that mass-produced, low-cost and self-administered olfactory tests might reduce the spread of SARS-CoV-2. Interesting approach but attention: this is just a model.

Severe COVID

This non-interventional prospective study (1045 adult COVID-19 patients hospitalized in two different hospitals in Alsace, France: Strasbourg University Hospital and Mulhouse Hospital in March 2020) presents a wealth of data. Advanced age, being male, inflammation parameters and dyspnea were associated with the development of severe disease and death. Being overweight or obese was associated with severe disease only, whereas co-morbidities such as chronic kidney disease, diabetes and immunosuppression increased the risk of death.

Hoffmann – Kamps
Beyond Corona


In recent years, nanoparticles have been developed to navigate biological barriers — systemic, microenvironmental and cellular — that are heterogeneous across patient populations and diseases. In this 294-citation review, Robert Langer, Michael Mitchell and colleagues discuss advances in nanoparticle design. Optimized drug delivery in a personalized manner might ultimately have an impact on patient outcome.

Press


Some vaccine experts worry that “unblinding” the trials and giving all of the volunteers vaccines would tarnish the long-term results. See also Placebo-Controlled Trials of Covid-19 Vaccines — Why We Still Need Them. N Engl J Med 2020, published 2 December. Full-text: https://doi.org/10.1056/NEJMp2033538

Spanish


Estas pruebas se están convirtiendo en un arma clave en la segunda ola y ya se usan como análisis de referencia en hospitales y primaria. Son lo bastante sensibles para detectar personas contagiosas.

French

Remember the paper COVID-19 Outbreak Associated with a 10-Day Motorcycle Rally in a Neighboring State — Minnesota, August–September 2020 that we presented on 21 November? If you read French, read Le Bars S. Une
Cet État américain, rural et conservateur, dont les habitants « n’aiment pas qu’on se mêle de leurs affaires », est majoritairement réfractaire à toute mesure sanitaire. Au nom de la liberté. (Ndlr : Nous devrions peut-être leur expliquer le vrai sens de la parole liberté.)

7 December

Prevention


From March 15, 2020 to June 14, 2020, student volunteers recorded 29,602 hours (2277 hours per week) in 7 different task forces which operated at 7 different hospitals throughout the health system. Volunteers included students from all years of medical school as well as PhD, master’s, and nursing students.


Lockdowns, quarantine and self-isolation are periods characterized by cessation of outdoor exercise. To avoid the harmful effects of periods of not doing exercise, physical activity (PA) could be prescribed to older adults, which is of great importance for breaking their sedentary lifestyle and improving their immunity. The authors discuss the importance of performing PA to reduce the harmful effects of COVID-19.

Clinical

This document provides guidance to rheumatology providers on the management of adult rheumatic disease in the context of the COVID-19 pandemic.

**Comorbidities**


Case report of a woman at 28 weeks gestation, diagnosed with COVID-19 4 weeks prior, and admitted with chest pain. Evaluation indicated myocarditis and marked elevations of inflammatory markers consistent with multisystem inflammatory syndrome in adults. Treatment with intravenous immunoglobulin and corticosteroids was associated with a favorable outcome.


Peripheral nerve injury can occur in COVID-19 patients secondary to post-infectious inflammatory neuropathy, prone positioning-related stretch/compression injury, systemic neuropathy, or nerve entrapment from hematoma. MR neurography and high-resolution ultrasound are excellent diagnostic tools for peripheral nerve injury. For COVID-19 patients and survivors with neuromuscular complications, imaging of peripheral nerves can aid medical decision-making, rehabilitative care, and patient/family counseling.
Pediatrics

Compared with older adults, severe or fatal COVID-19 disease is much less common in infants, children and young adults. In this review, the authors discuss proposed hypotheses for the age-related difference in severity of COVID-19. The observed age-gradient seems to most closely parallel changes in immune and endothelial/clotting function.

Collateral Effects

Patients with COVID-19 are at increased risk of cardiac complications including cardiac arrest. Of admitted patients, almost 30% may have evidence of myocardial injury with mortality among hospitalized patients as high as 70%. The resuscitation of these patients requires a conscious effort to minimize the spread of SARS-CoV-2. The authors present a best-practice model based on four guiding principles: (1) reduce the risk of exposure to the entire health care team; (2) decrease the number of aerosol-generating procedures; (3) use a small resuscitation team to limit potential exposure; and (4) consider early termination of resuscitative efforts.


Interruptions of TB control programs could potentially prolong diagnostic delays and worsen TB treatment outcomes. In addition, the upcoming economic recession could lead to a reduction of income and a rise in unemployment rates in TB-affected households. All of these factors increase the risk of TB incidence and the economic impact on TB-affected households.
General measures to keep COVID-19–free cancer divisions have been adopted worldwide. In this prospective clinical trial, the authors evaluated the efficacy of triage to identify COVID-19 among patients with cancer. Of 562 enrolled patients, 6 (1%) were diagnosed with COVID-19, of whom 4 (67%) had the disease detected through telehealth triage, and 2 patients (33%) without suspect symptoms at triage had the disease detected later. The authors conclude that telehealth triage was helpful in detecting suspect patients and to keep a COVID-19–free cancer center. The overall incidence of COVID-19 diagnosis (1%) and antibody positivity (13%) in patients with suspect symptoms was similar to that observed in the general population.

The risk of all-cause death is more prominently heightened during COVID-19 among people with rare autoimmune rheumatic diseases (RAIRD) than among the general population. This is a result of an analysis which included 168,691 people with a recorded RAIRD diagnosis alive on 01/03/2020. The age-standardized mortality rate (ASMR) among people with RAIRD was 1.44 times higher than the average ASMR during the same months of the previous 5 years, whereas in the general population of England it was 1.38 times higher. The authors suggest quantifying how much risk is due to COVID-19 and how much is due to a disruption to healthcare services.

8 December

Epidemiology

Although many elderly persons continued to follow the recommended preventive measures during the transitional phase between the two pandemic waves, social mixing with younger persons constitutes a way for transmission of infections across age groups. In this large survey from Switzerland, about one quarter of all elderly were still strictly adhering to social distancing and preventive measures. In contrast, a minority of 10% of the elderly had many social contacts and were lacking adherence to preventive measures. The remaining groups seemed to fall in between: while they did have multiple personal contacts, they did maintain the recommended distance. Thus, preventive measures remain important among all age groups.


A discrete modeling framework is proposed to capture the dynamics of highly age-sensitive epidemics and to evaluate the effect of social contact patterns on the load of hospitals and their intensive care units. According to the authors, there should be sufficient time for governments to take corrective measures in case they detect a significant increase in hospitalizations after relaxing the lockdown. Even though the second wave may not lead to a collapse of the healthcare system in Switzerland, it is still important to maintain the overall reproduction number always below one to avoid any silent multiplication of the total number of fatalities.

Transmission


Club X is located in a basement in Berlin, Germany. The area accessible to guests is 150 m² with a height of 3 m. Ventilation of the space is ensured by a mechanical air exhaust and supply system and maintenance was performed according to the manufacturer’s instructions. To avoid noise pollution in the surrounding neighborhood, windows are usually closed during events. On February 29, Club X held an event attended by 300 guests and an index patient who had self-reported initial symptoms one day before attending event. Results: 74 reported cases were linked to the outbreak. Staff members were
particularly affected (attack rate 56%) and likely caused sustained viral transmission after an event at the club. This outbreak illustrates the potential for superspreader events and supports current club closures.

**Immunology**


Ania Wajnberg and colleagues used a cohort of 30,082 infected individuals with mild to moderate COVID-19 symptoms screened at Mount Sinai Health System in New York City to determine the robustness and longevity of the anti-SARS-CoV-2 antibody response. They found that neutralizing antibody titers against the SARS-CoV-2 spike protein persisted for at least 5 months after infection. The authors plan to follow this cohort over a longer period of time.


There are diversities in distribution of ACE2 and TMPRSS2 polymorphisms among different populations. According to this systematic review, analyzing the genetic variants and expression of ACE2 and TMPRSS2 genes in a population may provide the genetic marker for susceptibility or resistance against the coronavirus infection. This might be useful for identifying susceptible population groups for targeted interventions and for making relevant public health policy decisions.
Prevention

Face masks became mandatory at different points in time across different regions in Germany. Timo Mitze and colleagues compared the rise in infections in regions with masks and regions without masks. Weighing various estimates, they concluded that face masks reduced the daily growth rate of reported infections by around 47%.

Clinical

Surprisingly, of the 25 patients with severe or critical disease in this study from Brazil, only three (12%) manifested convincing retinal changes (microhemorrhages, flame-shaped hemorrhage and nerve fiber layer infarcts). These retinal changes were likely secondary to clinical intercurrences or comorbidities.

Collateral damage

The authors leveraged a large, national US EMS database to characterize emergent trends in overdose mortality fueled by the pandemic. They describe a large-magnitude, national surge in overdose-related cardiac arrest during the initial months of the COVID-19 epidemic in the US. Peak rates in May 2020 were more than double the baseline from 2018 and 2019, and overall 2020 values were elevated by approximately 50%. Results suggest that the fallout from the COVID-19 pandemic—perhaps especially social isolation—is sharply accelerating fatal overdose trends.
Treatment

In this observational cohort study using data from Danish nationwide registries, 843/4842 (17%) COVID-19 patients redeemed a prescription of statins in the 6 months prior to COVID-19 diagnosis. Recent statin exposure was not associated with an increased or decreased risk of all-cause mortality or severe infection. The results were consistent across subgroups of age, sex and presumed indication for statin therapy. Among patients with statin exposure, there was no difference between statin drug or treatment intensity with respect to outcomes.


In this retrospective analysis on 280 patients admitted to the San Raffaele Hospital (Milan, Italy) with moderate/severe COVID-19, time to negativization of nasopharyngeal swabs was similar in steroid and non-steroid users. According to multivariate analysis, SARS-CoV-2 clearance was associated with age ≤ 70 years, a shorter duration of symptoms at admission, a baseline PaO2/FiO2 > 200 mmHg, and a lymphocyte count at admission > 1.0 × 10⁹/L. SARS-CoV-2 clearance was not associated with corticosteroid use.

French

Dans une adresse émue à Denise que « Le Monde » publie, trois réanimateurs et une sociologue évoquent leur admiration pour cette patiente âgée, décédée
des suites du Covid-19 et qui avait choisi de ne pas occuper le dernier lit disponible en réanimation.


Il faudra du temps pour contrôler l'épidémie alors que les conditions de propagation du virus persistent, expliquent Renaud Piarroux et Bruno Riou, l'épidémiologiste et le directeur du centre de crise de l'Assistance publique.


Contre toute attente, c'est une technologie encore jamais éprouvée sur l'homme qui a permis de proposer le plus rapidement des solutions vaccinales contre le SARS-CoV-2, via les projets de Pfizer/BioNTech et de Moderna. Rétour sur une course de vitesse lancée il y a plusieurs décennies.

9 December

Immunology


A central paradigm of immunity is that interferon (IFN)-mediated antiviral responses precede pro-inflammatory ones, optimizing host protection and minimizing collateral damage. This brilliant work suggests that this paradigm might not apply for COVID-19. By investigating temporal IFN and inflammatory cytokine patterns in 32 moderate-to-severe patients, Ioanna-Evdokia Galani from Athens, Greece and colleagues show here that IFN-λ and type I IFN production are both diminished and delayed, induced only in a fraction of
patients as they became critically ill. On the contrary, pro-inflammatory cytokines such as tumor necrosis factor (TNF), interleukin (IL)-6 and IL-8 were produced before IFNs in all patients and persisted for a prolonged time. By comparison, in 16 patients with influenza, IFN-λ and type I IFN were induced earlier, robustly, at higher levels and independently of disease severity, whereas pro-inflammatory cytokines were only acutely produced. These data point to an un-tuned antiviral response in COVID-19, contributing to persistent viral presence, hyperinflammation and respiratory failure. Fantastic work (take a look at the beautiful figures) which is among the 10 most important COVID-19 immunology papers of the year.


Daniel Poston and colleagues measured neutralizing activity against SARS-CoV-2 in pre-pandemic sera from 37 Scottish patients with prior PCR-confirmed seasonal coronavirus infection. While neutralizing activity against seasonal coronaviruses was detected in nearly all sera, cross-reactive neutralizing activity against SARS-CoV-2 was undetectable. This data argues against a broad role for pre-existing protective humoral immunity against SARS-CoV-2.


Infection of macrophages and dendritic cells potentially plays a major role in COVID-19 pathogenesis, even in the absence of productive infection. Jian Zheng and colleagues from Iowa demonstrate that SARS-CoV-2 infection of human monocyte-derived macrophages (MDMs) and dendritic cells (MDDCs) was abortive but induced the production of multiple antiviral and pro-inflammatory cytokines. Despite the lack of efficient replication in MDMs, SARS-CoV-2 induced profound IFN-mediated cell death of host cells. Macrophage activation and death was not enhanced by exposure to low levels of
convalescent plasma, suggesting that antibody-dependent enhancement of infection does not contribute to cell death.

**Diagnostics**


Most PCR assays are designed to detect two or more specific target gene regions. An inconclusive result can rarely occur when only one of the targets is detected (< 1%). Shangxin Yang developed a quantitative algorithm to assess and interpret inconclusive PCR results, by combining laboratory, clinical, and epidemiologic data. They determined 5 (28%) of 18 (CDC assay) and 20 (39%) of 51 (TaqPath assay) cases to be false positive. Lowering the cycle threshold cut-off from 40 to 37 in the TaqPath assay resulted in a dramatic reduction of the false-positive rate to 14%. Testing of asymptomatic individuals was associated with a significantly higher probability of having a false-positive result.


In a large study from Denmark, analyzing all patients aged ≥ 18 years admitted to hospital with COVID-19 from 27th of February to 1st of May 2020, with available biochemistry data, of the 1310 patients admitted to hospital (54.6% men; median age 73.6 years), 352 (26.9%) experienced the composite endpoint and 263 (20.1%) died. Elevated levels of CRP, leucocytes, procalcitonin, urea, troponins and D-dimer, and low levels of eGFR were associated with higher standardized absolute risk of death/ICU admission within 30 days.

**Clinical**

The authors from Norway conducted a postal survey at the end of June 2020 among non-hospitalized patients, about 1–4 months after the positive PCR test. Of the 451 subjects (48%) who responded to the survey, > 50% (women 53%, men 67%) had no symptoms 1.5–6 months after symptom onset while 16% reported dyspnea, 12% loss/disturbance of smell, and 10% loss/disturbance of taste. Co-morbidities and a high symptom load during the acute phase were associated with persistent symptoms. At 1.5–6 months, however, there was no difference in symptoms according to length of time since COVID-19 onset. Note that these patients were non-hospitalized.


Hospitalized patients may differ. In this observational study from the UK, at 8–12 weeks post-admission, 163 survivors were invited to a systematic clinical follow-up. Of 131 participants, 110 attended the follow-up clinic. Most (74%) had persistent symptoms (notably breathlessness and excessive fatigue) and limitations in reported physical ability. However, clinically significant abnormalities in chest radiograph, exercise tests, blood tests and spirometry were less frequent (35%), especially in patients not requiring supplementary oxygen during their acute infection (7%).

**Treatment**


Ivermectin, an inexpensive, over-the-counter medicine, is widely used as a preventative against COVID-19 in many South/Latin American countries. However, the evidence that ivermectin protects from COVID-19 is scant. This group from Bangladesh conducted a randomized, double-blind, placebo-controlled trial of oral ivermectin alone or in combination with doxycycline compared with placebo among 72 hospitalized patients. Virological clearance was earlier in the 5-day ivermectin treatment arm versus the placebo group (9.7 days vs. 12.7 days; p = 0.02); but not in the ivermectin + doxycycline arm (11.5 days; p = 0.27). There were no severe adverse drug events recorded in
the study. According to the authors, “larger trials will be needed to confirm these preliminary findings”.


Interesting case report. Convalescent plasma (CP) is widely used to treat COVID-19, but without formal evidence of efficacy. Here, Kazuhito Honjo and colleagues report the beneficial effects of CP in a severely ill COVID-19 patient with prolonged pneumonia and CLL, who was unable to generate an antiviral antibody response of her own. On day 33 after becoming symptomatic, the patient received CP containing high-titer neutralizing antibodies, defervesced and improved clinically within 48 hours, and was discharged on day 37. Hence, when present in sufficient quantities, NAbs to SARS-CoV-2 may have clinical benefit even if administered relatively late in the disease course.

Pediatrics

Julia Stowe and colleagues used national and regional hospitalization data in England to assess the risk of stillbirths during the COVID-19 pandemic. Contrasting previous reports from single hospitals, there was no evidence of any increase in stillbirths regionally or nationally when compared with the same months in the previous year and despite variable community SARS-CoV-2 incidence rates in different regions. This data is reassuring given the concerns about patients, including pregnant women, receiving fewer services or being hesitant to access health care during the pandemic.

French

Avec l’épidémie due au coronavirus, les situations où les soignants ont dû prioriser les malades à prendre en charge se sont multipliées, au-delà des services de réanimation.

Ce pays de 52 millions d’habitants est parvenu à limiter le bilan à 549 morts depuis le début de la pandémie, tout en maintenant la liberté de circulation.


10 December

**Prevention**


Some people still claim on social media that masks can cause hypoxia and are therefore dangerous. Please forget this nonsense. Noel C. Chan provided participants aged 65 years or older with a 3-layer plane-shaped disposable non-medical face mask with ear loops (Boomcare DY95 model) and a portable pulse oximeter. In their cross-over study on 25 subjects, wearing a 3-layer nonmedical face mask was not associated with a decline in oxygen saturation.
Epidemiology


In this prospective, cross-sectional analysis of educational settings in England that had re-opened after the first national lockdown, SARS-CoV-2 infections and outbreaks were uncommon. Among 55 outbreaks (at least two epidemiologically linked cases, with sequential cases diagnosed within 14 days in the same educational setting), probable direction of transmission was staff-to-staff in 26, staff-to-student in 8, student-to-staff in 16 outbreaks, and student-to-student in 5 outbreaks. The risk of an outbreak increased by 72% (95% CI 28–130) for every five cases per 100,000 population increase in community incidence, emphasizing the importance of controlling community transmission to protect educational settings. Interventions should focus on reducing transmission in and among staff.

See also the comment by Flasche S, Edmunds JW. The role of schools and school-aged children in SARS-CoV-2 transmission. The Lancet Infectious Diseases. December 8, 2020. Full-text: https://doi.org/10.1016/S1473-3099(20)30927-0

Immunology


A huge study on viral kinetics that may enrich our understanding of the various patterns of SARS-CoV-2 positivity and the disease course: In 2142 patients with laboratory-confirmed COVID-19, the viral positivity rate peaked within the first 3 days. The median duration of viral positivity was 24,0 days (95% CI, 18,9 to 29,1 days) in critically ill patients and 18,0 days (CI, 16,8 to 19,1 days) in non-critically ill patients. Being critically ill was an independent risk factor for longer viral positivity. In patients with laboratory-confirmed COVID-19, the IgM-positive rate was 19,3% in the first week, peaked in the fifth week (81,5%), and then decreased steadily to around 55% within 9 to 10 weeks. The IgG-positive rate was 44,6% in the first week, reached 93,3% in the fourth week, and then remained high.
Vaccine

60-70% protection: this is what we can probably expect from inactivated vaccines. This important paper describes the first interim safety and efficacy data for a viral vector coronavirus vaccine, ChAdOx1 nCoV-19 (AZD1222, developed at Oxford University), evaluated in four trials across three continents. Between April 23 and Nov 4, 2020, 23,848 participants were recruited and vaccinated: 1077 in COV001 (UK), 10,673 in COV002 (UK), 10,002 in COV003 (Brazil), and 2096 in COV005 (South Africa). The vaccine showed significant vaccine efficacy of 70.4% after two doses and protection of 64.1% after at least one standard dose, against symptomatic disease. Across all four studies, the vaccine had a good safety profile with serious adverse events and adverse events of special interest balanced across the study arms. The efficacy of 90.0% seen in those who received a low dose as prime in the UK by error (COV002, read how this dosing error happened and about the implications) was intriguingly high compared with the other findings in the study. However, this has to be confirmed. Moreover, pre-specified sub-group analyses (elderly, those with comorbidities) were not included in this report. Of note, the ChAdOx1 vaccine can be easily administered in existing healthcare systems (in contrast to mRNA vaccines), stored at ‘fridge temperature’ (2-8 °C) and distributed via existing logistics.


In their comment on the ChAdOx1 paper, Maria Deloria Knoll and Chizoba Wonodi are enthusiastic: “Despite the outstanding questions and challenges in delivering these vaccines, it is hard not to be excited about these findings”. They believe that “perhaps by this time next year, we can celebrate the global control of SARS-CoV-2, in person”. We’ll see.

On December 10, Pfizer and its partner, the German company BioNTech, will be publicly reviewed by the FDA. Find here two documents (53 and 92 pages, respectively) which go into the details of the Phase III trial on 44,000 volunteers recruited in the United States, Brazil and Argentina. Among the first 170 infected persons, 162 had received the placebo and 8 the vaccine – an effectiveness of 95%. The documents disclose more details about protection after the first vaccine dose as well as the protection of elderly people, obese people and those suffering from co-morbidities. There seem to have been no significant differences between the vaccinees and the placebo group in the few serious complications recorded. However, moderate side effects were recorded after the second injection: headache, fatigue, muscle pain and chills affected up to 50% of the vaccinees, particularly those under 55 years old.

Clinical
Interesting case report: on 9 March 2020, male twins from Italy who were 60 years old and considered homozygous because of their appearances and other personal characteristics, were diagnosed with SARS-CoV-2 infection (probably transmitted by the same index patient). Despite a similar viral load at diagnosis, both twins had very different clinical courses (one with mild-to-moderate disease, one with critical COVID-19, requiring mechanical ventilation). Bottom line: everyone is unique (even homozygous twins).

Collateral
Between April 1 and May 13, 2020, online questionnaires were distributed among ongoing cohorts from the Netherlands, including people with (n = 1181) and without (n = 336) depressive, anxiety, or obsessive-compulsive disorders. People without depressive, anxiety, or obsessive-compulsive disorders showed a greater increase in symptoms during the COVID-19 pandemic, whereas individuals with the greatest burden on their mental health tended to show a slight symptom decrease.
Comorbidities

Registry case data from Italy: the cumulative incidence of SARS-CoV-2 infection in solid organ transplantation recipients (SOTRs) is three times higher than that estimated for the Italian population, highlighting that SOTRs are more at risk of infection than non-SOTRs. The 30- and 60-day cumulative incidence of mortality of COVID+ SOTRs was twice as high when compared to non-SOTRs.

French

La revue « The Lancet » a publié les résultats complets du laboratoire britannique, tandis que la FDA a rendu publics ceux du groupe américain.


Des vaccins élaborés en pleine pandémie due au coronavirus, une campagne de vaccination de masse amorcée sans données scientifiques exhaustives… Pour de nombreux spécialistes, la situation est inédite.
11 December

Transmission

Transmission models offer a systematic way to investigate transmission dynamics and produce predictions that integrate assumptions about biological, behavioral, and epidemiological processes. These models also generate possible trajectories of disease burden, evaluate the effectiveness of intervention strategies, and estimate key transmission variables. In this review, the authors highlight key aspects of the history of infectious disease dynamic models. Learn more about malaria, HIV/AIDS, measles, rubella, foot and mouth disease and Ebola.

Immunology

David Fajgenbaum and Carl June remind us that 2020 marks 10 years since the first description of a cytokine storm that developed after chimeric antigen receptor (CAR) T cell therapy and 27 years since the term was first used in the literature to describe the engraftment syndrome of acute graft-versus-host disease after allogeneic hematopoietic stem-cell transplantation. Follow them on their suspense-packed narrative. The 19-page review for your weekend.

Vaccine

Safety and efficacy findings from the phase 2/3 trial evaluating the safety, immunogenicity, and efficacy of 30 μg of the Pfizer/BioNTech vaccine candidate BNT162b2. A two-dose regimen of BNT162b2 conferred 95% protection against Covid-19 in persons 16 years of age or older. Reactogenicity was generally mild or moderate, and reactions were less common and milder in older adults than in younger adults. A must-read.

The first Phase I-II results of NVX-CoV2373 (Novavax), a recombinant nanoparticle vaccine. Cheryl Keech et al. evaluated the safety and immunogenicity of the vaccine in 131 adults using 5-μg and 25-μg doses, with or without Matrix-M1 adjuvant. Reactogenicity was absent or mild in the majority of participants and more common with adjuvant. The addition of adjuvant resulted in enhanced immune responses, was antigen dose–sparing, and induced CD4+ T cell responses that were biased toward a Th1 phenotype. The two-dose 5-μg adjuvant regimen induced geometric mean anti-spike IgG (63,160 ELISA units) and neutralization (3906) responses that exceeded geometric mean responses in convalescent serum from mostly symptomatic COVID-19 patients (8344 and 983, respectively). NVX-CoV2373 is composed of trimeric full-length SARS-CoV-2 spike glycoproteins and a Matrix-M1 adjuvant.

**Clinical**

Meyerowitz EA, Richterman A, bogoch I, Low N, Cevik M. **Towards an accurate and systematic characterisation of persistently asymptomatic infection with SARS-CoV-2.** Lancet Infect Dis 2020, published 7 December. Full-text: [https://doi.org/10.1016/S1473-3099(20)30837-9](https://doi.org/10.1016/S1473-3099(20)30837-9)

Transmission of SARS-CoV-2 from individuals without symptoms is a major force driving pandemics. Eric Meyerowith and colleagues describe three methodological issues that hinder attempts to estimate the proportion of asymptomatic or pre-symptomatic individuals. First, incomplete symptom assessment may overestimate the asymptomatic fraction; second, studies with inadequate follow-up misclassify pre-symptomatic individuals; and third, serological studies might identify people with previously unrecognised infection, but reliance on poorly defined antibody responses and retrospective symptom assessment might result in misclassification. Discover the answers to these issues.

**Comorbidities**

Several studies suggest that mental health deteriorated in many countries before and during lockdowns. The authors show that the highest levels of depression and anxiety occurred in the early stages of lockdown but declined fairly rapidly, possibly because individuals adapted to circumstances.


Large French database, including patients with inflammatory rheumatic and musculoskeletal diseases (iRMD). Of 694 adults, 438 (63%) developed mild (not hospitalized), 169 (24%) moderate (hospitalized non-ICU) and 87 (13%) severe (ICU/deceased) disease. In multivariable imputed analyses, the variables associated with severe infection were age, male gender, hypertension and higher BMI. Use of corticosteroids (OR=1.97), mycophenolate mofetil (OR=6.6) and rituximab (OR=4.21) were also risk factors.

Pediatrics


Children with cancer with SARS-CoV-2 infection do not appear at increased risk of severe infection compared to the general pediatric population. This is reassuring result of a retrospective and prospective observational study of all children in the UK under 16 diagnosed with cancer. Between 12 March 2020 and 31 July 2020, Gerard Millen et al identified 54 cases: 15 (28%) were asymptomatic, 34 (63%) had mild infections and 5 (10%) moderate, severe or critical infections. No patients died and only three patients required intensive care support due to COVID-19. The estimated incidence of hospital identified SARS-CoV–2 infection in children with cancer under 16 was 3%.

Collateral Effects

Giant cell arteritis, a common primary systemic vasculitis affecting older people, presents acutely as a medical emergency and requires rapid specialist assessment and treatment to prevent irreversible vision loss. The authors show that during the COVID-19 pandemic, patients might be involved in the reshaping of clinical services.

**Education**


The editors discuss who should be first in line as COVID-19 vaccines are rolled out.

**Spanish**


India y Sudáfrica lideran una petición ante la Organización Mundial del Comercio para que se suspenda temporalmente la propiedad intelectual sobre tecnologías, medicamentos y vacunas contra el nuevo coronavirus mientras dure la pandemia; 99 países les apoyan, el mundo rico se resiste

**French**


La sociologue Eva Illouz retrace l’histoire du complotisme et analyse les causes profondes de l’importance qu’il a prise cette dernière décennie, jusqu’à remettre en question « le pari que les démocraties ont fait sur la liberté d’expression et sur la force de la vérité ». 
German

If you read German, read Fischer S. **Wir haben uns den Lockdown redlich verdient.** Der Spiegel 2020, published 10 December. Full-text: https://www.spiegel.de/politik/deutschland/corona-wir-haben-uns-den-lockdown-redlich-verdient-kommentar-a-41252d4b-baf8-4d11-bd07-ae97312803a0


12 December

**Epidemiology**


Elisabetta Tanzi, Antonella Amendola and colleagues from the University of Milan identified SARS-CoV-2 RNA in an oropharyngeal swab specimen collected from a child with suspected measles in early December 2019, more than two months before the first identified SARS-CoV-2 case in Italy. The authors cautiously conclude that “long-term, unrecognized spread of SARS-CoV-2 in northern Italy would help explain, at least in part, the devastating impact and rapid course of the first wave of COVID-19 in Lombardy.”


Seroprevalence for SARS-CoV-2 continues to be low in England. After randomly collecting samples from individuals aged 2 years and older living in private households in England, the percentage of people testing positive for SARS-CoV-2 initially decreased between April 26 and June 28, 2020, from 0.40% to 0.06%, followed by low levels during July and August, 2020, before substantially increasing at the end of August, 2020, with percentages testing positive above 1% from the end of October, 2020. Age (young adults, particularly those aged 17–24 years) was an important initial driver in the second
wave. For example, the estimated percentage of individuals testing positive was more than six times higher in those aged 17–24 years than in those aged 70 years or older at the end of September, 2020. More than half of infections were in asymptomatic individuals.

Prevention


In any given week more than 200,000 people are booked into jails across the USA, and the same number leave each week. US prisons are SARS-CoV-2 hubs, says the author, “people go to court, go back to their prison, and often people get moved to another prison once they have been sentenced.” Consider prisoners an important group in vaccine prioritization.

Vaccine


Before December 2020, no existing vaccines had been shown to be effective against infection with any beta-coronavirus; strategies to increase the speed of vaccine development had never been tested; and no vaccines based on mRNA technologies had yet been approved. Now, with the paper by Polack et al. that we presented yesterday, all this has been done and the NEJM editors qualify it as a triumph that holds the promise of saving uncounted lives. Rightly, they continue questioning: “Will unexpected safety issues arise when the number grows to millions and possibly billions of people? Will side effects emerge with longer follow-up? Implementing a vaccine that requires two doses is challenging. What happens to the inevitable large number of recipients who miss their second dose? How long will the vaccine remain effective? Does the vaccine prevent asymptomatic disease and limit transmission? And what about the groups of people who were not represented in this trial, such as children, pregnant women, and immunocompromised patients of various sorts?” The story will continue...

In the next weeks, SARS-CoV-2 candidate vaccines will be granted emergency use authorizations after only months of clinical experience. The authors caution that emergency use designations could inadvertently threaten ongoing vaccine research that is yet to define immunological correlates of protection against COVID-19, which could vary according to the vaccine platform, individual characteristics, age groups, and population subset.

Diagnostics

Imagine that even if you have no symptoms of COVID-19, the sound of your forced cough transmitted to your smartphone or smart speaker then processed by an algorithm, could provide a 98.5% accurate diagnosis. Here, Eric Topol describes this science fiction scenario while commenting on a study by Laguarta et al. [Laguarta J, Hueto F, Subirana B. Covid-19 artificial intelligence diagnosis using only cough recordings. IEEE Open J Eng Med Biol 2020, published 29 September. Full-text: https://doi.org/10.1109/OJEMB.2020.3026928], who trained their MIT Open Voice model and built a data collection pipeline of COVID-19 cough recordings through their website (opensigma.mit.edu) between April and May 2020 and created the largest audio COVID-19 cough dataset reported to date with 5320 subjects. Result: COVID-19 sensitivity of 98.5% with a specificity of 94.2% (AUC: 0.97). For asymptomatic subjects it achieves sensitivity of 100% with a specificity of 83.2%.

Pediatrics

In this case series of 25 hospitalized children (11 girls [44%]; median age, 3 years [range, 0.7-17 years]) with suspected MIS-C during the COVID-19 pandemic, Vikash Oza, Trevor Young and colleagues identify a wide spectrum of
mucocutaneous findings. Although protean and transient in nature, these mucocutaneous features serve as important clues in the recognition of MIS-C.


Collateral Effects


Self-harm often precedes suicide and can be used as a proxy outcome to identify how the pandemic has affected population mental health. As yet, there is no indication that the pandemic has caused self-harm rates to increase in the UK. The authors cite a study of 1500 general practices in the UK which found that the recorded incidence of self-harm was 38% lower in April, 2020, than the rate expected on the basis of previous years (Carr MJ, Steeg S, Webb RT, et al). Primary care contact for mental illness and self-harm before, during and after the peak of the COVID-19 pandemic in the UK: cohort study of 13 million individuals. Lancet Public Health (in press)). This decrease was particularly marked in women, people younger than 45 years, and those from the most deprived quintile of practices.

Press

Nogrady B. How kids’ immune systems can evade COVID. Nature 2020, published 10 December. Full-text: https://www.nature.com/articles/d41586-020-03496-7#ref-CR1

Young children account for only a small percentage of COVID-19 infections. Kids’ immune systems might simply be better equipped to eliminate SARS-CoV-2 than those of adults.
Spanish


El panel de expertos de la FDA recomienda la autorización del uso de emergencia de la vacuna de Pfizer-BioNTech, que se espera se realice en las próximas horas o días.

French


Ce retard est dû à une réponse immunitaire insuffisante chez l’adulte. La disponibilité du vaccin est désormais attendue au quatrième trimestre 2021 si le plan de développement est terminé avec succès.

German


Emma Hodcroft und Richard Neher verfolgen, wie Sars-CoV-2 mutiert. Im Virus-Erbgut lesen sie, wie gefährlich es wird, wo es herkam und warum es kaum verschwinden wird.

13 December

Epidemiology

Brazil has experienced one of the world’s most rapidly-growing COVID-19 epidemics, with the Amazon being the worst hit region. Here, Ester Sabino, Nuno Faria, Lewis Buss and colleagues show that one month after the epidemic peak in Manaus, capital of Amazonas state, 44% of the population had detectable IgG antibodies. Correcting for cases without a detectable antibody response and antibody waning, the authors estimate a 66% attack rate in June, rising to 76% in October. The authors conclude that when poorly controlled, COVID-19 can infect a high fraction of the population causing high mortality.


New Zealand is one of a handful of countries that aimed to eliminate coronavirus disease 19 (COVID-19). Here, Jemma L. Geoghegan generated 649 SARS-CoV-2 genome sequences from infected patients with samples collected during the ‘first wave’, representing 56% of all confirmed cases in this time period. The authors found that only 19% of virus introductions into New Zealand resulted in ongoing transmission of more than one additional case. They conclude that ongoing genomic surveillance should be an integral part of the national response to monitor any re-emergence of the virus, particularly when border restrictions might eventually be eased.

Transmission


Understanding the role of superspreading events in transmission is critical for prioritizing public health interventions. Here, Jacob Lemieux et al. report the analysis of 772 complete SARS-CoV-2 genomes from early in the Boston area epidemic. They found numerous introductions of the virus, a small number of which led to most cases. Find more about two superspreading events in a skilled nursing facility and at an international business conference and varying transmission dynamics in superspreading events.
Clinical


The early clinical course of COVID-19 can be difficult to distinguish from other illnesses driving presentation to hospital and PCR testing can take up to 72 h. Here, David Clifton, Andrew Soltan and colleagues from Radcliffe, Oxford, trained linear and non-linear machine learning classifiers to distinguish patients with COVID-19 from pre-pandemic controls. Their models excluded COVID-19 with high-confidence by use of clinical data routinely available within 1 h of presentation to hospital. The authors suggest that their approach could be rapidly scalable, fitting within the existing laboratory testing infrastructure and standard of care of hospitals in high-income and middle-income countries.

Treatment


Baricitinib plus remdesivir was superior to remdesivir alone in reducing recovery time and accelerating improvement in clinical status among hospitalized adults with COVID-19, notably among those receiving high-flow oxygen or noninvasive ventilation. This is the result of double-blind, randomized, placebo-controlled trial involving 1033 patients. The 216 patients receiving high-flow oxygen or noninvasive ventilation at enrollment had a time to recovery of 10 days with combination treatment (n=103) and 18 days with control (n=103) (rate ratio for recovery, 1.51; 95% CI, 1.10 to 2.08). The 28-day mortality was 5.1% in the combination group and 7.8% in the control group (hazard ratio for death, 0.65; 95% CI, 0.39 to 1.09). We still need better drugs.


JAMA published a Medical Letter about the investigational neutralizing IgG1 monoclonal antibody bamlanivimab (LY-CoV555; Lilly) which has been granted an FDA Emergency Use Authorization (EUA) for treatment of recently di-
agnosed mild to moderate COVID-19 in patients who are ≥12 years old, weigh at least 40 kg, and are at high risk for progressing to severe disease and/or hospitalization. See also the FDA fact sheet of bamlanivimab at https://www.fda.gov/media/143603/download.

Comorbidities

Should people with HIV in the UK be at increased risk of COVID-19 mortality? This would be the suggestion of a retrospective cohort study by Ben Goldacre, Krishnan Bhaskaran and colleagues who analyzed the data of 17,282,905 adults, of whom 27,480 (0.16%) had HIV recorded. 14,882 COVID-19 deaths occurred during the study period, with 25 among people with HIV. People living with HIV had higher risk of COVID-19 death than those without HIV after adjusting for age and sex: hazard ratio (HR) 2.90 (95% CI 1.96–4.30; p<0.0001). In a comment, Laura Waters and Anton Pozniak urge for caution in interpreting the results of this study. (Waters LJ, Pozniak AL. COVID-19 death in people with HIV: interpret cautiously. Lancet HIV 2020, published 11 December. Full-text: https://doi.org/10.1016/S2352-3018(20)30332-5.) They emphasize a low absolute mortality of less than 0.1% and recall that 23 (92%) of 25 people with HIV who died had comorbidities.

Pediatrics

As a consequence of the social distancing measures, medical visits to primary care physicians have dropped, including preventive visits and scheduled vaccinations. In Colorado, after March 15 (weeks 12-18), the mean immunization rate dropped 31% for individuals aged 0 to 2 years, 78% for those aged 3 to 9 years, and 82% for those aged 10 to 17 years.
Beyond Corona


Living things depend on water, but it breaks down DNA and other key molecules. So how did the earliest cells deal with the water paradox? In this News Feature, Michael Marshall goes back to the beginning of life. Listen also to the Nature podcast at 00:46: *A shallow start to life on Earth?* – https://www.nature.com/articles/d41586-020-03512-w | It’s long been thought that life on Earth first appeared in the oceans. However, the chemical complexities involved in creating biopolymers in water has led some scientists to speculate that shallow pools on land were actually the most likely location for early life.

14 December

Prevention


Everything You Always Wanted to Know About Face Masks* (*But Were Afraid to Ask). Does wearing face masks reduce primary respiratory infection risk by only 6–15%? See also the comment by Cowling BJ, Leung GM. *Face masks and COVID-19: don't let perfect be the enemy of good.* Euro Surveill. 2020 Dec;25(49):2001998. PubMed: https://pubmed.gov/33303063. Full-text: https://doi.org/10.2807/1560-7917.ES.2020.25.49.2001998


On 31 October, Slovakia deployed around 20 thousand medical staff and 40 thousand non-medical personnel to administer up to 4 million SARS-CoV-2 tests in 2 days. Here the authors report the results of the mass testing where rapid antigen tests were used to screen the whole population and to isolate infectious cases together with their household members. Prevalence of de-
tected infections decreased by 58% (95% CI: 57-58%) within one week in the 45 counties that took part in two rounds of mass testing. See also the comments at https://www.sciencemediacentre.org/expert-reaction-to-a-pre-print-looking-at-population-wide-rapid-antigen-testing-for-sars-cov-2-in-slovakia/

Immunology


In November, two groups (Shrock 2020 and Ng 2020; we presented the papers on 30 September and 9 November) showed that individuals exposed and unexposed to SARS-CoV-2 have cross-reactive serum antibodies against the spike protein of SARS-CoV-2 and seasonal HCoVs. Jenna Guthmiller and Patrick Wilson discuss the studies more in depth. They conclude by highlighting the need for further research into how SARS-CoV-2 antibody responses are shaped by previous exposures to seasonal HCoVs and how this immunity can be harnessed to provide protection.


Pathogenesis


The variability in the clinical response to infection with SARS-CoV-2 reflects differences in host genetics and/or immune response. In this review, Elizabeth Hennessy and Garret FitzGerald examine the influence of viruses on the host epigenome and consider how variation in the epigenome may contribute to heterogeneity in the response to SARS-CoV-2.
Vaccine


A history of BCG vaccination was associated with decreased seroprevalence of anti-SARS-CoV-2 IgG and reduced reported COVID-19-related clinical symptoms in a cohort of healthcare workers in Los Angeles. Of the 6201 HCWs, 29.6% reported a history of BCG vaccination whereas 68.9% did not receive BCG vaccination. Seroprevalence of anti-SARS-CoV-2 IgG as well as incidence of self-reported clinical symptoms associated with COVID-19 were significantly decreased among HCWs with a history of BCG vaccination compared to those without BCG vaccination.


Comorbidities


Asthma may not be a risk factor for poor prognosis of COVID-19. In a nationwide retrospective cohort study, Seon Cheol Park, Sang Chul Lee and colleagues from South Korea selected 7272 adult COVID-19 patients, 686 of whom had a history of asthma. After adjusting for age, sex, and the Charlson comorbidity score, asthma was not a significant risk factor for respiratory failure or mortality among all COVID-19 patients (odds ratio [OR] = 0.99, \( p = 0.997 \) and OR = 1.06, \( p = 0.759 \)). Only a history of acute exacerbation in the previous year before COVID-19 was a significant risk factors for death (OR = 2.63, \( P = 0.043 \)).


Sporadic episodes of sexual dysfunction? Don’t worry, it’s COVID. The reassuring news has just been published by Mehmet Gökhan Çulha and colleagues in a short summary of an online survey among 185 healthcare professionals. Sexual desire, weekly sexual intercourse/masturbation number, foreplay...
time, sexual intercourse time – everything decreased. When factors affecting sexual dysfunction were analyzed as univariate and multivariate, sexual dysfunction was shown to be significantly more common in males and alcohol users. Time to put the bottle aside and get vaccinated.


The authors describe the case of a 60-year-old COVID-19 patient whose inaugural presentation was a refractory cardiac arrest secondary to the destabilization of known, non-significant coronary artery disease. This case illustrates several potential mechanisms that are thought to drive the cardiac complications seen in COVID-19.


In this position paper, the authors discuss the impact of COVID-19 on ACHD patients, focusing on pathophysiology, risk stratification for work, self-isolation, hospitalization, impact on pregnancy, psychosocial health, and longer-term implications for the provision of ACHD care.


Living at home with dementia is complicated, even more so during the SARS-CoV-2 pandemic. In this article Mary Val Palumbo, Betty Rambur and Lori P McKenna describe that unpredictability is heightened; that grief associated with dementia progression because of relationship changes, loss of emotional support, decreased financial support, increased dependency, and loss of future plans has intensified; and that fear of contracting the virus has exacerbated stress for single, largely homebound family caregivers.
Spanish

Estas fiestas serán peligrosas y se espera que aumenten los contagios por COVID. Pero hay alternativas para minimizar los problemas que pueden surgir en cada situación. Piense bien su celebración y aplique las restricciones que le proponemos.


Sería mejor vacunar en paralelo en todos los países que hacerlo en función de su riqueza.

German
If you read German, read Simmank J, Schumann F, Fischer L. Die USA haben eine Impfung – was kann sie? Die Zeit 2020, published 12 December. Full-text: https://www.zeit.de/wissen/gesundheit/2020-12/corona-impfstoff-biontech-usa-wirksamkeit-nebenwirkungen-europa-faq

Die erste Impfung gegen Covid-19 wird in den USA zugelassen. Wie funktioniert sie, was wissen wir bisher über Wirksamkeit und Nebenwirkungen – und wann folgt Europa?

15 December

Epidemiology

A short summary of the study by Lemieux JE et al. we presented two days ago (Lemieux JE, Siddle KJ, Shaw BM, et al. **Phylogenetic analysis of SARS-CoV-2 in Boston highlights the impact of superspreading events.** Science 2020, published 10 December. Full-text: [https://doi.org/10.1126/science.abe3261](https://doi.org/10.1126/science.abe3261)).

As many as 300,000 coronavirus cases across the United States can be traced to a two-day conference in Boston convened by the drug company Biogen.

**Virology**

Swann H, Sharma H, Preece B, et al. **Minimal system for assembly of SARS-CoV-2 virus like particles.** Sci Rep 10, 21877 (2020). Full-text: [https://doi.org/10.1038/s41598-020-78656-w](https://doi.org/10.1038/s41598-020-78656-w)

Non-infectious virus-like particles (VLPs) displaying essential viral proteins can be used to study the structural properties of the SARS-CoV-2 virions and because of their maximum immunogenicity are also vaccine candidates. Here, Saveez Saffarian, Heather Swann and colleagues demonstrate that non-infectious SARS-CoV-2 virus-like particles (VLPs) can be assembled by co-expressing the viral proteins S, M and E in mammalian cells.

**Pathogenesis**

Hernández Cordero AI, Li X, Yang CX, et al. **Gene expression network analysis provides potential targets against SARS-CoV-2.** Sci Rep 10, 21863 (2020). Full-text: [https://doi.org/10.1038/s41598-020-78818-w](https://doi.org/10.1038/s41598-020-78818-w)

Cell entry of SARS-CoV-2 is facilitated by host cell angiotensin-converting enzyme 2 (ACE2) and transmembrane serine protease 2 (TMPRSS2). Here, the authors show that dozens of genes are co-expressed with ACE2 and TMPRSS2, many of which have plausible links to COVID-19 pathophysiology and might potentially be targetable with existing drugs.
Vaccine


On December 12, 2020, the Advisory Committee on Immunization Practices (ACIP) issued an interim recommendation for use of the Pfizer-BioNTech COVID-19 vaccine in persons aged ≥ 16 years for the prevention of COVID-19. Mass vaccinations in the US started two days later.

Diagnostics


Have you ever needed to detect SARS-CoV and SARS-CoV-2 viral products in formalin-fixed paraffin-embedded (FFPE) specimens? Fabian Lean and colleagues show you how. The authors conclude that the diverse techniques for virus detection and control material generation could be applied to investigations of coronavirus pathogenesis and therapeutic research in animal models.

Genetics


RNA interference (RNAi) mechanism has been used for the silencing of genes that are related to cancer, viral infections, and autoimmune diseases. In this review, Cihan Tastan, Burak Berber and colleagues discuss molecular biology approaches that could revolutionize the diagnostics of viral infections and therapies to fight COVID-19 in a highly specific, stable, and efficient way.

Treatment

The authors report the case of a patient with COVID-19 and the prototypic genetic antibody deficiency X-linked agammaglobulinemia (XLA). The patient developed persistent SARS-CoV-2 pneumonitis, without progressing to multi-organ involvement. Over two independent courses of treatment, the authors observed a temporally correlated clinical and virologic response, leading to clinical resolution and viral clearance.

Comorbidities

Some reports of Guillain-Barré syndrome (GBS) have emerged during the coronavirus disease 2019 (COVID-19) pandemic. Here, Michael Lunn, Stephen Keddie and colleagues from University College London Hospitals NHS Foundation Trust studied the epidemiology of GBS cases reported to the UK National Immunoglobulin Database from 2016 to 2019 and compared it to cases reported during the COVID-19 pandemic. The result: GBS incidence has fallen during the pandemic, which may be the influence of lockdown measures reducing transmission of GBS inducing pathogens such as Campylobacter jejuni and respiratory viruses.

Collateral Effects

Yesterday, we reported about sexual desire, weekly sexual intercourse/masturbation number, foreplay time, and sexual intercourse which might be somewhat decreased in COVID times (see https://covidreference.com/top-10-december-14). Now Shuiqiao Yuan, Xixiang Ma and colleagues from Huazhong University of Science and Technology, Wuhan, evaluated the effects of SARS-CoV-2 infection on spermatogenesis by examining the pathophysiology and molecular features of testes obtained from five male COVID-19 patients at autopsy. Their findings might provide evidence that SARS-CoV-2 can infect the testis and germ cells, indicating the potential impact of the COVID-19 pandemic on spermatogenesis and male fertility.
Spanish

If you read Spanish, read Camarero A. **Las medidas anticovid en los colegios reducen los casos de bronquiolitis o catarros y la incidencia de piojos en los niños.** El País 2020, published 14 December. Full-text: https://elpais.com/mamas-papas/2020-12-14/las-medidas-anticovid-en-los-colegios-reducen-los-casos-de-bronquiolitis-o-catarros-y-la-incidencia-de-piojos-en-los-ninos.html

Mantener la distancia de seguridad y el uso de la mascarilla están produciendo un efecto beneficioso en las aulas. Los expertos destacan que se está registrando un descenso en el número de consultas pediátricas.

French


Dans le service de gériatrie, douze lits sont réservés aux patients touchés par le Covid-19, qui accable d’une intense fatigue les malades très âgés, parfois complètement déboussolés.


La restriction des contacts et la fermeture des lieux propices à de nouvelles relations plongent certains jeunes dans le désarroi, à un âge habituellement associé à une diversité d’expériences sexuelles et sentimentales.

Les fédérations des directeurs d’établissement pour personnes âgées plaident pour un accord écrit des résidents.

**German**


**16 December**

**Epidemiology**


Essential workers such as healthcare workers (RR 7.43, 95% CI 5.52 to 10.00), social and education workers (RR 1.84, 95% CI 1.21 to 2.82) and other essential workers (RR 1.60, 95% CI 1.05 to 2.45) appear to have a higher risk of severe COVID-19. This is the result of a prospective cohort study of 120.075 persons, (employed or self-employed, alive and aged < 65 years in 2020), of whom 271 had severe COVID-19. We need to protect them!


Seroprevalence of SARS-CoV-2 antibodies was 10% among the subset of decedents undergoing forensic post-mortem examination in June in Maryland. Decedents of motor vehicle crashes had similar seroprevalence compared to those with a natural death (including decedents with SARS-CoV-2 infection). Decedents of motor vehicle crashes may be a sentinel surveillance population.
Virology


More on the mechanisms of S (SARS-CoV-2 spike) recognition and conformations for immunogen design. The authors apply single-molecule fluorescence (Förster) resonance energy transfer (smFRET) imaging to observe conformational dynamics of S on viral particles, showing transitions from a closed ground state to the open receptor-accessible conformation via an on-path intermediate.

See also the comment by Serrão VHB, Lee JE. **FRETing over SARS-CoV-2: Conformational Dynamics of the Spike Glycoprotein.** Cell Host Microbe 2020, published 9 December. Full-text: [https://doi.org/10.1016/j.chom.2020.11.008](https://doi.org/10.1016/j.chom.2020.11.008)

Prevention

McLellan A, Godlee F. **Covid 19: Christmas relaxation will overwhelm services.** BMJ 2020, published 15 December. Full-text: [https://doi.org/10.1136/bmj.m4847](https://doi.org/10.1136/bmj.m4847)

Since the UK’s first lockdown in March, the government has had one (perhaps only one) consistent message—protect the NHS. Now, with the number of hospital patients with COVID-19 again on the rise, and a third wave almost inevitable, the New Year is likely to see NHS trusts facing a stark choice: be overwhelmed or stop most elective and non-urgent work. Rather than lifting restrictions over Christmas as currently planned, the UK should follow the more cautious examples of Germany, Italy, and the Netherlands. To protect the NHS, the UK government must abandon plans for household mixing.

Lewis D. **Why many countries failed at COVID contact-tracing — but some got it right.** Nature 2020, published 14 December. Full-text: [https://www.nature.com/articles/d41586-020-03518-4](https://www.nature.com/articles/d41586-020-03518-4)

Nine months after the World Health Organization (WHO) declared COVID-19 a pandemic, few countries are wielding contact-tracing effectively. Even rich nations have struggled with one of the most basic and important methods for controlling infectious diseases.
Vaccine


Over the coming months, the supply of SARS-CoV-2 vaccine will be limited. Who should receive the first available vaccine doses? It depends. If your priority is preventing as many transmissions as possible, give the vaccine to adults aged 20-49. If you want to minimize mortality and years of life lost, vaccine the 60+ years old.

Severe COVID


SARS-CoV-2 causes direct damage to the airway epithelium, enabling aspergillus invasion, and azole-resistant aspergillus have been reported. Philipp Koehler et al. present a consensus statement on defining and managing COVID-19-associated pulmonary aspergillosis, endorsed by medical mycology societies. Among the key messages: a) Three different grades are proposed (possible, probable, and proven COVID-19-associated invasive pulmonary aspergillosis [CAPA]) to enable researchers to homogeneously classify patients in registries and interventional clinical trials; b) voriconazole or isavuconazole are recommended as first-line treatment for possible, probable, and proven CAPA.

Collateral Effects


By mid-December, the Northern Hemisphere is usually well into the start of its annual cold and flu season — but so far this year, even as the COVID-19 pandemic surges in dozens of countries, the levels of many common seasonal infections remain extremely low. Measures meant to tame the coronavirus pandemic are quashing influenza and most other respiratory diseases, which could have wide-ranging implications.
Beyond Corona


Highlights from News & Views published this year:

1. Fight or flight turns hair white — Shayla A. Clark and Christopher D. Deppmann
2. Matter–antimatter symmetry violated — Silvia Pascoli and Jessica Turner
3. Jet stream stops shifting as ozone layer recovers — Alexey Yu. Karpechko
4. Incest uncovered at elite prehistoric Irish burial site — Alison Sheridan
5. Satellites could soon map every tree on Earth — Niall P. Hanan and Julius Y. Anchang
6. Latent HIV gets a shock — Mathias Lichterfeld
8. A fast radio burst in our own Galaxy — Amanda Weltman and Anthony Walters
9. Cryo-electron microscopy reaches atomic resolution — Mark A. Herzik Jr
10. Interferon deficiency can lead to severe COVID — Eric Meffre and Akiko Iwasaki

Video. The OSIRIS-REx spacecraft touches the surface of asteroid Bennu. (This video has no sound.) Credit: NASA/Goddard/University of Arizona
https://www.nature.com/immersive/d41586-020-03438-3/assets/KhWoVgA7OQ/a_samcam_approach_and_tag_37x_2.mp4

French

Ils sont intérimaires, intermittents du spectacle, jeunes diplômés... Privés de travail à cause de la crise, ils sont contraints de se tourner vers les banques alimentaires pour la première fois.

Prevention


Is COVID-19 a flu (no)? Or is it more severe and deadly than seasonal influenza (yes)? Yan Xie and colleagues have compared patients admitted to hospital with COVID-19 between 1 February 2020 and 17 June 2020 (n = 3641) and seasonal influenza between 2017 and 2019 (n = 12,676). COVID-19 was associated with higher risk of acute kidney injury (odds ratio 1.52), incident renal replacement therapy (4.11), severe septic shock (4.04), vasopressor use (3.95), pulmonary embolism (1.50), deep venous thrombosis (1.50), stroke (1.62), acute myocarditis (7.82), arrhythmias and sudden cardiac death (1.76). Compared with seasonal influenza, COVID-19 was also associated with higher risk of death (HR 4.97), mechanical ventilator use (4.01), and admission to intensive care (2.41). You may use this data for discussions with COVID-19 deniers (meh, they won’t believe you anyway).


Jan M. Brauner and colleagues from Oxford evaluated the impact of several NPIs on the epidemic’s growth in 34 European and 7 non-European countries by using a Bayesian hierarchical model. Good to know during these days of a second lockdown: closing all educational institutions, limiting gatherings to 10 people or less, and closing face-to-face businesses each reduced transmission considerably. Interestingly, the additional effect of stay-at-home orders was comparatively small.
Epidemiology


Seroprevalence is likely to be much higher than the reported prevalence of COVID-19 based on confirmed COVID-19 cases in Iran. The overall population weight-adjusted and test performance-adjusted prevalence of antibody seropositivity in the general population was 17.1% (95% CI 14.6–19.5). Despite high seroprevalence in a few cities, a large proportion of the population is still uninfected.

Immunology


Min-Seok Rha and colleagues from Korea detected SARS-CoV-2-specific CD8+ T cells using MHC class I multimers and investigated their *ex vivo* phenotypes in peripheral blood mononuclear cells (PBMCs) from acute and convalescent COVID-19 patients. Notably, SARS-CoV-2-specific memory CD8+ T cells from convalescent patients exhibited a high proliferative capacity, but IFN-γ was produced by less than half of the SARS-CoV-2-specific memory CD8+ T cell population. The authors also demonstrated that PD-1-expressing SARS-CoV-2-specific CD8+ T cells from acute and convalescent patients were not exhausted, but activated and functional. PD-1 expression on CD8+ T cells likely reflects activation, rather than exhaustion, in COVID-19.


For this Norwegian COVID-19 cohort study, plasma cytokine levels at admission and follow-up during the first ten days of hospitalization were related to disease severity. A broad network of pro-inflammatory cytokines was elevated in plasma, especially pronounced in severe cases. Although the authors “did not find convincing evidence of a true cytokine storm”, combinations of
IL-6 and MCP-1 may be further explored as potential biomarkers in severe COVID-19 infection.


Cholesterol 25-hydroxylase (CH25H) is an interferon (IFN)-stimulated gene that shows broad antiviral activities against a wide range of enveloped viruses. Here, using an IFN-stimulated gene screen against vesicular stomatitis virus (VSV)-SARS-CoV and VSV-SARS-CoV-2 chimeric viruses, Ruochen Zang from St. Louis and colleagues identified CH25H and its enzymatic product 25-hydroxycholesterol (25HC) as potent inhibitors of SARS-CoV-2 replication. Internalized 25HC accumulates in the late endosomes and potentially restricts SARS-CoV-2 spike protein catalyzed membrane fusion via blockade of cholesterol export. Data suggest a unifying model in which 25HC results in a redistribution of cholesterol and inhibits both endosomal entry and plasma membrane fusion, which potentially explains the CH25H inhibitory activity against wild-type SARS-CoV-2.


The authors used immunoinformatics to identify conservative B and T cell epitopes for S proteins of SARS-CoV-2, which might play roles in the initiation of SARS-CoV-2 infection. They identified the B cell and T cell peptide epitopes of S protein and their antigenicity, as well as the interaction between the peptide epitopes and human leucocyte antigen (HLA).

**Vaccine**


Participants who received placebo in the vaccine trials have made an essential contribution to testing vaccine safety and efficacy. This important viewpoint argues that given limited vaccine supply for at least several months,
only the participants receiving placebo who would be eligible for vaccination outside the trial should be offered access to the vaccines at this point. What did the informed consent say? Did it contemplate a EUA or other vaccines getting to market before their specific trial finishes?

Wang W, Wu Q, Yang J, et al. **Global, regional, and national estimates of target population sizes for covid-19 vaccination: descriptive study.** BMJ 15 December 2020; 371. Full-text: [https://doi.org/10.1136/bmj.m4704](https://doi.org/10.1136/bmj.m4704)

For the record: The adult population willing to be vaccinated is estimated at 3.7 billion (95% confidence interval 3.2 to 4.1 billion).

**Comorbidities**


During the first 3 months of the pandemic, among patients already receiving OUD medication, there was no decrease in medication fills or clinician visits.


An international call for cases of children with encephalopathy related to SARS-CoV-2 infection and abnormal neuroimaging findings was made. In total, 38 cases from 8 different countries reviewed by a central neuroradiology panel. The most common imaging patterns were post-infectious immune-mediated acute disseminated encephalomyelitis-like changes of the brain (16 patients), myelitis (eight patients), and neural enhancement (13 patients).

**18 December**

**Virology**

Baric RS. **Emergence of a Highly Fit SARS-CoV-2 Variant.** NEJM December 16, 2020. Full-text: [https://doi.org/10.1056/NEJMci2032888](https://doi.org/10.1056/NEJMci2032888)

Brief overview on the genetic and molecular evidence for enhanced fitness of the G614 variant over ancestral strains by Ralph S. Baric, one of the world's
leading experts in the field. Fortunately, the new variant is as sensitive to the serum specimens as the D614 strain and thus should allay fears that it might escape vaccine-elicited immunity. However, there remains a critical need for proactive, rather than reactive, tracking of SARS-CoV-2 and other potential emerging coronaviruses.

**Immunology**


Wilfredo Garcia-Beltran from Boston and colleagues examined antibody responses in 113 COVID-19 patients and found that severe cases exhibited increased inflammatory markers, lymphopenia, pro-inflammatory cytokines, and high anti-RBD antibody levels. A new finding was that patient sera were also able to neutralize the recently emerged SARS-CoV-2 mutant D614G, suggesting cross-protection from re-infection by either strain. In contrast, SARS-CoV-2 sera lacked cross-neutralization to a highly homologous bat coronavirus, WIV1-CoV, that has not yet crossed the species barrier.


Min-Wen Ku from Paris and colleagues generated a lentiviral vector (LV) that elicits neutralizing antibodies against the Spike glycoprotein of SARS-CoV-2. Eliciting an immune response in the respiratory tract through an intranasal boost results in $> 3 \log_{10}$ decrease in the lung viral load and reduces local inflammation. The vaccine also worked well in golden hamsters, designating intranasal immunization as a powerful approach against COVID-19.


Erola Pairo-Castineira and colleagues report the results of the GenOMICC (Genetics Of Mortality In Critical Care) genome-wide association study (GWAS) in 2244 critically ill COVID-19 patients from 208 UK intensive care units (ICUs). They scanned each person’s genes, which contain the instructions for every biological process, including how to fight a virus. They have identified some
genetic differences (odds ratio of the tested risk alleles were 1.2-1.9) between patients with severe COVID-19 and the general population, revealing “robust genetic signals relating to key host antiviral defense mechanisms, and mediators of inflammatory organ damage”.

**Prevention**


COVID apps may work (at least in Switzerland!). By 10 September 2020, the SwissCovid app (it uses the EN framework to estimate proximity between phones) has been downloaded 2,36 million times. Marcel Salathé and colleagues estimate that digital contact tracing can show similar effectiveness at identifying infected partners of index cases as classic contact tracing, provided that both the index case and the exposed contacts use the app. These apps represent a helpful complementary tool for controlling the spread of SARS-CoV-2. Please download your local app.

**Clinical**


According to provisional National Center for Health Statistics data, the COVID-19 pandemic was associated with increases in all-cause mortality among US adults aged 25 to 44 years from March through July of 2020. From March to July, a total of 76,088 all-cause deaths occurred among US adults aged 25 to 44 years, which was 11,899 more than expected (incident rate ratio, 1.19 [95% CI, 1.14-1.23]). Of note, only 38% of all-cause excess deaths were attributed directly to COVID-19, suggesting that COVID-19–related mortality may have been under-detected in this population.

Retrospective cohort study covering Medicare fee-for-service beneficiaries, comparing 653,966 elderly residents in nursing homes (NH) and 292,302 with end-stage renal disease (ESRD) from the primary study population of > 25 million individuals aged ≥ 65. COVID-related death rates (per 10,000) were much higher among elderly NH residents (275.7) and ESRD patients (60.8) than the primary study population (5.0). Regression-adjusted clinical predictors of death among the primary population included immunocompromised status (OR: 1.43), frailty index conditions such as cognitive impairment (3.16) as well as other co-morbidities including congestive heart failure (1.30). Demographic-related risk factors included male sex (1.77), older age (OR: 3.09 for 80-year-old vs. 65-year-old), and racial/ethnic minority.

Severe COVID-19
Ankit Bharat and colleagues from Chicago report the results of lung transplantation in three patients with non-resolving COVID-19–associated respiratory failure: a 28-year-old Latina female with neuromyelitis optica (who was treated with rituximab, patient A), a 62-year-old male with hypertension (B), and a 43-year-old man with medically controlled type 2 diabetes mellitus (C). About 4-5 months after transplantation, patients A and B reported independence in activities of daily living while patient C received care in an in-patient rehabilitation facility at month 3. SARS-CoV-2 RNA could not be detected in the explanted lungs of these patients, but fibrotic pathology and transcriptional changes resembling those of lungs from patients with pulmonary fibrosis were observed.

Comorbidities
Tofacitinib is a Janus kinase inhibitor (JAKi) approved for the treatment of ulcerative colitis (UC) and other immune-mediated diseases. As many JAKis, it is also evaluated in COVID-19 trials. Manasi Agrawal and colleagues here describe characteristics and outcomes of COVID-19 in 37 patients with IBD
treated with tofacitinib compared with other medications in the SECURE-IBD registry. Overall, they found no difference in COVID-19 outcomes between the two groups. Good to see: though tofacitinib at the higher dose has been associated with venous thromboembolism, none of the tofacitinib-treated patients in this cohort experienced thrombotic complications.

19 December

Immunology

A rapid decline of SARS-CoV-2 IgG seropositivity or neutralizing capacity is unlikely: Among 74 (91%) HCW from Belgium who remained seropositive, median duration of antibody persistence (defined as the time between the day IgGs were last detected and the day of presumed onset of infection) is currently 168,5 (range 62–199) days. In total, 61 (82%) had neutralizing antibodies in their most recent IgG-positive serum sample.

Vaccine

Moderna’s messenger RNA vaccine (mRNA-1273) seems to work in older people. In this Phase I, dose-escalation, open label trial in 40 older adults, serum neutralizing activity was detected in all the participants by multiple methods after the second immunization. Solicited adverse events were dose-dependent and predominantly mild or moderate in severity.

Transmission

In March 2020, US transplant centers began to report potential donor-derived SARS-CoV-2 transmission to the Organ Procurement and Transplantation Network (OPTN). For 8 potential donor-derived SARS-CoV-2 transmissions
reported to the OPTN during March–May 2020, the available evidence suggest that the most likely source of transmission was community or healthcare exposure, not the organ donor.

Clinical


No, again, it’s not a flu. This nationwide retrospective cohort study from France included discharge summaries for all hospital admissions, comparing 89,530 patients with COVID-19 and 45,819 patients with influenza. In-hospital mortality was higher in patients with COVID-19 than in patients with influenza (16.9% vs 5.8%), with a relative risk of death of 2.9 (95% CI 2.8–3.0) and an age-standardized mortality ratio of 2.82.


Case report of an inflammatory ocular neuritis that was associated with uveitis may have been induced by SARS-CoV-2, and resulted in permanent loss of visual acuity. It is notable that although initial disc edema was moderate to mild in this patient, it led to severe atrophy. Other viruses (eg, varicella-zoster virus) have also been reported to have this effect.

Severe COVID-19


Retrospective medical record review of 148 patients requiring mechanical ventilation at a single tertiary-care medical center in New York City. Median length of stay was 40 days in those who underwent early tracheostomy (within 10 days of endotracheal intubation) and 49 days in those who underwent late tracheostomy. In a competing risks model with death as the competing risk, the late tracheostomy group was 16% less likely to discontinue mechanical ventilation (hazard ratio, 0.84; 95% CI, 0.55 to 1.28). According to the authors, their data provide an opportunity to reconsider guidelines for trache-
ostomy for patients with COVID-19, demonstrating non-inferiority of early tracheostomy.

Long COVID-19

Complex clinical findings are currently addressed in COVID long-haulers, for which the more clinically related term chronic COVID syndrome (CCS) has recently been coined. This Viewpoint highlights this syndrome, the possible pathogenetic pathways involved, and the treatment approaches that can be taken to help manage COVID long-haulers in CCS.

Comorbidities

In this multicenter cohort study following more than 1,3 million patients with hypertension from the USA and Spain, no clear association of increased risk of COVID-19 diagnosis, hospital admission, or subsequent complications was seen with the outpatient use of ACEI or ARB. These findings support recent recommendations that patients should not halt their ACEI or ARB therapy despite previously posited mechanisms of increased COVID-19 risk. Furthermore, the marginal difference between ACEIs and ARBs does not warrant class switching to reduce COVID-19 susceptibility.


Systemic review and meta-analysis of 34 adult and 5 pediatric studies (3377 patients) from Asia, Europe, and North America (14 of 34 adult studies included only hospitalized patients). Adult patients with hematologic malignancy and COVID-19 found a 34% risk of death, whereas pediatric patients had a 4% risk of death. Patients on systemic anticancer therapy had a similar risk of death to patients on no treatment.
Treatment

Antibodies may work, but only in seronegative patients. Here, an interim analysis is presented for the two anti-spike antibodies casirivimab (REGN10933) and imdevimab (REGN10987). Both make up REGN-COV2 (and were given to Trump). This ongoing Phase I-II trial randomly assigned 275 non-hospitalized patients to receive placebo, 2.4 g or 8.0 g of REGN-COV2. The least-squares mean difference (REGN-COV2 dose groups vs. placebo group) in the time-weighted average change in viral load from day 1 through day 7 was minus 0.56 log_{10} copies/mL among patients who were serum antibody-negative at baseline and minus 0.41 log_{10} copies/mL in the overall trial population. But did this translate into a clinical benefit? Maybe. At least one medical attended visit was necessary in 3% vs. 6% (placebo) overall and in 6% vs. 15% (placebo) in serum antibody-negative at baseline.


This study examined the association between pre-infection blood pressure (BP) control and COVID-19 outcomes using data from 460 general practices in England. Eligible patients were adults with hypertension who were diagnosed with COVID-19. A total of 4277 patients (9.4%) were diagnosed with COVID-19 and 877 died within 28 days. There was no association between BP control and COVID-19 diagnosis or hospitalization. Of note, individuals with stage 1 uncontrolled BP had lower odds of COVID-19 death (OR 0.76, 95%CI 0.62-0.92) compared to patients with well-controlled BP. However, these patients were older, had more co-morbidities and had been diagnosed with hypertension for longer, suggesting more advanced atherosclerosis and target organ damage.
20 December

Virology

Have no clue what HOPS and SNARE complexes are? Never mind. Autophagy acts as a cellular surveillance mechanism to combat invading pathogens. Viruses have evolved various strategies to block autophagy and even subvert it for their replication and release. This study reveals a mechanism by which SARS-CoV-2 evades lysosomal destruction. ORF3a, an accessory protein specific to SARS-CoV-2, greatly impairs the formation of degradative autolysosomes.


SARS-CoV-2 may infect bats, and the extensive species diversity of bats may have profound effects on SARS-CoV-2 evolution. However, SARS-CoV-2 receptor binding domain (RBD) binds to bACE2-Rm with lower affinity than that to human ACE2 receptor (hACE2).

Immunology

Changfu Yao and colleagues have added some evidence to the observation that although most immune cellular compartments have an expected hyper-inflammatory response in severe patients, several of their key pathways are dysfunctional. Moreover, immune imbalance in which dysregulation of both the innate and adaptive immune responses may be contributing to a more severe disease course. The key findings: monocyte antigen presentation pathway gene expression is lower in severe COVID-19, lymphocyte cytotoxicity pathways are reduced, and B cell activation is blunted. Interferon signaling is elevated in lymphocytes but diminished in monocytes.

In this report, Michael Keller and colleagues demonstrate a broadly specific T cell therapeutic targeting 3 structural proteins of SARS-CoV-2 that could be reliably expanded from the majority of convalescent donors. The authors believe that SARS-CoV-2 directed T cell immunotherapy targeting structural proteins (most importantly the membrane protein) should be feasible for the prevention or early treatment of SARS-CoV-2 infection in immunocompromised patients with blood disorders.

**Vaccine**


See title. Even a global mass immunization program will not immediately end the COVID-19 pandemic. Although control over the infection's most harmful effects is expected and limiting its spread can be hoped for, it will likely be a few years before the virus can be brought under control worldwide.

**Prevention**


In their comment (which was signed by > 200 researchers), the authors urge governments throughout Europe to agree on clearly formulated common goals, coordinate their efforts, develop regionally adapted strategies to reach the goals, and thereby work resolutely towards lowering case numbers.

**Clinical**


The news media dutifully report each day’s increase in new cases and deaths but putting these numbers in perspective may be difficult. According to CDC
data, by October 2020, COVID-19 had become the third leading cause of death for persons aged 45 through 84 years and the second leading cause of death for those aged 85 years or older. Adults 45 years or older were more likely to die from COVID-19 than from chronic lower respiratory disease, transport accidents (eg, motor vehicle fatalities), drug overdoses, suicide, or homicide. Steven H. Woolf and colleagues argue that the daily US mortality rate for COVID-19 deaths is equivalent to the September 11 attacks, which claimed 2988 lives, occurring every 1.5 days, or 19 Airbus 320 jetliners, each carrying 150 passengers, crashing every day.

Comorbidities


The OpenSAFELY project analysed factors associated with COVID-19 deaths in 17 million patients. The picture that arose differs significantly from initial reports. For example, hypertension is not an independent risk factor for COVID-19 death, but renal disease very much is. Dialysis (aHR 3.69), organ transplantation (aHR 3.53) and CKD (aHR 2.52 for patients with eGFR < 30 mL/min/1.73 m²) represent three of the four co-morbidities associated with the highest mortality risk from COVID-19. The risk associated with CKD Stages 4 and 5 is higher than the risk associated with diabetes mellitus (aHR range 1.31–1.95, depending upon glycemic control) or chronic heart disease (aHR 1.17). This article defines essential action points, among which is advocating the inclusion of CKD patients in clinical trials, testing the efficacy of drugs and vaccines to prevent severe COVID-19.

Treatment


In this RCT, 389 patients hospitalized with COVID-19 pneumonia who were not receiving mechanical ventilation were randomized to receive standard of care plus one or two doses of either tocilizumab (TCZ) or placebo. TCZ reduced the likelihood of progression to the composite outcome of mechanical ventilation or death (12% vs 19%), but it did not improve survival.

In their comment on remdesivir pricing, Rafael Dal-Ré and colleagues review the clinical data available and argue that once remdesivir becomes available in Europe, governments should agree a substantially lower price with Gilead (amid a time of high incidence of COVID-19 cases in Europe, and with remdesivir in short supply, the European Commission had signed a joint procurement contract with Gilead, with an agreed price of $2340 for a 5-day course). Until the effectiveness of remdesivir in clinical practice is well defined in Europe, a pay-for-result agreement might also be considered.

**21 December**

**Transmission**


South East England has recently faced a rapid increase in COVID-19 cases. Analysis of viral genome sequence data showed that a large proportion of cases belonged to a new single phylogenetic cluster. The new variant is defined by multiple spike protein mutations (deletion 69-70, deletion 144, N501Y, A570D, D614G, P681H, T716I, S982A, D1118H) present as well as mutations in other genomic regions. Preliminary analysis in the UK suggests that this variant is more transmissible than previously circulating variants, with an estimated potential to increase the reproductive number (R) by 0.4 or greater with an estimated increased transmissibility of up to 70%. There is no
indication at this point of increased infection severity associated with the new variant.

Virology

Domestic swine are susceptible to low levels of SARS-CoV-2 viral infection. Among 16 experimentally inoculated animals, 5 (31.3%) displayed some level of exposure or elicited an immune response to the virus. Only 1 pig in the study retained live virus, but 2 other animals had detectible RNA measured in nasal wash, and another 2 developed antibodies. Of note, Brad Pickering from the Canadian Food Inspection Agency and colleagues used a 10-fold higher viral dose for experimental infection than was used in previous studies.

Immunology
Singh DK, Singh B, Ganatra SR. et al. **Responses to acute infection with SARS-CoV-2 in the lungs of rhesus macaques, baboons and marmosets.** Nat Microbiol December 18, 2020. Full-text: https://doi.org/10.1038/s41564-020-00841-4

Rhesus macaques, baboons and marmosets can all be infected with SARS-CoV-2 but show differential progression to COVID-19. Whereas older marmosets have a mild infection, macaques developed moderate progressive pneumonia that resolves, accompanied by a marked reduction in lung and nasal viral loads. Baboons have the most severe lung pathology, and the greatest viral load.

Vaccine
Dai L, Gao GF. **Viral targets for vaccines against COVID-19.** Nat Rev Immunol 18 December 2020. Full-text: https://doi.org/10.1038/s41577-020-00480-0

Which viral elements are used in COVID-19 vaccine candidates, why might they act as good targets for the immune system and what are the implications for protective immunity? This review addresses these questions.
Ewer KJ, Barrett JR, Belij-Rammerstorfer S. et al. *T cell and antibody responses induced by a single dose of ChAdOx1 nCoV-19 (AZD1222) vaccine in a phase 1/2 clinical trial.* Nat Med December 18, 2020. Full-text: [https://doi.org/10.1038/s41591-020-01194-5](https://doi.org/10.1038/s41591-020-01194-5)

A detailed description of the immune response after administration of one dose of ChAdOx1 nCoV-19 in 88 adults (ages 18-55 years). The authors define, in detail, the isotypes, subclasses and antibody avidity induced after vaccination. They also performed multiplex cytokine profiling and intracellular cytokine staining analysis, demonstrating that ChAdOx1 nCoV-19 vaccination induces a predominantly Th1-type response (that appears to be good).

**Prevention**


In France, measures including curfew and lockdown were implemented to control the COVID-19 pandemic second wave in 2020. This study found a considerable decrease in incidence of COVID-19 cases and hospital admissions 7 to 10 days after mitigation measures were put in place, occurring earlier in metropolitan areas.

**Transmission**


Some evidence of a lower infectivity of asymptomatic patients. Andrew Sayampanathan and colleagues looked at 628 people with COVID-19 and 3790 close contacts in Singapore. Overall, 89 (2%) of 3790 close community contacts developed COVID-19 while in quarantine. Binomial regression revealed that when adjusted for age, gender, and serology of index case, the incidence of COVID-19 among close contacts of a symptomatic index case was 3.85 times higher than for close contacts of an asymptomatic index case (95% CI 2.06–7.19; p < 0.0001).

Be careful with human corpses: Fabian Heinrich and colleagues from Hamburg found that nasopharyngeal viral RNA stability in 79 corpses showed no time-dependent decrease. Maintained infectivity was supported by virus isolation up to 35 hours post-mortem. There was no correlation between the post-mortem interval (time of death until cooling at 4°C; median 17.8 hours) and the viral RNA loads of corpses. According to the authors, their data indicate potentially high infectivity of human corpses, requiring hazard assessments in professional fields concerned and careful and conscious handling.

**Comorbidities**


Among 66,646 (6.5%) admissions with a COVID-19 diagnosis across 613 US hospitals, 12,388 (18.6%) died in-hospital. In multivariable analysis, male sex was independently associated with 30% higher mortality risk (aRR, 1.30, 95% CI: 1.26 – 1.34). Of note, diabetes without chronic complications was not a risk factor at any age (aRR 1.01, 95% CI: 0.96 – 1.06), and hypertension without chronic complications was only a risk factor in younger people (20-39 year-olds) (aRR, 1.68, 95% CI: 1.17 – 2.40). Diabetes with chronic complications, hypertension with chronic complications, and obesity were risk factors in most age groups, with highest relative risks among 20-39 year-olds (respective aRRs 1.79, 2.33, 1.92; p ≤ 0.002).


According to this brief review, many questions about COVID-19 in patients with rheumatic diseases remain unanswered. These patients, when analyzed as a combined group, might have a slightly increased risk of death, although the role of disease activity and treatment was not taken into account in most studies. Chronic use of glucocorticoids at moderate or high doses is associated with hospitalization for severe COVID-19. Treatment with cytokine inhibitors
could reduce the risk of SARS-CoV-2 infection, although the mechanisms of this protective effect are not clear.

22 December

Epidemiology


Large investigation on the incidence of SARS-CoV-2 in almost 60,000 patients with cancer. The 0.68% rate of infection was relatively low. Notably, the rate remained below 1% even in areas with the greatest COVID-19 spread, partly reflecting reorganization measures implemented in medical oncology units in Italy at the onset of this outbreak, supporting the continuation of most oncologic treatments in the adjuvant and metastatic setting. Based on these data, delaying active antitumor treatment to avoid SARS-CoV-2 transmission should not be routinely recommended.

Virology


Monoclonal antibodies that target SARS-CoV-2 must be produced in mammalian cells and need to be delivered intravenously. By contrast, nanobodies can be produced in bacteria or yeast, and their stability may enable aerosol delivery. Here, Aashish Manglik, Michael Schoof and colleagues describe nanobodies that disrupt the interaction between the SARS-CoV-2 Spike protein and the host cell receptor angiotensin-converting enzyme 2 (ACE2). Cryo–electron microscopy (cryo-EM) revealed that one nanobody, Nb6, binds Spike in a fully inactive conformation with its receptor binding domains locked into their inaccessible down state, incapable of binding ACE2.

In yet another paper on nanobodies, Yi She, Yufei Xiang and colleagues describe neutralizing nanobodies (Nbs) with picomolar to femtomolar affinities that inhibit viral infection at concentrations below the nanograms-per-milliliter level. The authors determined a structure of one of the most potent Nbs in complex with the RBD. Multivalent constructs of selected nanobodies achieved even more potent neutralization.

**Prevention**


To control this second SARS-CoV-2 pandemic wave, French national and local authorities implemented a series of mitigation measures in certain metropolitan areas starting mid-October, followed by a countrywide lockdown on 30 October. Here, Guillaume Spaccaferri, Sophie Larrieu and colleagues assess the impact and timeliness of these measures, mainly curfews, describing COVID-19 spread and severity in the 22 French metropolitan areas. A considerable decrease in incidence and hospital admissions was observed 7 to 10 days after the measures were put in place, occurring earlier in metropolitan areas where these had first been undertaken.


Some simple advice for anyone contemplating a holiday gathering: Wait until March or Easter 2021: 4 April.

**Vaccine**

Ball P. *The lightning-fast quest for COVID vaccines — and what it means for other diseases*. Nature 2020, published 18 December. Full-text: [https://www.nature.com/articles/d41586-020-03626-1](https://www.nature.com/articles/d41586-020-03626-1)

The speedy approach used to tackle SARS-CoV-2 could change the future of vaccine science. “It shows how fast vaccine development can proceed when there is a true global emergency and sufficient resources,” says Dan Barouch, director of the Center for Virology and Vaccine Research at Harvard Medical School in Boston, Massachusetts.

The editors discuss the five types of COVID-19 vaccine under study, as well as trial results of the therapeutic agent baricitinib.

**Severe COVID**


David Berlin, Roy Gulick and Fernando Martinez describe the case of a 50-year-old, previously healthy man who presented to the emergency department with 2 days of worsening dyspnea. He had fever, cough, and fatigue during the week before presentation. The authors discuss various strategies, review some guidelines for severe COVID-19 (American Thoracic Society, Infectious Diseases Society of America, National Institutes of Health, and Surviving Sepsis Campaign) and conclude with recommendations.

**Journal Feature**


It’s almost Christmas. Let’s enjoy some pictures about wafer-thin solar cells, gene-edited squids, a 30-micrometre boat and many more.

**Retractions**


According to Retraction Watch in early December, 39 articles about the novel coronavirus have been retracted from preprint servers or peer-reviewed journals so far—a number we’re confident will grow. (That number does not include the retraction of an article from a Johns Hopkins student newspaper claiming that COVID-19 has had “relatively no effect on deaths in the United States.”)
23 December

Epidemiology


In the first 7 weeks following the end of the French lockdown on 11 May 2020, 90,000 cases (9 out of 10 cases) may not have been ascertained by the national surveillance system. Vittoria Colizza, Giulia Pullano and colleagues suggest that more aggressive, targeted and efficient testing is required to act as a pandemic-fighting tool. They warn that a coherent testing strategy will be again of critical value to avoid a third SARS-CoV-2 wave in the coming months.

See also the **NEWS AND VIEWS** comment by Shaman J. **An estimation of undetected COVID cases in France.** Nature 2020, published 21 December. Full-text: https://www.nature.com/articles/d41586-020-03513-9


This study from the Netherlands found an increased positivity to the COVID test among workers in the hospitality and public transport sectors, but also among driving instructors, hairdressers and estheticians.

Transmission

Eisenstein M. **What’s your risk of catching COVID? These tools help you to find out.** Nature 2020, published 21 December. Full-text: https://www.nature.com/articles/d41586-020-03637-y

Several apps have been recently launched that claim to predict the chance of infection and illness depending on what people are doing and where they are. In this **Technology Feature**, Michael Eisenstein takes a closer look.

Prevention

A one-sentence abstract by Michael Mina and Kristian Andersen: “To control the pandemic, testing should be considered a public health tool.” Discover the world of SARS-CoV-2 testing one year into the pandemic.


The head of scientific work at the World Health Organization reflects on the agency’s challenges and achievements as it navigates the COVID pandemic.

Immunology


In this Primer, Nicholas Jarjour, David Masopust and Stephen Jameson explain the fundamental features of T cell memory and their potential relevance for effective immunity to SARS-CoV-2.

Vaccine


The Food and Drug Administration (FDA) issued an Emergency Use Authorization (EUA) for the Moderna COVID-19 (mRNA-1273) vaccine. Adverse events that occur in a recipient after receipt of COVID-19 vaccine should be reported to the Vaccine Adverse Events Reporting System (VAERS). FDA requires that vaccination providers report vaccination administration errors, serious adverse events, cases of multisystem inflammatory syndrome, and cases of COVID-19 that result in hospitalization or death after administration of the COVID-19 vaccine under an EUA. Information on how to submit a report to VAERS is available at https://vaers.hhs.gov/index.html.
Severe COVID


During the first pandemic wave in Spain in spring 2020, males had higher odds ratio (OR) of severe outcomes than females with regard to hospitalization, ICU admission and death. Pneumonia was associated with a 27-fold higher odds of hospitalization. Patients who presented with cardiovascular disease were more likely to have a severe outcome. Older age predicted mortality, with highest odds of death among patients ≥ 80 years (OR: 28.45; 95% CI: 19.85–40.78), compared with patients < 40 years. Looking at predisposing conditions, chronic kidney disease had the highest OR of death.

Society


Social media can be a global calamity in times of pandemic. Misinformation, fake news, and rumors spread on social media faster than reliable information – even faster than the virus itself. In this study, Eqbal Radwan, Afnan Radwan and Walaa Radwan (Father and sons? Cousins?) determined how social media affects the spread of panic about COVID-19 among primary and secondary school students in the Gaza Strip, Palestine. You know the answer.

24 December

Epidemiology

During the first month of the SARS-CoV-2 outbreak in Scotland, 2641 cases of COVID-19 led to 1832 hospital admissions, 207 intensive care admissions and 126 deaths. Here, Emma Thomson, Ana da Silva Filipe and colleagues sequenced 1314 SARS-CoV-2 viral genomes and show that SARS-CoV-2 was introduced to Scotland on at least 283 occasions during February and March 2020. Early introductions of SARS-CoV-2 originated from mainland Europe (the majority from Italy and Spain). The authors identified subsequent early outbreaks in the community, within healthcare facilities and at an international conference. The authors conclude that the risk of multiple reintroduction events in future waves of infection remains high in the absence of population immunity.

**Virology**


The origin of SARS-CoV-2 and its evolutionary relationship is still being discussed. Here, Jie Feng, Tingting Li and colleagues applied the matrix representation with parsimony (MRP) pseudo-sequence supertree analysis to study the origin and evolution of SARS-CoV-2.

**Immunology**


In order to effectively combat the SARS-CoV-2 pandemic, a vaccine will need to protect the vast majority of the human population and stimulate diverse T cell responses against multiple viral targets including, but not limited to, the S protein. Here, Travor Clancy, Brandon Malone and colleagues profiled the entire SARS-CoV-2 proteome across the most frequent 100 HLA-A, HLA-B and HLA-DR alleles in the human population and generated comprehensive epitope maps. They identified a subset of epitope hotspots that could be harnessed in a vaccine formulation to provide broad coverage across the global population.

Afucosylated IgG (~6% of total IgG in humans) are specifically formed against enveloped viruses but generally not against other antigens. Here, Gestur Vidarsson, Mads Delbo Larsen and colleagues report that critically ill COVID-19 patients, but not those with mild symptoms, had high levels of afucosylated IgG antibodies against SARS-CoV-2, amplifying pro-inflammatory cytokine release and acute phase responses.

Pathogenesis

Mathias Munschauer, Nora Schmidt and colleagues provide detailed molecular insights into the identity of host factors and cellular machinery that directly and specifically bind SARS-CoV-2 RNAs during infection of human cells. They integrated CRISPR perturbation data and performed genetic and pharmacological validation experiments that together suggest functional roles for 18 RNA interactome proteins in SARS-CoV-2 infections.

Vaccine

2021 may be the perfect time for immunologists to be involved in designing the next generation of powerful immunogens. In this review, Andrew Pollard and Else Bijker provide an overview of vaccines, immunization and related issues.

Diagnostics
Would you like to classify individuals who were infected more than 6 months ago and measure perform serological surveys in very low transmission settings? Then measure IgG and IgM antibody responses to 1) seven SARS-CoV-2 spike or nucleoprotein antigens, 2) two antigens for the nucleoproteins of the 229E and NL63 seasonal coronaviruses, and 3) three non-coronavirus antigens up to 39 days after symptom onset from 215 adults – and start your machine learning algorithms. A paper by Michael White, Jason Rosado and colleagues from the Pasteur Institute in Paris.

**Treatment**


The Lilly monoclonal antibody LY-CoV555, when co-administered with remdesivir, did not demonstrate efficacy among hospitalized patients who had COVID-19 without end organ failure. This is the result of a randomized study involving 314 hospitalized patients by Jens D. Lundgren and colleagues of the ACTIV-3/TICO LY-CoV555 Study Group.

**Pediatrics**

Henderson LA, Yeung RSM. *MIS-C: early lessons from immune profiling*. Nat Rev Rheumatol (2020). Full-text: [https://doi.org/10.1038/s41584-020-00566-y](https://doi.org/10.1038/s41584-020-00566-y)

A brief summary of what we have learned in 9 months about the multisystem inflammatory syndrome in children (MIS-C), a rare complication of SARS-CoV-2 infection.

**Beyond Corona**


Kai-Uwe Eckardt, David Steindl and colleagues report the clinical details of 44-year-old Alexei Navalny’s poisoning. Two weeks after the poisoning, a laboratory of the German armed forces identified an organophosphorus nerve agent from the novichok group in blood samples collected immediately after Navalny’s admission to Charité clinic in Berlin.

Nature's first editorial of 2020 marked the beginning of what was expected to be a super-year for the environment and sustainable development. Then, on 21 January, Nature's first editorial on the coronavirus appeared.

25 December

In Memoriam

Epidemiology

Management of epidemics requires careful monitoring of the infected population because special measures such as lockdowns rely on this kind of information. Here, Laurent Moulin and colleagues from Eau de Paris report the analysis of raw waste water (WW) collected at the inlets of waste water treatment plants (WWTPs). They demonstrate that a quantitative detection of SARS-CoV-2 in WW reflects the circulation of the virus in the human population in Greater Paris.

Transmission

In immune-suppressed individuals, treatment with convalescent plasma might lead to the emergence of a mutated SARS-CoV-2 strain. Here, Ravindra Gupta from the Cambridge Institute for Therapeutic Immunology and Infectious Diseases reports the case of a repeated evolutionary response by SARS-CoV-2 against antibody therapy during the course of a persistent and eventu-
ally fatal infection in an immunocompromised host. The authors describe a 69-70 deletion in the spike protein which was twice as infectious in a lentivirus model. The 69-70 deletion is also present in the new UK variant strain B.1.1.7.


Prevention


A retired PR consultant and translator has produced a video suggesting the government is to ban certain sounds and letters of the alphabet because they increase the transmission of COVID-19. Instead of “please take care”, we should say “flease nake lare”, says the skit.

Immunology


Christmas 2020 – good news for people with SARS-CoV-2 antibodies. In this longitudinal cohort study, there were no symptomatic infections in 1265 workers with anti-spike antibodies. Two anti-spike–seropositive health care workers had a positive PCR test (0.13 per 10,000 days at risk), and both workers were asymptomatic when tested. The authors conclude that the presence of anti-spike or anti-nucleocapsid IgG antibodies are associated with a substantially reduced risk of SARS-CoV-2 reinfection in the ensuing 6 months.
Treatment

Zhang LK, Sun Y, Zeng H, et al. **Calcium channel blocker amlodipine besylate therapy is associated with reduced case fatality rate of COVID-19 patients with hypertension.** Cell Discov. 2020 Dec 22;6(1):96. PubMed: [https://pubmed.gov/33349633](https://pubmed.gov/33349633). Full-text: [https://doi.org/10.1038/s41421-020-00235-0](https://doi.org/10.1038/s41421-020-00235-0)

Might anti-hypertensive treatment with amlodipine be associated with a decreased case fatality rate of SARS-CoV-2 infection? Gengfu Xiao and Lei-Ke Zhang from Wuhan Institute of Virology, Center for Biosafety Mega-Science, report on 96 patients who only had hypertension as co-morbidity. 19 patients received amlodipine besylate, 14 received nifedipine, 8 received ARBs/ACEIs, 45 had no drug information, and 10 had no anti-hypertensive drug treatment. The numbers are too small to draw conclusions.


Nanobodies are 12–15 kDa single-domain antibody fragments that can be delivered by inhalation and are amenable to relatively inexpensive large-scale production. Here, David Brody, Thomas Esparza and colleagues describe the nanobody candidate NIH-CoVnb-112 which binds to the SARS-CoV-2 spike protein RBD and blocks spike protein interaction with the ACE2 receptor. They are optimistic about the possibility that low-cost, stable, and safe nanobody-based therapeutics will be developed for inhaled use in the home outside of formal healthcare environments.

Severe COVID


Studies about risk factors for increased COVID-19 mortality abound. In this retrospective study from Wuhan including 281 older patients with severe COVID-19 categorized into two age groups (60–79 years and ≥ 80 years), LDH had the highest predictive value for 28-day all-cause mortality.
26 December

Epidemiology


Individuals living in municipalities with extreme poverty had a 9% higher risk of dying than those living in municipalities classified as not poor. This is the result of a retrospective Mexican cohort study of nearly 250,000 COVID-19 patients. Mortality was 12.3% reaching 59.3% in patients with ≥ 1 comorbidities. Combating extreme poverty needs to be a central preventive strategy.


Due to job-related exposures, first responders (FRs) are at a higher risk of SARS-CoV-2 infection than the general population. Here, Paula Eckardt, Jianli Niu and colleagues from Memorial Healthcare System, Hollywood, screened a total of 3375 FRs between March and April 2020. Overall, 289 (8.6%) were positive, with the highest rates among those aged 25-49 years. Of those testing positive, 235 (81.3%) were asymptomatic.

Transmission


Patients with profound immunosuppression may shed viable SARS-CoV-2 for at least 2 months. This is the results of a study by Mini Kamboj, Teresa Aydillo and colleagues from Memorial Sloan Kettering Cancer Center, New York. The authors used cell cultures to detect viable virus in serially collected respiratory samples obtained from 18 recipients of hematopoietic stem cell transplants or chimeric antigen receptor (CAR) T cell therapy and 2 patients with lymphoma.
Treatment


ACEI treatment in patients with SARS-CoV-2 infection and hypertension might warrant further investigation. This is the suggestion by Irina Lehmann, Saskia Trump and colleagues from Charité, Berlin, who combined clinical data (n = 144) and single cell sequencing data of airway samples (n = 48) with *in vitro* experiments. The authors observed a distinct inflammatory predisposition of immune cells in patients with hypertension that correlated with critical COVID-19 progression. ACEI treatment was associated with dampened COVID-19-related hyperinflammation and with increased cell intrinsic antiviral responses.

Severe COVID


In this cohort study of patients with rheumatic and musculoskeletal diseases, Hyon Choi, April Jorge and colleagues from Massachusetts General Hospital compared 2811 patients who were diagnosed with COVID-19 during the first 90 days of the pandemic (early cohort) with 5729 patients diagnosed during the second 90 days of the pandemic (late cohort). The late cohort fared better: the risk of hospitalization, intensive care unit admission, mechanical ventilation, acute kidney injury, renal replacement therapy, and death was lower in the late cohort than in the early cohort. This finding is probably multifactorial, due to increased testing capacity allowing for detection of milder cases, improved supportive care, and improved treatments. The lesson for the future: use historical comparators cautiously in observational studies of new therapies for COVID-19!

Comorbidities


Hoffmann – Kamps
Of the total Scottish population on March 1, 2020 (n = 5,463,300), the population with diabetes was 319,349 (5.8%), 1082 (0.3%) of whom developed fatal or critical care unit treated COVID-19 by July 31, 2020. In the population without diabetes, 4081 (0.1%) of 5,143,951 people developed fatal or critical care unit-treated COVID-19. As of July 31, the overall odds ratio (OR) for diabetes, adjusted for age and sex, was 1,395 compared with the risk in those without diabetes. The OR was 2.4 in type 1 diabetes and 1.4 in type 2 diabetes. Among people with diabetes, adjusted for age, sex, and diabetes duration and type, those who developed fatal or critical care unit-treated COVID-19 were more likely to be male, live in residential care or a more deprived area, have a COVID-19 risk condition, retinopathy, reduced renal function, or worse glycemic control, have had a diabetic ketoacidosis or hypoglycemia hospitalization in the past 5 years, be on more anti-diabetic and other medication (all p < 0.0001), and have been a smoker (p = 0.0011).

See also the comment by Stehouwer CDA. **Observational research on severe COVID-19 in diabetes.** Lancet Diabetes Endocrinol 2020, published 23 December. Full-text: [https://doi.org/10.1016/S2213-8587(20)30432-0](https://doi.org/10.1016/S2213-8587(20)30432-0)


Nothing new in this short review about the most frequent SARS-CoV-2 comorbidities: hypertension, diabetes mellitus, cardiovascular disease, chronic pulmonary disease, and chronic kidney disease. And: men had a higher risk of dying than women. But if you want a concise literature overview, here you go.

**Collateral Effects**

Silverman ME, Burgos L, Rodriguez ZI, et al. **Postpartum mood among universally screened high and low socioeconomic status patients during COVID-19 social restrictions in New York City.** Sci Rep 10, 22380 (2020). Full-text: [https://doi.org/10.1038/s41598-020-79564-9](https://doi.org/10.1038/s41598-020-79564-9)

Post-partum depression, the most common complication of childbearing, is a prevalent, cross-cultural disorder. Even in the best environments, the period following childbirth represents a time of heightened stress and vulnerability for most, if not all, new parents. In this study of 516 post-partum patients, Michael Silverman et al. now demonstrate a differentiated response in the post-partum mood of those living in New York City during the COVID-19 pan-
demic... based on socioeconomic status! While those in areas with higher socio-economic status (SES) demonstrated no change in post-partum mood after implementation of social restrictions in New York, those living in lower SES expressed improved mood over the same time period. Try to find out why.

Education

In this Christmas *Perspective*, Andrew Tambyraja reminds us about traditional strengths in medicine: agility and patient focus, humility and the pursuit of the greater good.

Beyond Corona
Else H. **Climate change and COVID-19 vaccines are among the themes set to shape research.** Nature 2020, published 22 December. Full-text: [https://www.nature.com/articles/d41586-020-03651-0](https://www.nature.com/articles/d41586-020-03651-0)

The science events to watch for in 2021: Climate comeback | COVID vaccines | Open access drive | Stem cell revamp | Crunch time for Alzheimer’s drug | Mars gets busy | Long-awaited telescope launch | Ripple effect

27 December
Prevention

Imagine inviting more than 13,000 healthcare workers (HCWs) to get SARS-CoV-2 tested. Now about 8% (n = 1150) of the workforce volunteer and you find no cases of asymptomatic SARS-CoV-2 infection. You would probably conclude, like Manish Pareek, Christopher Martin and colleagues, that voluntary testing of asymptomatic staff may not be cost-effective.
Vaccine

If everything goes according to plan, November 2020 will be remembered as the beginning of the end of the COVID-19 pandemic. Countries will have to ensure that they have the infrastructure for mass immunization campaigns. Those without experience in distributing influenza vaccines must learn how to establish platforms for adult vaccination. Vaccine hesitancy will have to be overcome.


Medical students are among the group of frontline healthcare providers likely to be exposed to COVID-19 patients. It is important to achieve high COVID-19 vaccination coverage rates in this group as soon as a vaccine is available. In this survey completed by 168 of 494 medical students (response rate = 34%), the vast majority had positive attitudes regarding immunizations in general and the importance of vaccines for themselves and patients. 53% indicated they would participate in a COVID-19 vaccine trial; only 23% were unwilling to take a COVID-19 vaccine immediately upon FDA approval.

Diagnostics

How does serologic antibody testing outcome link with virus neutralization of SARS-CoV-2? To answer this question, Jennifer Rathe et al. compared serum Ig levels across platforms of viral antigens and antibodies with 15 positive and 30 negative SARS-CoV-2 controls followed by viral neutralization assessment. After applying these platforms to a clinically relevant cohort of 114 individuals with unknown histories of SARS-CoV-2 infection, they confirmed that no single serologic assay provides perfect prediction for viral neutralizing ability. Spike IgG3 provided the highest accuracy for predicting serologically positive individuals with virus neutralization activity.
Clinical


SARS-CoV-2 infection may exhibit cognitive deficits that persist into the recovery phase. This is what Adam Hampshire and colleagues from the Imperial College in London suggest after analyzing cognitive test data from 84,285 Great British Intelligence Test participants who completed a questionnaire regarding suspected and biologically confirmed COVID-19 infection. Deficits were most pronounced in individuals who had been hospitalized, but were also detectable in individuals with mild but biologically confirmed cases who reported no breathing difficulty. The scale of the observed deficits was substantial; for the hospitalized patients who needed ventilator support they were equivalent to the average 10-year decline in global performance between the ages of 20 to 70 – comparable to a 8.5-point difference in IQ. Let’s hope that the results of this pre-print paper posted in October will be proved wrong and not be accepted for publication.


Might quantified smell loss be the best predictor of COVID-19 amongst those with symptoms of respiratory illness? That’s the suggestion by Valentina Parma, Richard Gerkin and colleagues after quantifying changes in chemosensory abilities in individuals with a positive (C19+; n = 4148) or negative (C19-; n = 546) COVID-19 laboratory test outcome.

Comorbidities


Henri Guillet et al. from Hôpital Henri Mondor, Paris, describe four different cases of COVID-19 infection with ischemic arterial events: a myocardial infarction with high thrombus load, ischemic stroke on spontaneous throm-
bosis of the aortic valve, floating thrombus with mesenteric, splenic and renal infarction, and acute limb ischemia.


What do you know about the relationships between substance use disorders (SUDs), overdose and COVID-19 severity and mortality? Patients with histories of SUD and drug overdose could face disproportionate risk of critical COVID-19 illness, is the answer by Bennett Allen et al. However, the authors concede that they cannot assure whether the outcomes were due to COVID-19 or unrelated because they adjusted for few comorbidities. In particular, due to missing data, body mass index was not assessed.

Beyond Corona


Tuberculosis and malaria are greater long-term threats than COVID-19 and planning of resource allocation must account for that.

German


Vergesslich, unkonzentriert oder sogar depressiv: Eine Corona-Infektion kann Spuren im Gehirn hinterlassen. Was über neurologische Schäden bekannt ist.

French

Il a fallu moins d’un an pour mettre au point les premiers vaccins, au lieu de dix habituellement.

Les anticorps activés par l’organisme infecté par le SARS-CoV-2 n’ont pas la même durée de vie chez les hommes et chez les femmes.

Une étude estime que 76 % des habitants de la métropole amazonienne posséderaient des anticorps contre le coronavirus. Sur place, les médecins confrontés à la deuxième vague restent sceptiques.

Spanish
Media docena de expertos responden a cuestiones como la seguridad a largo plazo de las inyecciones y la duración de la protección en los vacunados.

Una mezcla de medidas demasiado suaves, tardanza en reaccionar y falsa sensación de seguridad llevan al alumno aventajado en la prevención a ser uno de los más golpeados por el virus.
28 December

Transmission


Controversy remains regarding the level of air contamination from SARS-CoV-2 in hospitals. After reviewing 24 cross-sectional observational studies, the authors report that the air close to and distant from patients with coronavirus disease 2019 was frequently contaminated with SARS-CoV-2 RNA; however, few of these samples contained viable virus. High viral loads were found in toilets and bathrooms, staff areas, and public hallways.

Prevention


A modeling study of simulated adults living in homeless shelters. Daily symptom screening with PCR testing of individuals who had positive symptom screening paired with non-hospital care site management of people with mild to moderate coronavirus disease 2019 (COVID-19) was associated with a substantial decrease in infections and lowered costs.

Vaccine

The Pfizer–BioNTech COVID-19 vaccine, codenamed BNT162b2, is now being sold under the brand name Comirnaty™ (INN: Tozinameran). Find here a summary of the product characteristics and the package leaflet if you want to be able to answer the questions of your patients: https://www.ema.europa.eu/en/documents/product-information/comirnaty-epar-product-information_en.pdf
Severe COVID


COVID-19 mortality in hospitals seems to be lower when the prevalence of SARS-CoV-2 infection in their surrounding communities is lower; and hospital outcomes for patients with COVID-19 have been improving throughout the year 2020. These are the key messages of a cohort study of 38,517 adult patients by David Asch and colleagues from the University of Pennsylvania. See also the comment by Boudourakis L. Decreased COVID-19 Mortality—A Cause for Optimism. JAMA Intern Med. Published online December 22, 2020. Full-text: https://doi.org/10.1001/jamainternmed.2020.8438.

Pediatrics


Knowledge is scarce about the factors that determine SARS-CoV-2 transmission to the newborn. In this prospective cohort study including 127 pregnancies, Andrea Edlow et al. found no maternal viremia, placental infection, or vertical transmission of SARS-CoV-2. However, the authors describe also a compromised transplacental transfer of anti–SARS-CoV-2 antibodies. Discover the implications and read the comment by Jamieson DJ, Rasmussen SA. Protecting Pregnant Women and Their Infants From COVID-19: Clues From Maternal Viral Loads, Antibody Responses, and Placentas. JAMA Netw Open. 2020;3(12):e2030564. Full-text: https://doi.org/10.1001/jamanetworkopen.2020.30564

Journal Feature


The coronavirus pandemic shaped the year in research — from vaccines and treatments to campus shutdowns and virtual meetings.
Spanish

La investigación científica resulta tan compleja que muchos sintieron que era poco relevante para su vida. Pero el virus SARS-CoV-2 cambió de golpe esta percepción. Nunca en la historia se había logrado una vacuna en tan poco tiempo. Hemos visto lo mejor y lo peor de la ciencia este 2020. ¿Mantendrá ese esencial reconocimiento y apoyo en el futuro?

El virus que lo cambió todo. Esta imagen de microscopio electrónico de barrido muestra el SARS-CoV-2 (coloreado en azul) emergiendo de la superficie de células cultivadas en laboratorio. Fotografía de NIAID.


Tras la aprobación por parte de la Agencia Europea del Medicamentos y de la Comisión Europea, el fármaco de Pfizer comienza a distribuirse en la mayor parte del territorio europeo. Un viaje ultra frío a 70 grados bajo cero desde una fábrica de Puurs (Bélgica) hasta los almacenes de cada comunidad.


Así se ha gestado la innovación tecnológica radical que ha permitido desarrollar las vacunas de la COVID en un tiempo récord

French

En 2020, les discours expliquant la pandémie de Covid-19 par des complot ont séduit des millions d’adeptes. Leur succès tient moins à leur véridité qu’à des ficelles rhétoriques éprouvées. Notre guide pour les débusquer. (Netflix,
tout comme Amazon Prime Video, propose des documentaires conspirationnistes.)


Du pangolin à la chauve-souris, en passant par des expériences de laboratoire controversées, « Le Monde » a tenté de remonter jusqu’aux origines de l’épidémie, responsable de plus d’un million et demi de morts dans le monde.


Un variant du virus, porteur de plusieurs mutations génétiques, semble être associé à une hausse brutale du nombre de cas dans la région de Londres. Mais la preuve d’une contagiosité accrue n’a pas été faite.

29 December

Virology

Mahase E. Covid-19: What have we learnt about the new variant in the UK? BMJ 2020, published 23 December. Full-text: https://doi.org/10.1136/bmj.m4944

The new SARS-CoV-2 variant has evoked scenes reminiscent of the early days of COVID-19 when much of the world banned travel to and from Wuhan, China. With large parts of south-east England locked down, Elisabeth Mahase looks at what we know so far.
Prevention


In this *Long read*, Adam Tinson and Amy Clair summarize why housing problems are likely to be a significant component of the SARS-CoV-2 pandemic that has led to greater risks of COVID-19 infection and serious complications for certain social groups. The authors conclude that overcrowding, poor quality and unaffordable homes are a threat to health.

Diagnostics


SARS-CoV-2 pandemic control calls for fast, low-barrier, high-performing field assays accessible to people who will not otherwise be tested or who will receive results too late for results to make a difference. Here, Diane Havlir, Genay Pilarowski and colleagues evaluated the Abbott BinaxNOW™ COVID-19 antigen card rapid assay performance for detection of persons with high levels of virus and measured the time to isolation in a community walk-up “test and respond” program. Among 3302 persons tested by BinaxNOW™ and RT-PCR in a community setting, rapid assay sensitivity was 100%/98.5%/89% using RT-PCR Ct thresholds of 30, 35 and 0. The specificity was 99.9%. Performance was high across ages and those both with and without symptoms. Rapid results may permit immediate public health action.

Clinical


Coronavirus disease 2019 may present in pregnancy with a myriad of clinical symptoms other than respiratory. Acute pancreatitis represents an infrequent complication of primary COVID-19 infection.
Severe COVID


For elderly patients in intensive care units or with critical illness, skeletal muscle loss adversely affects clinical outcomes. Here, Pengfei Rong, Zhishao Feng and colleagues from Third Xiangya Hospital, Central South University, Changsha, report that higher paraspinal muscle radiodensity (PMD), a proxy measure of lower muscle fat deposition, may be associated with a reduced risk of disease deterioration and decreased likelihood of prolonged viral shedding among female patients with severe COVID-19.

Collateral Effects


The authors report risk factors, clinical manifestations, and treatment course of two lung transplant recipients diagnosed with COVID-19 pneumonia. After being hospitalized and later discharged home, both patients were readmitted several days later with significant worsening of respiratory status and infectious symptoms.


The authors give a short overview of papers about Americans living under varying social and travel restrictions; individuals living in Sweden during a period of voluntary social distancing; individuals living in Spain during a mandatory lockdown; older age predicting better or worse functioning; the ability of elderly people to deal with adversity; and the importance of using behavioral research to reduce ageism and promote intergenerational solidarity.

El fútbol español ha intentado aportar un poco de alegría y de entretenimiento al mundo entero en este año marcado por la pandemia. Estos son los momentos que más recordaremos.


La bioquímica húngara Katalin Karikó pasó 40 años trabajando en la sombra y desarrollando avances claves para las inyecciones de Moderna y BioNTech.


Tras meses fuera de órbita, en 2021 toca poner los pies en el suelo. ¿Emprenderemos la recuperación de la crisis sanitaria y económica? ¿Lucharemos seriamente contra el cambio climático? ¿Se reforzarán las fronteras y se beneficiarán los demagogos? Especialistas de la economía, el pensamiento o la geopolítica hacen sus apuestas.

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**French**


German

If you read German, read Schöps C. **Diese Impfreaktionen sind ganz normal.** Die Zeit 2020, published 23 December. Full-text: https://www.zeit.de/wissen/gesundheit/2020-12/corona-impfung-risiken-nebenwirkungen-fieber-immunsystem

Arm geschwollen, Kopfschmerz, Fieber, all das kann nach der Impfung gegen das Coronavirus passieren. Sorgen muss man sich deshalb aber keineswegs machen.

30 December


Clinical


Patients with olfactory dysfunction or “loss of smell” might have a milder course of the disease. This is the result of a “Systematic Review and Meta-Nnalysis” (sic!) of 51 studies with 11,074 confirmed COVID-19 patients. Let’s hope that the analysis is more accurate than the copy-editor of *The American Journal of the Medical Sciences.* 😊

Severe COVID


Can a transparent deep learning (DL) model predict the need for MV in hospitalized patients and those with COVID-19 up to 24 hours in advance? The authors used commonly available data in electronic health records as well as commonly used clinical criteria (heart rate, oxygen saturation, respiratory rate, FiO₂ and pH) to feed their deep learning algorithm. The model provided significant improvement over traditional clinical criteria (p < 0.001).
Comorbidities
In comparison to the general population, adult patients with primary immunodeficiency (PID) and symptomatic secondary immunodeficiency (SID) display greater morbidity and mortality from COVID-19. This is the result of a study that enrolled 100 patients by 1 July 2020, 60 with PID, 7 with other inborn errors of immunity including autoinflammatory diseases and C1 inhibitor deficiency and 33 with SID.

Pediatrics
Most children with kidney disease taking immunosuppressive medication have mild disease with SARS-CoV-2 infection. This is the result of a cross-sectional study by the European Rare Kidney Disease Reference Network which included 113 children from 30 different countries. The main underlying reasons for immunosuppressive therapy: kidney transplant (47%), nephrotic syndrome (27%), systemic lupus erythematosus (10%). The authors suggest that children on immunosuppressive therapy should not be more strictly isolated than children who are not on immunosuppressive therapy.

Collateral Effects
There was a 50% decrease in the incidence of suicidal behaviors in children and adolescents during the COVID-19 lockdown in Paris, France. The authors
of this retrospective observational study conducted in Necker Hospital for Sick Children, Paris (January 2018–June 2020), speculate about the reasons for this decline.

Spanish


De la expedición de Balmis para llevar la vacuna de la viruela por todo el mundo, a la fabricación en masa de penicilina en la segunda Guerra Mundial, la humanidad ha superado retos como los que plantea ahora la covid.


Una investigación en Francia revela cómo la medida benefició a ciudades donde no fue aplicada.


Aunque el final de esta pesadilla parezca cada vez más cerca, todavía queda recorrido.


Una lista de datos positivos para el año nuevo, en la 'newsletter' de Kiko Llaneras.
French
Pfizer, Moderna, AstraZeneca... les vaccins de ces laboratoires vont-ils assurer une immunité globale suffisante pour arrêter la transmission du coronavirus?

Si le taux de mortalité dans les hôpitaux a été divisé par deux depuis avril, près de 32 500 personnes sont mortes des suites de la maladie lors des cinq derniers mois, contre un peu moins de 30 300 entre février et juillet.

German
Der Beginn der Impfkampagne darf nicht täuschen: Sars-CoV-2 steckt voller Überraschungen.

31 December
Vaccines
On December 30, UK regulatory authorities approved the Oxford University/AstraZeneca vaccine. ChAdOx1 nCoV-19 (AZD1222) needs only normal refrigeration at 2-8°C and is far cheaper than the previously approved vaccines Comirnaty (BioNTech/Pfizer) and mRNA-1273 (Moderna).

The Joint Committee on Vaccination and Immunisation (JCVI) recommends that both the AstraZeneca (ChAdOx1) and the BioNTech/Pfizer (Comirnaty) vaccines are safe and provide high-levels of protection against COVID-19, including severe COVID-19. As protection is obtained around 2 weeks after the first vaccine dose, the committee recommends that vaccinating more people with the first dose is prioritized above offering others their second dose. This would provide the greatest public health benefits in the short term and save more lives. For the BioNTech/Pfizer vaccine, the second vaccine dose can be offered between 3 to 12 weeks after the first dose. (Pfizer is not amused.) For the AstraZeneca vaccine, the second dose can be offered 4 to 12 weeks after the first dose.

Our World in Data. **COVID-19 vaccination doses administered per 100 people.** 30 December 2020. Link: [https://ourworldindata.org/grapher/covid-vaccination-doses-per-capita](https://ourworldindata.org/grapher/covid-vaccination-doses-per-capita)
Prevention


Spring 2020 lockdown in California. At the largest trauma center in Los Angeles, there was a reduction in the automobile versus pedestrian admissions by 42.5%, motorcycle injuries by 38.7%, and bicycle accidents by 28.4%, but no significant effect on the number of motor vehicle accident admissions. There was an increase in ground level falls by 32.5%, especially in the elderly group. The absolute number of gunshot wounds increased by 6.2% and knife injuries by 39.3%. ☹

Pediatrics


In case you didn’t know it, there are reviews and reviews of reviews! Here is one of the latter species: fever and cough are the most common symptoms in children and young people (CYP) under age 20 years with COVID-19, with other symptoms infrequent. The conclusion of this review of reviews by Viner et al.: further research is needed. Praise be.

Collateral Effects


The authors analyzed the impact of the SARS-CoV-2 pandemic on pre-operative assessment, elective surgery, and post-operative management of colorectal cancer patients, using a 35-item survey, which was answered by a total of 1051 respondents from 84 countries. The result: both diagnostic and therapeutic practices changed. Endoscopic and radiologic procedures were highly affected and elective CRC surgery was impacted for almost all re-
spondents (97.3%), with planned procedures being temporarily suspended (46.8%) or capacity reduced (50.5%).

Spanish
El Gobierno de Johnson anuncia que extiende el nivel 4 de Alerta Máxima impuesto en Londres a amplias zonas del centro y norte de Inglaterra. El regreso escolar de Secundaria se retrasa al 18 de enero

French
Sinopharm n’a pas précisé si les essais cliniques étaient achevés pour ce premier vaccin, qui fait l’objet d’une demande d’homologation auprès des autorités chinoises.

German
In Großbritannien wird massenhaft geimpft, aber die Corona-Fälle steigen weiter rasant. Das Gesundheitssystem kollabiert, Intensivstationen suchen freiwillige Helfer.

Römer J. **Studien liefern erste Erkenntnisse zur Gefahr durch die Corona-Mutation.** Der Spiegel 2020, published 30 December. Full-text: [https://www.spiegel.de/wissenschaft/mensch/grossbritannien-corona-mutation-fuehrt-nicht-haeufiger-zu-schweren-verlaeufern-a-8c22d51c-bea3-4aa3-aea4-67fdadea2e93](https://www.spiegel.de/wissenschaft/mensch/grossbritannien-corona-mutation-fuehrt-nicht-haeufiger-zu-schweren-verlaeufern-a-8c22d51c-bea3-4aa3-aea4-67fdadea2e93)

Eine Studie zeigt: Die auch in Deutschland entdeckte Corona-Variante B.1.1.7 verursacht schwere Erkrankungen nicht häufiger als andere Viruslinien. Aber ein Grund zur Entwarnung ist das nicht.
January 2021

1 January

Vaccines


Finally – after press releases, an emergency use authorization and the start of mass vaccinations – the scientific paper by Lindsey Baden et al.! Nothing new: the mRNA-1273 vaccine developed by Moderna and the Vaccine Research Center at the National Institute of Allergy and Infectious Diseases (NIAID), within the National Institutes of Health (NIH), has more than 90% efficacy at preventing COVID-19 illness, including severe disease. Moderate-to-severe systemic side effects, such as fatigue, myalgia, arthralgia, and headache, were noted in about 50% of participants in the mRNA-1273 group after the second dose. These side effects were transient, starting about 15 hours after vaccination and resolving in most participants by day 2, without sequelae. The incidence of serious adverse events reported throughout the entire trial was similar for mRNA-1273 and placebo. Importantly, mRNA-1273 did not show evidence in the short term of enhanced respiratory disease after infection, a concern that had emerged from animal models used in evaluating SARS and Middle East Respiratory Syndrome (MERS) vaccine constructs. The authors rightly conclude that the safety of the mRNA-1273 vaccine regimen seems to be reassuring.


On December 8, 2020, within 24 hours after the start of the U.K. mass vaccination program for health care workers and elderly adults, the program reported probable cases of anaphylaxis in two women, 40 and 49 years of age, who had known food and drug allergies and were carrying auto-injectable epi-nephrine. One week later, a 32-year-old female health care worker in Alaska who had no known allergies presented with an anaphylactic reaction within 10 minutes after receiving the first dose of the vaccine. Since then, several more cases of anaphylaxis associated with the Pfizer mRNA vaccine have been
reported in the United States after vaccination of almost 2 million health care workers, and the incidence of anaphylaxis associated with the Pfizer SARS-CoV-2 mRNA vaccine appears to be approximately 10 times as high as the incidence reported with all previous vaccines, at approximately 1 in 100,000, as compared 1 in 1,000,000. Mariana Castells and Elizabeth Phillips explain what is at stake: “It is critical that we focus on safe and efficient approaches to implementing mass vaccination. In the future, these new vaccines may mark the beginning of an era of personalized vaccinology in which we can tailor the safest and most effective vaccine on an individual and a population level.”

Happy New Year!

Comorbidities


In people living with HIV (PLWH), immune deficiency is a possible risk factor for severe COVID-19, even in the setting of HIV virologic suppression. There is no evidence for a protective effect of PIs or tenofovir alafenamide. This is the result of a multi-center cohort study which evaluated risk factors for morbidity and mortality of COVID-19 in PLWH infected with SARS-CoV-2 in three countries. Patients with severe COVID-19 had a lower current CD4 T cell count and a lower CD4 T cell nadir, compared with patients with mild-to-moderate COVID-19. In a multivariate analysis, the only factor associated with risk for severe COVID-19 was a current CD4+ T cell count of < 350/µl (adjusted odds ratio 2.85, 95% confidence interval 1.26-6.44, p = 0.01). The only factor associated with mortality was a low CD4 T cell nadir.

Epidemiology


The investigation into the new SARS-CoV-2 variant which has spread rapidly within the UK. The authors found that the new variant substantially increases transmissibility.
Clinical


The authors report a 50-year-old Thai woman who presented with acute high-grade fever, vomiting, and myalgia for 1 day. RT-PCR of the nasopharyngeal swab detected SARS-CoV-2, and RT-PCR of the blood detected dengue virus serotype 2.

Collateral Effects


In this meta-analysis, the authors assessed outcomes of 50,123 patients from 10 studies. Did the analyzed data show that acute and timely medical care of these patients had been maintained during the pandemic in most countries? Yes, they did. Consequently, despite a significant reduction in overall admission rates of patients with STEMI during the COVID-19 pandemic (incidence rate ratio = 0.789, 95% CI 0.730 to 0.852, I²=77%, p < 0.01), there was no significant difference in hospital mortality (OR = 1.178, 95% CI 0.926 to 1.498, I²=57%, p = 0.01) compared with patients with STEMI admitted before the outbreak.

French


Ce variant baptisé « VoC 202012/01 » présente plusieurs mutations susceptibles d’accroître sa contagiosité.

La campagne de vaccination contre le Covid-19 est censée commencer en janvier dans le pays qui prévoit d’acquérir 500 000 doses.

2 January

Prevention


Severe, potentially fatal pneumonia supposes that SARS-CoV-2 reaches the acinar airways. What if we reduced the number of viruses getting there? After characterizing the deposition distribution of SARS-CoV-2 in the airways upon exposure to cough-generated droplets and aerosol particles, Balázs Madas et al. found that the number of viruses deposited in the extra-thoracic airways is about 7 times higher than in the acinar airways. The authors hypothesize that most cases of COVID-19 pneumonia might be preceded by SARS-CoV-2 infection of the upper airways and that without the enhancement of viral load in the upper airways, COVID-19 would be much less dangerous. Ergo, we should use the period between the onset of initial symptoms and the potential clinical deterioration to block or significantly reduce the transport of virus towards the acinar airways, for example with non-specific treatment forms like disinfection of the throat and nasal and oral mucosa. In any case, recommend the authors, use a tissue or cloth in order to absorb droplets and aerosol particles emitted by your own coughs and sneezes... before re-inhalation! Even if you are alone in quarantine.

Clinical


Clinicians are facing important emotional stressors during the COVID-19 pandemic, including grief from seeing so many patients die, fears of contracting
the virus and infecting their family members, and anger over health care disparities and other systems failures. Jo Shapiro and Timothy McDonald show the way medical institutions should follow to design emotional-support programs that clinicians will embrace. The last of four suggestions: institutional leadership should be accountable for clinicians’ well-being. Leaders should empower clinicians to speak up about unsafe, highly stressful or morally challenging workplace conditions and ensure that concerns are listened to and, whenever possible, acted on.

Severe COVID


The authors suggest using Sequential Organ Failure Assessment (qSOFA) and point-of-care ultrasound (POCUS) for evaluation purposes to use fluid therapy, norepinephrine and low-dose corticosteroids depending on etiology. The authors also recommend avoiding the routine use of central venous or arterial catheters and using simple bedside measures such as capillary refill time to address targets of resuscitation.

Comorbidities


The authors review the literature to date on COVID-19 in patients with systemic lupus erythematosus (SLE) and provide an in-depth review of current research in the area, including immune pathway activation, epidemiology, clinical features, outcomes, and the psychosocial impact of the pandemic in patients with SLE.
Collateral Effects

Low-dose computed tomography (LDCT) screening reduces lung cancer mortality by at least 20%. At the University of Cincinnati, COVID-19 caused significant disruption in lung cancer screening, leading to a decrease in new patients screened and an increased proportion of nodules suspicious for malignancy once screening resumed.

Education

The editors discuss the new mRNA-1273 vaccine against SARS-CoV-2, along with other studies of native and exogenous antibodies.

3 January

Epidemiology

Prevention

One of your household members is diagnosed with SARS-CoV-2 infection. Is a 7-day quarantine enough (7 days after the symptom onset of the index patient) even if you are asymptomatic and have a negative laboratory test result?
Not always, because 19% of people in your situation will experience symptoms or receive positive test results in the following week. The recommendation by Melissa Rolfes, et al.: persons released from quarantine before 14 days should continue to avoid close contact and wear masks when around others until 14 days after their last exposure.


Fish landing sites along the Ghana coast could be transmission hotspots. To get a clearer picture, Isaac Okyere et al. employed an unmanned aerial vehicle. Aerial measurements taken at times of peak landing beach activity indicated that the highest proportion of people, representing 56%, 48%, 39% and 78% in Elmina, Winneba, Apam and Mumford respectively, were located at distances of less than one meter from their nearest neighbor.

Vaccine


Emergency Use Authorizations for two mRNA COVID-19 vaccines represent a turning point in the pandemic. They also herald a new era for vaccinology—an era where vaccines are designed on computers, iteratively optimized in discovery and manufactured on demand—all without expensive and finicky cell culture.


Use of all COVID-19 vaccines authorized under an EUA should be implemented in conjunction with ACIP’s interim recommendations for allocating initial supplies of COVID-19 vaccines. Before vaccination, the EUA Fact Sheet should be provided to recipients and caregivers. Providers should counsel Moderna COVID-19 vaccine recipients about expected local and systemic reactogenicity.
Clinical


Neuro-COVID – headache and neuroinflammatory or cerebrovascular disease – are frequent in patients with severe COVID-19. Here, Gerd Meyer zu Hörste, Michael Heming and colleagues identified specific immune alterations in the CSF of neuro-COVID patients featuring an increase of de-differentiated monocytes and exhausted T cells. They observed an IFN response in neuro-COVID that was attenuated compared with viral encephalitis. Severe neuro-COVID exhibited a broad clonal T cell expansion and curtailed IFN response compared with mild neuro-COVID.

Treatment


SARS-CoV-2 can undergo positive selection and attain remdesivir resistance with very few mutations. This is the result of a study that generated a total of 100,000 mutations and provided insight into the functional outcomes of mutations in the remdesivir binding site in the nsp12 subunit of RdRp.

Severe COVID


Avindra Nath, Myoung-Hwa Lee and colleagues from the US National Institute of Neurological Disorders and Stroke in Bethesda observed multifocal microvascular injury in the brain and olfactory bulbs in the brains of 13 patients. They found no evidence of viral infection after PCR with multiple primer sets, RNA sequencing of several areas of the brain, and RNA in situ hybridization and immunostaining.
A new variant of the coronavirus, known as B.1.1.7, is spreading across the globe. It is thought that this variant will not decrease vaccine efficacy much, if at all. There is no evidence for more severe COVID-19 either. All good and no cause for alarm? Maybe not.

4 January

Epidemiology


As of 22 November 2020, the continent of Africa, comprising 1.3 billion people, had recorded two million cases of COVID-19 and 50,000 deaths, representing ~ 3.6% of total global cases. Why? Justin Maeda and John Nkengasong comment on a paper we previously presented on 13 November: Uyoga S, Adetifa IMO, Karanja HK, et al. Seroprevalence of anti–SARS-CoV-2 IgG antibodies in Kenyan blood donors. Science 2020, published 11 November. Full-text: https://doi.org/10.1126/science.abe1916 | In April-June 2020, the crude prevalence of anti–SARS-CoV-2 IgG among blood donors in Kenya was 5.6% (174/3098). It was highest in urban counties, Mombasa (8.0%), Nairobi (7.3%) and Kisumu (5.5%). Of note, Kenya had reported only 341 deaths by the end of that period. The authors conclude that the sharp contrast between the reported COVID-19 cases and deaths suggests that the disease might be attenuated in Africa.

Transmission


Could cats and dogs serve as intermediate hosts of SARS-CoV-2 infection? Here, Kun Sun from Shenzhen, China, describe the conservation of ACE2 and
its expression pattern among various mammalian species that are close to human beings. Let’s keep an eye on cats and dogs.

Prevention

SARS-CoV-2 is able to survive on surfaces for extended periods of time. Although contact with surfaces contaminated with droplets generated by infected persons through exhaling, talking, coughing and sneezing is not the major driver of SARS-CoV-2 transmission (the main driver is speaking to and coughing, shouting and sneezing at people), it would be useful to inactivate SARS-CoV-2 on contaminated surfaces. Here, Anthony Griffiths, Nadia Storm and colleagues describe the almost instantaneous inactivation of SARS-CoV-2 in both wet and dry format using radiation generated by a commercially available ultraviolet (UV)-C light source at 254 nm.

Vaccines

Anaphylaxis has been reported following COVID-19 vaccination. The incidence of anaphylaxis associated with the Pfizer SARS-CoV-2 mRNA vaccine appears to be approximately 10 times as high as the incidence reported with all previous vaccines, at approximately 1 in 100,000, as compared 1 in 1,000,000 (Castells 2020). The CDC recommends that appropriate medical treatment for severe allergic reactions must be immediately available in the event that an acute anaphylactic reaction occurs following administration of an mRNA COVID-19 vaccine. In particular, persons without contraindications to vaccination who receive an mRNA COVID-19 vaccine be observed after vaccination for the following time periods:

- 30 minutes: Persons with a history of an immediate allergic reaction of any severity to a vaccine or injectable therapy and persons with a history of anaphylaxis due to any cause.
- 15 minutes: All other persons
Diagnostics

To improve detection of SARS-CoV-2 when used with CDC-recommended assays, researchers from Ceres Nanosciences developed affinity-capture hydrogel particles (Nanotrap particles) that capture and concentrate the virus prior to RNA purification. A 5-min Nanotrap particle capture step substantially increases the sensitivity of SARS-CoV-2 RT-PCR assays when used in conjunction with either commercial RNA extraction kits or a simple heat and detergent extraction method in both saliva and transport medium samples. Furthermore, the authors identified viral RNA in several diagnostic remnant samples that previously had tested negative for SARS-CoV-2.

Severe COVID

The authors found 76 previously unreported proteins which could be novel prognostic biomarker candidates. Their plasma proteome signatures highlighted the role of neutrophil activation, complement activation, platelet function, and T cell suppression as well as pro-inflammatory factors upstream and downstream of interleukin-6, interleukin-1β, and tumor necrosis factor.

Collateral Effects

An unexpected tragedy of the coronavirus disease 2019 (COVID-19) pandemic is increased opioid and fentanyl overdoses, since many factors could have helped in reducing opioid use disorder (OUD) and overdoses during the pan-
demic. Follow Thomas Kosten and Ismene Petrakis on this short trip through drug addiction and society’s response.

French

Le mythe d'une éternelle jeunesse sexuelle flatte l'ego masculin mais invisibilise les effets du vieillissement, explique la chroniqueuse de La Matinale Maïa Mazaurette, qui observe que tout se passe comme si seules les femmes subissaient les assauts du temps.

German

Reiche Länder teilen seit Monaten den größten Teil der Vakzinen unter sich auf. Regierungen wohlhabender Staaten, die 14 Prozent der Weltbevölkerung repräsentieren, haben sich schon jetzt über die Hälfte aller Impfstoffdosen gesichert, die bereits in der Produktion sind oder demnächst auf den Markt kommen.

5 January
Vaccine

Severe allergy-like reactions in at least eight people who received the COVID-19 vaccine produced by Pfizer and BioNTech over the past 2 weeks may be due to a compound in the packaging of the messenger RNA (mRNA) that forms the vaccine’s main ingredient, scientists say. A similar mRNA vaccine developed by Moderna, which was authorized for emergency use in the United States on Friday, also contains the compound, polyethylene glycol (PEG).
Clinical

As the coronavirus claims more victims, a once-rare diagnosis is receiving new attention from scientists, who fear it may affect nutrition and mental health. Not peer-reviewed, not even from a medical journal, but worth reading.


Detection of either respiratory or gastrointestinal shedding of SARS-CoV-2 RNA in children and staff members attending day-care centers. This is the result of a longitudinal study over a period of 12 weeks from June to September 2020 to screen children and staff from day-care centers in the state of Hesse, Germany. 859 children (ages 3 months to 8 years) and 376 staff members from 50 day-care centers participated. The authors caution that the study was conducted at a time when activity of other respiratory pathogens was also low in Hesse, Germany, and children with symptoms of upper respiratory infection, other than runny nose only, were excluded from attending day care due to restricts set in place during pandemic.

Severe COVID

Upper respiratory tract (URT) viral load could be used to identify patients at higher risk for morbidity or severe outcome. This is the result of a study that included 1122 patients (mean age: 46 years), both asymptomatic and symptomatic patients, either hospitalized or cared for in the community. Helena Maltezou et al. categorized URT as high, moderate or low. A high URT viral load was more often detected in patients with COVID-19 than in asymptomatic patients. Patients with the following co-morbidities more often had high URT viral load than moderate or low URT viral load: chronic cardiovascular...
disease, hypertension, chronic pulmonary disease, immunosuppression, obesity, and chronic neurological disease (p values < 0.05 for all comparisons). A high SARS-CoV-2 URT viral load was significantly associated with an increased risk for intubation or a fatal outcome in the course of COVID-19, as well as with prolonged disease severity.

Collateral Effects


Head and neck cancer surgery in the COVID-19 era appears safe even when surgery is prolonged and complex. This is the result of an international, observational cohort study comprised of 1137 consecutive patients with head and neck cancer undergoing primary surgery with curative intent in 26 countries. The overall 30-day mortality was 1.2%. Twenty-nine patients (3%) tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) within 30 days of surgery; 13 of these patients (44.8%) developed severe respiratory complications, and 3 (10.3%) died. There were significant correlations with an advanced tumor stage and admission to critical care.

Note of the editor: The original text said: “and 3.51 (10.3%) died.” Too much alcohol during pre-Christmas proof-reading?


Maintaining surgical oncologic activity in the era of the COVID-19 pandemic seems safe and feasible, with low postoperative morbidity and mortality. The authors collected data on thoracic malignancy surgeries from January 1 to April 30, 2020, including patients from high-volume thoracic surgery departments in Nancy, Strasbourg, Freiburg, Milano, Torino and Montreal. In the cohort of 731 patients, 9 cases (1.2%) of COVID-19 were confirmed by PCR, including 5 in-hospital contaminants. The total number of deaths was 22 (3%). Only one death was related to COVID-19 (0.14%).
COVID History


I realized I was dying about half an hour earlier. My heart had gone loco during a kick-around on Tooting Common, South London. I suddenly felt tired and asked to go on the bench for a rest. Then I keeled over. I remember being confused at finding myself lying on the grass and too weak to move.

French


Déjà plus de 10 % de la population a reçu une première injection. Le premier ministre, Benyamin Nétanyahou, en campagne pour sa réélection, espère ainsi contrebalancer sa gestion désastreuse de la crise sanitaire.


Quelle est la stratégie française ? Pourquoi si peu de vaccinés depuis le 27 décembre ? Que font les autres pays ?

6 January

Transmission


An update on the role of children in the transmission of SARS-CoV-2 and the role of schools in the COVID-19 pandemic, based on experience in the EU from
August through December 2020. The document also addresses transmission to and from staff in school settings, school-related mitigation measures including risk communication, testing, contact tracing and the efficacy of partial and full school closures.


This paper presents evidence for increased transmission occurring among school children when schools are open, particularly in children of secondary school age (high confidence). Multiple data sources show a reduction in transmission in children following schools closing for half-term, and transmission rates increasing again following the post-half-term return to school.

Pathogenesis

A report of 14 patients who died from RT-PCR confirmed COVID-19. All patients underwent ante-mortem CT and autopsy. A significant proportion of ground glass opacities (GGO) correlates with the pathologic processes of diffuse alveolar damage, capillary dilatation and congestion and microthrombosis. Maurice Henkel, Thomas Weikert and colleagues conclude that these results underline the importance of vascular alterations as a key pathophysiological driver in lethal COVID-19.

Clinical

Re-infections with SARS-CoV-2 are possible, but don’t seem to be the rule within the first 9 months after the original infection. As a matter of fact, we
don’t currently see an epidemic of re-infections in people who were infected during the spring of 2020. Here, Marc Pandori, Richard Tillett and colleagues present the case of a 25-year-old man who presented to health authorities on two occasions with symptoms of viral infection, once at a community testing event in April 2020, and a second time to primary care and then hospital at the end of May and beginning of June 2020. The authors show that the patient was infected by SARS-CoV-2 on two separate occasions by a genetically distinct virus.


Treatment


Prompt early initiation of sequenced multi-drug therapy (SMDT) is a widely and currently available solution to stem the tide of hospitalizations and death. Here, Peter McCullough et al. present a multi-pronged therapeutic approach that includes 1) adjuvant nutraceuticals, 2) combination intracellular anti-infective therapy, 3) inhaled/oral corticosteroids, 4) antiplatelet agents/antiocoagulants, 5) supportive care including supplemental oxygen, monitoring, and telemedicine.

Severe COVID


Extra-corporeal membrane oxygenation (ECMO) in patients with severe COVID-1 has been associated with high mortality rates. Here, Jean-Damien Ricard, D. Roux, C. Le Breton and colleagues report on 13 patients who required VV-ECMO (femoro-jugular cannulation). All 13 patients were weaned from ECMO after a median of 13 days (range 3 to 34). Two patients died while still on mechanical ventilation. As of June 28th, 2020 all surviving patients were weaned from the ventilator after a median duration of 29 days (range 20
to 51) and were discharged alive from the ICU after a mean stay of 34 days (range 23 to 55). The authors conclude that ECMO should be an integral part of intensive care for properly selected COVID-19 patients without life-threatening co-morbidities.

7 January

Epidemiology


Marc Veldhoen and J. Pedro Simas predict that the maintenance of population immunity will not depend on continued vaccinations but on the endemic presence of SARS-CoV-2. The authors offer an intriguing long-term perspective: “Endemic SARS-CoV-2 will ensure maintenance of seroprevalence and mucosal immunity in the population, which will increase over time in new generations. As such, most infected individuals will ultimately endure a largely asymptomatic or mild course of disease, although similarly to the other common cold HCoVs, SARS-CoV-2 may cause fatalities in extremely vulnerable elderly or immunocompromised individuals.”


Different states and counties in the USA, and different countries in the world, have experienced COVID-19 epidemics differently. Here, Anthony Ives and Claudio Bozzuto put numbers on these differences in the USA. The authors show that most of the high inter-county variance is explained by four factors ($R^2 = 0.70$): the timing of the outbreak, population size, the population density, and spatial location. Their recommendation for the future: design public health interventions at the county level.

Transmission

Nicolas Davies et al. estimate that the novel SARS-CoV-2 variant emerged in southeast England in November 2020, is 56% more transmissible (95% credible interval across three regions 50-74%) than preexisting variants of SARS-CoV-2. The author did not find evidence that VOC 202012/01 resulted in greater or lesser severity of disease than pre-existing variants. However, the increase in transmissibility is likely to lead to a large increase in incidence, with COVID-19 hospitalizations and deaths projected to reach higher levels in 2021 than were observed in 2020.

**Immunology**


Outpatients and asymptomatic individuals might have higher ratios of spike protein receptor-binding domain-specific IgG versus nucleoprotein-targeted IgG antibodies than hospitalized patients. This is the result of a study by Scott Boyd, Katharina Röltgen and colleagues who analyzed 983 longitudinal plasma samples from 79 hospitalized COVID-19 patients and 175 SARS-CoV-2-infected outpatients and asymptomatic individuals. Plasma antibody increases correlated with decreases in viral RNAemia, but antibody responses in acute illness were insufficient to predict inpatient outcomes.

**Treatment**


In this review, Gianfranco Umberto Meduri et al. examine the pharmacological principles guiding glucocorticoids (GC) treatment in ARDS that demonstrates how each component of the treatment protocol is relevant to achieve optimal results. The authors integrate current clinical pharmacology knowledge of various GCs, including hydrocortisone, methylprednisolone and dexamethasone. Find more about the dosage, timing of initiation, mode of administration, duration, and tapering.
Severe COVID


During the first wave of the SARS-CoV-2 pandemic in Spring 2020, intensive care physicians discovered specificities of severe COVID-19 including the need for deep sedation and neuromuscular blockade, the increased risk of thrombotic and hemorrhagic events, the prolonged duration of mechanical ventilation with high rate of delirium, and the beneficial effects of early administration of glucocorticoids. Here, Damien Contou et al. report their experience during the second SARS-CoV-2 wave in Autumn 2020. Their sobering discovery: compared to the first wave, less patients required invasive mechanical ventilation, thrombotic events were less frequent and the delay between ICU admission and tracheal intubation was longer. However, ICU mortality (50% vs. 52%, p = 0.96) and duration of ICU stay did not differ between the two waves. The Kaplan–Meier survival analysis did not show a significant difference between the two waves (p = 0.90, log-rank test).

Collateral Effects


Cumulative counts of domestic crimes were higher during the COVID-19 period of 2020 than in the preceding two years suggesting increased occurrence of domestic violence, especially during shelter-in-place orders. This is the result of an analysis of 30 weeks of crime data collected from the Atlanta Police Department (APD). Dabney Evans, Shila René Hawk and Carrie Ripkey found that a spike in domestic crimes was recorded after city and statewide shelter-in-place orders. The authors summarize that the “co-occurring pandemics of COVID-19 and domestic violence come amidst a period of racial justice reckoning in the United States and that both have a disproportionate impact on Black, Indigenous, and People of Color. As the country grapples with how to deal with health and safety concerns related to the pandemic, and the unacceptable harms being perpetrated by police, a public health approach is strongly warranted to address both universal health care and violence prevention.”
French
Les données actuelles fournies par les autorités britanniques rapportent une augmentation du risque de transmission (R0 augmenté de +0.4 en comparaison des autres virus), avec une augmentation modérée de la « charge virale » estimée à partir des valeurs de RT-PCR (augmentation de 0.66 log soit 2 Ct en moins), mais aucune différence n’est notée à ce jour en termes de pathogénicité (manifestations cliniques, durée de la maladie) ou d’échappement à la réponse immunitaire des personnes déjà infectées au cours de deux premières vagues.

Les essais ont montré leur efficacité à combattre les symptômes du Covid, mais on ignore encore s’ils peuvent bloquer la contamination d’autres personnes.

Un an après la première alarme sur l’apparition d’un « virus inconnu », finalement reconnu comme un nouveau coronavirus et dont la maladie qu’il provoque fut baptisée « Covid-19 », la planète déplore des dizaines de millions de contaminations, et plus d’1,6 million de morts. Au même moment, d’autres pandémies, parfois vieilles de plusieurs milliers d’années, continuent de faucher des milliers de vies.

En refusant de quitter le pouvoir après les élections, Donald Trump expose, dans une ultime offensive destructrice, la fragilité du système américain. Une leçon pour toutes les démocraties, estime Sylvie Kauffmann, éditorialiste au « Monde ».

8 January

Epidemiology


The UK remains one of the most badly affected countries. As of 6 January 2021, it had recorded more than 2,8 million cases of SARS-CoV-2 infection and almost 80,000 deaths. Driven by the new variant's increased infectiousness, the UK has recently reported more than 60,000 cases a day, and there are fears that the pandemic may get very much worse before it gets better. The only hope now is that deaths and hospitalizations will plummet as the number of elderly and vulnerable people receiving a vaccine sharply increases in the coming weeks.

Pathogenesis


Given the neurological symptoms observed in a large majority of individuals with COVID-19, does SARS-CoV-2 penetrate into the CNS? Here Frank Hepnner, Jenny Meinhardt and colleagues demonstrate the presence of SARS-CoV-2 RNA and protein in anatomically distinct regions of the nasopharynx and brain. Watch SARS-CoV-2 crossing the neural–mucosal interface in olfactory mucosa (exploiting the close vicinity of olfactory mucosal, endothelial and nervous tissue), following neuroanatomical structures and penetrating
defined neuroanatomical areas including the primary respiratory and cardiovascular control center in the medulla oblongata.

See also the comment by Yates D. A CNS gateway for SARS-CoV-2. Nat Rev Neurosci (2021). Full-text: https://doi.org/10.1038/s41583-020-00427-3

Immunology


After Year 1 of the SARS-CoV-2 pandemic, we realize that although millions of people were infected during spring 2020, there is no sizeable epidemic of re-infections. This observation suggests that SARS-CoV-2 infection might confer a solid immunity. Now, Shane Crotty, Alessandro Sette, Daniela Weiskopf, Jennifer Dan and colleagues publish in Science the pre-print paper we presented on 13 November. The authors analyzed multiple compartments of circulating immune memory to SARS-CoV-2 in 188 COVID-19 cases, including 43 cases at > 6 months post-infection. The result: Spike-specific memory B cells were more abundant at 6 months than at 1 month post symptom onset. SARS-CoV-2-specific CD4+ T cells and CD8+ T cells declined with a half-life of 3-5 months. These findings might suggest that after SARS-CoV-2 infection (or after vaccination), the vast majority of people could be protected from severe COVID-19 for years. Read also the NYTimes article by Mandavilli A. Immunity to the Coronavirus May Last Years, New Data Hint. The New York Times 2020, published 17 November. Full-text: https://www.nytimes.com/2020/11/17/health/coronavirus-immunity.html


Correlates of protection against SARS-CoV-2 infection in humans are not yet established. Here, Alicia Widge et al. describe immunogenicity data 119 days after the first vaccination in 34 healthy adult participants. Despite a slight expected decline in titers of binding and neutralizing antibodies, mRNA-1273 might have the potential to provide durable humoral immunity.
Vaccine


One case of anaphylaxis in 100,000 vaccine recipients of the BioNTech/Pfizer vaccine Comirnaty. That is the result of the 10 days of monitoring (14-23 December) by the Vaccine Adverse Event Reporting System which detected 21 cases of anaphylaxis after administration of a reported 1,893,360 first doses of the vaccine (11.1 cases per million doses). Note that 71% of these occurred within 15 minutes of vaccination. Screen recipients for contraindications and precautions; have the necessary supplies available to manage anaphylaxis; implement the recommended post-vaccination observation periods; and immediately treat suspected cases of anaphylaxis with intramuscular injection of epinephrine! For detailed insight, check also Castells MC, Phillips EJ. Maintaining Safety with SARS-CoV-2 Vaccines. N Engl J Med 2020, published 30 December. Full-text: https://doi.org/10.1056/NEJMra2035343 which we presented on 1 January.


On 30 December the four UK chief medical officers announced that the second doses of the COVID vaccines should be given towards the end of 12 weeks rather than in the previously recommended 3-4 weeks. German authorities will issue a similar recommendation soon. Gareth Iacobucci and Elisabeth Mahase look at the questions this has raised.

Treatment


Early administration of high-titer convalescent plasma against SARS-CoV-2 to mildly ill infected older adults might reduce the progression of COVID-19. This is the result of a randomized, double-blind, placebo-controlled trial of convalescent plasma with high IgG titers against SARS-CoV-2 by Fernando P. Polack, Romina Libster and colleagues. The authors randomized 160 patients. Severe respiratory disease developed in 13 of 80 patients (16%) who received
convalescent plasma and 25 of 80 patients (31%) who received placebo (relative risk, 0.52; 95% confidence interval [CI], 0.29 to 0.94; p = 0.03). Relative risk reduction: 48%.


In hospitalized patients with COVID-19 pneumonia who were not receiving mechanical ventilation, tocilizumab did not improve survival, but it reduced the likelihood of progression to the composite outcome of mechanical ventilation or death. This is the result of a trial that randomized 249 patients into the tocilizumab group and 128 patients into the placebo group. Shalini Mohan, Carlos Salama and colleagues report that death from any cause by day 28 occurred in 10.4% of the patients in the tocilizumab group and 8.6% of those in the placebo group.

**Collateral Effects**


Adolescent substance use is a significant and largely undertreated public health concern. The COVID-19 pandemic has exacerbated many pre-existing risk factors for adolescent substance use, such as early life stress, social isolation, school connections, and boredom. Here, Dana Sarvey and Justine Welsh give a short overview of changing risk and protective factors for substance use and potential opportunities during the pandemic. They recommend that practitioners should consider any and all means of reaching out to these youth and their families and addressing other co-occurring psychiatric symptoms, such as depression and anxiety.

**Beyond Corona**

“Twitter at one point decided he shouldn’t be able to have access to his Twitter, and yet this is someone who has access to our launch nuclear launch codes. There’s an incongruity there.”

French


Le Royaume-Uni s’est lancé dans une course de vitesse contre le virus et son variant apparu dans le Kent, à l’heure où la mortalité causée par la pandémie reste très importante.

9 January

Epidemiology


Two new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) lineages carrying the amino acid substitution N501Y in the receptor-binding domain (RBD) of the spike protein have spread rapidly in the United Kingdom (UK) during late autumn 2020. Tommy Lam, Joseph Wu, Kathy Leung and colleagues explain that 501Y Variant 2 (also named B.1.1.7, 20B/501Y.V1 and VOC-202012/01) is estimated to present an R₀ 1.75 times higher than 501N, meaning it is 75% more transmissible compared with the 501N strain.


In early 2020, pre-lockdown, high travel volumes and few restrictions on international arrivals led to the establishment and co-circulation of >1000 identifiable UK transmission lineages, jointly contributing to accelerated epidemic growth that quickly exceeded national contact tracing capacity. The authors
reveal the fine-scale genetic lineage structure of this early epidemic through analysis of 50,887 SARS-CoV-2 genomes, including 26,181 from the UK sampled throughout the country’s first wave of infection.


Lockdowns lead to a decrease in the common cold, bronchiolitis, acute otitis media, and acute gastroenteritis (AGE) in children. Having found that, François Angoulvant, David Yang and colleagues were curious to know what would happen after the end of the lockdown and analyzed a total of 908.887 pediatric emergency visits from 6 academic hospitals over the last three years. As expected, two weeks after the lockdown, observed values reached expected values for the common cold, bronchiolitis, and acute asthma exacerbation. There was one surprise, though: there was no increase in AGE after the end of lockdown. The authors suggest continued regular handwashing and the use of alcohol-based sanitizers as an explanation for this finding. They conclude that the positive lessons learned from SARS-CoV-2, especially handwashing and social distancing, should not be forgotten after the pandemic.

Virology


The emergence of the new “UK variant”—lineage B.1.1.7—has raised widespread concern. Adam Lauring and Emma Hodcroft explain virus evolution and the genomic epidemiology of SARS-CoV-2. They conclude that it is possible that mutations in spike that are “good” for the virus right now could also make it less fit in the context of population-level immunity in the future. Defining these dynamics, and their potential influence on vaccine effectiveness, will require large-scale monitoring of SARS-CoV-2 evolution and host immunity for a long time to come.
Transmission


We know that humans can infect animals with SARS-CoV-2, for example, cats and dogs, hamsters and rabbits. Here, Oude Munnink and colleagues show that that mink-to-human transmission also occurred. See also the perspective by Zhou P, Shi ZL. *SARS-CoV-2 spillover events.* Science. 2021 Jan 8;371(6525):120-122. PubMed: https://pubmed.gov/33414206. Full-text: https://doi.org/10.1126/science.abf6097

Prevention


Might “washing your throat” with a pharyngeal antisepsis before sleeping, when healthy adults of all ages aspirate material from above the larynx, help protect individuals against COVID-19 pneumonia? Find out why Bruce Davidson et al think it may.

Vaccine


Researchers race to determine why variants identified in Britain and South Africa spread so quickly and whether they’ll compromise vaccines.

Graph

Diagnostics

Everything you always wanted to know about pre-test probability, test sensitivity and test specificity* (*But Were Afraid to Ask). Jessica Watson and Alex Richter have prepared an interactive page where you can define any of these values. Get a feel for it.

Treatment

Could convalescence from mild-to-moderate (MtoM) COVID-19 disease be supported by integrative medicine (IM) strategies? Lise Alscher et al. suggest adoption of an anti-inflammatory diet, supplementation with vitamin D, glutathione, melatonin, cordyceps, astragalus and garlic have potential utility. If you are also interested in osteopathic manipulation, qigong, breathing exercises and aerobic exercise, you should read this paper with 146 references.

Education

The editors discuss how health care organizations are planning vaccine rollout and uptake both among their staff and in their communities.

French

Des chercheurs américains ont montré en laboratoire qu’une mutation présente dans le variant sud-africain du SARS-CoV-2 affaiblissait sensiblement le pouvoir des anticorps de patients contaminés par la souche dominante. Des variants déjà retrouvés en France.
German


10 January

Prevention


Pathogenesis


Could high-density lipoprotein (HDL) scavenger receptor B type 1 (SR-B1) facilitate ACE2-dependent entry of SARS-CoV-2? That is the statement by Hui
Zhong, Congwen Wei, finding that the S1 subunit of SARS-2-S binds to cholesterol and possibly to HDL components and facilitates SARS-CoV-2 cellular attachment, entry and infection. SARS-CoV-2 entry is inhibited by silencing SR-B1 expression and by SR-B1 antagonists. Blockade of the cholesterol-binding site on SARS-2-S1 with a monoclonal antibody inhibited HDL-enhanced SARS-CoV-2 infection.

See also the comment by Di Guardo G. **SARS-CoV-2-Cholesterol Interaction: A Lot of Food for Thought.** Pathogens 2021, 10(1), 32- Full-text: [https://doi.org/10.3390/pathogens10010032](https://doi.org/10.3390/pathogens10010032)

**Vaccines**


In France, some 60% of the population is skeptic about getting vaccinated. In search of inspiration, French authorities should take a look at this paper by Stacy Wood & Kevin Schulman. They should be ready to revise their marketing skills. Communication needs to become more a part of regular science.


Find the 32-page product information of the EMA.


Find the product information as approved by the CHMP on 6 January 2021, pending endorsement by the European Commission.


Naming a vaccine is almost always a matter of threading semantic needles, branding experts said, where the goal is to evoke positive vibes without irk ing the world’s more conservative regulatory bodies. And it takes time.
Clinical

At 6 months after acute infection, more than 70% of COVID-19 survivors in Wuhan, China, were troubled with fatigue or muscle weakness, sleep difficulties, and anxiety or depression. This is the result of a cohort study of discharges from Jin Yin-tan Hospital between 7 January and 29 May 2020. Bin Cao, Chaolin Huang and colleagues enrolled 1733 of 2469 discharged patients with COVID-19 (median age 57 years, 52% men). Fatigue or muscle weakness (63%) and sleep difficulties (26%) were the most common symptoms. Anxiety or depression was reported among 23% of patients. 13% of patients without acute kidney injury and with normal eGFR at the acute phase had decreased eGFR at follow-up. Patients who were more severely ill during their hospital stay had more severe impaired pulmonary diffusion capacities and abnormal chest imaging manifestations. See also the comment by Cortinovis M, Perico N, Remuzzi G. Long-term follow-up of recovered patients with COVID-19. Lancet 2021, published 8 January. Full-text: https://doi.org/10.1016/S0140-6736(21)00039-8

Treatment

Traditional central nervous system (CNS) drugs that have a high affinity at the sigma-1 receptor (i.e., fluvoxamine, donepezil, ifenprodil) for the treatment of SARS-CoV-2-infected patients? In this review, Kenji Hashimoto discusses the brief history of the sigma-1 receptor and its role in SARS-CoV-2 replication in cells.
Collateral Effects

Recent studies have shown that patients with chronic liver disease (CLD) in general, and especially those with decompensated cirrhosis and alcohol-related liver disease, are at higher risk COVID-19-related mortality. In this multi-center US cohort study, Renumathy Dhanasekaran, Nia Adeniji and colleagues included 909 patients with CLD and COVID-19 from 21 US centers. They show that non-Hispanic Blacks (NHB) and Hispanics are disproportionately represented in patients with CLD who acquire COVID-19. Both non-Hispanic Blacks and Hispanics had lower household income, lower rates of private insurance, and Hispanics had higher rates of being uninsured. Additionally, the authors show that both NHB and Hispanics had a higher likelihood of living in multifamily housing and in neighborhoods with higher rates of poverty and overcrowding than non-Hispanic Whites.

Journal Feature

Climate scientists recommend ways to boost the value of virtual conferences and reduce carbon footprints even when travel curbs ease.

French

« The Lancet » a publié samedi une étude portant sur une cohorte de plus de 1 700 patients chinois hospitalisés au printemps 2020, qui montre que 76 % d’entre eux souffraient encore, six mois plus tard, d’au moins un symptôme.
Epidemiology

Charron N, Lapuente V, Rodriguez-Pose A. **Uncooperative Society, Uncooperative Politics or Both? How Trust, Polarization and Populism Explain Excess Mortality for COVID-19 across European regions.** The Quality of Government (QoG) Institute 2020 (December). Full-text: [https://gupea.ub.gu.se/handle/2077/67189](https://gupea.ub.gu.se/handle/2077/67189)

Why have some places performed better than others in the fight against COVID-19? The authors found that societal polarization played a significant role. When the divide in political trust between supporters and opponents of incumbent governments within societies is high, the authors observe consistently higher COVID-19-related excess mortality deaths during the first wave of the pandemic. They also find that regions with a political elite less supportive of European integration are regions where excess deaths have been significantly higher. *Vive l’Europe!*

Virology


Jesse Bloom, Allison Greaney and colleagues comprehensively mapped how mutations to the SARS-CoV-2 RBD affected binding by the antibodies in convalescent human serum. One major finding is that serum antibody binding is predominantly affected by mutations at just a few dominant epitopes in the RBD. The most important site is E484, where neutralization by some sera is reduced > 10-fold by several mutations, including one in emerging viral lineages in South Africa and Brazil. *Don’t miss this pre-print paper.*


If constantly pressured, SARS-CoV-2 virus has the ability to escape even a potent polyclonal serum targeting multiple neutralizing epitopes. By Rino Rappuoli, Emanuele Andreano and colleagues.
Transmission

SARS-CoV-2 transmission may occur on aircraft and the risk may be increased during long-distance flights. Joep de Ligt, Tara Swadi and colleagues from New Zealand describe an air travel cluster where among the 7 eventually-infected passengers, 2 were probably index case-patients infected before the flight, 4 were probably infected during the flight, and the remaining passenger was probably infected while in New Zealand under “managed isolation and quarantine”. All 7 passengers were seated in aisle seats within 2 rows of where the presumed index case-patient(s) were seated.

Vaccine

Recent SARS-CoV-2 variants in the United Kingdom and South Africa have multiple mutations in their S glycoproteins, which are key targets of viral neutralizing antibodies. These rapidly spreading variants share the spike N501Y substitution. Pei-Yong Shi, Philip R. Dormitzer and Xuping Xie generated isogenic N501 and Y501 SARS-CoV-2. Sera of participants in a previously reported trial of the mRNA-based COVID-19 vaccine BNT162b2 had equivalent neutralizing titers to the N501 and Y501 viruses.

Clinical

In this cohort of 669 persons (mean age 43, 60% women, 24,6% health care workers, 68,8% with no underlying risk factors), symptoms persisted in one third of ambulatory patients 30 to 45 days after diagnosis. Fatigue, dyspnea, and loss of taste or smell were the main persistent symptoms.

Cross-sectional mono-center survey on 70 consecutive patients presenting with an initial symptomatic COVID-19 infection who developed prolonged COVID symptoms defined as persistent symptoms (> 2 months after the first day of the initial episode) or resurgent symptoms (at least 3 weeks after the 1st episode). Median age was 45 (range 23–75), 78.6% were female. The authors classify the characteristics of late symptoms in 7 main categories:

- Major fatigue or exhaustion for 51 patients (72.9%)
- Neurological symptoms, in 54 (77.1%), divided into neuro-cognitive disorders (such as memory, mood or attention disorders), headaches, sensory disturbances (such as balance disorders, tingling, burning sensations and neurogenic pains), or others (swallowing or speech disorders, thermoregulation disorders).
- Cardiothoracic symptoms in 50 patients (71.4%): chest pain and tightness, palpitations, cough, dyspnea.
- Muscular or/and articular pains for 20 (25.7%).
- ENT symptoms: persistent or recurrent anosmia, hyposmia and/or dysgeusia for 21 (30%).
- Gastro-intestinal symptoms for 17 (24.3%): diarrhea, nausea/vomiting, epigastric or abdominal pain.
- Skin and vascular symptoms in 10 (14.4%).


Acute brain dysfunction was highly prevalent and prolonged in critically ill patients with COVID-19. Now, Brenda Pun, Rafael Badenes and colleagues publish the results of a cohort study on 2088 patients treated in 69 adult intensive care units (ICUs) across 14 countries. Benzodiazepine use and lack of family visitation were identified as modifiable risk factors for delirium. The
authors conclude that their data present an opportunity to reduce acute brain dysfunction in patients with COVID-19.

Comorbidities

No comment needed. The key messages presented at the beginning of the paper:

- Patients with cirrhosis experience high rates of hepatic decompensation and death following SARS-CoV-2 infection.
- Mortality increased in stepwise fashion according to Child-Pugh class.
- Other risk factors for death included advancing age and alcohol-related liver disease.
- Mortality risk was higher in patients with advanced cirrhosis than propensity-score-matched controls without liver disease.
- The majority of deaths in patients with cirrhosis were from COVID-19-related lung disease.

Spanish

La expansión fuera de control del coronavirus y el retraso de la segunda dosis vacunal pueden favorecer la aparición de mutantes resistentes.


Un tercio de los 1.500 sanitarios fallecidos en todo el mundo trabajaba en el gigante sudamericano. A la falta inicial de equipos de protección se suma el agotamiento y la llegada de personal inexperto.
12 January

Virology

Mao Mao, Yan Chen and colleagues analyzed 4013 full-length SARS-CoV-2 genomes from different continents over a 14-week timespan since the outbreak in Wuhan. 2954 unique nucleotide substitutions were identified with 31 of the 4013 genomes remaining as ancestral type, and 952 (32.2%) mutations recurring in more than one genome. The authors used the same approach to analyze 261,350 full-length SARS-CoV-2 genomes available in the GISAID database as of 25 December 2020. They suggest that viral genotypes can be utilized as molecular barcodes in combination with epidemiologic data to monitor the spreading routes of the pandemic and evaluate the effectiveness of control measures.


SARS-CoV-2 is constantly evolving, with more contagious mutations spreading rapidly, in particular in England and South Africa. Here, Gideon Schreiber, Jiří Zahradník and colleagues show that the naturally selected mutations S477N, E484K, and N501Y of the Spike protein RBD, which show higher infectivity, were also selected by yeast surface display affinity maturation already in the first round, giving rise to the South African, E484K, N501Y, and British variants that bind ACE2 13 and 3.5-fold tighter than RBD-WT.

Prevention

To ease the potentially devastating socioeconomic consequences of pharmaceutical interventions, social distancing, lock-downs and mobility restrictions, Baruch Barzel, Dror Meidan and colleagues, propose an alternative alternating quarantine strategy: at any moment, half of the population re-
mains under lockdown while the other half continues to be active - maintaining a routine of weekly alternation of activity and quarantine. This regime would minimize infectious interactions, as it allows only half of the population to interact for just half of the time. Dramatic reduction in transmission despite sustaining socioeconomic continuity at ~50% capacity?

Pathogenesis

SARS-CoV-2 might cause a slowly unfolding, spatially limited alveolitis in which alveolar macrophages harboring SARS-CoV-2 and T cells form a positive feedback loop that drives persistent alveolar inflammation. This is the result of a study that collected bronchoalveolar lavage fluid samples from 88 patients with SARS-CoV-2-induced respiratory failure and 211 patients with known or suspected pneumonia from other pathogens and subjected them to flow cytometry and bulk transcriptomic profiling.

Vaccine

Yvonne Bordon comments on two recent reports from the Oxford COVID-19 vaccine team which detail the immune outcomes observed in a Phase I/II trial of their ChAdOx1 nCoV-19 vaccine. In one of the papers we presented on 21 December, the authors give a detailed description of the immune response after administration of one dose of ChAdOx1 nCoV-19 in 88 adults (ages 18-55 years) (Ewer 2020). They define the isotypes, subclasses and antibody avidity induced after vaccination. They also performed multiplex cytokine profiling and intracellular cytokine staining analysis, demonstrating that ChAdOx1 nCoV-19 vaccination induces a predominantly Th1-type response (that appears to be good). See also Barrett JR, Belij-Rammerstorfer S, Dold C, et al. Phase 1/2 trial of SARS-CoV-2 vaccine ChAdOx1 nCoV-19 with a booster dose induces multifunctional antibody responses. Nat Med. 2020 Dec 17. PubMed: https://pubmed.gov/33335322. Full-text: https://doi.org/10.1038/s41591-020-01179-4
Clinical
In this Viewpoint article, Dennis McGonagle et al. highlight how imaging and post-mortem findings point to a novel vasculitis mimic related to COVID-19 that might lead to cryptogenic strokes across multivessel territories, acute kidney injury with hematuria, a skin vasculitis mimic, intestinal ischemia, and other organ ischemic manifestations.

Solomon T. Neurological infection with SARS-CoV-2 — the story so far. Nat Rev Neurol 2021, published 7 January. Full-text: https://doi.org/10.1038/s41582-020-00453-w
As the COVID-19 pandemic developed and neurological manifestations were reported, concern grew that SARS-CoV-2 might directly invade neuronal cells. However, research throughout the year to address this concern has revealed a different story with inflammatory processes at its center.

Treatment
Bamlanivimab (Lilly) and the double-antibody cocktail casirivimab + imdevimab (Regeneron) have been recently given an Emergency Use Authorization (EUA) for use in high-risk COVID-19 patients with mild or moderate disease. Though both drugs represent new options for treating the coronavirus infection, neither is ideal. The future of monoclonals remains uncertain.

Consistent with international society recommendations, angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs), inhibitors of the renin–angiotensin system, can be safely continued in patients admitted to hospital with COVID-19. A confirmation from a small
study that enrolled 152 participants randomly assigned them to either continue or discontinue renin-angiotensin system inhibitor therapy. There were 16 (21%) of 75 participants in the continuation arm versus 14 (18%) of 77 in the discontinuation arm who required intensive care unit admission or invasive mechanical ventilation, and 11 (15%) of 75 participants in the continuation group versus ten (13%) of 77 in the discontinuation group who died.

Severe COVID
Comorbidities

Whether a separate entity of post-COVID-19 diabetes possibly associated with lasting β-cell damage also exists is not yet clear.

Spanish


French

Après des débuts prometteurs, une erreur de laboratoire a fait perdre cinq à six mois au groupe. Nouveau rebondissement, vendredi 8 janvier : sous la pression de Bercy, le groupe français pourrait mettre son outil industriel à disposition de ses concurrents les plus avancés, et dont les capacités de production sont limitées.
13 January

Treatment

“Only return to exercise after at least seven days free of symptoms and begin with at least two weeks of minimal exertion. Use daily self-monitoring to track progress, including when to seek further help.” In this nice 6-page paper, David Salman and colleagues give an excellent guide to physical activity after COVID-19. Clearly, patients with ongoing symptoms or who had severe COVID-19 or a history suggestive of cardiac involvement need thorough clinical assessment.

Epidemiology

Increases in community rates might be associated with increases in nursing home COVID-19 incidence, and nursing home mitigation strategies need to include a comprehensive plan to monitor local SARS-CoV-2 transmission and minimize high-risk exposures within facilities.

Transmission

The new SARS-CoV-2 lineage B117 (B.1.1.7, also named VOC 202012/01), originated in England in late Summer to early Autumn 2020. Available data indicate a larger share of under 20-year-olds among reported B117 than non-B117 cases. B117 seems to have a substantial transmission advantage, with the estimated difference in reproduction numbers between B117 and non-B117 ranging between 0.4 and 0.7. Neil Ferguson, Erik Volz and colleagues note that these estimates of transmission advantage apply to a period where high levels of social distancing were in place in England; extrapolation to other transmission contexts therefore requires caution.
Prevention
Quarantine after SARS-CoV-2 exposure is critical to preventing transmission. Among young, healthy athletes, the probability of receiving positive test results after day 10 of quarantine is low. A shorter quarantine after COVID-19 exposure could increase adherence but still pose a small residual risk for transmission.

Among the persons in quarantine who tested negative at day 7 after exposure, none who were retested between days 8 and 14 were positive. Allowing asymptomatic persons to shorten quarantine with a negative test at day 7 or later has not been demonstrated to result in transmission of SARS-CoV-2.

Immunology
Anti-Annexin A2 antibodies were elevated among hospitalized COVID-19 patients and these levels predicted mortality. This is the message of a pre-print paper by Ana Rodriguez, Marisol Zuniga and colleagues. The authors explain that inhibition of Annexin A2 induces systemic thrombosis, cell death, and non-cardiogenic pulmonary edema and that autoimmunity to Annexin A2 might explain key clinical findings of severe COVID-19. (Annexin A2 is a phospholipid-binding protein involved in fibrinolysis, cell membrane stabilization and repair, that ensures the integrity of the pulmonary microvasculature.)
Vaccine

Patients with advanced liver disease have well recognized deficiencies in innate and humoral immunity, termed cirrhosis-associated immune dysfunction (CAID). Nonetheless, given the high COVID-19-related mortality in patients with decompensated cirrhosis, it remains of utmost importance to prioritize vaccinations in this sub-group. Eleanor Barne, Thomas Marjot and colleagues express their belief that patients with advanced liver disease should be prioritized for vaccination, with the likely benefits far outweighing any potential risks. Until it is established whether patients with liver disease and transplantation achieve optimal protection after immunization, clinicians should remain vigilant for post-vaccination COVID-19 in these cohorts.

Clinical

Certain thyroid diseases may have a negative impact on the prevention and control of COVID-19; some anti-COVID-19 agents may cause thyroid injury; and COVID-19 and thyroid disease may mutually aggravate the disease burden.


In December, NICE published an updated rapid review of recent studies on vitamin D and COVID-19. Their recommendations: everyone should take vitamin D supplements to maintain bone and muscle health during the autumn and winter months. Later, new guidance from the UK government allowed extremely clinically vulnerable people to opt in to receive a free 4-month supply of daily vitamin D supplements—similar to an initiative launched earlier in Scotland. Several clinical trials on vitamin D and COVID-19 outcomes are underway.
Severe COVID


How would you predict the risk of clinical deterioration in acute COVID-19 cases? Mahdad Noursadeghi, Rishi K Gupta and colleagues developed and validated a prognostic model for in-hospital clinical deterioration which integrated 11 routinely available predictors: age, sex, nosocomial infection, Glasgow coma scale score, peripheral oxygen saturation (SpO₂) at admission, breathing room air or oxygen therapy (contemporaneous with SpO₂ measurement), respiratory rate, urea concentration, C-reactive protein concentration, lymphocyte count, and presence of radiographic chest infiltrates.

14 January

Epidemiology


In the US, the start of the 2020–21 academic year was sometimes the beginning of local epidemics. Kristyn Vang et al. describe SARS-CoV-2 transmission by on- and off-campus congregate living settings and activities. Their analysis indicates that 91% of gatherings were associated with fraternity or sorority activities. Interestingly, at one university, women accounted for 70% of COVID-19 cases although they constituted only 54% of the university’s student body. Among linked gatherings, women accounted for 86% of cases. The authors speculate about possible explanations (involvement in gender-specific activities? sorority rush week?).

Transmission

Cotton provides the lowest environmental stability to SARS-CoV-2. When applied to 100% cotton fabric, the virus underwent rapid degradation and became undetectable by TCID$_{50}$ assay within 24 h. However, viable SARS-CoV-2 was recovered after 21 days on plastic, 14 days on stainless steel, 7 days on nitrile gloves and 4 days on chemical resistant gloves.


Indoor aerosol aerosol transmission might be underappreciated. This is the suggestion by Jongho Heo, Seo Eun Hwang and colleague who investigated a cluster of 9 COVID-19 infections in an apartment building in Seoul, South Korea. The investigation found no other possible contact between the cases than the airborne infection through a single air duct in the bathroom. All infected cases (living from the 2$^{nd}$ to the 11$^{th}$ floor of the building) were found along two vertical lines of the building, and each line was connected through a single air duct in the bathroom for natural ventilation. The authors assume that the first infected person probably released the virus during a shower in the bathroom by coughing, breathing, singing, or flushing and that SARS-CoV-2 may have combined with water vapor and became aerosols in the humid environment.

Prevention

European countries that implemented more stringent mitigation policies by the time they reached an early mortality threshold in spring 2020 (closure of non-essential businesses, restrictions on gatherings and movement, and stay-at-home orders) tended to report fewer COVID-19-associated deaths through the end of June. These countries have saved tens of thousands of lives relative to those countries that implemented similar policies, but later. These findings suggest that earlier implementation, even by just a few weeks (even one week!), may prevent widespread transmission and large numbers of deaths.
Immunology
In this review, Alessandro Sette and Shane Crotty describe how CD4+ T cells, CD8+ T cells, and neutralizing antibodies all contribute to the control of SARS-CoV-2, in both non-hospitalized and hospitalized cases of COVID-19. The authors discuss the specific functions and kinetics of these adaptive immune responses, as well as their interplay with innate immunity and implications for COVID-19 vaccines and immune memory against re-infection.

In a cohort of 140 SARS-CoV-2 individuals with confirmed SARS-CoV-2 infection, nAb titers correlated strongly with disease severity and with anti-spike IgG levels. Patients from intensive care units exhibited high nAb titers; conversely, patients with milder disease symptoms had heterogeneous nAb titers, and asymptomatic or exclusively outpatient patients had no or low nAbs. nAb activity in SARS-CoV-2-infected patients displayed a relatively rapid decline after recovery compared to individuals infected with other coronaviruses.

Vaccine
The technology could revolutionize efforts to immunize against HIV, malaria, influenza and more.

Mahase E. How the Oxford-AstraZeneca covid-19 vaccine was made. BMJ 2021; 372. Full-text: https://doi.org/10.1136/bmj.n86
Andrew Pollard has been leading the Oxford vaccine clinical trials in the UK, Brazil, and South Africa. He tells how the Oxford vaccine came to be, how dosing was worked out, and whether it will stand up to the new variants.
Severe COVID

In the coming weeks, available medical resources will not always meet the increased demand for life-saving intensive care. Alexander Supady, Randall Curtis and colleagues propose that triage committees could be involved in providing policies and guidance for clinicians to help ensure equity in the application of rationing under crisis standards of care.

Comorbidities

Patients without disease modifying therapies (DMTs), with previous cardiovascular diseases, or with a severe degree of disability may be at a higher risk of severe COVID-19. In this review of 873 published cases, immunosuppressive therapy itself did not appear to be a substantial risk factor. The authors argue that it might be reasonable to assume that these therapies could be protective, either directly by mitigating the cytokine storm, or indirectly by reducing the disease activity of MS.

Spanish

Un estudio europeo muestra que muchos de los casos menos graves sufren alucinaciones olfatorias.

Crece el temor a que la segunda ola de COVID-19 arrase con las barriadas más pobres de la capital, cuyos habitantes apenas han podido resistir a los estragos de la primera. Un recorrido por algunas de ellas.

**French**


Plusieurs articles évoquant la mort de personnes peu après une injection alimentent la défiance envers la vaccination. Comment sont analysés ces décès et que peut-on en conclure?

**German**

If you read German, read Fischer L. *Dieses mutierte Coronavirus könnte alles ändern.* Die Zeit 2021, published 13 Januar. Full-text: https://www.zeit.de/wissen/2021-01/corona-variante-b-1-1-7-mutationgefahr-massnahmen-angela-merkel

Die schneller übertragbare Corona-Variante B117 hat Deutschland erreicht. Sie könnte die Fallzahlen explodieren lassen. Warum wir die Mutante jetzt eindämmen müssten.

**15 January**

**Epidemiology**

Ledford H. *COVID reinfections are unusual — but could still help the virus to spread.* Nature 2021, published 14 January. Full-text: https://www.nature.com/articles/d41586-021-00071-6

A large study of UK healthcare workers suggests that most people are immune for months after catching COVID-19 for the first time.


If you want to do some math, read this short paper and revise a concept neither Boris Johnson (how could he!) nor his advisers really understood. In
short: as immunity accumulates in a population — naturally during the course of an epidemic or through vaccination — the spread of infectious disease is limited by the depletion of susceptible hosts. In this primer, Ben Ashby and Alex Best discuss the concept of herd immunity from first principles, clarify common misconceptions, and consider the implications for disease control.

Vaccine

Hanneke Schuitemaker, Jerald Sadoff and colleagues describe the safety and immunogenicity profiles of Ad26.COV2.S. As with other SARS-CoV-2 vaccines, the most frequent adverse events were fatigue, headache, myalgia, and injection site pain. Systemic adverse events were less common in people 65 years or older than in those 18 to 55 years of age. Neutralizing-antibody titers against wild type virus were detected in 90% or more of all participants on day 29 after the first vaccine dose and reached 100% by day 57 with a further increase in titers (GMT, 288 to 488), regardless of vaccine dose or age group. Ad26.COV2.S, developed by Janssen Pharmaceutical Companies of Johnson & Johnson, is a recombinant replication-incompetent adenovirus type 26 (Ad26) vector-based COVID-19 vaccine encoding a prefusion-stabilized SARS-CoV-2 Spike immunogen.


The Israeli newspaper reports a deal between Israel and Pfizer: Pfizer will receive anonymized data about consequences of the inoculations, side effects, efficacy, and the amount of time it takes to develop antibodies, according to different types of population, age, gender, pre-existing conditions, and other factors.

Long COVID
While discussing the NICE guidelines on long COVID published a few weeks ago, Priya Venkatesan gives a short overview of the condition. The guideline defines long COVID as (1) ongoing symptomatic COVID-19 for people who still have symptoms between 4 and 12 weeks after the start of acute symptoms; and (2) post-COVID-19 syndrome for people who still have symptoms for more than 12 weeks after the start of acute symptoms. Patients with new or ongoing symptoms 4 weeks or later after acute infection should receive a full blood count, kidney and liver function tests, a C-reactive protein test, and an exercise tolerance test (recording level of breathlessness, heart rate, and O₂ saturation). The guidelines also recommend that a chest x-ray should be offered to all patients by 12 weeks after acute infection if they have continuing respiratory symptoms. [COVID-19 rapid guideline: managing the long-term effects of COVID-19 – NICE guideline [NG188]. Access: https://www.nice.org.uk/guidance/NG188]

**Treatment**


Patients who have not yet received mechanical ventilation may benefit from transfusion of plasma with high anti–SARS-CoV-2 IgG antibody levels. However, in this study of 3082 patients there was no effect on the risk of death among patients who had received mechanical ventilation.


This study found an association between ruxolitinib and overall mortality in 40% of the 45 cases treated with this drug. This effect was due not so much to drug exposure but to its rapid discontinuation (median 0.5 days), that accounted for 75% of deaths. The authors speculate about the reasons for stopping the treatment: uncertainties about possible adverse events? risk of interactions with other drugs? missing interactions between managing physicians and referring hematologist?
Severe COVID

Downar J, Kekewich M. **Improving family access to dying patients during the COVID-19 pandemic.** Lancet Respir Med 2021, published 12 January. Full-text: [https://doi.org/10.1016/S2213-2600(21)00025-4](https://doi.org/10.1016/S2213-2600(21)00025-4)

James Downar and Mike Kekewich propose elements of an end-of-life visitor policy: 1) Visitors (up to 4, according to the size of the room) should be allowed during normal visiting hours, 2) preferably 1 h at a time, and 3) when physical circumstances allow, one family member can remain with the patient outside of these hours. 4) Avoid cycling of visitors and 5) make visitors comply with proper infection prevention and control procedures to limit the risks to patients, staff, and to themselves.

Pediatrics


Between May 15, 2020, and November 15, 2020, there was an increase in hospitalizations among infected children and adolescents in the US. Using data extracted from the University of Minnesota COVID-19 Hospitalization Tracking Project, Pinar Karaca-Mandic, Zachary Levin and colleagues identified 5364 patients aged 19 and under who were hospitalized in 22 US states. The cumulative average rate rose to 17.2 hospitalizations per 100,000 children in November from 2 per 100,000 children in May.

Education


The editors discuss Covid-19 in Africa and the impact of a newly discovered SARS-CoV-2 variant.

Spanish

Alemania se prepara para extender el confinamiento más allá de enero ante las “ocho o diez semanas muy duras” de contagios que prevé Merkel.


La falta de recursos para conseguir dosis, los problemas de aceptación y una logística compleja dificultan que el continente alcance la inmunidad de grupo el año próximo.

**French**


La concentration de virus dans les eaux usées de la région a cru d’environ 50 % en trois semaines, montrent les prélèvements effectués par le réseau Obépine.

**German**

If you read German, read Erdmann E, Schumann F. **Jagd auf die mutierten Coronaviren.** Die Zeit 2021, published 14 January. Full-text: [https://www.zeit.de/wissen/gesundheit/2021-01/corona-mutationen-variante-b-1-1-7-deutschland-verbreitung-sequenzierung](https://www.zeit.de/wissen/gesundheit/2021-01/corona-mutationen-variante-b-1-1-7-deutschland-verbreitung-sequenzierung)

Neue Corona-Varianten haben Deutschland erreicht. Um rauszufinden, wie verbreitet sie sind, muss das Virenergut untersucht werden. Doch wird das ausreichend getan?


Der Sonderweg ist teilweise zu Ende: Britische Urlauber haben die hochansteckende Virusvariante ins Land gebracht – nun verkündet die Schweizer Regierung einen härteren Shutdown. Skipisten bleiben aber auf. (Sono pazzil, Ed.)
16 January

COVID Reference

Since the publication of COVID Reference’s first edition on 29 March 2020, our website has lived an uneventful life. We have had our regular visitors – maybe you! – who read our presentation of the daily Top 10 papers or one or another PDF, in English, Spanish, Italian, Turkish or other languages. For more than 10 months, COVID Reference (CR) has been a steady source of daily, but mostly confidential information. Until last night, when the number of visitors to our website greatly increased. We don’t know why and why now, but the unusual activity may convince us to go ahead with our non-profit project. Thank you for staying with us! The CR Team.

Virology

2021 is shaping up to be the year of COVID-19 variants. In the past two months, scientists have identified several fast-spreading variants that have prompted government restrictions in many countries — and new variants are being detected more frequently.

Transmission

Quantitative RNA viral load assays and serological assays might be used in testing based strategies to discontinue or de-escalate infection prevention and control precautions. This is the result of a study by Jeroen van Kampen and colleagues who report that infectious viral shedding is detected by virus cultures in 23 of 129 patients (17.8%) hospitalized with COVID-19. Of these, 89 patients (69.0%) were admitted to intensive care and the remaining 40 (31.0%) admitted to medium care. The median duration of shedding infectious virus
was 8 days post-onset of symptoms (IQR 5–11) and dropped below 5% after 15.2 days post-onset of symptoms (95% confidence interval (CI) 13.4–17.2). Viral loads above $7 \log_{10}$ RNA copies/mL were independently associated with isolation of infectious SARS-CoV-2 from the respiratory tract.


The identification and isolation of persons with symptomatic COVID-19 alone might not control the ongoing spread of SARS-CoV-2. This is the conclusion of a decision model by Jay Butler, Michael Johansson and colleagues who assessed multiple scenarios for the infectious period and the proportion of transmission from individuals who never had COVID-19 symptoms. Measures such as mask wearing and physical distancing might be needed to protect them and their communities for quite some time.

Immunology


Senescent fibroblasts in the skin of older participants secrete an array of chemokines including CCL2 in response to tissue injury, such as that induced by injection of saline, VZV or air. Arne Akbar, Emma Chambers and colleagues show how this phenomenon can be blocked pharmacologically to boost adaptive immunity. See also the comment by Kasler H, Verdin E. How inflammaging diminishes adaptive immunity. Nat Aging 1, 24–25 (2021). Full-text: https://doi.org/10.1038/s43587-020-00021-3

Vaccine


In mice and baboons, low-dose levels of NVX-CoV2373 with Matrix-M was highly immunogenic. NVX-CoV2373, developed by Novavax, is a recombinant nanoparticle vaccine (rSARS-CoV-2) composed of trimeric full-length SARS-


On 30 December, the United Kingdom announced that it would allow doses of two coronavirus vaccines to be administered as many as 12 weeks apart, even though, in clinical trials, the two doses of the vaccine made by Pfizer of New York City and BioNTech of Mainz, Germany, were given to participants about three weeks apart. Not everyone agrees.

Clinical


SARS-CoV-2 strains containing the Spike E484K mutation may be a source of re-infection. The authors describe the case of a 37-year-old woman without pre-existing co-morbidities, a healthcare worker (medical doctor) who had two clinical episodes of COVID-19 (June and October 2020, interval: 116 days). The second infection (with the E484K strain) was mild and evolved without complications like the first episode.

Treatment


Dope for SARS? Not yet. Although treatment with cannabis compounds CBD, CBG and THCV may have clinical value in reducing cytokine secretion in lung epithelial cells, Hinanit Koltai, Seegehalli Anil and colleagues from the Volcani Center in Rishon LeZion, Israel, caution that the increase of macrophage-secreted IL-6 and IL-8 levels by cannabis-based treatment may potentially lead to a worsening of the “cytokine storm” identified in severe COVID-19 patients. As for now, users and healthcare personnel should avoid the use of cannabis for COVID-19 prevention or treatment.
Collateral Effects
Eva Morris et al.
Pandemic COVID-19 waves lead to a sustained reduction in the number of people referred, diagnosed, and treated for colorectal cancer. As compared to the monthly average in 2019, in April 2020 there was a 63% reduction (from 36,274 to 13,440) in the monthly number of 2-week referrals for suspected cancer and a 92% reduction in the number of colonoscopies (from 46,441 to 3484).

Spanish
Hay que flexibilizar los planes sin escatimar medios y preparar medidas extraordinarias.

Los nuevos modelos indican que la COVID será en los próximos años una enfermedad leve de la infancia. Y los niños de hoy serán los adultos del futuro, y estarán inmunizados de un modo u otro.

French
Face aux chiffres de contaminations, d'hospitalisations et de morts et à une vaccination qui patine, Joe Biden s’est engagé à « agir vite ». 

En Ile-de-France, le bouche-à-oreille permet vite de trouver quelques restaurants qui servent, rideaux baissés, leur clientèle d’habitués. Les voisins voient bien le manège puisqu’il y a derrière une terrasse où, aux beaux jours, on fait barbecue. Ils ne disent rien : l’ambiance est moins à la délation qu’à la commisération.

**German**

If you read German, read Hecking C. **Deutschland braucht die FFP2-Maskenpflicht.** Der Spiegel 2021, published 13 January. Full-text: [https://www.spiegel.de/wissenschaft/mensch/deutschland-braucht-die-ffp2-maskenpflicht-a-0a6f4051-d3f6-4eb8-9aaf-e91ec2e9e13c](https://www.spiegel.de/wissenschaft/mensch/deutschland-braucht-die-ffp2-maskenpflicht-a-0a6f4051-d3f6-4eb8-9aaf-e91ec2e9e13c)

Die selbst genähnte Alltagsmaske ist ein Relikt. Es wird höchste Zeit, dass wir alle professionelle Masken tragen, die auch uns selbst vor dem Virus schützen. Bezahlen muss sie der Staat.
Here we publish in a single PDF the daily Top 10 scientific papers we have presented ever since COVID Reference’s first edition on 29 March 2020. There is no secret to our procedure: the daily scanning of the literature helps us to stay afloat in the never-ending waves of new publications about SARS-CoV-2 and COVID-19. Most papers discussed in the Top 10 will eventually make it into subsequent editions of COVID Reference.

We dedicate this book to our students. May this selection of approx. 1,000 fine articles and full-text links deepen their understanding of the new coronavirus and prepare them for the challenges ahead.