Public Health England

COVID-19 Literature Digest – 07/12/2020

Dear all,

Please find today's report below.

PHE's COVID-19 Literature Digest has been produced since February 2020. A selection of our previous Digests can be found here. This resource aims to highlight a small selection of recent COVID-19 papers that are relevant to UK settings, contain new data, insights or emerging trends. The Digest Team generate a report three times per week (Mon, Wed, Fri). The reports include both preprints, which should be treated with caution as they are NOT peer-reviewed and may be subject to change, and also research that has been subject to peer review and wider scrutiny. The Digest is very rapidly produced and does not claim to be a perfect product; the inclusion or omission of a publication should not be viewed as an endorsement or rejection by PHE. We do not accept responsibility for the availability, reliability or content of the items included in this resource.

To join our email distribution list please send a request to COVID.LitDigest@phe.gov.uk. If you are interested in papers relating to behaviour and social science please contact COVID19.behaviouralscience@phe.gov.uk to sign up to receive the PHE Behavioural Sciences Weekly Report.

Best wishes,

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On behalf of the PHE COVID-19 Literature Digest Team

Report for 07.12.2020 (please note that papers that have **NOT been peer-reviewed** are highlighted in red).

Sections:

Transmission

Serology and immunology

Publication Date	Title / URL	Journal / Article type	Digest
04.12.2020	NERVTAG: Certifying COVID-19 immunity, 19 November 2020	Gov.uk / Research and analysis	• Paper by NERVTAG on the concept of an immunity certificate.
19.11.2020	Synergism of TNF-α and IFN-γ Triggers Inflammatory Cell Death, Tissue Damage, and Mortality in SARS-CoV-2 Infection and Cytokine Shock Syndromes	Cell / Article	• Of several cytokines tested by the authors, only the combination of TNF-α and IFN-γ induced inflammatory cell death characterised by inflammatory cell death, PANoptosis. • Mechanistically, TNF-α and IFN-γ co-treatment activated the JAK/STAT1/IRF1 axis, inducing nitric oxide production and driving caspase-8/FADD-mediated PANoptosis. • TNF-α and IFN-γ shock mirrors cytokine storm syndromes in mice, including COVID-19. • Neutralizing TNF-α and IFN-γ protects against SARS-CoV-2, HLH, and sepsis in mice. • Overall, findings suggest blocking the cytokine-mediated inflammatory cell death signalling pathway identified may benefit patients with COVID-19 or other infectious and autoinflammatory diseases by limiting tissue damage/inflammation.
04.12.2020	Correlates of protection against SARS-CoV-2 in rhesus macaques	Nature / Article	• Authors demonstrate that adoptive transfer of purified IgG from convalescent macaques protects naïve recipient rhesus macaques against SARS-CoV-2 challenge in a dose dependent fashion. • Depletion of CD8+ T cells in convalescent animals partially abrogated the protective efficacy of natural immunity against SARS-CoV-2 re-challenge, suggesting the importance of cellular immunity in the context of waning or sub-protective antibody titres. • Suggests relatively low antibody titres are sufficient for protection against SARS-CoV-2 in rhesus macaques, and that cellular immune responses may contribute to protection if antibody responses are sub-optimal. • Also demonstrates that higher antibody titres are required for therapy of SARS-CoV-2 infection in macaques.

Diagnostics and genomics

Publication Date	Title / URL	Journal / Article type	Digest
03.12.2020	Fast detection of SARS-CoV-2 RNA via the integration of plasmonic thermocycling and fluorescence detection in a portable device	Nat Biomed Eng / Article	• Authors demonstrate SARS-CoV-2 RNA can be detected in 17 min via a portable device integrating reverse transcription, fast thermocycling (via plasmonic heating through magneto-plasmonic nanoparticles) and in situ fluorescence detection following magnetic clearance of the nanoparticles. • The device correctly classified all nasopharyngeal, oropharyngeal and sputum samples from 75 patients with COVID-19 and 75 healthy controls, with good concordance in fluorescence intensity with standard RT-qPCR (Pearson coefficients > 0.7 for the N1, N2 and RPP30 genes).
19.11.2020	Evaluating the Effects of SARS-CoV-2 Spike Mutation D614G on Transmissibility and Pathogenicity	Cell / Article	• Increasing frequency of SARS-CoV-2 D614G are suggestive of a selective advantage - investigated using more than 25,000 whole genome SARS-CoV-2 sequences in UK - but may be due to a random founder effect. • Phylodynamic analyses do not show significantly different growth of D614G clusters. • There is no indication that patients infected with spike D614G variant have higher COVID-19 mortality or clinical severity. • The D614G replacement is associated with higher viral load and younger patient age.

Epidemiology and clinical – children / pregnancy

Publication Date	Title / URL	Journal / Article type	Digest
04.12.2020	Arteritis and Large Vessel Occlusive Strokes in Children Following COVID-19 Infection	Pediatrics / Case report	• Describes two previously healthy children that suffered disabling arterial ischemic strokes due to acute intracranial large vessel occlusion within 3-4 weeks of COVID-19 infection. • These cases illustrate that systemic post-infectious arteritis with cerebrovascular involvement may complicate COVID-19 infection in previously healthy school age children, and their presentations may overlap though not fulfil criteria for MIS-C or FCA.

Epidemiology and clinical – risk factors

Publication Date	Title / URL	Journal / Article type	Digest
01.12.2020	Assessment of Racial/Ethnic Disparities in Hospitalization and Mortality in Patients With COVID-19 in New York City	JAMA Netw Open / Original investigation	• New York cohort study of 9722 patients: Black (odds ratio [OR], 1.3; 95% CI, 1.2-1.6) and Hispanic patients (OR, 1.5; 95% CI, 1.3-1.7) more likely than White patients to test positive for COVID-19. • Among those testing positive, odds of hospitalization similar among White, Hispanic, and Black patients, but higher among Asian (OR, 1.6, 95% CI, 1.1-2.3) and multiracial patients (OR, 1.4; 95% CI, 1.0-1.9) compared with White patients. • Among those hospitalized, Black patients less likely than White patients to have severe illness (OR, 0.6; 95% CI, 0.4-0.8) and to die or be discharged to hospice (hazard ratio, 0.7; 95% CI, 0.6-0.9). • Although Black patients were more likely than White patients to test positive for COVID-19, after hospitalization they had lower mortality, suggesting that neighbourhood characteristics may explain the disproportionately higher out-of-hospital COVID-19 mortality among Black individuals.
02.12.2020	Pre-existing cardiovascular disease rather than cardiovascular risk factors drives mortality in COVID-19	medRxiv (non-peer reviewed) / Article	• Cohort study of consecutive adults (n=1721 median age 71 years, 57% male) hospitalised for severe COVID-19, of which 349 (20.3%) had pre-existing cardiovascular disease (CVD), 888 (51.6%) had cardiovascular risk factors without CVD (RF-CVD), and 484 (28.1%) had neither. • CVD was independently associated with in-hospital mortality among patients <70 years of age (adjusted HR 2.43), but not in those ≥70 years (aHR 1.14). • RF-CVD were not independently associated with mortality in either age group (<70y aHR 1.21; ≥70y aHR 1.07). • Most cardiovascular complications occurred in patients with CVD (66%) versus RF-CVD (17%) or neither (11%; p<0.001); 213 [12.4%] patients developed venous thromboembolism (VTE). • CVD was not an independent predictor of VTE.

Epidemiology and clinical – long-term complications / sequelae

Publication Date	Title / URL	Journal / Article type	Digest
03.12.2020	Persistent symptoms 1.5-6 months after COVID-19 in non-hospitalised subjects: a population-based cohort study	Thorax / Brief communication	• Study assessed symptoms and their determinants 1.5 to 6 months after symptom onset in non-hospitalised COVID-19 patients until 1 June 2020, in the catchment areas of two Norwegian hospitals. • The 451 who responded (out of 938 invited; 48%) reported fewer symptoms after 1.5 to 6 months than during COVID-19; median (IQR) 0 (0-2) versus 8 (6-11),

			respectively (p<0.001); 53% of women and 67% of men were symptom free, while 16% reported dyspnoea, 12% loss/disturbance of smell, and 10% loss/disturbance of taste. • In multivariable analysis, having persistent symptoms was associated with number of comorbidities and number of symptoms during the acute COVID-19 phase.

Epidemiology and clinical – other

Publication Date	Title / URL	Journal / Article type	Digest
04.12.2020	Defra/JBC: Wastewater COVID-19 monitoring in the UK: summary, 19 November 2020	Gov.uk / Research and analysis	• This paper provides a technical overview of wastewater-based epidemiology and its application for COVID-19, a summary of the UK Wastewater Programmes and presentation of some results and data use-cases from the English programme.

Infection control / non-pharmaceutical interventions

Publication Date	Title / URL	Journal / Article type	Digest
03.12.2020	Face masks considerably reduce COVID-19 cases in Germany	Proc Natl Acad Sci U S A / Article	• As face masks became mandatory at different points in time across German regions, authors compare the rise in infections in regions with masks and regions without masks. • Weighing various estimates, they conclude that 20 days after becoming mandatory face masks have reduced the number of new infections by around 45% (15% - 75% dependant on region). • As economic costs are close to zero compared to other public health measures, masks seem to be a cost-effective means to combat COVID-19.
04.12.2020	Summary of Guidance for Public Health Strategies to Address High Levels of Community Transmission of SARS-CoV-2 and Related Deaths, December 2020	MMWR Morb Mortal Wkly Rep / Report	• The COVID-19 pandemic control requires a multipronged application of evidence-based strategies while improving health equity: universal face mask use, physical distancing, avoiding nonessential indoor spaces, increasing testing, prompt quarantine of exposed persons, safeguarding those at increased risk for severe illness or death, protecting essential workers, postponing travel, enhancing ventilation and hand hygiene, and achieving widespread COVID-19 vaccination coverage.

Transmission

Publication Date	Title / URL	Journal / Article type	Digest
04.12.2020	Airflows inside passenger cars and implications for airborne disease transmission	Sci Adv / Article	• Authors present results from numerical simulations to assess how the in-cabin microclimate of a car can potentially spread pathogenic species between occupants, for a variety of open and closed window configurations. • Estimates relative concentrations and residence times of a non-interacting, passive scalar – a proxy for infectious particles – being advected and diffused by turbulent air flows inside the cabin. • An air flow pattern that travels across the cabin, farthest from the occupants, can potentially reduce the transmission risk. • Findings reveal the complex fluid dynamics during everyday commutes, and non-intuitive ways in which open windows can either increase or suppress airborne transmission.
03.12.2020	Prophylactic intranasal administration of a TLR2/6 agonist reduces upper respiratory tract viral shedding in a SARS-CoV-2 challenge ferret model	EBioMedicine / Research paper	• *This paper was previously included in the Digest as a preprint.* • Authors show that prophylactic intra-nasal administration of the TLR2/6 agonist INNA-051 in a SARS-CoV-2 ferret infection model effectively reduces levels of viral RNA in the nose and throat. • After 5 days post-exposure to SARS-CoV-2, INNA-051 significantly reduced virus in throat swabs (p=<0.0001) by up to a 24 fold (96% reduction); in nasal wash (p=0.0107) up to a 15 fold (93% reduction) in comparison to untreated animals. • Results support clinical development of a therapy based on prophylactic TLR2/6 innate immune activation in the URT, to reduce SARS-CoV-2 transmission and provide protection against COVID-19.
04.12.2020	Characteristics and Timing of Initial Virus Shedding in Severe Acute Respiratory Syndrome Coronavirus 2, Utah, USA	Emerg Infect Dis / Article	• Investigation of household transmission in 5 households with daily specimen collection for 5 consecutive days starting a median of 4 days after symptom onset in index patients. • 7 contacts across 2 households implementing no precautionary measures were infected: 2 tested positive on day 3 of 5. Both had mild, nonspecific symptoms for 1–3 days preceding the first positive test. SARS-CoV-2 was cultured from the fourth-day specimen in 1 patient and from the fourth- and fifth-day specimens in the other. • Authors also describe infection control measures taken in the households that had no transmission. • Persons exposed to SARS-CoV-2 should self-isolate, including from household contacts, wear a mask, practice hand hygiene, and seek testing promptly.

Produced by the PHE COVID-19 Literature Digest Team

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