COVID-19 Research Watch
November 30, 2020

PATHOPHYSIOLOGY

SARS-CoV-2, SARS-CoV, and MERS-CoV viral load dynamics, duration of viral shedding, and infectiousness: a systematic review and meta-analysis

The authors conducted a systematic review and meta-analysis to evaluate and compare viral load kinetics, duration of viral shedding, and viable virus of SARS-CoV-2, SARS-CoV and MERS-CoV. The mean duration of SARS-CoV-2 RNA shedding was 17 days in the upper respiratory tract (URT), 14.6 days in the lower respiratory tract (LRT), 17.2 days in stool, and 16.6 days in serum. Increased patient age was associated with prolonged SARS-CoV-2 shedding as well. Finally, the authors found that SARS-CoV-2 viral load in the URT peaked during the first week of illness, as compared to SARS-CoV (days 10-14) and MERS-CoV (days 7-10). This peak of viral shed provides important insight into the optimal time for clinical case diagnosis and highlights the effectiveness of case investigation and public education as key to containing SARS-CoV-2.

ZOONOSES

Recurrent mutations in SARS-CoV-2 genomes isolated from mink point to rapid host adaptation

Given evidence of SARS-CoV-2 transmission on mink farms across Europe and in the USA, Van Dorp et al. sought to investigate secondary transmission of SARS-CoV-2 between humans and minks. By screening 239 publicly available viral genome assemblies from farmed mink in the Netherlands and Denmark, the authors detected 23 recurrent mutations of the virus, including three nonsynonymous mutations in the receptor binding domain (RBD) of SARS-CoV-2 spike protein. Based on repositories of SARS-CoV-2 strains circulating in humans, the mink-adapted mutations have occurred at a very low frequency, leading the authors to suggest these mutations should not increase virus transmission in humans. However, Van Dorp et al. suggest those mutations within the RBD spike protein should be monitored as it may have implications for antigenic response.

Of note, The Lancet Infectious Diseases published a Comment by Dr. Marion Koopmans on the culling of mink in Denmark, reiterating the importance of surveillance for spillover of SARS-CoV-2.

* Please note all studies published in medRxiv and bioRxiv are preprints and have not yet undergone a rigorous peer review process.

NON-CLINICAL TRENDS

Racial disparities in COVID-19 mortality are driven by unequal infection risks

Researchers studied the effects of race, ethnicity, age and socioeconomic status on disparities in mortality from COVID-19 by looking at exposure, infection and case-fatality
rates. They analysed data from 49,701 probable and confirmed COVID-19 cases and 5,815 deaths recorded by the Michigan Disease Surveillance System from March 8 through July 5, 2020. Of those individuals included in the study, 19,662 identified as Black or African American, 23,301 as White, 1,346 as Asian or Pacific Islanders, 123 as Native Americans, and 1,612 people identified as the ‘other’ category. The overall case-fatality was 12%. Results showed that the average age for cases who identify as White was 53.4, for those identifying as Black, 51.4, and for Latinos, 38.1. The average age for death was 79.2 for Whites, 71.2 for Blacks, and 66.7 for Latinos. Compared to those identifying as White, there were higher rates of incidence and deaths per 100,000 people in all groups other than Native Americans. Furthermore, in comparison to Whites, there were much higher age-specific incidence rates for Blacks ages 30-70, which was more prominent among 40-49-year olds. Additionally, infection rates were 6-8 times higher for Blacks than Whites, which largely caused increased mortality rates. However, race is not the only factor affecting health conditions and researchers urge for dismantling systemic conditions that cause greater incidence and mortality of disease for some groups over others.

PHARMACEUTICAL INTERVENTIONS

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

Results from a phase 1/2 trial of the ChAdOx1 nCoV-19 vaccine, a replication-defective chimp adenovirus-vectored vaccine with the SARS-CoV-2 spike glycoprotein gene, showed that the vaccine is safe and effective at generating antibodies in young adults. To test efficacy and safety in older adults, researchers conducted a single-blind, multi center, randomized and controlled phase 2/3 trial study in adults aged 18-55, 56-69, and 70 years and older. All three groups were randomly assigned to experimental or control vaccines. Overall, 560 people participated in the study, with 160 people in the 18-55 age group (100 in experimental group and 60 in control), 160 in the 56-69 age group (120 in experimental group and 40 in control), and 240 people aged 70 or older (200 in experimental group and 40 in control). Results showed that the vaccine was safe in older adults, with lower reactogenicity compared to younger adults. Furthermore, immunogenicity was similar in all age groups after a booster vaccine with response to spike glycoprotein 28 days after a single dose. Systemic adverse events were mild to moderate, and any serious adverse events were judged unrelated to the study. Overall, this study shows the potential of this vaccine in older and more vulnerable populations. Phase 3 trials are currently ongoing in Brazil, UK and the US.

CLINICAL PRESENTATION AND MANAGEMENT

Comprehensive health assessment three months after recovery from acute COVID-19

The authors aimed to assess the health domains in patients three months after recovery from acute COVID-19. The prospective observational study in Nijmegen, the Netherlands
reported on 124 patients (27 with mild, 51 with moderate, 26 with severe, and 20 with critical disease) who attended the COVID-19 aftercare facility at Radboud university medical center. Results showed critical disease patients were younger and predominantly male compared to moderate to severe disease patients. Of the moderate to critical disease patients, 29% had no comorbidities and critical disease patients had less comorbidity than moderate-severe disease patients. In 42% of discharged patients, lung diffusion capacity was below the lower limit of normal. Of discharged patients, 99% had reduced ground-glass opacification on repeat CT imaging and 93% of patients with mild diseases had a normal chest x-ray. Of the discharged patients, 91% had residual pulmonary parenchymal abnormalities and correlated with reduced lung diffusion capacity. Problems with mental and cognitive function were found in 36% of patients, 22% had low exercise capacity, and 19% low fat-free mass index. The study found a generally poor health status in the domains functional impairment (64%), quality of life (72%), and fatigue (69%). The authors conclude that although the pulmonary parenchyma markedly recovered, patients had a lower long function, and many patients suffered from health problems in different domains. Longer follow-up studies are needed to find predictors of long-term trajectories, explain natural trajectories of COVID-19 recovery, and strategies to decrease long-term COVID-19 morbidity.

NON-PHARMACEUTICAL/PUBLIC HEALTH INTERVENTIONS

Ct values and infectivity of SARS-CoV-2 on surfaces

This report aimed to determine if a person with a positive SARS-CoV-2 PCR test result is inherently infectious or only if the cycle threshold (Ct) of their PCR test is below an epidemiologically relevant value. Kampf et al. identified 6 studies on surface contamination with SARS-CoV-2 using a MEDLINE search through October 6, 2020. Results indicate that infectious SARS-CoV-2 was not detected on any surface in 5 out of the 6 studies. In one study, infectious virus was detected in 9.2% of samples due to one patient with persistent cough and sputum spitting. These findings support data demonstrating Ct values of 29.3 for steel surfaces and 29.5 for plastic surfaces correlate with detection of culturable SARS-CoV-2 virus whereas Ct values of 32.5 for steel and 32.7 for plastic correlate with non-culturable virus. In workplaces, the authors found that only 5 of 841(0.6%) employees tested positive for SARS-CoV-2 over a two-week period with Ct values between 33-36. Only 44 (0.8%) of the 5500 surface samples were positive, indicating viral loads were low on surfaces. The authors suggest that disinfection of surfaces may lead to increased diversity of resistance genes and therefore surface disinfection with biocidal agents should only occur when there is evidence of contamination with a sufficient amount of infectious virus that cannot be controlled by hand washing or surface cleaning.

ADDITIONAL RESOURCES

UCSF Library COVID-19 Research and Information Resources
UCSF Institute for Global Health Sciences COVID-19 Resources
UC Davis One Health Institute COVID-19 FAQs
Harvard Viswanath Lab Myths vs Facts
Note on this Document: This document was assembled by graduate and doctoral students attending the University of California, San Francisco with the intent of facilitating the rapid dissemination of information to the global community in order to help during this time. Hannah Thomas, Anika Kalra, and Micaela Reyna contributed to these summaries. This work is volunteer based.

References: