

Aerosol Particulates, SARS-CoV-2, and the Broader Potential for Global Devastation

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Abstract

Particulate pollution has multiple, well-known, serious adverse consequences on human and environmental health. Airborne transmission has been identified as the dominant route in the global spread of COVID-19. Several lines of evidence now point to particulate pollution as a possible co-factor in the COVID-19 Pandemic, specifically, as a potential means of viral transport, and as a role in exacerbating susceptibility and mortality, and diminishing immune response to the SARS-CoV-2 virus. The association of particulate pollution with the COVID-19 Pandemic is a wake-up call to humanity that foreshadows even greater global devastation through undisclosed particulate pollution. Even in the midst of this Pandemic, we submit, the medical and public health community and others must demand a full and open accounting of all that transpired with respect to the causality of and response to the SARS-CoV-2 virus, including deliberate aerosol particulate pollution.

Keywords: COVID-19; Particulate pollution; ENMOD; Aerosol particulates; Particulate jet-emplacement; Environmental modification.

INTRODUCTION

The COVID-19 Pandemic, due to the SARS-CoV-2 virus, is a wake-up call to humanity, reminding us of our vulnerability and the necessity for global integrity with regard to human and environmental health. Liquid particulates, especially exhaled bioaerosol droplets, are frequently discussed in connection with person-to-person viral transmission [1-3]. The recent studies reviewed here, however, highlight the importance of solid particulate pollution as a potential means of its viral transport, and its role in exacerbating susceptibility and mortality, and diminishing immune response. Particulate pollution solids portend even greater global devastation.

METHODS

Review articles are written in different ways to achieve different results [4,5]. The approach we use in this review is to gather seemingly unrelated facts scattered through the literature, which when arranged logically, reveal causal relationships and lead to new understanding [6]. Detailed multi-discipline

literature searches were conducted to reveal medical connections and implications between the SARS-CoV pandemic and particulate aerosol pollution.

DISCUSSION

SARS-CoV-2 – Particulate Association

In 1989 Hammond et al. [7] postulated that atmospheric dispersion and intercontinental transport of aerosolized influenza virus may contribute to the “spread, persistence, and ubiquity of the disease, the explosiveness of epidemics, and the prompt region-wide occurrence of outbreaks.” In 2006, Tellier [8] reviewed the evidence that infectious influenza virus is transported by aerosol particles. In 2015, Bao et al. [9] investigated the three dimensional microstructure of aerosol particles, and noted that coal fly ash, a major pollutant, contains many pores which may be possible virus carriers. They suggest that transmission of pandemic influenzas by this mechanism potentially explains long-distance transmission. As both are airborne contagion, those implications for influenza [10,11] also apply to the SARS-CoV-2 virus [12,13].

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The observed correlation between the high levels of lethality of SARS-CoV-2 and atmospheric pollution in Northern Italy led Conticini et al. [14] to suggest that atmospheric pollution might be a co-factor for COVID-19. A similar conclusion was reached for a different viral illness by Su et al. [15] who found that air pollutants can increase the risk of influenza-like illness. Particulate pollutants also degrade immune defense mechanisms [16,17].

Setti et al. [18] discovered the first preliminary evidence indicating the existence of SARS-CoV-2 on collected samples of outdoor, airborne, particulate matter (PM) from an industrial site in the high-lethality [19] Province of Bergamo in Northern Italy. A large-scale epidemiological investigation in the United States found that an increase of 1 (one) $\mu\text{g}/\text{m}^3$ in $\text{PM}_{2.5}$

is associated (at a 95% confidence interval) with a 15% increase in the SARS-CoV-2 death rate [20].

Nature of Particulate Pollution

Particulate pollution is usually thought to arise from natural sources, e.g. windblown sand and forest-fire ash, or from anthropogenic sources, e.g. machine abrasion, fossil fuel emissions, and coal combustion. There is a more pernicious source of particulate pollution that is being deliberately and covertly jet-emplaced into the troposphere on a near-daily, near global basis, and which evidence indicates is mainly coal fly ash, the abundant waste product of coal burning [21-23]. This particulate pollution is typically evident as white (occasionally black) trails across the sky, that spread out, briefly resembling cirrus clouds, before becoming a white haze, as shown in Figure 1.



Figure1. Deliberate jet-emplaced particulate trails, clockwise from top left San Diego, California, USA; Karnack, Egypt; London, England; Danby, Vermont, USA; Luxembourg; Jaipur, India.

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The jet-dispersal of particulates into the troposphere has been undertaken with ever-increasing frequency, intensity, and geographical range for more than a decade without regard for public health. Moreover, concerted efforts are made [24,25] to deceive the public into believing that the aerial particulates are harmless ice-crystal contrails from aircraft engine exhaust-moisture. That contrail-deception is contrary to scientific evidence based upon radiometric measurements [22] and observations [23], including the lower-right photograph of Figure 1 that shows black trails that cannot be composed of ice-crystals.

Even commercial airlines are involved in the deliberate atmospheric pollution [23]. Aside from the health risks arising from the aerosolized particulate-matter itself, lack of high-level security at airports affords 'bad actors' a potential opportunity to engage in biological warfare by contaminating the commercial airlines' aerial feed-stock.

Activities that pose risks to human health should never be cloaked in secrecy; the human and environmental

health risks should be revealed, not misrepresented, including their legal basis. The supposedly legal basis of the undisclosed, deliberate particulate pollution was a mystery [26] until we cracked the code [27]. As shown in Figure 2, numerous nations signed on to a *Trojan horse* treaty [28] entitled "*Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques*" [hereafter ENMOD]. Trojan horse is an appropriate descriptor as ENMOD does not do what its title indicates, but instead it sanctions the use of "*environmental modification techniques*" for "*peaceful purposes*" and, moreover, obligates each signatory "State Party" to cooperate in unspecified environmental "*improvement*" operations by an unspecified international organization for unspecified purposes [27]. As used in that treaty [28] "*the term 'environmental modification techniques' refers to any technique for changing – through the deliberate manipulation of natural processes – the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space.*"

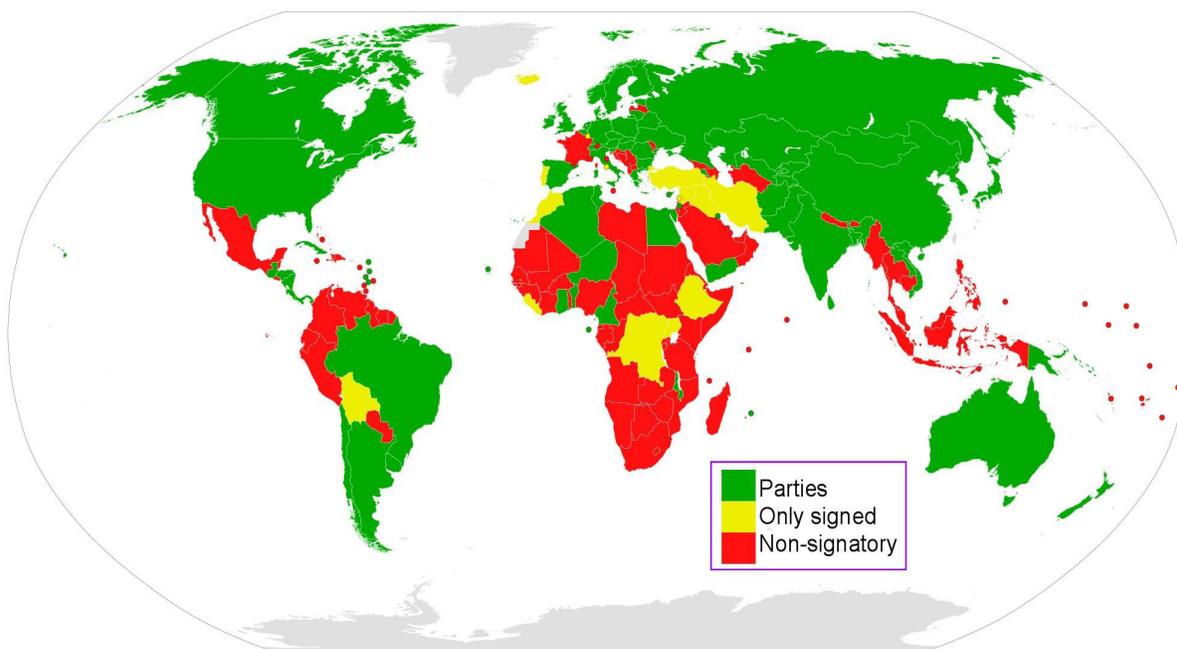


Figure2. ENMOD status of sovereign nations as of January 3, 2018. From [27].

Particulate matter jet-sprayed into the troposphere reduces atmospheric convective heat-loss from the surface, producing local and/or global warming [29-31] and potentially melting polar ice [32,33]. Moreover, the jet-sprayed particulates disrupt stable weather patterns and habitats [23,34-37], producing droughts,

floods, and crop failures [26,38], decimating bat [39], bird [40], and insect [41] populations, worsening wildfires [23], killing forests [42], facilitating harmful aquatic algae [43], enabling pestilence [44], and destroying the ozone layer [45]. In short, global environmental warfare [46].

Air pollution is the leading environmental cause of morbidity and mortality worldwide [47,48]. Particulate matter with combustion-morphology has been found in the brains of persons with dementia [49]. Numerous reactive iron magnetic particulates were found in the hearts of persons from highly polluted areas [50]. Particulate air pollution is a significant contributor to heart, stroke, and neurodegenerative disease [49-52] and is a risk factor for increased premenopausal breast cancer [53], decreased male fertility [54], cognitive decline [55-58] and for Alzheimer's Dementia later in life [55]. Particulate air pollution is also a risk factor for children having cognitive defects [57,58] and for Autism Spectrum Disorder in children [59,60].

Particulate air pollution is a major contributor to respiratory diseases, including lung cancer [61], COPD [62], respiratory infections [63], and asthma [64]. PM_{2.5} injury mechanisms include free radical peroxidation, oxidative stress, imbalanced intracellular calcium homeostasis, and induction of inflammatory processes [65]. Pollution particles can deposit throughout the respiratory track and, if sufficiently small, can enter the bloodstream [ref] and deposit in the brain [49] or heart [50]. PM_{2.5} exposure is associated with lower respiratory tract infection in children and adults [66]. It is not surprising, therefore, that particulate air pollution exposure predisposes individuals to increased lethality from SARS-CoV-2 [20].

Previous experimental and observational studies on interhuman transmission have shown a significant role of aerosols in the transmission of respiratory viruses including influenza, SARS-CoV-1, and Middle East Respiratory Virus (MERS). Airborne transmission was recently established as the dominant route of spread of COVID-19 [67]. Inhalation of virus-laden fine particles deep into the nasopharynx, tracheobronchial area, and lungs would certainly increase the chance of multisystem infection by COVID-19. Investigations of adsorption and survival of COVID-19 on the surface of particulate matter and mechanisms of virus-particle entry into the body are needed to better understand the role of air pollution in COVID-19 transmission [68]. It is likely that long-term (and cumulative) exposure to air pollutants is one of the most important contributors to the spread and severity of COVID-19 on a world-wide basis [69].

CONCLUSIONS

The COVID-19 Pandemic should give humanity serious

pause for reflection. The SARS-CoV-2 virus might return in a more aggressive form; other pandemics will inevitably follow. Through arrogance and blind obedience, sovereign nations have opted to participate in modifying our planetary environment and have done so without question, without public disclosure, and without informed consent [22,23]. Life is possible because of the multitude of complex interactions by and between biota and their respective environments. Environmental modification cannot be *peaceful*, but is extremely hostile – de facto environmental warfare. The suffering and global devastation caused by the SARS-CoV-2 virus on a short time-frame prefigures the slow planetary demise that will inevitably result from continued application of the Trojan horse ENMOD treaty [28] “*through the deliberate manipulation of natural processes – the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space.*”

In the aftermath of the COVID-19 Pandemic, we submit, the medical and public health community and others should demand a full and open accounting of all that transpired with the causality of and response to the SARS-CoV-2 virus; steps should be taken to prevent its ever happening again. The steps to be taken should include ending forever the deliberate aerial particulate pollution and the revocation of the deceptive ENMOD treaty [28] by each of the signatory nations.

Abbreviations

COVID-19: coronavirus disease 2019; SARS-CoV-2: severe acute respiratory syndrome coronavirus. ENMOD: Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques.

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