Social Antiviral System

On use of Telecommunications Technologies to stop the spread of Aerosolized Viral Particles and Prevention of Pandemics

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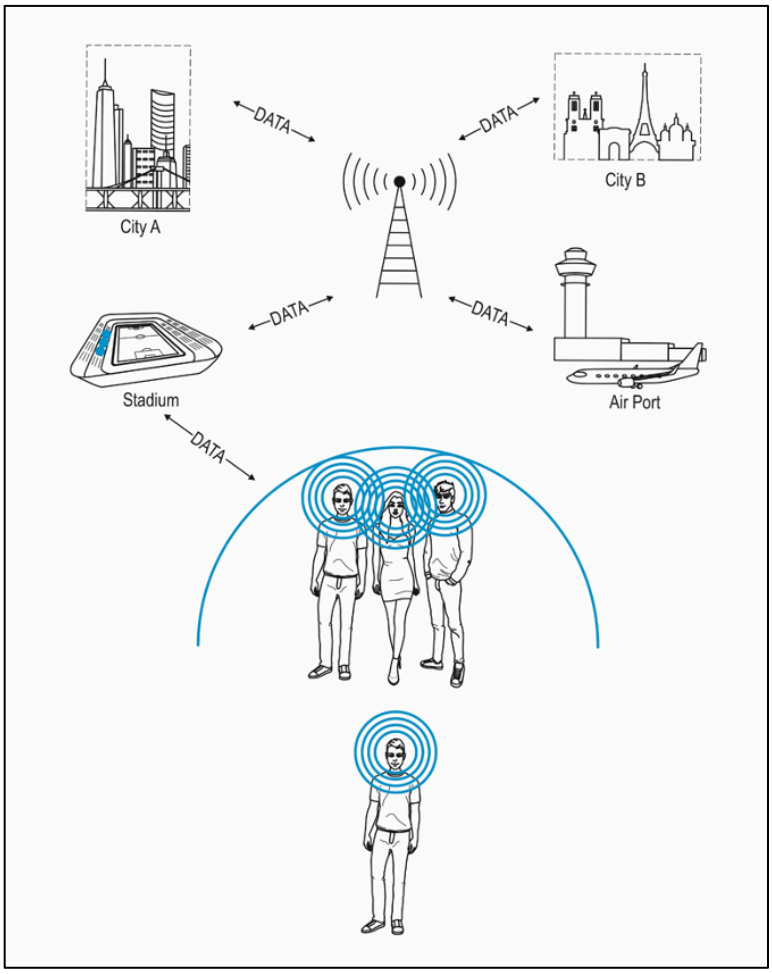

THE SAS NETWORK

PCT patent examiners have allowed claims on a Social Antiviral System [1]. This system can detect and eradicate aerosolized viral strains, regardless of their pathogenicity or source of origin. The Social Antiviral System will quash viral outbreaks before they become global pandemics.

We have never imagined a world without pandemics. Perhaps this is because no government, academic or private institution has ever designed a response specifically for *aerosolized viral threats.* Instead, there has been a reflexive decision to repurpose existing modalities that were primarily designed for bacterial threats [2 3 4 5]. This decision fails to account for the fundamental differences between viruses and bacteria. Failing to account for these differences has created massive gaps in our public health strategy. These gaps remain largely unseen because of the selective and relatively low mortality rate of the Covid-19 pandemic. Though death and long-term complications from COVID-19 are too high, future pandemics may be much worse [6]. If the next viral pandemic is unselective and as deadly as the Spanish flu pandemic of 1918, then losses may become so staggering that humanity may be forced to look outside the box for a new solution [7 8 9 10]. We can develop that solution now, before the next pandemic arrives, by appreciating the differences between virus and bacteria. Understanding these differences must be the foundation for responding to future pandemics.

Viral and bacterial threats differ in their mutation capability and susceptibility to therapeutics. RNA viruses can mutate up to 10,000 times more rapidly than DNA viruses and bacteria. Viruses are more resilient because they lack their own energy and cellular mechanisms, which are targeted by therapeutics. This resilience means that new viral threats are largely invulnerable to the collection of therapeutics that science has already discovered [11].

Rapid mutation capability may enable viral threats to constantly evade and outpace the development of vaccines and therapeutics. This problem may become aggravated by further growth and development of pandemic biology. Gene-editing techniques can now manipulate the virulence and transmissibility of existing viral threats [12]. These techniques may also create entirely new threats from viral strains that were previously benign to humans. There are almost 700,000 viruses that could make the jump from animals to humans[13].

Scientists are now able to use experimental methods to produce gain of a desired function in a virus. These methods have generated viruses with properties that do not exist in nature. There has been artificial manipulation of viral pathogenicity, virulence, replication efficiency, and transmissibility[14].

Furthermore, viral aerosolized particles may not only travel like projectiles, but may also float and remain suspended in the air for extended periods of time[15 16 17 18 19]. If particles can behave this way, then it may be possible that infections can occur without any proximity to infected persons. Infection without proximity has been documented with Measles, Ebola, Smallpox and the Influenza virus [20 21]. Peer reviewed publications have shown that these viral particles can spread between isolation rooms, without any direct contact, even in a controlled laboratory setting. This is because some aerosolized viral particles may remain suspended in

the air for much longer periods of time than we believe. We should be concerned if viral suspension times can be enhanced either naturally through mutation or artificially through gain of function manipulation.

Just as nuclear physics led to the proliferation of nuclear weapons, pandemic biology may create threats that scientists cannot control. This may lead to global catastrophes. The struggle to control current viral threats exists because our personal protective equipment was not designed to prevent aerosolized viral transmission. Gloves, masks, gowns, and face shields have been repurposed from the healthcare industry to become public health safeguards. These modalities were originally designed to prevent bacterial wound infections in surgical settings. They were not designed to prevent transmission of aerosolized viral nuclei, which are up to 100 times smaller than bacteria [22]. Because of their smaller size, viruses are more easily aerosolized and capable of transmission without any direct physical contact or proximity.

Virology researchers understand this capability and they protect themselves from these particles by wearing self-contained space suits with independent respirators. Although it may be impractical to provide similar levels of protection for the global public, it may become necessary for future viral pandemics. The Social Antiviral System describes entirely new modalities and infrastructure to provide this level of protection. This system provides protection not by isolating the subject from the outside air, but instead by sanitizing the outside air before it reaches the subject [1]. This novel non-centralized process of air sanitation blocks transmission of aerosolized viral particles before they reach the mucosal membranes and cause infection.

To sanitize the air that surrounds each individual, the Social Antiviral System harnesses the strength of the most powerful disinfecting source, the sun [23] [24] [25] [26]. Scientists have studied the germicidal effects of the sun's energy for decades. They have recognized that viral transmission is far less likely to occur outdoors because of the sun's energy [27] [28]. Microbial pathogens, like viruses and bacteria, are highly susceptible to the phototoxic effects of visible light, ultraviolet light, and the other frequencies of the electromagnetic spectrum [26] [29]. Other industries have attempted to recreate the sun's germicidal effects indoors, with systems that artificially emit ultraviolet light to disinfect surfaces. However, these traditional systems have been unable to stop the spread of this viral pandemic. Four primary limitations prevent these systems from completely stopping aerosolized viral transmission. These systems are distance to source dependent, and dependent on exposure time [30]. Most of these systems cannot be safely used when humans are present, and none have focused their disinfecting power to the personal airspace surrounding the human face. Protecting this airspace is critical since it surrounds the mucosal membranes of the eyes, nose, and mouth. These membranes are the only means for aerosolized viral particles to enter the human body [31]. Aerosolized viral transmission can be completely blocked by protecting this airspace and addressing these limitations[1].

Most of these systems cannot operate when humans are present because they emit the whole spectrum of ultraviolet light, most of which is harmful to human eye and skin cells. Other systems emit only certain segments of ultraviolet light like FAR UVC, which is safe to humans. Yet even these systems can be ineffective because they require a specific distance to source and exposure time [30].

The distance to source problem exists because these systems typically emit ultraviolet light from a fixed position, like a wall or ceiling. The germicidal disinfection of ultraviolet light

decreases exponentially as the distance to source increases [32]. This creates an effective range for these systems, somewhere around eight feet. Objects or persons outside this range will not receive the maximum disinfecting effect of ultraviolet light. The fixed position of these systems also creates the exposure time problem. Maximum disinfecting effects requires that objects remain within effective range for extended periods of time, up to 30 minutes [30]. Human beings are mobile and dynamic creatures, and rarely stay in the same position for an extended period. Thus, even when humans get close enough to an emitting source, they may not remain there long enough to be disinfected.

Disinfecting power of ultraviolet light has not previously been focused to the human face because of safety concerns. Even though most of the ultraviolet spectrum is harmful, there is one segment which can safely be titrated to a dosage that is safe for humans yet still harmful to viruses. A “virus kill human safe” dosage of UVC 222nm at 2mJ/cm could be safely directed to the human face [33]. Directing this power to this area would effectively shield the mucosal membranes in the eyes, nose, and mouth from aerosolized viral particles [1].

It may also be possible to obtain “virus kill human safe” dosages of other segments of the electromagnetic spectrum. Identifying these dosages and matching their disinfecting power to aerosolized viral threats could give birth to a new defense science.

“Virus kill human safe” dosages could be deployed in a manner that solves both the distance to source and exposure time problems. Items we already possess could be retrofitted into “beacons” which emit disinfecting power. Our watches, phones, and clothing could easily be made into beacons with the addition of a few inexpensive electronic components [1].

Distributing disinfecting power amongst numerous beacons will also provide greater protection than a fixed and centralized emitting source. When persons gather and socialize, the power of the cumulative beacons will overlap. This overlap will create amplified strength for all who are within the field of protection. This distributed disinfection field will exponentially increase in strength as people increase in number.

There is a danger however, to constantly scrubbing and sanitizing the airspace that surrounds the human face. Constant sanitation of this airspace could weaken the normal development of our natural immune system. A constantly sterile environment reduces the body’s natural ability to fight infection by robbing it of necessary interaction with virus and bacteria. Sanitation must be used in a manner that augments that body’s own defenses, without shutting down all natural interaction with the microbial world. The Social Antiviral System can raise and lower its defenses as necessary, thereby preventing the human immune system from atrophying from nonuse [1].

For a system to know when it must raise and then lower its defenses, there must be active sensing and communication within that system. Sensors embedded in each beacon can read the viral nuclei count in the ambient air. Beacons can communicate this information with each other and venues like schools, restaurants, bars, and concerts. City and state governments can gather this information and automatically tune an appropriate response for the level of threat. This tuning can be accomplished through geolocation features and the “Internet Of Things.” By instantly detecting viral threats and responding to them automatically, this system could prevent outbreaks from becoming pandemics [1].

It is assumed that pathogens will inevitably reach the human body. It is assumed that viral threats can only be confronted inside the body, with therapeutics and vaccines. These

assumptions have not been challenged. No one has thought to confront aerosolized viral particles as they travel through the outside air, while they are exposed and most vulnerable. No one has thought of exploiting our knowledge of physics to prevent aerosolized infections from ever occurring. The behavior of aerosolized viral particles is a physical phenomenon not a biological one. The scientific understanding of this behavior is still in its infancy. The field of physics has not been utilized to address this threat. There has been an over reliance on the field of biology. Physics is not just for sending rockets into space, it could also be used for preventing pandemics.

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