



THE COVID-19 PANDEMIC AND CARDIOVASCULAR PATHOGENESIS

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ABSTRACT

The coronavirus disease 2019 (COVID-19) pandemic has not only caused respiratory problems that in many cases led to the death of the affected patient but has also caused significant cardiovascular diseases. The action of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) induces inflammatory disorders and dysregulation of the immune and cardiovascular systems with hypoxia and coagulopathy. In severe cases, COVID-19 can cause myocardial injury, with elevated cardiac biomarkers. COVID-19 often triggers a “cytokine storm,” where pro-inflammatory cytokines, such as interleukin (IL)-6, IL-1 β , and tumor necrosis factor (TNF), are released excessively. SARS-CoV-2 infection is associated with a high risk of blood clot formation due to systemic inflammation and endothelial injury and has a significant impact on the cardiovascular system, causing myocardial injury, heart failure, and thromboembolism with high mortality rates. Understanding these mechanisms may help improve the management of COVID-19-associated cardiovascular pathogenesis.

KEYWORDS: COVID-19, SARS-CoV-2, virus, infection, inflammation, cardiovascular, cytokine



ACTIVATION OF INNATE IMMUNITY BY SARS-COV-2

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ABSTRACT

In some patients with severe coronavirus disease 2019 (COVID-19), both the innate and adaptive immune responses are dysregulated. The activation of innate immunity in response to SARS-CoV-2 is an important early defence mechanism and its dysregulation is responsible for the onset of COVID-19. Innate immune cells such as macrophages, dendritic cells, and epithelial cells recognize SARS-CoV-2 that has entered host cells through pattern recognition receptors (PRRs). PRRs detect pathogen-associated molecular patterns (PAMPs), which are molecular structures of the virus. PRRs include Toll-like receptors (TLRs) and NOD-like receptors (NLRs). NLRs and NOD-like receptor protein 3 (NLRP3)s form inflammasomes, which are important for the inflammatory response. The excessive immune response can lead to the increased production of life-threatening inflammatory cytokines, and therefore, it is crucial to prevent the spread of SARS-CoV-2.

KEYWORDS: *Innate immunity, immunity, SARS-CoV-2, COVID-19, inflammation, cytokine, Toll-like receptor*



EPSTEIN-BARR VIRUS IS AN UBIQUITOUS ASYMPTOMATIC INFECTION IN HUMANS

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ABSTRACT

Epstein-Barr virus (EBV), and specifically human herpesvirus 4 (HHV-4), is one of the most common viruses in nature. EBV causes a very widespread and often asymptomatic infection in humans and infects about 90-95% of the world's population, with most people becoming infected during childhood or early adulthood. When EBV infection occurs in adolescence or adulthood, it can cause infectious mononucleosis, which is easily transmitted through saliva. Symptoms of mononucleosis include fever, sore throat, swollen lymph nodes, and fatigue. After the initial infection, EBV remains in the body where it can reactivate, usually without symptoms, but this can sometimes lead to complications. The disease can be associated with lymphomas, carcinomas, and autoimmune diseases such as multiple sclerosis (MS) and lupus. In summary, while EBV is widespread and usually asymptomatic, it can cause disease, particularly if it is contracted later in life or in immunocompromised individuals.

KEYWORDS: *Epstein-Barr virus, immunity, infection, mononucleosis, lymph node*



INACTIVATION OF SARS-COV-2 BY ULTRAVIOLET LIGHT IRRADIATION

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ABSTRACT

Ultraviolet (UV) light is categorized based on wavelength and includes long-wave UV light, short-wave UV light, and medium-wave UV light. UV light has the power to inactivate or kill viruses. Short-wave UV light is the most powerful and effective form for destroying viruses and other microorganisms. UV light irradiation has been studied as a method for inactivating SARS-CoV-2, the virus that is responsible for coronavirus disease 2019 (COVID-19). UV light destroys the virus's genetic material such as RNA and DNA, rendering it unable to replicate and infect host cells. The nucleic acids of viruses absorb the energy of UV light, causing the formation of pyrimidine dimers in their genetic material, as occurs in respiratory viruses such as SARS-CoV-2 and other influenza viruses. UV light can significantly reduce the infectiousness of SARS-CoV-2 and can be used to disinfect surfaces contaminated with the virus. Higher intensity doses and longer exposure times result in more effective SARS-CoV-2 inactivation. The use of UV light has been of great help in public health care settings to control the spread of COVID-19. It is clear that UV light is an efficient method for inactivating viruses, but it must be used with care to avoid harm to the skin, eyes, and other body tissues.

KEYWORDS: *Ultraviolet light, SARS-CoV-2, COVID-19, DNA, RNA, inactivation, wavelength*



STRESS AND MENTAL HEALTH DISORDERS INDUCED BY COVID-19

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ABSTRACT

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection caused the coronavirus disease 2019 (COVID-19) pandemic that has resulted in diverse mental disorders in patients including stress and anxiety. Stress is often caused by fear of contracting COVID-19, reduced social interactions, and isolation. Depression can be caused by many factors such as grief over the loss of loved ones and uncertainty about the future. In addition, sleep disturbances may occur during the pandemic due to increased stress and anxiety, exacerbating the mental state. From the data emerging on COVID-19, it has been noted that approximately 30% of patients have reported psychiatric and/or neurological disorders, including cognitive problems, anxiety, and depression. When COVID-19 disease is prolonged (long COVID), in addition to the symptoms of mental disorders described above, patients may also experience brain fog and chronic fatigue that contribute to stress. Various therapies such as relaxation exercises, meditation, and social contact have been used to alleviate stress due to COVID-19.

KEYWORDS: *COVID-19, SARS-CoV-2, mental disorder, fatigue syndrome, anxiety, depression*