

## REVIEW ARTICLE

# Role of Antimicrobial Peptides as Potential Arsenal Against SARS-CoV-2 and Other Pathogens

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## ABSTRACT

Antimicrobial peptides (AMPs) represent a diverse group of short peptides that are widely distributed across various organisms and serve as essential defense agents. Their crucial role in combating the escalating threat of antimicrobial resistance has heightened their significance in global research. This comprehensive review discusses the structures, characteristics, classifications, and mechanisms of action of AMPs, outlining their diverse biological functions. AMPs exhibit notable potential in antimicrobial, antiviral, antifungal, and antiparasitic activities, and have significant applications in immune response orchestration and anticancer therapies. Notably, this review highlights the emerging role of AMPs in combating the SARS-CoV-2, including their potential as a promising therapeutic strategy. Additionally, the potential utilization of AMPs in diagnostics, along with their prospects in the development of novel therapeutics, is thoroughly examined, underlining their significant clinical implications.

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## INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was initially detected in Wuhan, Hubei Province, China, in December 2019, and the current coronavirus disease 2019 (Covid-19) pandemic has swiftly spread around the globe (1). The United States, Brazil, India, Russia, Colombia, France, Italy, Mexico, Argentina are among the hardest hit nations as the Covid-19 pandemic has expanded to 200 countries throughout the world (2). As of the most current report from the World Health Organization (WHO) dated 7 January 2024, over 774 million confirmed cases and over seven million deaths have been reported globally (3). Antimicrobial peptides (AMPs) are short peptides that can be found in plants, bacteria, vertebrates, invertebrates, and other organisms as crucial defense chemicals that keep the host safe. There are more than 2,500 peptides

in the database (1,2), and a newly announced data store of antimicrobial peptides (updated 10/2016) has 17,360 sequences, including 4,582 available AMPs, 12,704 patented sequences, and 74 peptides in therapeutic development (3). According to Kurpe *et al.* (2020), AMPs can suppress viruses, which means they might be a viable option for combating SARS-CoV-2 (4). To limit viral infection, antiviral peptides either destroy the viral envelope, impede replication, or prevent the virus from attaching to host cells.

Antimicrobial resistance in microorganisms is increasingly problematic (5,6); hence, the discovery of novel antibiotics or other antimicrobial resources has become a pressing necessity all around the globe. AMPs could potentially be substituted for antibiotics owing to their crucial antibacterial functions and may be used to treat a wide range of bacteria, including drug-resistant ones (7). However, the mechanisms of action of several AMPs have not been elucidated fully, and further research is needed to establish the connection between various physicochemical characteristics to develop low-cost, extremely safe AMPs with exceptional