Cells 2025 Conference

The 3rd International Online Conference on Cells

25–27 March 2025 | Online

MDPI

Design of a Nasal Prophylactic for Targeting SARS-CoV-2 Variants with B-escin and Nanoparticles

Ilyes Zatla and Lamia Boublenza

Laboratory of Microbiology applied to the Food industry, Biomedical and the Environment, Faculty of Natural and Life Sciences, Earth and Universe Sciences. Department of Biology. University of Tlemcen, Tlemcen,13000, Algeria.

INTRODUCTION & AIM

The emergence of SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2) variants continues to challenge global healthcare systems, necessitating the exploration of innovative therapeutic modalities. This study proposes a novel nasal treatment approach leveraging the antiviral properties of Beta-escin (B-escin), a natural compound, in conjunction with gold and silver nanoparticles. B-escin, extracted from horse chestnut seeds, exhibits notable efficacy against coronaviruses, while nanoparticles offer advantageous features for targeted delivery and stability enhancement.

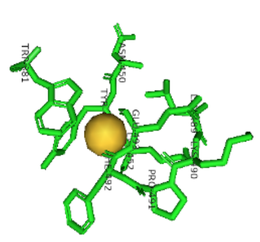
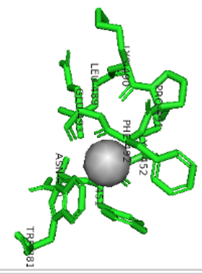
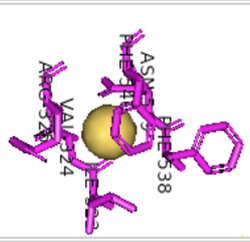
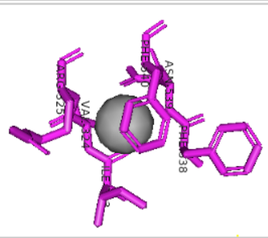
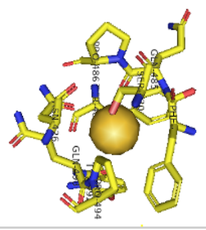
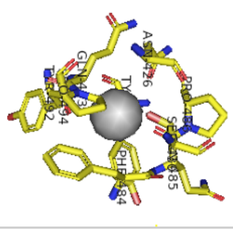
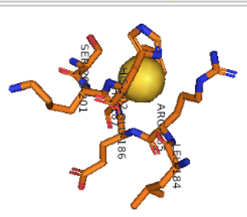
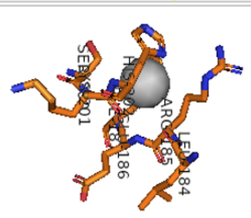
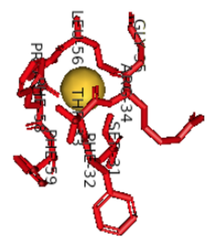
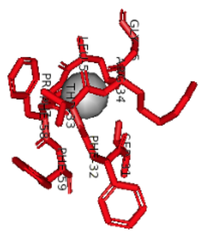
METHOD

Through integrated computational analyses encompassing molecular docking, molecular dynamics simulations, and quantum mechanical calculations, we assess the potential of this combined strategy against prevalent COVID-19 variants, including Alpha, Beta, Gamma, Delta, and Omicron. Specifically tailored for nasal administration, our investigation emphasizes the synergistic interactions between B-escin and nanoparticles, elucidating their collective impact on variant-specific viral targets within the nasal mucosa.

DISSCUSSION

The computational results indicate augmented antiviral activity and target specificity when combining B-escin with gold (Au) and silver (Ag) nanoparticles, surpassing individual treatment efficacy. Moreover, we investigate the influence of nanoparticle characteristics, such as size, morphology, and surface functionalization, on the observed synergistic effects.

RESULTS

AuNPs	AgNPs	Ligand
		ACE2-Spike Alpha variant
		ACE2-Spike Beta variant
		ACE2-Spike Delta variant
		ACE2-Spike Omicron variant
		ACE2-Spike Gamma variant

CONCLUSION

These findings underscore the promise of developing a nasal treatment utilizing natural compounds and nanotechnology, offering a potential frontline defense against the diverse spectrum of SARS-CoV-2 variants.

FUTURE WORK / REFERENCES

Zatla I, Boublenza L. Battling COVID-19 leveraging nanobiotechnology: Gold and silver nanoparticle–B-escin conjugates as SARS-CoV-2 inhibitors. *Open Life Sciences*. 2025;20(1): 20221047. https://doi.org/10.1515/biol-2022-1047