Editorial

ACE-2-Expressing-lung-exosomes inhalation for prophylactic protection against COVID-19

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Attapon Cheepsattayakorn,[1,2,3,4] Ruangrong Cheepsattayakorn,[5] Porntep Siriwanarangsun[2]

[1]Faculty of Medicine Vajira Hospital, Navamindradhiraj University, Bangkok, Thailand
[2]Faculty of Medicine, Western University, Pathumtani Province, Thailand
[3]10th Zonal Tuberculosis and Chest Disease Center, Chiang Mai, Thailand
[4]Department of Disease Control, Ministry of Public Health, Thailand
[5]Department of Pathology, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand

Correspondence: Attapon Cheepsattayakorn, 10th Zonal Tuberculosis and Chest Disease Center, 143 Sridornchai Road Changklan Muang Chiang Mai 50100, Thailand, Tel 66 53 140767, Email Attapon1958@gmail.com

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SARS-CoV-2 infectivity depends on binding its S protein with the entry-receptor " hACE-2 " a promising strategic treatment, therefore, is this interaction inhibition.[1–3] Some SARS-CoV-2 variants, such as B.1.1.7 (Alpha), B.1.617.2 (Delta), and B.1.1.529 (Omicron) variants were highly resistant to mRNA-1273 vaccine-induced humoral immunity or BNT162b2.[4–6] A recent study demonstrated that in a female mouse model, inhalation of ACE-2-expressing-human-lung-spheroid-cells (LSC)-derived exosomes (LSC-Exo) (Figure 1) could protect the host throughout the whole lung by biodistribution and deposition against COVID-19 (SARS-CoV-2) infection by SARS-CoV-2 binding, blocking the interaction of host cells with SARS-CoV-2, and virus neutralization both in vitro and in vivo.[7] This study also revealed decrease of viral loads and protection of SARS-CoV-2-induced disease.[7] Three different types of inhalation devices are commonly used; jet, ultrasonic, and vibrating mesh (all are nebulizer) (Figure 2).[8] In non-human primates and rats studies, when nebulized with eFlow, human immunoglobulin preparations were deposited into the airways as well as treated-lung alveoli.[9] VR942, an anti-interleukin (IL)-13 mAb is a first-in-class for dry-powder inhalers (DPIs).[10]

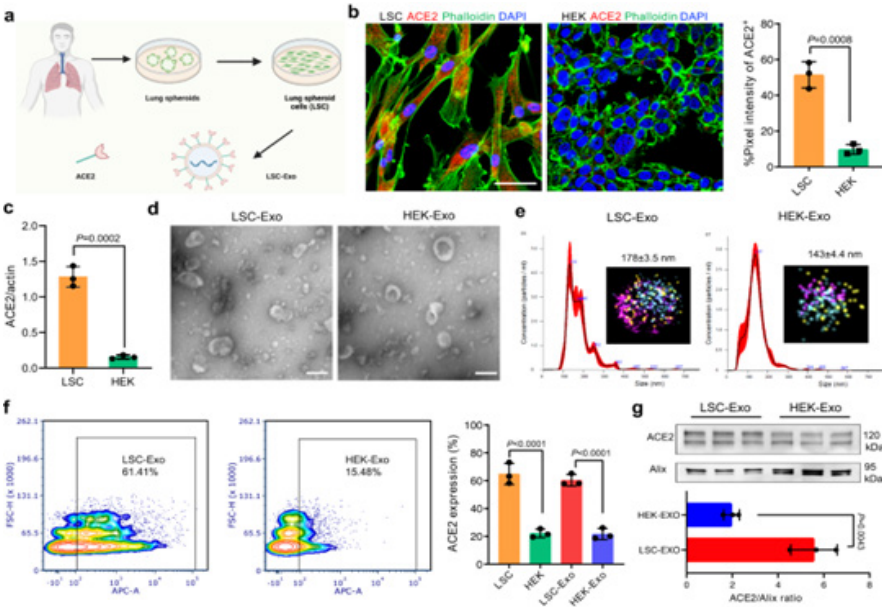

Figure 1

a. Demonstrating extraction scheme of LSC and LSC-Exo from healthy donors, created with Biorender.com.

b. Demonstrating immunofluorescence staining and quantification analysis of ACE-2 on LSC and HEK. Scale bar: 50μm. *n*=3.

c. Demonstrating Western blot quantification of ACE-2 expression in LSC and HEK, which derived from the same experiments and processed in parallel. *n* = 3.

d. Demonstrating representative TEM images of LSC-Exo and HEK-Exo from 3 independent experiments. Scale bar: 100μm.

e. Demonstrating measurements of size distribution of LSC-Exo and HEK-Exo via nanoparticle tracking analysis. Inset: 3-colar dSTORM image of CD63-Alexa Fluor®-488, PE-CD9, APC-CD81 of LSC-Exo or HEK-Exo.

f. Demonstrating quantification of ACE-2 expression on LSC-Exo and HEK-Exo by flow cytometry. *n*=3.[7]

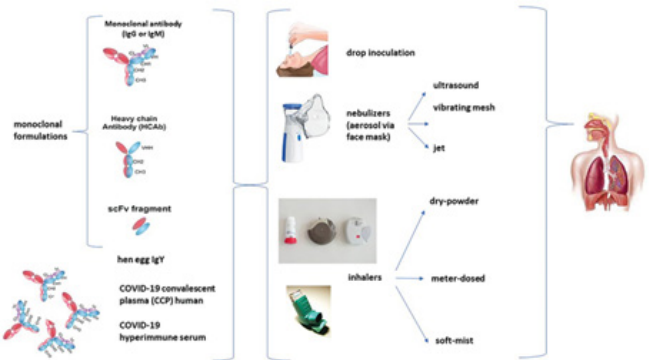

Figure 2 Demonstrating potential therapeutic approaches for respiratory delivery of passive immunotherapeutics against SARS-CoV-2 (COVID-19).[8]

In conclusion, ACE-2-expressing-human-lung-spheroid-cells-derived exosomes could be a promising-broad-spectrum bioprotectant against SARS-CoV-2 variants and other emerging virus variants.

Acknowledgments

None.

Conflicts of interest

None.

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