**Vaccinia virus-based vaccines confer protective immunity against SARS-CoV-2 virus in Syrian hamsters**

Rakesh Kulkarni1,2, Wen-Ching Chen2, Ying Lee2, Chi-Fei Kao2, Shiu-Lok Hu3, Hsiu-Hua Ma4, Jia-Tsrong Jan4, Chun-Che Liao5, Jian-Jong Liang5, Hui-Ying Ko5, Cheng-Pu Sun5, Yin-Shoiou Lin5, Yu-Chiuan Wang5,6, Sung-Chan Wei2, Yi-Ling Lin5,7,Che Ma4, Yu-Chan Chao2, Yu-Chi Chou 7, and Wen Chang1,2\*

1Molecular and Cell Biology, Taiwan International Graduate Program, Academia Sinica and Graduate Institute of Life Science, National Defense Medical Center, Taipei, Taiwan.

2Institute of Molecular Biology, Academia Sinica, Taipei, Taiwan.

3Department of Pharmaceutics, University of Washington, Box 357610, 1959 NE Pacific Street, Seattle, WA 98195-7610, USA.

4Genomics Research Center, Academia Sinica, Taipei, Taiwan.

5Institute of Biomedical Sciences, Academia Sinica, Taipei, Taiwan.

6 Academia Sinica SPF Animal Facility, Academia Sinica, Taipei, Taiwan.

7Biomedical Translation Research Center (BioTReC), Academia Sinica, Taipei, Taiwan.

**Abstract:**

COVID-19 in humans is caused by Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) that belongs to the beta family of coronaviruses. SARS-CoV-2 causes severe respiratory illness in 10-15% of infected individuals and mortality in 2-3%. Vaccines are urgently needed to prevent infection and to contain viral spread. Although several mRNA- and adenovirus-based vaccines are highly effective, their dependence on the “cold chain” transportation makes global vaccination a difficult task. In this context, a stable lyophilized vaccine may present certain advantages. Accordingly, establishing additional vaccine platforms remains vital to tackle SARS- CoV-2 and any future variants that may arise. Vaccinia virus (VACV) has been used to eradicate smallpox disease, and several attenuated viral strains with enhanced safety for human applications have been developed. We have generated two candidate SARS-CoV-2 vaccines based on two vaccinia viral strains, MVA and v-NY, that express full-length SARS-CoV-2 spike protein. Whereas MVA is growth-restricted in mammalian cells, the v-NY strain is replication-competent. We demonstrate that both candidate recombinant vaccines induce high titers of neutralizing antibodies in C57BL/6 mice vaccinated according to prime-boost regimens. Furthermore, our vaccination regimens generated TH1-biased immune responses in mice. Most importantly, prime-boost vaccination of a Syrian hamster infection model with MVA-S and v-NY-S protected the hamsters against SARS-CoV-2 infection, supporting that these two vaccines are promising candidates for future development. Finally, our vaccination regimens generated neutralizing antibodies that partially cross-neutralized SARS-CoV-2 variants of concern.

**Biography of presenting author** (should not exceed 100 words)

Mr. Rakesh Kulkarni is currently a final year PhD student in Taiwan International Graduate Program – Molecular and Cell Biology (TIGP-MCB) at Institute of Molecular Biology, Academia Sinica, Taiwan. He received his master’s degree in biochemistry from Osmania University, Hyderabad, India.

**Details of presenting author to be mentioned in the certificate:**

Name: Rakesh Kulkarni

Affiliation: Institute of Molecular Biology, Academia Sinica

Country: Taiwan

**Other Details:**

Presentation Category: (Oral Presentation)

Session Name:

Email: rakeshkulkarni10@gmail.com

Alternative email: rakeshkulkarni8@gate.sinica.edu.tw

Contact Number: +886-2789-9230

Twitter/Facebook/LinkedIn:

Recent Photograph: (High Resolution)

