


## Letter to Editor

## The potential efficacy of influenza vaccines in prevention from cardiovascular complications of COVID-19

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Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) were initially reported from Wuhan, China, and declared as a pandemic in early 2020 (1). Despite a high number of clinical trials, there is no specific treatment strategy for COVID-19 yet. As a result, the best option against COVID-19 is still prevention. Also, because the long-term efficacy and safety of existing COVID-19 vaccines have not been assessed, evaluation of the efficacy of other vaccines, especially the influenza vaccine on SARS-CoV-2 and its complications might be helpful.

### Cardiovascular complications of COVID-19 and its potential mechanisms

COVID-19 affects the lung in addition to other systems including renal, skin, gastrointestinal, endocrine, neural, and cardiovascular systems (2). In terms of cardiovascular complications, it can cause myocardial injury, arrhythmia, acute coronary syndrome (ACS), and thromboembolism (3).

Some potential mechanisms that contribute to cardiovascular complications in patients

with COVID-19 include inflammatory responses, cytokine storms, and endothelial damage which lead to hypercoagulability and myocardial injury due to hypoxia (3, 4). Also, the article by Nishiga et al. showed that the interaction between viral S protein and human angiotensin-converting enzyme 2 (ACE2), as well as high expression level of ACE2 on the heart and coronary arteries, can lead to the development of cardiovascular diseases (3).

### Cardiovascular complications of influenza virus and its potential mechanisms

Influenza virus can cause a range of cardiovascular manifestations, including myocarditis, pericarditis, sudden death, and changes in electrocardiogram (ECG) patterns or cardiac enzymes which could be due to myocardial involvement or exacerbation of their underlying diseases (5). Despite SARS-CoV-2, the influenza virus trigger destabilization of vulnerable plaques which might be a mechanism of its cardiovascular manifestations (6).

### Influenza vaccine and COVID-19

Our recent systematic review and meta-analysis showed that the influenza vaccine has protective effects on cardiovascular diseases (7). Also, Lanthier et al. showed that live attenuated influenza vaccines (LAIVs) can decrease viral titers and inflammatory responses by T cell response, especially CD8<sup>+</sup> T-cells and B-cell responses by producing antibodies against hemagglutinin (HA) and neuraminidase (NA) surface antigens in mice, although its mechanism in human is not clear (8). A study on 93 patients affected with SARS-CoV-2 in China, showed that acute cardiac injury was significantly higher in deceased patients who co-infected with influenza virus and SARS-CoV-2 compared to those with isolated SARS-CoV-2 infection (p-value=0.04) (9).

Regarding the above-mentioned issues, cardiovascular complications of COVID-19 are not as common as pulmonary complications, while they could be life-threatening. Also, because there is no prevention strategy with appropriate safety and efficacy for these complications, researchers and clinicians are recommended to evaluate different strategies. Effects of influenza vaccines on reducing inflammatory responses and robust immune system, as well as decreasing probability of SARS-CoV-2/influenza co-infection make it a strategy for prevention from cardiovascular events in patients with COVID-19. We suggest further preclinical and clinical researches be conducted to determine the efficacy of influenza vaccines in the reduction of cardiovascular complications in patients with COVID-19 (10).

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### ***Conflict of interest***

The authors declare no conflicts of interest.

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