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Editorial

Promising Drug Candidates for 2019-Novel Coronavirus (COVID-19) Pneumonia and Related Acute Respiratory Syndrome Treatment

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Patients with 2019-nCoV (COVID-19) infection are being recruited in randomized clinical trials to evaluate the efficacy of favipiravir plus phase III clinical trial were began in early February 2020 to evaluate intravenous remedesivir (200 mg on day 1 and 100 mg once daily for 9 days) in 2019-nCoV (COVID-19)-infected patients (NCT04252664 and NCT04257656), with estimated completion dates in April 2020. Favipiravir (T-705), an approved guanine analogue with effective inhibition of the RNA-dependent RNA polymerase of RNA viruses was reported recently against 2019-nCoV (COVID-19) (EC_{50} = 61.88 μM in Vero E6 cells). Other approved nucleoside analogues (ribavirin) and experimental nucleoside analogue (galidesivir) may have potential against 2019-nCoV (COVID-19). Nucleoside analogues in the form of adenine or guanine derivatives target the RNA-dependent RNA polymerase and block viral RNA synthesis in a broad spectrum of RNA viruses, including human coronavirus.

HIV protease inhibitors (lopinavir and ritonavir) have been initiated to test in 2019-nCoV (COVID-19)-infected patients in clinical trials (ChiCTR2000029539, etc.). Lopinavir and ritonavir appeared to be associated with improved clinical outcomes of SARS and MERS patients in a non-randomized open-label trial by hypothesized inhibition of the 3-chymotrypsin-like protease of SARS and MERS. Nevertheless, it is questionable whether HIV protease inhibitors could effectively inhibit the papain-like and 3-chymotrypsin-like proteases of 2019-nCoV (COVID-19). Griffithsin, a red-alga-derived lectin (spike glycoprotein) is also a promising target against 2019-nCoV (COVID-19). Subcutaneous interferon therapies should be closely monitored and dose reduction or discontinuation of therapy may be needed due to its multiple adverse effects. Nitazoxanide could also inhibit 2019-nCoV (COVID-19) (EC_{50} = 2.12 μM in Vero E6 cells). Chloroquine, an approved immune modulator demonstrates inhibitory effects against 2019-nCoV (COVID-19) (EC_{50} = 1.13 μM in Vero E6 cells). Small-molecule agents may also modulate the virus-host interactions of 2019-nCoV (COVID-19).

In conclusion, further investigations for 2019-nCoV (COVID-19) therapeutic interventions are urgently needed due to its potentially global health threat, particularly antiviral efficacy of several promising agents in clinical trials.