Hydrogen peroxide (H$_2$O$_2$) is ubiquitous in human tissues [1]. It is also excreted by airway cells including lung epithelia and its modest generation is part of a healthy immune response. Oxidative damage at cell and tissue level, however, is a serious risk factor for infected patients in intensive care units. If transition metal ions are present, H$_2$O$_2$, which is also generated in infected tissues of the coronavirus disease 2019 (COVID-19) patients, triggers inflammation and promotes oxidative damage of airways and among others of lung alveolar epithelial cells. Large amounts of lipid peroxidation by-products in lung cell membranes have been observed in people who died from SARS-coronavirus infection [2]. It was also noted that these oxidized phospholipid moieties can further trigger cytokine production in macrophages and increase the severity of acute lung injury. This exuberant inflammation, often leading to cytokine storm via autocatalytic process, is thus largely responsible for developing acute severe lung and other multi-organ failures in coronavirus infected thus, also in COVID-19 patients. Inhalation therapy with nebulized solutions has been widely used in pulmonary patients. This therapeutic method is advantageous when a direct contact of a water-soluble active ingredient with the human airways and lung epithelia is required. The sodium salt of pyruvic acid – sodium pyruvate (NaP), (C$_3$H$_3$NaO$_3$), molecular weight: 110.04 g/mol – is soluble in water (100 mg/ml). The solution is clear/colorless to faintly yellow. In a clinical study (NCT00262652), asthmatic patients were given 0.5 mM NaP in 5 ml 0.9% saline solution, nebulized via a Pari LC Plus® reusable nebulizer powered by a ProNeb® compressor (Midlothian, VA, USA). The scope of the research was the development of a nebulized NaP for the treatment of asthma. Although a pilot clinical study showed that 0.5 mM nebulized NaP resulted in a durable (4 hours) 30% reduction of expired H$_2$O$_2$ in asthmatics. The larger clinical study was terminated due to poor response by asthmatic patients. Unlike asthma, the outcome of COVID-19, when it has progressed to an advanced stage, will more probably be dependent on the oxidative injury provoked lung (and other organs) inflammation. Intracoronary NaP (300 mmol/l, 360 ml/h, over 30 minutes) was safely administered to cardiomyopathic patients (NCT00604331). When taken orally, pyruvate (in form of calcium pyruvate), even in massive doses (22–44 g/day) was not toxic. Therefore, also higher dosages of inhaled nebulized NaP, higher than 0.5 mM NaP / 5 ml normal saline, may safely be administered to COVID-19 patients.

**CONCLUSIONS**

The administration of inhaled nebulized NaP may provide efficient support for hospitalized COVID-19 patients by reducing their inner oxidative inflammatory milieu via diminishing H$_2$O$_2$ action and signaling. The use of inhaled nebulized sodium pyruvate solution in the treatment of hospitalized COVID-19 patients with inflammation-related impaired lung functions is suggested.

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**References**


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="It is health that is real wealth and not pieces of gold and silver”

Mahatma Gandhi (1869–1948), Indian political and spiritual leader"