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Effect of Dexamethasone Drug on over Drive Immune System of COVID-19 Patients and in Comparison with other Similar Drugs

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Opinion Article

Nowadays, the main life threatening disease left to be untreated is the pandemic coronavirus. The entry points of coronavirus in human are through nasal openings, eyes, ears and mouth via throat generally it settles in the lungs, which are the primary respiratory organs of humans. As soon as the microbe enters the immune system it gets activated, which results in release of high amount of cytokines and chemokines when compared to other immune cells.

Cytokines enter into the lungs via blood, which is a constantly circulating fluid among body and contains numerous proteins and cells suspended in it. Cytokines in the flow to kill virus also damages the lung cells, mainly epithelial cells are damaged, which is also known as over drive effect. As a result, damaged Lung cells in return effect the oxygen supply to the body, because of which the coronavirus infected patients have breathing problem as a major symptom. Massive levels of cytokines can cause extensive damage to epithelial cells of lung and lead to condition called Acute Respiratory Distress Syndrome.

Once the antigens over rule the immune system mechanism, they replicate and multiply and infect adjacent cells. Virus particles have a signature on their surface which makes a reflux action on the immune system.

Signals trigger another class of chemicals chemokines, other than cytokines. Which alert the immune system to send an array of different types of immunogenic cells that specifically destroys viral particles. Chemicals (chemokines and cytokines) trigger inflammation in the cells. In the nose and upper regions of the respiratory system, this inflammation produces mucus and a runny nose as a primary defense mechanism to trap viral particles and prevent their ingress. When the sinuses are inflamed we get a headache and dizziness. As defense system of the body is getting activated and is trying to kill the immunogenic particle that is coronavirus the temperature of the body also rise high: fever; another symptom of COVID. The main reason behind fever is inflammation of hypothalamus gland. Fevers due to viruses can last for one to two weeks.

Acute cough (that last for more than 3 days) can also be seen as a result of coronavirus, cough is a general action of reflux that is created by irritants of throat (mucus) of foreign particles. That leads to fluid retention in the lungs.

Depending on the degree of infection in the lungs, the inflammation and the fluid build-up can lead to pneumonia. The undefendable cytokine flow can lead to organ damage of kidneys as well as the heart, which may result in chest pain. Acute infection can also lead to a depletion of the first line defense system, white blood corpuscles tasked with fighting the infection and making the body vulnerable to other secondary infections, which may lead to death.



Dexamethasone

Figure 1: Chemical structure of Dexamethasone

In order to decrease that immune system overdrive, Dexamethasone plays an important role here. Dexamethasone, a corticosteroid was identified as a life-saving drug for coronavirus, which is used for treatment of arthritis and asthma. Dexamethasone is an immune suppressor, given for critical cases of coronavirus patients only, as it can also show some side effects when used to treat covid cases at initial stages. Other corticosteroids like perdnisole can also be used but dexamethasone have longer biological half-life when compared. Hydrocortisone is another corticosteroid, it can also be used but hydrocotisone act as mineralocorticoid and disturb electrolyte balance. Tocilizumab, a

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recombinant monoclonal antibody protein of IL-6 receptor inhibitor that helps to treats rheumatoid arthrithis, giant cell arteritis, and cytokine release syndrome i.e. immune suppresser. Theoretically, it should treat covid-19 pneumonia but the results failed to do so, taking drug (Tocilizumab) doesn't improve patient under ventilator support and not even chances of depending on ventilator doesn't improved. So when compare between all three corticosteroids and recombinant drug, dexamethasone is better, but as mentioned have adverse side effects so should be used in life saving and critical conditions only.

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