The role of taurine derivatives in the putative therapy of COVID-19-induced inflammation

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The pathologic process in COVID-19

The novel coronavirus disease (COVID-19) named by the World Health organization (WHO) as a global pandemic was discovered through a series of viral pneumonia cases associated with fever, cough and dyspnoea in Wuhan, China [1]. With over 700,000 deaths worldwide, current medical management is still supportive, while definite treatment of prophylactic vaccine or therapeutic drugs that are specific to COVID-19 is underway. The dominant mechanism of host cell entry by COVID-19 is via angiotensin-converting enzyme-2 (ACE-2) receptor expressed by epithelial cells of the lung, intestine, kidney, and blood vessels [2]. Like the SARS-CoV and MERS-CoV, COVID-19 dysregulates innate immune virus response via inhibition of interferons (INFs) produced in infected alveolar epithelial cells [1,2]. This leads to accumulated monocyte/macrophage load and the activation of NF-kB that triggers over-production and release of proinflammatory mediators such as IL-1β, IL-6, GM-CSF, TNF-α, CXC-chemokine ligand 8 (CXCL-8), CXCL-10, CC-chemokine ligand 2 (CCL-2) and CCL-3 [1,2] with a consequent phenomenon of the cytokine release storm (CRS). CRS is thought to be the major cause of disease severity and death in COVID-19 patients.

Potential role of IL-6 in COVID-19-induced inflammation

High circulating IL-6 levels are associated with disease severity, hospitalization, ICU admission and poor prognosis with higher risk of respiratory failure. A number of studies have shown that patients with severe COVID-19 infection display high serum/plasma IL-6 levels with lymphopenia [3]. Critically, an elevated IL-6 is an independent risk factor for development of sepsis and progression to critical illness in COVID-19 patients [1,3]. It is hypothesized that IL-6 and Fas-FasL interaction are primarily responsible for lymphocyte apoptosis observed in autopsy of spleen and lymph nodes from patients who died from COVID-19 [3]. Across the world, a large number of anti-IL-6 clinical trials are in progress for IL-6 blockade following some benefit [1-3].

Taurine derivatives

Taurine (Taurine) is a ubiquitous essential amino-acid, has been demonstrated in many biological processes and milieu such as oxidation, cell homeostasis and bile salt formation [4]. Taurine in humans is found endogenously in body fluids, heart, retina, skeletal muscle, brain, and of high concentration in leukocytes. Taurine naturally occurs in seafood and meat. It has been supplemented in infant formula containing meals and health drinks and are sold worldwide for treatment of various conditions and to improve general wellbeing [4]. In inflammatory settings such as trauma, sepsis and critical illness, the relevance for taurine is emphasized as the body systems have increasing requirements and a reduced anti-inflammatory protection. A decrease in taurine levels has been correlated with deranged metabolic pattern both in feline and human studies. With its acceptable properties and demonstrated therapeutic effect, taurine is used as a base compound for many derivatives.
Future potential therapy targeting IL-6 using taurine derivatives

With the world's current focus being on developing definite therapeutics, the issue of cytokine storm plaguing COVID-19 infection needs to be addressed. The proinflammatory process contributing to cytokine storm substantiates the need for targeted immune-suppressive treatment.

The efficacy of Taurine derivatives as an infection barrier is well documented in literature and we believe its putative anti-inflammatory role should be regarded as a promising available therapeutic approach in COVID-19 patient management, for which minimal to no side effects are known.

References

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