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(OMNS Apr 4, 2020) Recent research suggests that a compound called 'sulforaphane' may have both a prophylactic and curative benefit against ARDS and SARS-CoV-2. Sulforaphane is found in cruciferous vegetables such as broccoli and kale. It is generated by damage to the plant and is involved in protecting the plant from insect predators. In mammals it activates the Nrf2 anti-inflammatory pathway, is a potent anti-bacterial agent, and has anti-cancer properties. Recent research shows that it can modulate epigenetic pathways in mammalian cells. [1]

Anti-viral properties

Sulforaphane has also been shown to have antiviral properties. Studies have shown that sulforaphane reduces viral load in the nose, increases NK cell production, displays antiviral activity against H1N1 Influenza virus, and can suppress replication of Hepatitis C Virus and inhibit HIV infection of macrophages through Nrf2. [2-5] Interestingly, heat shock proteins which are produced upon sulforaphane consumption are also known to have antiviral properties. [6]

Inducer of NRF2 anti-oxidant pathway

Sulforaphane may be particularly beneficial for the elderly. It is a powerful inducer of Nrf2, which regulates expression of more than 200 cytoprotective genes, including an antiviral pathway that impairs virus reproduction. [7,8] Nrf2 signaling

is thought to decrease with age. According to one study, exercise induced Nrf2-signaling has been shown to be impaired in aging. [9] Sulforaphane was also shown to restore the age-related decrease of Th1 immunity in old mice. [10]

Sulforaphane treats ARDS

Animal and in vitro studies have shown that sulforaphane can mitigate the inflammatory damage to the lungs in ARDS. In one study, sulforaphane doubled the survivability of rabbits with ARDS. [11,12] Sulforaphane is also a potent inhibitor of NFkB, which is a master inducer of inflammation. [13] In one study, influenza virus-induced markers of inflammation were significantly lower in smokers after consumption of broccoli sprout homogenate. [14]

Protection for the lungs

Sulforaphane has a protective effect on the lungs. In a 12 week study in Qidong, China, consumption of sulforaphane was associated with immediate and sustained increase in urinary excretion of airborne pollutants, benzene 61% and acrolein 23%. [15] In another study, daily 100 æmol sulforaphane for 14 days was shown to improve the broncho-protective response in asthmatics. [16]

Cancer, diabetes

A plethora of studies have suggested sulforaphane has a mitigating effect on cancer, diabetes, and neurological disorders, all of which are risk factors of COVID-19 fatalities. [1,11,17]

Preparing sulforaphane

Broccoli sprouts contain the highest levels of precursors to sulforaphane: glucoraphanin and myrosinase. However, care must be taken because myrosinase is destroyed under heat. Broccoli sprouts must be thoroughly washed to prevent contamination by E. coli and Salmonella. Addition of myrosinase in the form of

daikon radish, or mustard seed powder can increase the sulforaphane content. [18] Several supplements containing sulforaphane or its precursors glucoraphanin and myrosinase have been validated by multiple studies; those containing glucoraphanin alone have an average 10% bioavailability. [19,20] The suggested minimal adult dose is 4.4mg, based on the study in Qidong China that determined the level of sulforaphane needed to excrete benzene and acrolein. [15]

I am not an expert in the field infectious diseases or immunology and I certainly do not want to give people false hope. Currently, there are no clinical studies of sulphoraphane against COVID-19. But since there are no randomized controlled clinical trials of ANY treatment against COVID-19, we are left to utilize therapeutic approaches based on past research. Sulforaphane has been shown to be safe for consumption and is commercially available. I believe it may be an important treatment available to the average citizen in the current viral pandemic. Lastly, I hope this publication draws interest from experts and researchers in COVID-19 for further research and investigation.

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