

## INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a global disease with an incidence rate of approximately 10% in people aged >45 years old. COPD is currently the fourth leading cause of death worldwide. With worsening of the disease, under the effects of some predisposing factors, patients repeatedly experience acute exacerbations of chronic obstructive pulmonary disease (AECOPD), leading to the deterioration of lung function and increases in hospitalization and mortality. In addition, recent studies have shown that PM<sub>2.5</sub> exposure in animal or cell models triggers immune disorders that promote lung inflammation and exacerbate airway remodeling, but the exact mechanisms are not fully understood. Oxidative stress signifies an imbalance between oxidants and antioxidants in favor of an oxidative state. Oxidative stress due to excess production of reactive oxygen species (ROS) is pivotal in apoptosis and cell death in the toxicology of arsenic

Recent studies have indicated that NLRP3-related pyroptosis plays a vital role in pulmonary diseases, especially in inflammatory lung diseases. In addition, the inflammasome has been suggested to be a key and effective inducer of inflammation. Therefore, targeting inflammasomes may be an effective strategy for treating inflammatory lung disease.

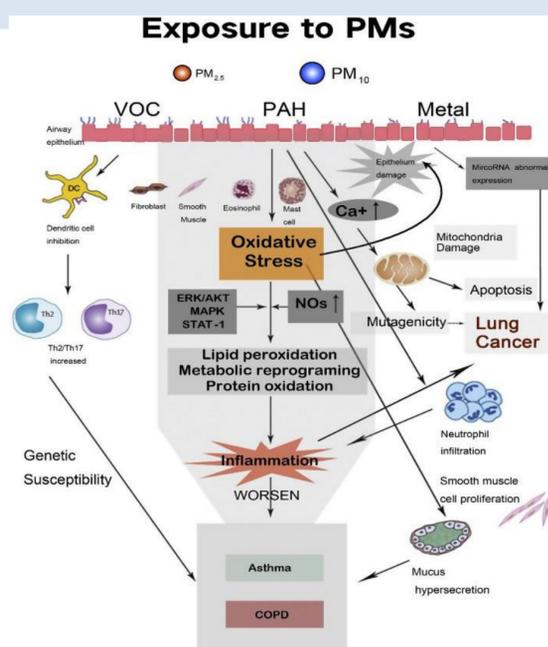


Figure 1. Exposure to Particulate matter .

Uncontrolled inflammatory responses cause tissue injury and severe immunopathology. Pharmacological interference of intracellular pro-inflammatory signaling may confer a therapeutic benefit under these conditions. Daphnetin, a natural coumarin derivative, has been used to treat inflammatory diseases including bronchitis. However, the protective effect of daphnetin in inflammatory airway disorders has yet to be determined, and the molecular basis for its anti-inflammatory properties is unknown. This poster shows that daphnetin treatment conferred substantial protection from oxidative stress caused in COPD.

## OBJECTIVE

This study aimed to suggest the protective effects, molecular mechanisms and potential targets of Daphnetin in reducing the inflammation in COPD & AECOPD by PM<sub>2.5</sub>.

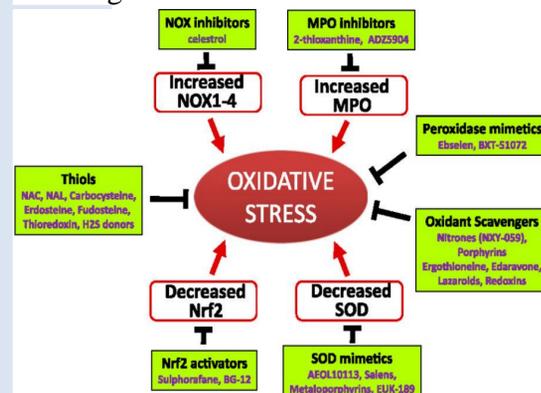


Figure 2. Oxidative stress in COPD

## MECHANISM

Daphnetin has been used to treat various inflammatory diseases because of its diverse pharmacological activities. Daphnetin exerted anti-inflammatory activity by inhibiting the NLRP3 inflammasome-related pathway. Daphnetin inhibits the inflammasome NLRP3. PM<sub>2.5</sub> increased the inflammatory cytokines IL-6, TNF- $\alpha$ , IL-1 and IL-18 and upregulated the expression levels of NLRP3, cleaved caspase-1, ASC, IL-1 $\beta$ , and p-NF- $\kappa$ B in AECOPD. In various studies of pulmonary diseases, daphnetin showed as immunosuppressant which reduces the release of inflammatory cytokines and other inflammatory factors. In addition to the secretion and maturation of IL-1 $\beta$  and IL-18, inflammasome activation triggers a form of inflammatory cell death known as pyroptosis. When considering the role of inflammasomes in inflammatory diseases, pyroptosis and the secretion of IL-1 $\beta$  and IL-18 should be considered potential inflammatory mechanisms. Since, it showed various positive results to reduce inflammation in pulmonary diseases. Daphnetin can also be used as a potential therapeutic drug to reduce the acute exacerbations in chronic obstructive pulmonary disease.

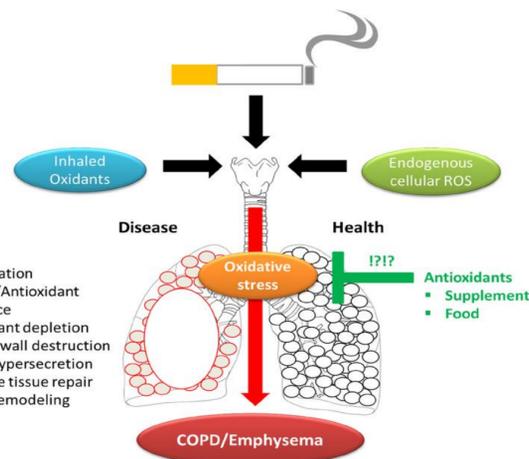


Figure 3. cigarette smoking also leads to COPD.

## CONCLUSION/ DISCUSSION

Air pollution is a major public health problem faced by countries worldwide. Exposure to PM<sub>2.5</sub> increases the incidence of inflammation-related diseases in various organ systems.

COPD is an inflammatory disease accompanied by bronchitis, mucus hypersecretion and dyspnea, and its prevalence has increased annually worldwide. In particular, airway inflammation is an important pathophysiological characteristic of COPD. Daphnetin has anti-inflammatory activity as it inhibits the NLRP3 inflammasome-related pathway in various pulmonary diseases. The key role of the NLRP3 inflammasome in lung inflammation in PM<sub>2.5</sub>-induced AECOPD or COPD. In summary, Daphnetin not only would reduce COPD but also helps in effectively alleviates PM<sub>2.5</sub>-induced AECOPD by inhibiting lung inflammation and the underlying mechanisms may be strongly associated with suppressing pyroptosis induced by the NLRP3 inflammasome. As the environmental pollution is increasing day by day and thus affecting the health of the humans by causing several harmful diseases which can be incurable to an extent. Scientists are trying the way out to find the cure for various diseases COPD is one of them. Thus, Daphnetin can be a potential drug to help in reducing the effect of PM<sub>2.5</sub> and helps in the prevention or reduction of chronic obstructive disease. This is a general hypothesis based on research papers.

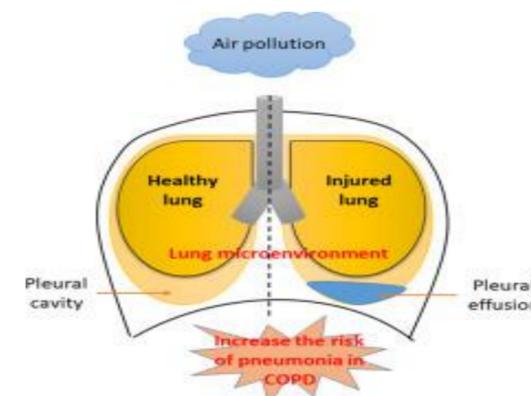


Figure 4. COPD occurrence and effects.

## REFERENCES-

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