

## Editorial

# COPD, Dementia, and Smoking

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COPD is projected to cause more than 6 million deaths annually, ranking as the third most common cause of death in the world [1]. On the other hand, cognitive dysfunction is gaining attention as a surging health problem worldwide, for instance, dementia is forecasted to affect 36 million people with annual cost of \$600 billion [2]. Are there any relationships between these two expanding health dooms of the world?

First of all, although the relationships remain to be established [3], several studies have indicated that COPD is associated with cognitive dysfunction [4,5]. Not only patients with severe COPD [6], or those lowered oxygen saturation [7] have impaired cognitive function, but also duration of COPD [8] or reduced expiratory pulmonary function [9] can be associated with exaggerated cognitive decline. In concert with these observations, brain imaging has documented that patients with COPD have hippocampal atrophy, suggesting a pathological basis of the cognitive dysfunction [10].

Second, these two disorders can affect each other, resulting in a lowered quality of life of affected individuals. For instance, a recent study showed that impaired cognitive function is associated with worse health status and longer hospital length of stay in patients hospitalized with an acute COPD exacerbation, and a significant proportion of patients are discharged home with unrecognized mild to severe cognitive impairment, which may not improve with recovery [11].

Third, COPD and dementia may share common pathogenesis. Epidemiological studies have noted that the prevalence of COPD [12] and dementia [13] is higher among people with lower socioeconomic class. Air pollution, an important culprit for the development of COPD, can be associated with cognitive decline [14]. In addition to these, smoking should be nominated as another common risk factor. Smoking is the established most important risk factor for COPD, and can also be for dementia.

Earlier case-control studies have indicated that smoking is not associated with AD [15], or even associated with a reduced risk of AD [16]. However, more recent longitudinal studies, but not all [17],

have documented that current smoking is associated with dementia [18] and cognitive dysfunction [19,20]. Not only active smoking, but also passive smoking may contribute to cognitive decline in never and former smokers [21]. Furthermore, in concert with the deleterious effects of environmental tobacco smoke, investigations with animal models have documented that an exposure to cigarette smoke [22] or nicotine [23] results in neuropathological alterations identical to those in AD.

Above mentioned notions stress an important link between the two dooming chronic health conditions, and imply “synergistic” negative impact on quality of life. Since COPD and dementia are both progressive and currently lack effective treatment, preventions and interventions at an early stage to minimize the functional decline are necessary. Therefore, better strategies are needed to evaluate and manage COPD and cognitive impairment concurrently in order to optimize health outcomes, along with better understanding of underlying mechanisms and treatment of cognitive dysfunction in COPD. For now, smoking cessation appears to be most promising. Smoking cessation has been positioned as essential for patients with COPD: it may prevent or slower the progression of the disease, depending on the status of the disease and more complex factors such as genetic and environmental interactions. Is smoking cessation also beneficial for dementia? Notably, it has been suggested that sustained smoking cessation for a prolonged period relieves the risk of dementia [24], and alleviates the decline in cognitive function in the elderly [20]. Thus, smoking cessation should also be a part of the management of patients with COPD complicated by cognitive dysfunction.

It is becoming clear that COPD should be noted not only as a health threat by itself but also as having propensity to accompany various other common diseases such as cardiovascular diseases and malignancies [25]. Cognitive dysfunction should be noted as another co-morbidity of COPD, and nominated as diseases which can be prevented by smoking cessation.

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