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Air pollution: A silent common killer for stroke and dementia

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Findings from the Global Burden of Disease (GBD) study showed that between 1990 and 2015, neurological disorders were the second largest cause of death (behind cardiovascular diseases) and the largest global cause of disability-adjusted life-years life-years (DALYs) worldwide.[1] Not surprisingly, dementia, as the third most prevalent neurological disorder and stroke with the largest proportion of total DALYs and deaths among all neurological disorders, plays a key role in such huge worldwide health burden.[1] Therefore, widespread prevention measures of stroke and dementia are becoming an inevitable necessity to fight against the health/economic burden of these potentially preventable disorders. The good news is that more than 90% of the stroke burden is attributable to modifiable risk factors, including behavioral (e.g. smoking), metabolic (e.g. diabetes mellitus), and environmental factors (e.g. air pollution).[2] What missing in the current reports of GBD studies are data on the extent to which stroke and dementia pose risks for each other[3] and consequently to what extend prevention of one or both simultaneously can decrease the burden of neurological disorders in total. Ideally, any preventive measure should be focused more on share and preventable risk factors and should be started at earliest stage of disease, i.e. ''brain-at-risk stage'' when the risk factors are present in clinically asymptomatic individuals.[4,5] In fact, stroke and dementia are one of the best examples in this ideal preventive model as they share many preventable behavioral and metabolic vascular risk factors.[6] However, the current literature has remained largely silent about commonalities between environmental risk factors of stroke and dementia, such as air pollution.

Now, in a thorough review, Yannick Béjot and colleagues show that air pollution is a common risk factor for both stroke and dementia. What striking in this study is the magnitude of air pollution impact: about one third of the global stroke burden and about one fifth of the global dementia burden can be attributed to air pollution, especially small particulate matter (<10 μm in diameter (PM10) and <2.5 μm in diameter (PM2.5)) and ozone. Béjot et al. also provide educational materials for readers explaining how with direct (e.g. inflammation) and indirect cardio-neuro-vascular mechanisms, air pollution may lead/enhance underlying pathophysiological changes of cerebrovascular disorders and neurodegeneration. In this study, the authors also identify those at risk of air pollution, including children and the elderly, those with other vascular risk factors, history of stroke, and individuals living in less privileged areas. These are important findings emphasizing a targeted individual centered public healthcare plan to decrease the burden of stroke and dementia in those at a higher risk. The authors also recommend wisely for future research to identify, for example, the impact of different types of air pollution and life-time cumulative effects of pollutants on stroke/its subtypes and dementia. Perhaps, the following studies/expert national and international meetings should focus on short- and long-term action plans to control health impact of air pollution as a major global threat. These studies should provide adequate information for public as well as policy makers at international (such as G20 members) and national levels. Currently, *despite a rapid decline in transportation emissions in the United States and Europe*, a troubling trend is that the use of volatile chemical products including pesticides, coating, printing inks, adhesives, cleaning agents, and personal care products now account for half of fossil fuel volatile organic compound emissions in industrialized cities.[7] Therefore, any national/international plan should include a range of activities from in-home fuels selections to emission standards. Even at the time of new national law legislations, it is vital to consider the possible indoor/outdoor impact of the law on air quality. For example, is it possible that with a trend toward marijuana legalization in many countries, we can endanger indoor air quality, in particular for children and the elderly who are often more vulnerable to air pollution?

In summary, Yannick Béjot and colleagues provide persuasive evidence about the impact of air pollution on stroke and dementia.[8] This is a thorough and a timely review with adequate educational material for readers and informative data for health policy makers.

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