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Letter to the Editor

Clean air for Brain Health; ongoing agenda of 2018 World Brain Day



Dear Editor,

The latest estimate of attributable deaths to pollution worldwide is extraordinary: 9 million deaths annually [2]. Deaths are related to cardiovascular disorders (myocardial infarction, congestive heart failure and stroke), lung diseases and cancers. The recent Global Burden of Disease study, based on 1990–2013 data from 188 countries demonstrated that air pollution contributes to 29.2% of the global burden of stroke. However the burden varies between 10% in high-income countries and 34% in low- and middle-income countries [3]. The effects of air pollution on the developing and adult brain have received increased interest in recent years, with studies suggesting relationships with autism, attention deficit disorder, dementia and Parkinson's disease. However these issues are still debated. Pioneering work was conducted on dogs chronically exposed to heavily contaminated air in Mexico City, the results of which suggested neurofibrillary degeneration [4]. Many population-based studies have shown associations between exposure to air pollution (particulate matter and/or specific chemicals) and neurobehavioral deficits acquired in utero, in childhood and adult life [5].

Air pollution is a global and diffuse contamination of air by noxious bio-aerosols (pollen, germs, particulates and other toxicants) and chemical compounds (manmade or of natural origin). Airborne contamination differs quantitatively and qualitatively between indoor (household) and outdoor (atmospheric or ambient) air, urban versus rural areas, local versus regional, or atmospheric contamination (atmospheric brown clouds). The chemical nature of environmental pollutants is complex and variable. Pollutants are classified as primary or secondary. The former include gases and solids (e.g. particulate matters) that enter the atmosphere from various sources (natural, human-made or human activities.) Secondary pollutants result from chemical reactions between primary pollutants. Air pollutants readily penetrate the body via the nose, lung and gut where they variably induce local inflammatory responses, cross membrane barriers and translocate via the systemic blood circulation or the nasal route to the brain. Air pollutants can also affect gut microbiota, which are critical to human health, including brain function. Air pollution may affect many biological mechanisms linked to stroke and neurodegenerative diseases including atherosclerosis systemic inflammation, oxidative stress, thrombosis and coagulation, systemic vascular dysfunction, systemic and pulmonary blood pressure, heart rate variability, brain blood barrier, microglia and astrocytes, and at the cellular level, mitochondria, DNA, the epigenome, and chromosome length (telomere). It is clear that inhalable PM (especially ultrafine particles such as PM 2.5) is associated with systematic inflammation and endothelial dysfunction raising the risk of coronary artery disease and stroke and possibly cancer [6].

Global chemical airborne contamination is a critical issue because air pollution is a major environmental risk factor for neurological

health. In 2014, only about one in ten people breathed clean air, as defined by the World Health Organization Air quality guidelines [7]. That means that 9 in 10 persons are exposed to polluted air. Although air pollution is a global hazard but citizens of Africa, South Asia and the Middle East breathe much higher and increasing levels of air pollutants that those in living other parts of the world.

Neurologists have long dealt with environmental issues, especially in the context of Tropical Neurology, Neuroepidemiology and Neurotoxicology. In the early 2000s a group of French neurologists began to focus on environmental neurology by forming the French Club de Neurologie de l'Environnement (CNE) leading to formation of Environmental Neurology Research Group (ENRG) in 2007 [8]. This group stimulated neurologists to consider more carefully environmental factors among the causes of neurological diseases. Subsequently, in 2016, the ENRG and CNE launched the first international meeting of Environmental Health (IMEH or RISE), dedicated mainly to the impact of air pollution on the developing and mature brain [9]. There is a need for collaboration between physician professional societies and environmental experts at a global level for increased awareness and advocacy. The WFN has actively adopted an advocacy role during last five years [10]. The World Brain day 2018 is an expression of WFN interest and role in global advocacy for environmental and neurological health. Every year 22nd July is celebrated by World Federation of Neurology (WFN) as “World Brain Day”. The purpose of World Brain day activities is to increase public awareness and advocacy related to brain disorders by promoting brain health awareness. More than 100 national societies (members of WFN) organize public awareness and media activities on this day. In 2015, world brain day (theme: epilepsy) was celebrated in collaboration with ILAE (International league against epilepsy) and IBE (international Bureau of epilepsy). The theme for 2016 World Brain day campaign was “Brain health in the aging population” and for 2017, it was “Stroke is a brain attack- prevent it and treat it” [1]. The 2017 World Brain day was organized in collaboration with World Stroke Organization (WSO website). The theme for 2018 World Brain day campaign is “Clean air for brain health”. For the first time in its history, the WFN has chosen to emphasize the impact of the environment, notably air pollution, on the brain. World Brain day activities this year included seminars, media briefings, newspaper articles and social media posts by WFN and national delegate societies. The World Health Organization (WHO) has acknowledged the issue [11]. First Global Conference on Air Pollution and Health was organized at WHO Headquarters in Geneva in November 2018 with brain and neurological health as an important area.

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