Air pollution and your brain: the bad, the ugly and the expected!

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Abstract: The emerging picture for Mexico City children with high exposures to both fine particulate matter (PM$_{2.5}$) and ozone shows systemic inflammation, immunodysregulation at both systemic and brain levels, oxidative stress, neuroinflammation, small blood vessel pathology, and an intrathecal inflammatory process, along with the early neuropathological hallmarks for Alzheimer’s and Parkinson’s diseases. Exposed brains are briskly responding to their harmful environment and setting the bases for structural and volumetric changes, cognitive, olfactory, auditory and vestibular deficits and long term neurodegenerative consequences. Multidisciplinary research is needed to improve our understanding of the PM pediatric short and long term CNS impact. Public health benefit can be achieved by integrating interventions that reduce fine PM levels and pediatric exposures and establishing preventative screening programs targeting pediatric populations that are most at risk. We have a 50-year window of opportunity between the pediatric brain changes associated with air pollution exposures and the time when the patient with mild cognitive impairment, dementia or tremor will show up at the neurologist’s door. Facing the current pediatric clinical and pathology evidence is imperative if we are aiming our efforts to identify and mitigate environmental factors that influence pediatric brain damage and AD/PD pathogenesis.

This Seminar will review neurological injuries caused by exposure to air pollution including structural brain abnormalities, neurocognitive deficits, early neurodegenerative changes similar to those seen in Parkinson’s and Alzheimer’s disease present in children and young adults with high exposures to PM$_{2.5}$ and ozone. It will provide information about strategies for educating and counseling parents, expectant mothers, and exposed populations of all ages to reduce their exposure to air pollutants.

About the speaker: Dr. Lilian Calderón-Garcidueñas MA, MD, PhD, is a physician whose love for exploring disease causes started in medical school at the National University of Mexico (UNAM) and took her to pursue her studies in the USA and Canada. Her pathology and neuropathology training at the University of Toronto were followed by her pediatric neuropathology fellowship at Harvard University and her first position as an Assistant professor at Northwestern University in Chicago. She earned an American Board in Anatomical Pathology and Neuropathology in 1981. Literature was always in her mind, so she went back to school to study English Literature and earned a MA in Comparative Literature in 1997. Her interest for clinical environmental research took her back to Chapel Hill, North Carolina where she earned a PhD in Toxicology in 2001, followed by three years as a postdoctoral fellow in Environmental Pathology. She loves her work, her teaching is key to her way to transmit her contagious enthusiasm for medicine and science and her research work focuses on the effects of air pollutants upon the developing brain.