Alzheimer’s disease starts in childhood and relentlessly progresses in highly polluted cities.

Hallmarks of Alzheimer disease are evolving relentlessly in Metropolitan Mexico City children and young adults. Exposed APOE4 carriers have higher suicide risk


Mexico City air pollution

MISSOULA, MONTANA, USA, April 2, 2018 /EINPresswire.com/ -- Alzheimer’s disease starts in childhood and relentlessly progresses in the first 4 decades of life in highly polluted cities (Mexico City).
Carriers of an Apolipoprotein E 4 allele have 4.92 times higher suicide odds versus APOE4 non-carriers having similar cumulative fine particulate matter exposures and age.

Missoula, MT, March 28,2018 — A new study by researchers at the University of Montana, Universidad del Valle de México, Instituto Nacional de Pediatría , Boise State, Lake Erie College of Osteopathic Medicine, UNAM, Médica Sur, and Universidad Autónoma de Piedras Negras, heightens grave concerns over the development of Alzheimer’s disease (AD) including hyperphosphorilated tau (Htau) and beta amyloid(amyloid β 17-24) in young urbanites’ brains with life exposures to airborne fine particulate matter (PM 2.5) concentrations above the USEPA standards. The researchers investigated AD protein aggregates and ultrastructural neurovascular pathology in 203 Metropolitan Mexico City (MMC) residents age 25.36±9.23y (range 11 months to 40 years). These findings are published in the Journal of Environmental Research 164:475-487:
Hallmarks of Alzheimer disease are evolving relentlessly in Metropolitan Mexico City infants, children and young adults. APOE4 carriers have higher suicide risk and higher odds of reaching NFT stage V at ≤ 40 years of age.Lilian Calderón-Garcidueñas MA, MD, PhD, Angélica Gónzalez-Maciel MS, Rafael Reynoso-Robles BS, Ricardo Delgado-Chávez MD, Partha S. Mukherjee PhD, Randy J. Kulesza PhD, Ricardo Torres-Jardón PhD, José Ávila-Ramírez MD, Rodolfo Villarreal-Ríos PhD
The early stages of AD were identified in the brainstems of babies as young as 11 months. By the second decade, characteristic AD Htau lesions were seen in cortical areas, neurofibrillary tangles (NFT) Stages I-II, and amyloid phases 1-2. AD progression (NFT stages III-V) was present in 24.8 %

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> *Lilian Calderón-Garcidueñas*

of 30-40y old subjects. Development of Htau pretangle stages-the earliest lesions detected in childhood- is associated with cumulative concentrations of fine PM (CPM2_5).

Apolipoprotein E (APOE) 4 allele- the most prevalent genetic risk for AD- plays a key role in the response of youth to pollution. The speed of disease progression is given by APOE 4, age, and CPM2_5. APOE4 carriers (~27% of the USA population carries 1 or 2 copies of the APOE4) had 4.92 times higher suicide odds, and 23.6 times higher odds of an advanced AD stage NFT V versus non-carriers having similar CPM2_5 and age.

The detrimental impact of tiny particles (PM2_5 and highly oxidative, magnetite pollution nanoparticles) getting into the brain through the nasal and olfactory epithelium, the lungs, the gastrointestinal tract and the systemic circulation is quickly recognized by early and progressive damage to the neurovascular unit.

Researchers are witnessing an accelerated Alzheimer disease process: air pollution and dementia, with striking time lines, and disease progression pace in Metropolitan Mexico City, home to ~24 million people, over 50,000 industries and >5.5 million cars. Researchers strongly suggest the first two decades of life are critical for brain damage associated to environmental pollutant exposures: Air pollution and detrimental effects on children's brain.
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Braak and Del Tredeci (2015) have suggested, and researchers fully agreed “continual formation of abnormal tau takes place from the beginning until the end-phase of Alzheimer’s disease and is not known to be subject to remission”.

Mexico City seemingly healthy young people have olfaction deficits and deficiencies in attention and short-term memory, compared to age, gender and socioeconomic status matched low air pollution residents. APOE 4 carriers age 25.2 ± 8.48 years had the highest suicide risk, opening the possibility AD stages contributed to depression and suicide at this early age.

Alzheimer’s disease starting in the brainstem of young children and affecting 99.5% of young megacity residents has serious health, social and economic consequences. In the USA and Mexico, women are at the highest risk for Alzheimer. In the USA we had ~5.3 million AD patients in 2017 and a projected 16 million by 2050.

The authors concluded ambient air pollution is a key modifiable Alzheimer risk for millions of people across the globe: 42 million Americans are exposed to harmful PM 2.5µm and 123 million are exposed to ozone levels above standards. The detrimental impact of neurotoxicants on the brain also includes indoor pollution and occupational exposures.

Authors emphasize the need to define pediatric environmental, nutritional, metabolic and genetic risk factor interactions of paramount importance to prevent a fatal disease. Neuroprotection ought to start very early,including the prenatal period and childhood.
Alzheimer’s disease starts in childhood in polluted environments, we must implement preventive effective measures early, rather than take reactive useless actions decades later.

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Authors ready to join efforts to accomplish the mission of the National Institute on Aging (NIA) NIH, to find ways to prevent Alzheimer’s Disease (National Alzheimer’s Project Act).

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