ENVIRONMENTAL AND NUTRITIONAL RISK FACTORS FOR NEURODEGENERATIVE DISEASES IN SSA

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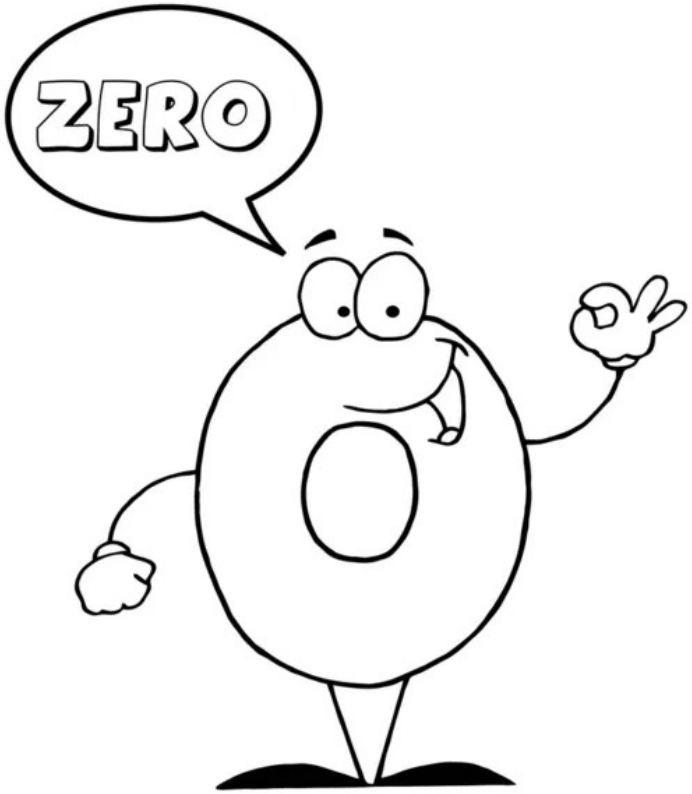
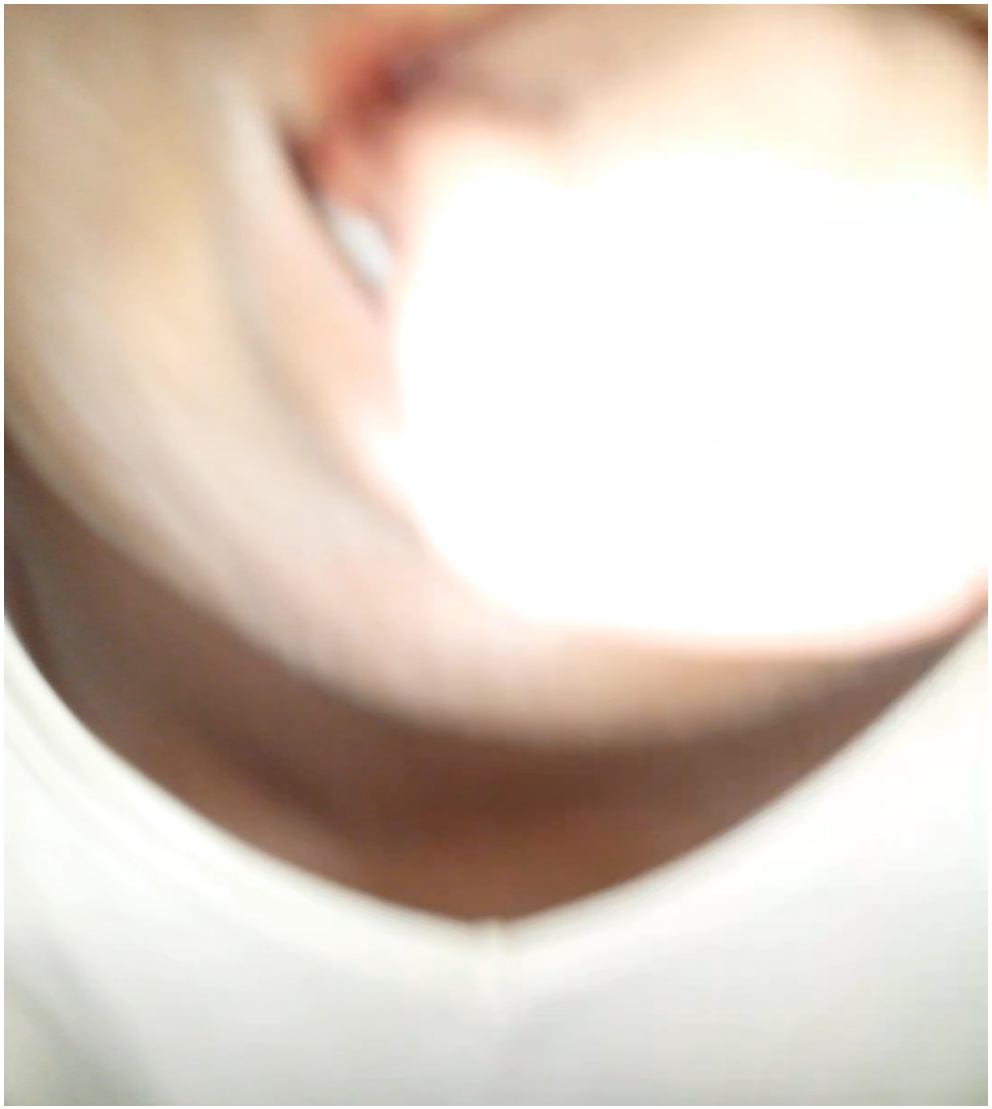
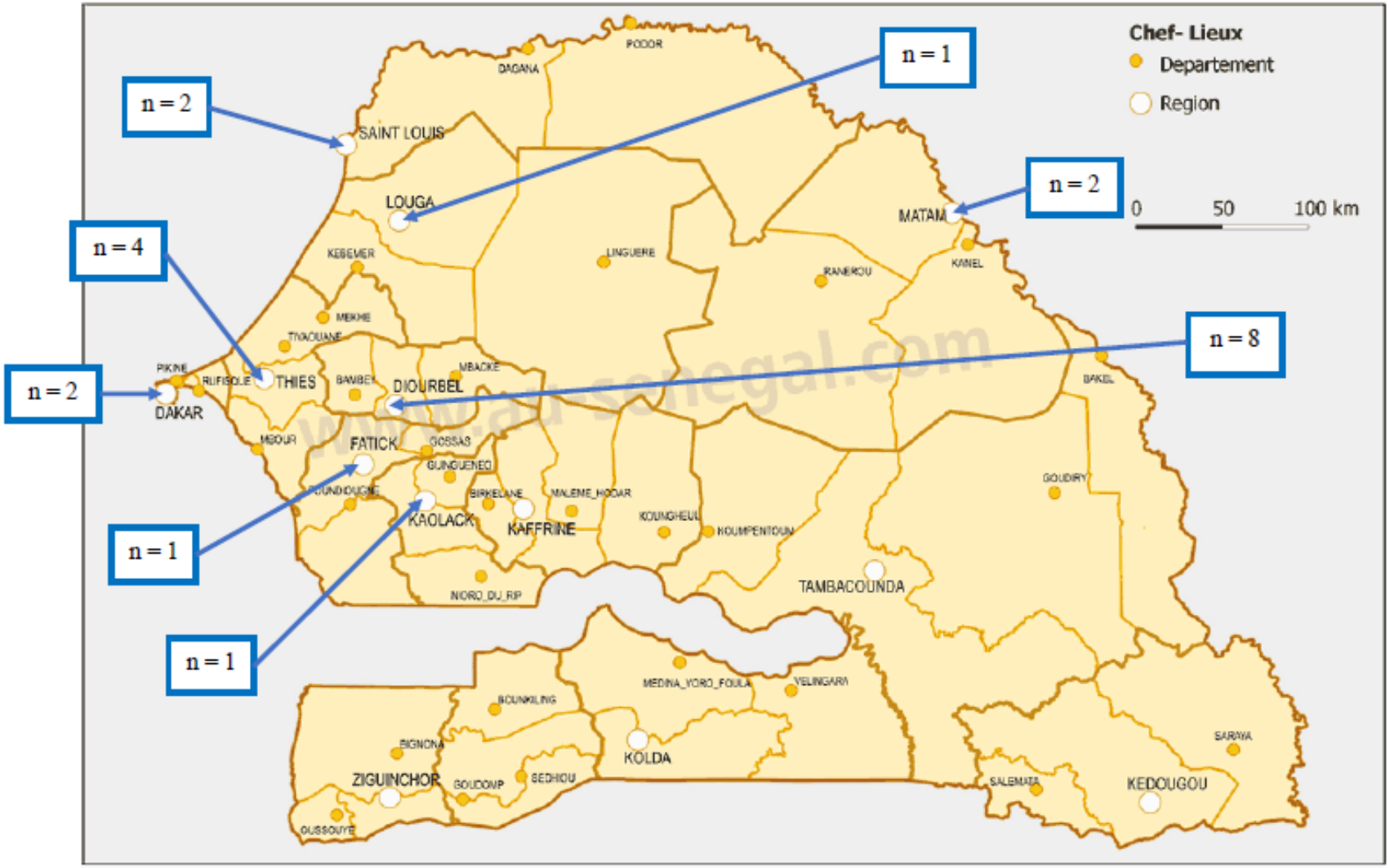
AFAN/CAN

Conflict of interest



Me struggling to understand ALS in Senegal…





Distribution of patients according to region

Past medical history and exposure

Les antécédents	Fréquence	Pourcentage
Antécédent familial de SLA/MMN	1	4,3%
Pesticides	11	47,8%
Engrais chimiques	12	52,2%
Alcool	2	8,7%
Tabac	4	17,4%
Traumatisme cranio-encéphalique	4	17,4%
Electrocution	3	13,0%
Rayon X	4	17,4%
Eau courante	21	91,3%
Eau puit	5	21,7%
Eau minérale	1	4,3%
Consanguinité parentale	2	8,7%

Univariate analysis of sociodemographic data

Out of Dakar

Farmer

Données sociodémographiques	Cas	Témoins	OR (IC = 95%)	*P value*
Age	44,3	48,3	-	0,84
Masculin	15	29	1,5 [0,6 - 4,2]	0,455
Féminin	8	24	0,6 [0,2 - 1,8]	0,455
Dakar ville	1	18	0,9 [0,01 - 0,7]	0,008
Banlieue de Dakar	1	20	0,07 [0,009 - 0,6]	0,002
Hors Dakar	21	15	26,6 [5,5 - 127,7]	<0,001
Agriculteur	8	2	13,6 [2,6 - 71]	0,001
Couturier	3	1	7,8 [0,8 - 79,5]	0,080
Sportif professionnel	1	1	2,4 [0,1 - 39,5]	0,51
Electricien	1	2	1,2 [0,1- 13,5]	1,000
Professionnel du bâtiment	1	3	0,8 [0,07 - 7,7]	1,000
Ménagère	9	16	1,5 [0,5 - 4,1]	0,596
Etudiant	1	4	0,6 [0,06 - 5,2]	1,000
Employé d'administration	1	-	0,3 [0,2 - 0,4]	0,303
Marchand ambulant	1	2	1,2 [0,1 - 13,5]	1,000
Chauffeur	1	1	2,4 [0,1 - 39,5]	0,516
Sans emploi	2	2	2,4 [0,3 - 18,4]	0,582
Supérieur	3	4	1,8 [0,4 - 8,9]	0,43
Secondaire	1	15	0,1 [0,01 - 0,9]	0,03
Primaire	9	11	2,5 [0,8 - 7,1]	0,15
Non-scolarisé	10	22	1,1 [0,4 - 2,9]	1,00

Univariate analysis of past medical history and exposure

Antécédents	Cas	Témoins	OR (IC = 95%)	*P value*
Familial de SLA/Démence	1	-	0,3 [0,2 - 0,4]	0,3
Pesticides	11	3	15,3 [3,7 - 63,4]	<0,001
Engrais chimiques	12	9	5,2 [1,7 - 15,4]	0,004
Alcool	2	1	4,9 [0,4 - 57,6]	0,22
Tabac	4	6	1,6 [0,4 - 6,5]	0,48
Traumatisme cranio-encéphalique	4	8	1,2 [0,3 - 4,4]	1,00
Electrocution	3	6	1,1 [0,3 - 5,0]	1,00
Rayon X	4	10	0,9 [0,2 - 3,2]	1,00
Eau courante	21	46	1,6 [0,3 - 8,3]	0,71
Eau puit	5	4	3,4 [0,8 - 14,0]	0,12
Eau minérale	1	5	0,4 [0,05 - 3,9]	0,661
Consanguinité parentale	2	7	0,6 [0,1 - 3,2]	0,71

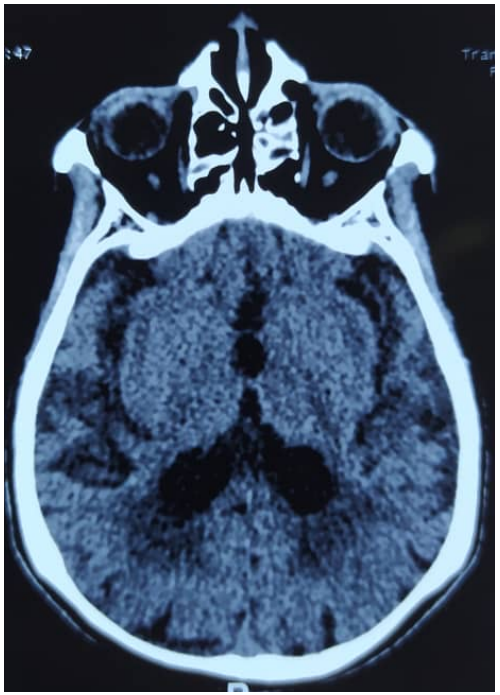
Environmental and nutritional risk factor of ALS

- β-Methylamino-L-alanine (BMAA) toxins: ALS-Parkinson-Dementia complex in the Western Pacific (Guam Island)
- Selenium: where people drink water containing a high concentration of selenium
- Metals: high manganese level, mercury-contaminated food, iron ???
- Pesticides: organochlorines, pyrethrins, herbicides and insecticides
- Electric shock and low frequency electromagnetic fields

Ingre. Clin Epidemiol, 2015
Ismail. J Neurol Neurosurg Psychiatry, 2013
Trojsi. Int J Mol Sci, 2013

Dementia and heavy metals

- 50 million people (60% in developing countries) >> 82 million (2030) >> 152 million (2050), *WHO*
- Alzheimer's disease: 1st cause of dementia (60 to 70%)
- USA: 476,000 new cases in 2016 (> 65): 1 person / 66 seconds
- In Africa: AD, 57.4 to 89.4% of dementias
- In Cameroon, very few data:
  - Dementia = 2nd reason for consultation in neurology among people ≥ 60 years old (*Kuaté et al., 2015*)

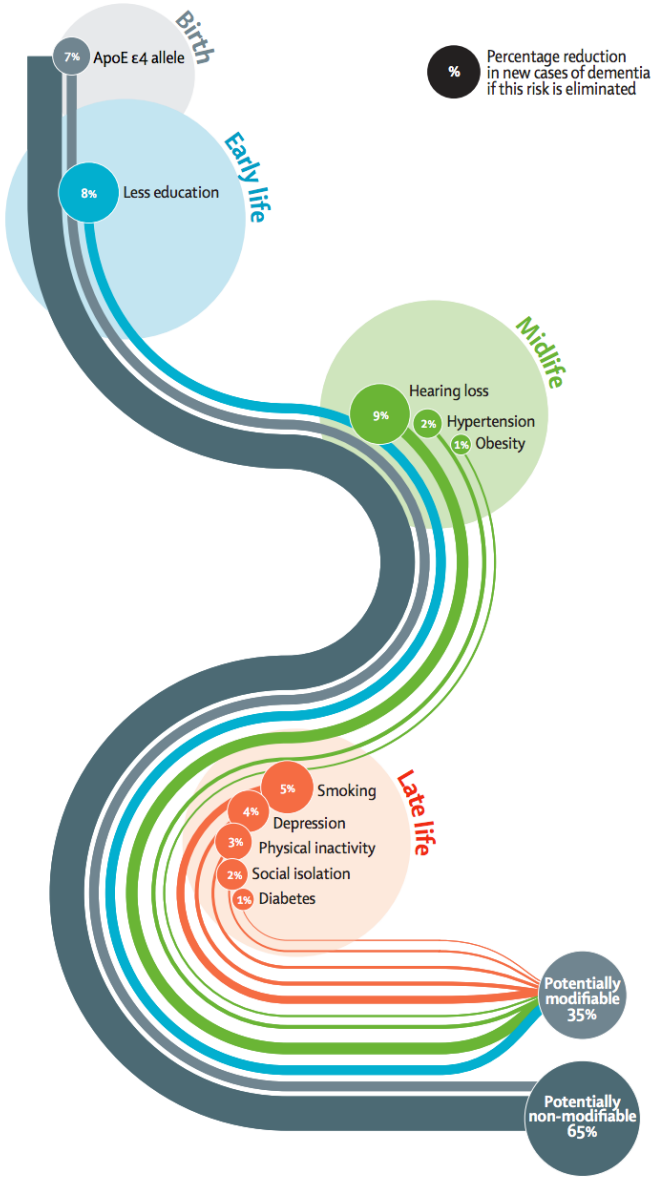


Dementia and heavy metals

- Early-life or mid-life lead exposure associated to cognitive decline
  - Neurotoxins crosses the BBB
- Cadmium, new neurotoxicants
  - Blood cadmium levels were significantly associated with AD-related mortality among older adults
- Neurotoxicity due to accumulation of manganese in brain
- Air pollution and increase incidence of dementia

Risk factors for dementia

The Lancet Commission presents a new life-course model showing potentially modifiable, and non-modifiable, risk factors for dementia.



THE LANCET

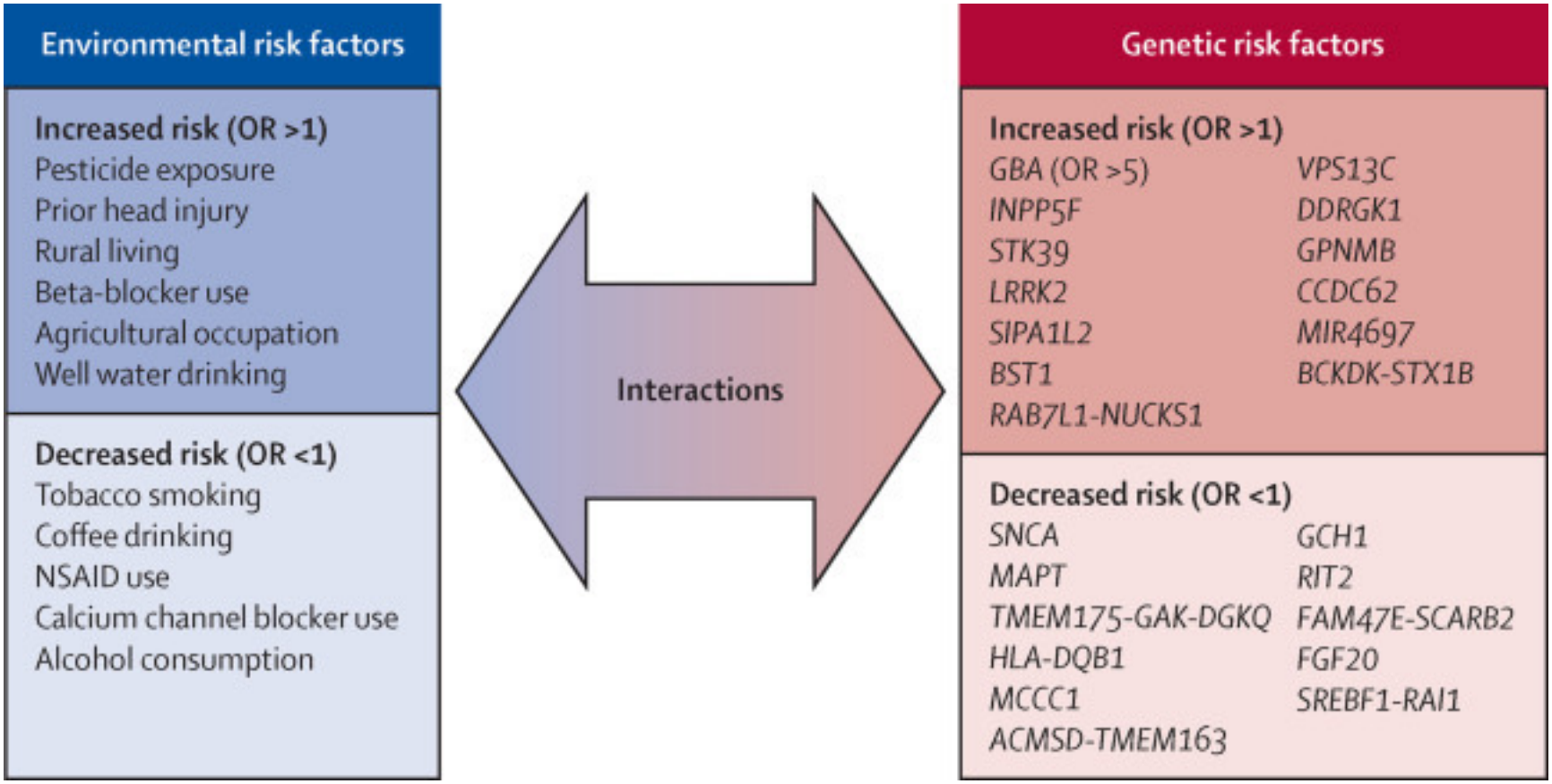
The best science for better lives

Junk food

Parkinson's disease

- PD second most common neurodegenerative disorder after Alzheimer's disease
- Loss of dopaminergic neurons in the substantia nigra
  - Decrease of dopamine's level in the striatum
  - Leading to motor and non-motor symptoms
- Rare before 50 years and more frequent after 60 years
- Genetic and environmental risk factors
- Classic ttt L-Dopa, new therapeutic approach

PD risk factors



Kalia and Lang, *The Lancet 2015*

PD and pesticides

John Hopkins Medicine

PD and pesticides

- **1-methyl-4-phenyl-1, 2, 3, 6-tetrahydropyridine (MPTP)**: neurotoxin → oxidative stress, mitochondrial apoptosis, inflammation, excitotoxicity, and formation of inclusion bodies acting singly → dopaminergic neuronal damage in SNc and striatum
- Rotenone, DDT, 2,4-dichlorophenoxyacetic acid (2,4-D), dieldrin, diethyldithiocarbamate, paraquat, maneb, trifluralin, parathion, and imidazoldinethione, accelerate the formation of α-synuclein fibrils in vitro

Narayan et al. Environ int., 2017

In conclusion

Let’s prevent what is preventable

WSD, October, 2018