

What are some possible preventative methods for neurodegeneration?

Some of the preventive measures described in the video and frequently mentioned in the literature are caloric restrictions: fasting, intermittent fasting or keto diet, stress reduction, good oral hygiene, various supplements like vitamin D 21, Omega 3, and traditional herbs like *Tinospora Cordifolia*, *Turmeric*, *Rhodiola*, *Ashwagandha* among them. Poor sleep can promote A β and tau buildup leading to systemic inflammation [1]. Regular exercise has generally long-lasting mitigating effects and it is highly recommended for people with MS; a study has shown that running can delay neurodegeneration in amygdala and hippocampus of AD Tg mice [2][3]. Recent studies have also considered light as a therapy: illumination of the trunk provides neuroprotective effects (photo biomodulation) likely by activating immune cells, inflammatory mediators, or bone-marrow-derived stem cells [4]. For coffee lovers, caffeine prevented neurodegeneration and behavioral alterations in a depressed mice model [5]. These are the most common referred preventive methods; some are more esoteric like Tualang honey [6].

Which treatments for neurodegeneration are showing the most promise?

According to the doctor in the video and using his analogy of the roof with 36 holes, today there is not one single drug for AD and more broadly for any neurodegenerative disease. Realistically such drug cannot exist as the neurodegenerative diseases are too complex. According to the patient cases in the video a personalized treatment involving many sub-therapies for every single patient seem to be more efficient [7]. Overall, there is as of today no cure, albeit some drugs delay the progress of the disease, or improve certain symptoms (refer to our course). The most promising treatments are cell therapy replacement which replace neuronal population and for AD, the drug, aducanumab which targets amyloid plaques (refer to our course).

[Now many researchers in the field have pointed out to the inability of the FDA to evaluate such complex protocols and the inadequacy of their policy in the case of neurodegenerative diseases by sticking to the stringent rule of “no risk” for patients which does not help in the face of these severe illnesses.]

What are some methods to study possible causes of neurodegeneration?

When so many clinical trials have failed, it is fair to assume that the root causes of these diseases are difficult to isolate. Various methods exist for screening, early diagnosis and monitoring of neurodegenerative diseases like MRI protocols to measure brain volume (see video of the class), biosensing devices or studies of comorbidities with other diseases or viral infections. I would think also elaborate scientific and mathematical modeling approaches which will try to extract similar patterns across neurodegenerative diseases may yield interesting results. Over the recent years researchers have come up with various biosensing devices for detecting inflammatory mediators due to the critical role of neuronal inflammation in many of the neurodegenerative diseases: for example, Carneiro et al. created an electrochemical biosensor which could detect A β ₁₋₄₂ levels which are below 500 pg/ml although the ratio is a better predictor [8]. Researchers are realizing likewise the necessity of mixed methods (see reasons for multi targets drugs above), and they redirect their effort to provide multiplex biosensors and portable lab-on-chip with low skill level required to operate them [8].

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