The Evidence of Brain Health in MS

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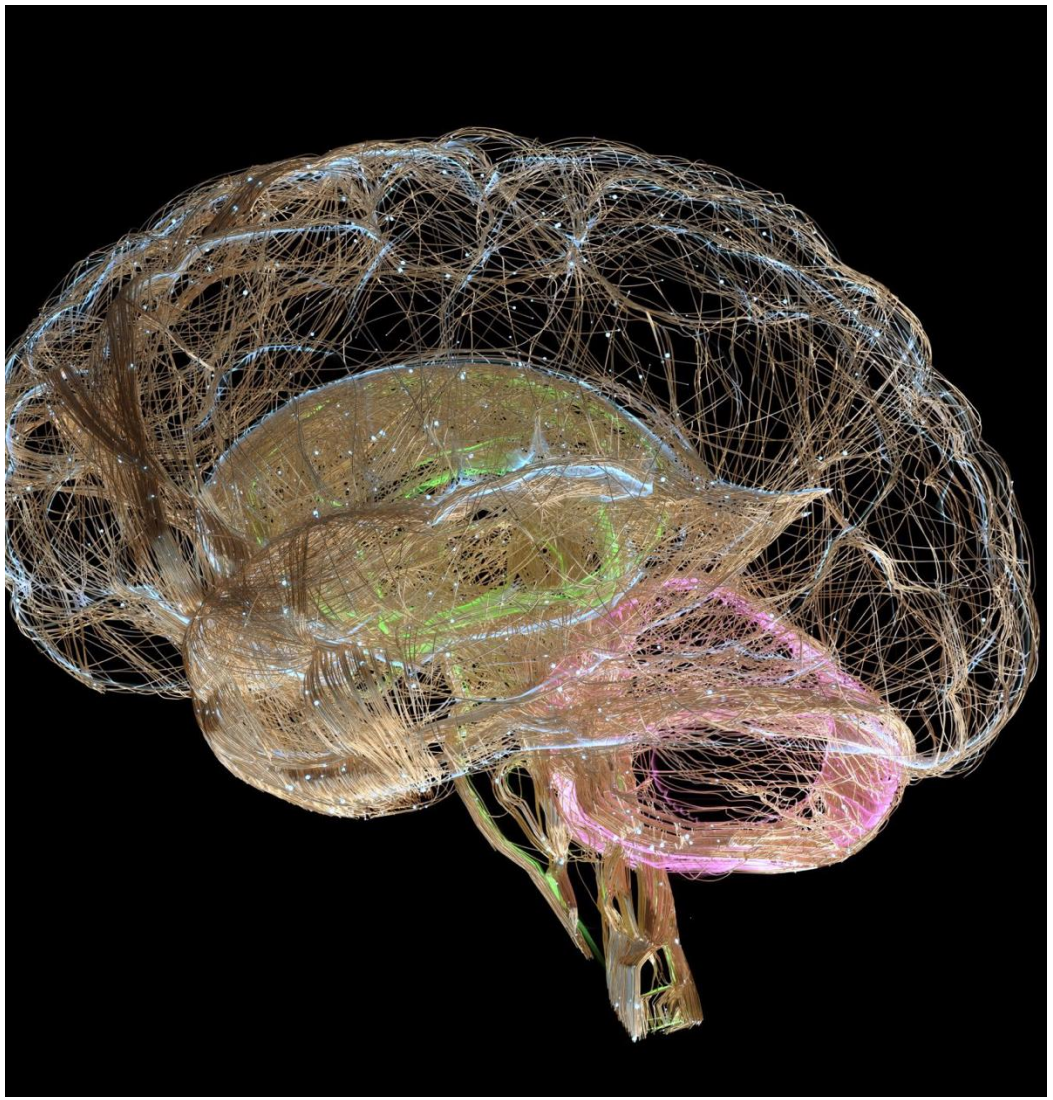
Disclosures

Cycle pharma, Bristol Myers Squibb, Horizon Therapeutics/Amgen, EMD-Serono, TG Therapeutics, Sanofi



Brain Health defined by The World Health Organization

"Brain health is the state of brain functioning across cognitive, sensory, social-emotional, behavioral and motor domains, allowing a person to realize their full potential over the life course, irrespective of the presence or absence of disorders"

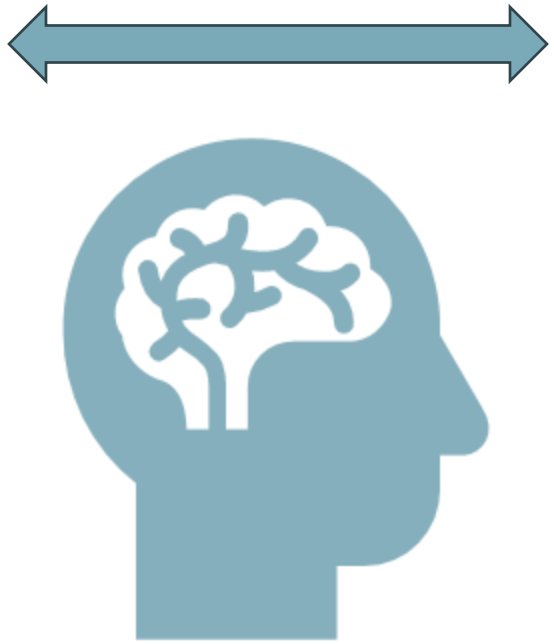
World Health Organization. (2024). Brain health.
Retrieved from https://www.who.int/health-topics/brain-health#tab=tab_1

Neurological Reserve

- Brain's ability to compensate for injury & maintain normal function
- Brain will adapt by shifting the function from damaged networks to healthy networks (remodeling itself)
- Neurological reserve & repair mechanisms can explain why MS can go undetected & undiagnosed in the early phase of the disease
- Concerns arise when neurological reserve & repair mechanisms can no longer compensate for damage; reserve is used up

Brain (passive) Reserve

- Determined congenitally/genetically
  - Brain volume
  - Neuronal count
  - Synaptic count
- Determined by early lifestyle factors



Cognitive (active) Reserve

- Ability of the brain to process info
- Ability to compensate for damage
- Shaped throughout life experiences
  - Education level
  - Occupation
  - Leisure activities

(Brandstadter et al., 2019; Giovannoni et al., 2016; Katz Sand, 2018)

Neuroplasticity

- Ability to adapt & re-wire itself
  - Forming new connections throughout life
    - Learn new information
    - Adjust to new experiences
    - Recover from injuries
- Learn new neural pathways & create new synaptic connections through repetition
- Ongoing damage creates challenges due to continued loss of neural reserve

(Ksiazek-Winiarek et al., 2015; Lipp & Tomassini, 2015)

Brain Atrophy

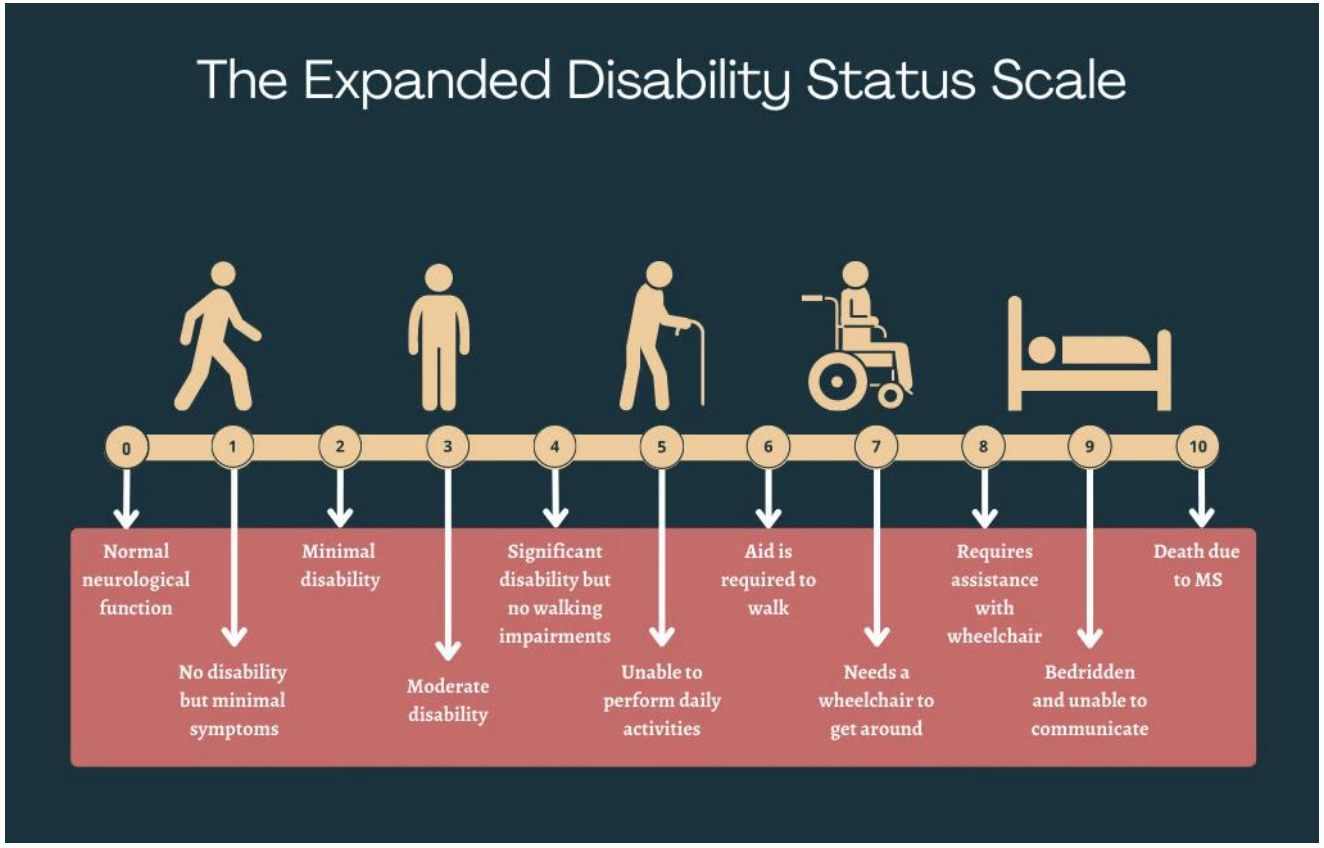
- Increases at the start of MS
  - Neurodegeneration – progressive loss of neurons
- Occurs 3x's faster in those not treated with DMT
  - Healthy adult, occurs 0.1-0.5% per year
  - Untreated MS adult, occurs 0.5-1.35% per year

MRIs are critical in measuring disease activity & brain atrophy

(Giovannoni et al., 2017)

Screening Tools

EDSS (Expanded Disability Status Scale)



EDSS, Expanded Disability Scale
(Multiple Sclerosis News Today, 2023; Multiple Sclerosis Trust, 2020; MS Society, n.d.; Rudick et al., 2014)

- Gold standard for assessing disability
- Widely used in clinical trials
- Heavily dependent on ambulation & lower extremity function
  - Does not assess cognition
    - Essential to employment & QoL
    - Cognitive screening
      - Due early in dx

Screening Tools

Measure performance, severity of disability, & changes over time

MSFC Multiple Sclerosis Functional Composite	Testing	MSPT Multiple Sclerosis Performance Test
25-foot timed walk	***Lower extremity function***	Walking speed test (25-foot)
None	***Walking & standing ability***	Balance test
9-hole peg test	***Hand coordination***	Manual dexterity test
Symbol digit modality test	***Cognitive processing speed*** ***(sensitive to slowed processing of info over time)***	Processing speed test
Sloan low contrast visual acuity	***Vision***	The Low Contrast Letter Acuity Test 2.5% and 100% opacity
None	***Patient questionnaire***	Patient history Well validated QoL instrument

(Benedict et al., 2017; Rhodes et al., 2019; Rudick et al., 2014)

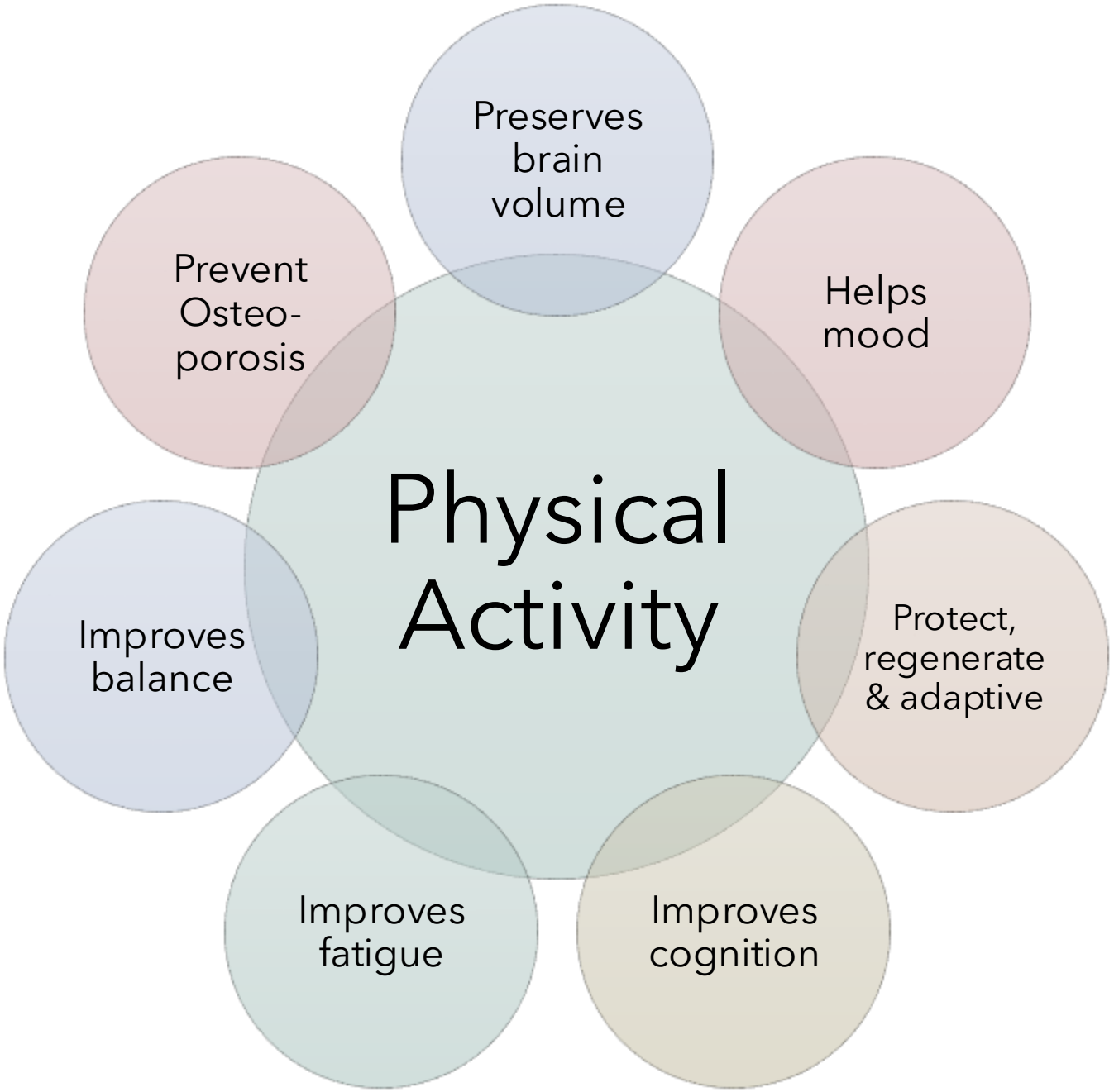
Preserving Brain Health and Reserve

- Role of DMT
  - Stop clinical relapses
  - Stop MRI inflammatory activity
  - Slow disability progression
  - Slow brain atrophy
  - Maintain cognitive function
  - Preserve functional reserve

- In addition to effective DMTs, what other factors play a role in brain health?

Modifiable Strategies

Brain Health in MS



(Giovannoni et al., 2017; Haartsen et al., 2017)

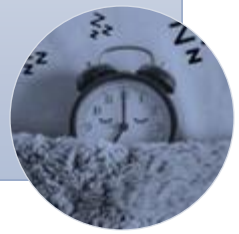
Brain Stimulation & Rest

- Reading, puzzles, higher education
- Hobbies
- Creative expression
  - Art, play music (repetition)
- Stress reduction, mindfulness

Mental Fitness

- Quality sleep
- Good sleep hygiene
- Improve memory & concentration

Adequate Sleep



- Support groups
- Family/Friends
- 1 in 4 individuals with MS have depression
  - Depression/anxiety contribute to reduced cognitive function

Social Interactions

(Brandstadter et al., 2019; Giovannoni et al., 2017; Haartsen et al., 2017)

Healthy Lifestyle

Healthy Diet

- Rich in fish, whole grains, green leafy vegetables, olives, & nuts
- Preparing meals at home
- Higher LDL – worse clinical outcomes
- Cut out sugar – more energy, less cog fog, better sleep

Limiting Alcohol

- Increased unsteadiness & risk of fall
- Increased brain volume loss
- Sleep problems
- Concerns with some DMTs & symptomatic meds (Liver)

Tobacco Cessation

- Progression
- Higher lesion volume/higher relapse rate
- Decreased brain volume
- Higher EDSS
- Increased cognitive impairment

(Brandstadter et al., 2019; Giovannoni et al., 2016; Giovannoni et al., 2017; Haartsen et al., 2017; Katz Sand, 2018; Luciano et al., 2017; MS Society, 2021)

Minimize Comorbidities

(any illness that is not MS or a complication arising from MS)

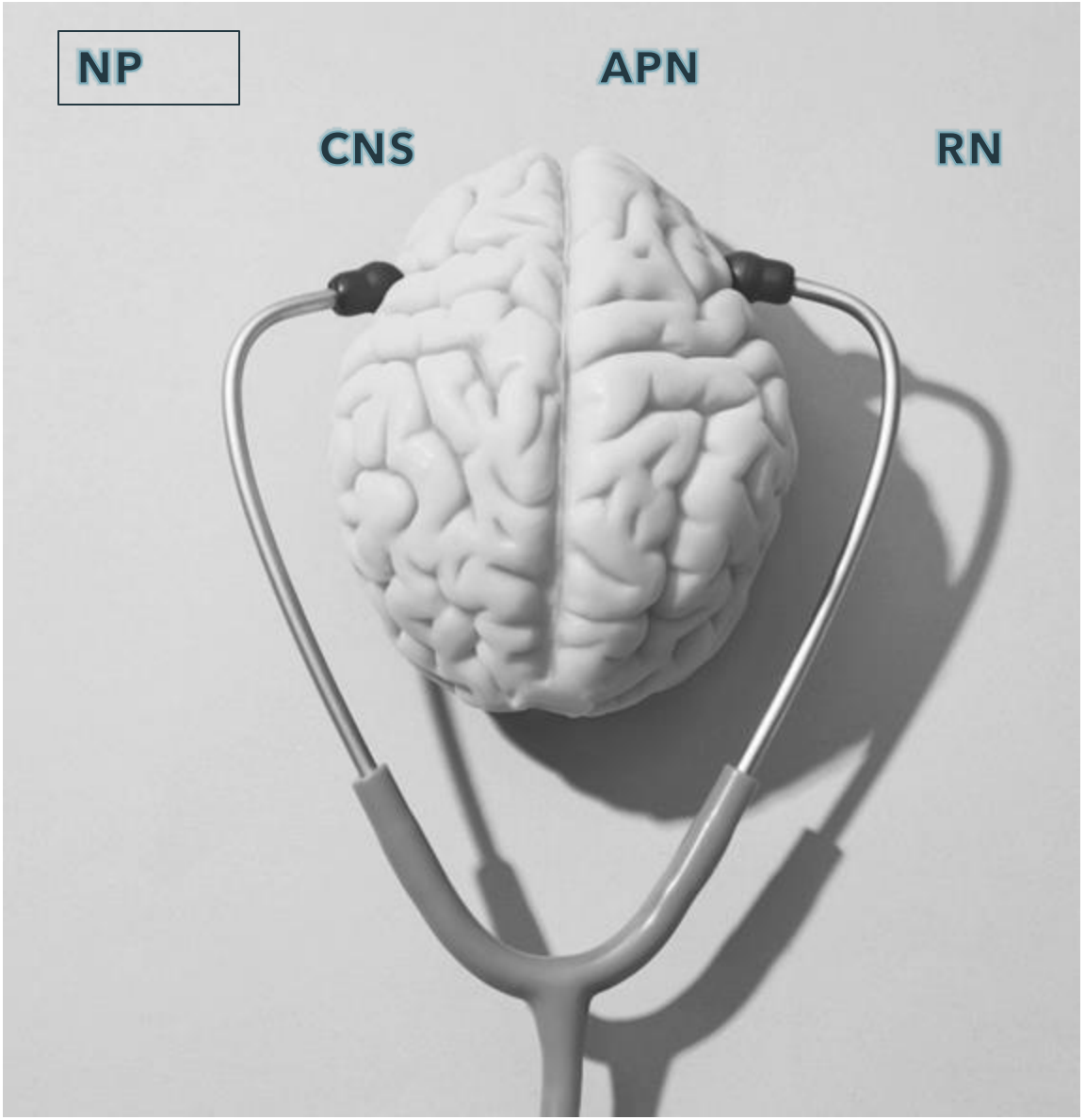
- Cardiovascular disease
  - Increase white matter abnormalities
  - Advanced brain atrophy
- HTN
- Diabetes
- HLD
- Obesity
  - Higher lesion volume
  - Increased atrophy (over 5-year period)
  - Higher risk cardiovascular risk factors
- Smoking
- Advise to have PCP

(Brandstadter et al., 2019; Giovannoni et al., 2016)

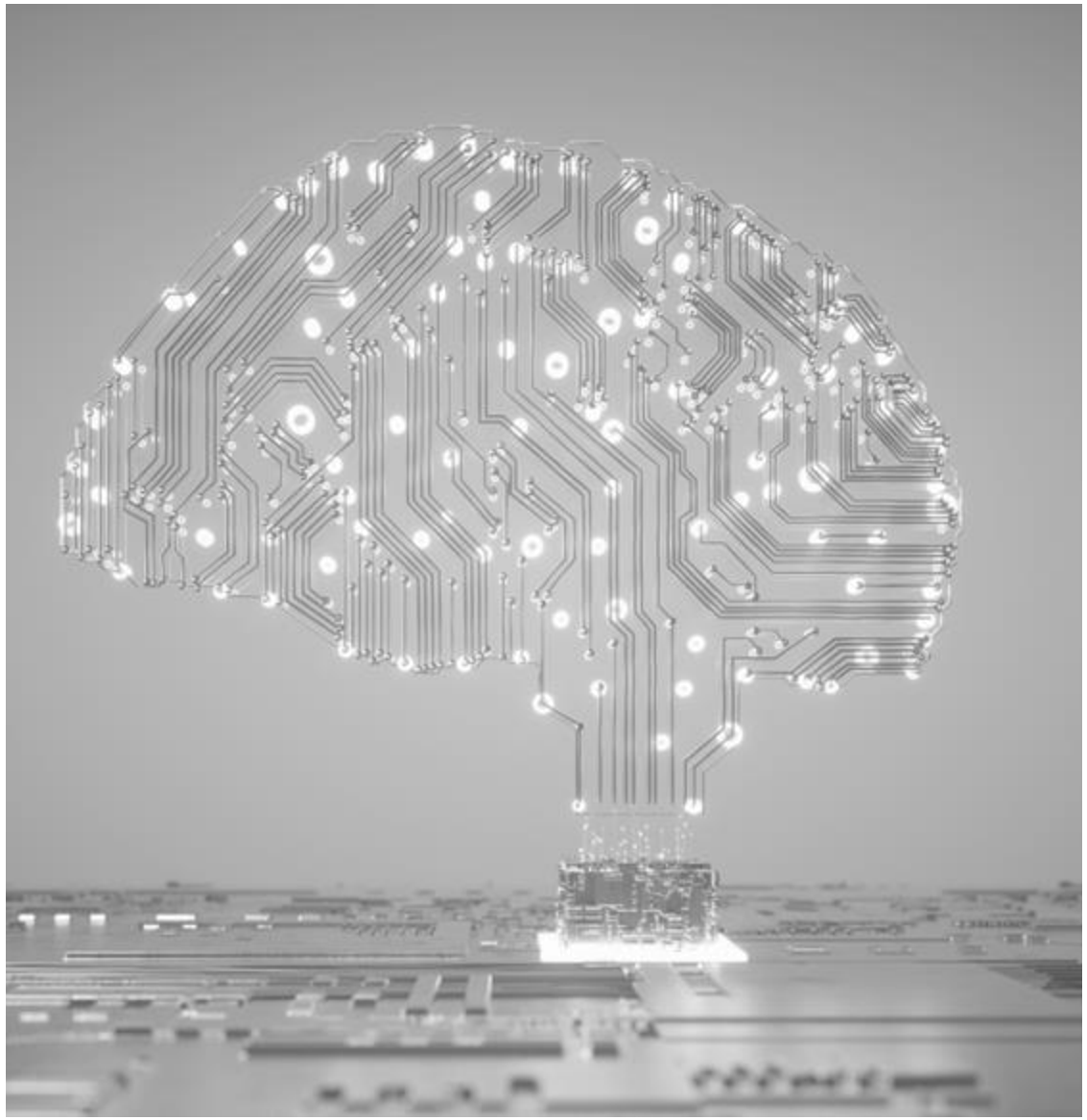
North American Research Committee of Multiple Sclerosis (NARCOMS) registry showed a link for patients with ≥ 1 vascular comorbidity during the time of their MS diagnosis had an increased ambulatory disability score

The Role of MS Nurses

- **Support, Advice, Encouragement & Hope**
- **Provide Support across the Lifespan**
  - Diagnosis, patients planning pregnancy, acute relapse management, & disability progression
- **Provide Education**
  - Disease course
  - Role of DMT
  - Modifiable risk factors
  - Promote adherence & compliance
- **Collaboration**
  - Interdisciplinary Team
    - Providers, Nurses, PT/OT/Speech, SW, BH, MA's etc
  - Caregivers/Family
- **Routine Appointments**
  - Improved access to care/virtual visits



(Burke et al., 2011; Haartsen et al., 2017; Harris et al., 2021; Nagaresh et al., 2024; Wills et al., 2024)



The Role of MS Nurses

- **Monitor MRIs**
  - Recognize disease activity
- **Independently manage DMTs**
  - DMT switches for suboptimal control or treatment related side effects
- **Monitor Labs for DMT safety**
- **Assessments**
  - Neuro or EDSS/cognitive/QoL/mood
- **Symptomatic management**
- **Advice**
  - Engaging patients to participate in care
  - Shared decision making
  - Promote positive change
- **Advocate**

(Burke et al., 2011; Haartsen et al., 2017; Harris et al., 2021; Nagaresh et al., 2024; Wills et al., 2024)

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