People with MS can suffer from cognitive deficits. Cognitive deficits impair their confidence in their ability to perform ADLs, and desired and valued activities.

**Assessment**

- **Sullivan & Schmitz-2006**
  - Minimal Examination of Cognitive Function in MS. This examination consists of a battery of 7 neuropsychological tests. It examines processing speed, working memory, learning and memory, executive function, visual spatial processing, and word retrieval. The test takes 90 minutes to administer.

- **Krupp et al-2008**
  - Acetylcholinesterase inhibitors are the most promising. Physostigmine has a short half life and has adverse effects. Donepezil is a popular type of the drug.
  - Another category is disease modifying agents. These drugs are used to treat other impairments due to MS and these may have consequences on cognition.

- **Why do acetylcholinesterase inhibitors work?** Because it’s transported through the basal forebrain to the cerebral cortex by the periventricular pathways that are destroyed by MS. So the theory is that there is a decreased cholinergic activity from demyelination of these pathways.

- Some drugs used to treat bladder infections can have anticholinergic effects, thus can impair memory, attention, and information processing speed.

- When doing test for cognitive deficits you need to be aware of the medications that are being used. A study by those on CNS active medications had greater impairments in processing speed, sustained attention, and fatigue. Amantadine, anticholinergics, and anti-depressants can affect cognition. Baclofen can impact cognition, also.

**Early Stage: Prescribe exercise as early as possible as a prophylactic measure.**

Physical function and cognitive function are independent of one another and therefore we’re unable to predict cognitive function based on stage of disease. (Penner et al, 2006)

**White et al, 2008**

- **Early Stage**-
  - The deficits in MS can include information processing speed, memory, and attention which correlate with damages to white and grey matter. Exercise has been shown to correlate with brain health. Physical activity may promote brain health through protection against neuronal damage. It may also slow the progression of MS associated damage and delay long term disability. ILGF-1 can act as a neuroprotective agent. Brain derived neurotrophic factor, which is released during exercise, can also help with neuronal health and increase learning and decrease memory loss. Exercise may help with mood states, learning, and memory. Since axonal loss occurs early on, exercise should be prescribed early on. Regular exercise conserves white and grey matter in aging humans and predicts better
cognitive function in humans and animals. Conversely blocking BDNF during exercise diminished exercise induced learning.

Examples of difficulties in ADL’s related to memory (www.mult-sclerosis.org)
- Whether meds have been taken
- Daily appts
- Move to get something, what went into a room to grab
- Shut windows before leaving house
- Forgetting a word they commonly use

Middle Stage: Teaching compensatory mechanisms:

Techniques: (www.mult-sclerosis.org)
- Having a place for things and put them back where they belong (i.e. keys, glasses, wallet)
- Work slowly, take your time, and don’t be rushed by anyone.
- Keep a diary or PDA and write important information down (i.e. people’s names people’s names and what they look like to you)

Lincoln and Harding (2003). RCT. Effectiveness of cognitive assessment and intervention. Beneficial techniques: (Results showed frequency of problems reported was lower than pre-intervention diaries.)

For difficulty w/ remembering peoples’ names → visual pneumonic (Create an association between that characteristic, the face, and the name in your mind, i.e. Evelyn has pretty “eyes”) Concentration problems → Encouraged to do one task at a time, minimize surrounding distractions, take breaks between tasks.

Usage of alarms and post-it messages as reminders. For example, one woman had difficulty remembering to lock the back door, so she’d use a post-it note to remember. Ex of pt who would think of something, but by the time he reached his list (b/c of physical problems) he’d forget what he wanted to add to it → used a Dictaphone.

Shevil and Finlayson (2009)
- MS patients with mild to moderate cog difficulties can self-manage symptoms through PST (problem solving techniques)
  Example: breaking cognitively demanding tasks into smaller, manageable steps such as “cleaning the house”. Rather than thinking “I’ll clean the entire house”, “I’ll clean out the clothes pile, fold them properly and put them into the dresser”

- Practicing PST in everyday life. Patients reported feeling they were organizing not only their thought processes but their activities, time, and physical environment. Pt’s reported feeling less stress and frustration, problematic for MS patients.
- Other examples: time management sheet for hours of the day, dry erase board to write daily activities,

These are all compensatory strategies we can help our patients employ in the Middle stage.
**Late Stage:** Caregiver training to provide assistance with making appointments and cueing for ADL’s. Patient teaching on importance of communicating with caregiver/spouse/aide about their cognitive difficulties and to ask for help. 2009 (Shevil and Finlayson)

*Take Home Messages:*
Early stage: exercise as a preventative measure.
Middle stage: compensatory techniques like alarms, post-its, calendars, Dictaphones, pneumonic, breaking up large tasks.
Late Stage: caregiver training on assisting with ADL’s and cooperative communication.

**Sources**


Sullivan, Susan B; Schmitz, Thomas J. 2006. Physical Rehabilitation. pg. 789


White, LJ, Castellano, V. Exercise and brain health-implications for multiple sclerosis.