Cognitive Aging:
What Every Clinician (and Patient)
Should Know

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Demographics


What is Cognitive Aging?

• Cognition refers to the mental functions involved in attention, thinking, understanding, learning, remembering, solving problems, and making decisions.
• Cognitive aging is a process of gradual, ongoing, yet highly variable changes in cognitive functions that occur as people get older.
• Cognitive aging is a lifelong process. It is not a disease or a quantifiable level of function.
• In the context of aging, cognitive health is exemplified by an individual who maintains his or her optimal cognitive function with age.

Definition of Cognitive Aging

– Best assessed within an individual over time so that he or she serves as his own norm, though this approach incorporates practice effects
– Need to regularly revisit the norms that we use to statistically norm cognition
– Cognitive Aging is not normal aging or successful aging
Implications Of The Definition

- As concepts of disease and syndromes change, cognitive aging changes
  - MCI was once not MCI, not a diagnosis, so prior cohorts that defined cognitive aging likely included people who had MCI who would not be in contemporary cohorts
- Over time, the norms change; they should change

A Lifecourse Approach to Aging and Cognitive Performance

Key Features of Cognitive Aging

- Inherent in humans and animals as they age
- Occurs across the spectrum of individuals as they age regardless of initial cognitive function
- Highly dynamic process with variability within and between individuals
- Includes cognitive domains that may not change, may decline, or may actually improve with aging, and there is the potential for older adults to strengthen some cognitive abilities
- Only now beginning to be understood biologically yet clearly involves structural and functional brain changes
- Not a clinically-defined neurological or psychiatric disease such as Alzheimer's disease and does not inevitably lead to neuronal death and neurodegenerative dementia.
Brain Changes with Cognitive Aging

- Human and animal studies
- Mechanisms of cognitive aging:
  - Decreases in neuronal function, not number
    - Declines in synaptic number
    - Declines in synaptic function
  - Neurotransmitter changes

Declines in Synaptic Integrity

- Studies on non-human primates
- Specific classes of dendritic spines lost in dorsolateral prefrontal cortex
- These spines are very important for synaptic plasticity
- Loss correlates with declines in working memory

What are some Functional Measures Reflecting Cognitive Aging? (IADLs)

- Filling out your tax form
- Downloading and using an app
- Renewing your drivers’ license and tags online
- Preparing a meal from a recipe
- Going from Terminal 1 to Terminal 2 at O’Hare
- Serving on a committee for a volunteer social goal
- Fixing a minor appliance problem
- Adapting to challenging personal, social situations
- Preparing Powerpoint slides

Personal Adaptations to Cognitive Aging (Examples) *Psychol Assessment 17:168*

- “External” Behaviors
  - Shopping lists
  - Bookmarks
  - Note birthdays
  - Telephone numbers
- “Internal Behaviors
  - Memory tricks
  - Think about a plan
  - Link old and new
  - Mental images
- “Reliance”
  - Ask for help to remember _______
- “Time”
  - Slow down speech
  - Read more slowly
- “Effort”
  - In conversation
  - Concentration
  - Trying hard to remember

What are people doing to intervene in cognitive aging?

- Computerized brain games
- Drugs (incl. caffeine)
- Stimulants: (methylphenidate/amphetamines)
- Transcranial electric stimulation
  (See Science 310:379)

Risk Factors for Cognitive Aging

- Factors which may accelerate the decline
- Factors which may be open to intervention.
Earlier “Lifecourse” Risk Factors and Conditions

- Educational development
- Adverse child and adolescent exposures
- Child and early adult mental/psychological conditions
- Potential occupational and other environmental exposures

External Contributors to Cognitive Decline

<table>
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<tr>
<th>Medications (psychoactive)</th>
<th>Vascular risk and disease (cerebro- and cardio-vascular)</th>
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<td>Anticholinergics</td>
<td>Multimorbidity:</td>
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<td>Polypharmacy</td>
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<td>Hearing and vision loss</td>
<td>Read trauma</td>
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<td>Sleep disorders, sleep apnea</td>
<td>Genetic factors</td>
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Medications and Cognitive Decline

- Older adults are prescribed 14 drugs per year on average
- High risk meds include anticholinergic drugs, benzodiazepines, and sedative/hypnotics,
- 20 – 50% on anticholinergic drugs (associated with cognitive impairment)
- Potent anticholinergics and over-the-counter antihistamines such as diphenhydramine (Benadryl) especially a risk

Impact of Hospitalization

![Graph](Image)

Evidenced Based Messages for Clinicians and the Public

- The brain ages, just like other parts of the body.
- Cognitive aging is not a disease. It is not the same as Alzheimer’s disease or other types of dementia. Cognitive aging is a normal, normal process that occurs in every individual.
- Cognitive aging is different for every individual. Some people may experience very few effects, while others may undergo changes that can affect cognitive abilities needed to carry out daily tasks, such as paying bills, driving, and following recipes.
- Some cognitive functions improve with age. Wisdom and knowledge often increase with age, and older adults report greater levels of happiness and satisfaction than their younger counterparts.
- There are steps patients can take to protect their cognitive health. Although aging is inevitable, it is possible to promote and support cognitive health and adapt to age-related changes in cognitive function.
Recommendations to Individuals and Families

The top 3 actions you can take to help protect your cognitive health as you age

1. Be physically active. Staying physically active can promote cognitive health in middle-aged and older adults.

2. Reduce your cardiovascular risk factors (including hypertension, diabetes, and smoking). Maintaining cardiovascular health supports cognitive health.

3. Manage your medications. A number of medications can have a negative effect on cognitive function when used alone or in combination with other medications. The effects can be temporary or long-term. It’s important to review all of your medications with a health care professional and learn about their effects on cognitive health.

Other actions that may promote cognitive health

- Be socially and intellectually active, and continually seek opportunities to learn.
- Get adequate sleep and seek professional treatment for sleep disorders, if needed.
- Talk to your health care provider to learn more about preventing delirium (a decline in cognitive function that can be associated with some medications and hospitalization).

Brain Stimulation Activities (Brain Games)

- No question that if most persons practice using brain games, they will improve in function on the games.
- Brain stimulation games have not as yet been demonstrated to
  - Transfer to everyday activities over time
  - Maintain gains over time once the games are no longer played

Brain games do come with a cost
- A small but for some significant financial cost
- Anxiety over performance on the game and comparison with others.

Resources related to Cognitive Aging and Financial Decision Making

Age-related declines in cognitive function may make older adults vulnerable to financial fraud or abuse at a time when significant financial decisions need to be made, such as planning for retirement. In 2010 alone, victims of elder financial abuse lost an estimated $2.9 billion, which includes loss of money and goods to legitimate businesses, scams, family, and friends and indirectly through medical insurance fraud. According to the National Council on Aging, the top 10 financial scams targeting older adults include telemarketing, Internet scams, and sales of anti-aging products. Fortunately, there are many resources available to raise awareness and help older adults, their families, and financial advisors avoid abuse and make sound financial decisions, including AARP’s “Scam Jam” and “FraudWatch Network,” the Consumer Financial Protection Bureau’s Office of Financial Protection for Older Americans, and the Federal Trade Commission’s “Prevent It, Fix It” financial fraud campaign.

Visit www.iom.edu/cognitiveaging to access a list of resources related to cognitive aging and financial decision making.

Institute of Medicine

Cognitive Aging: Progress in Understanding and Opportunities for Action

Free PDF of the report:
www.iom.edu/cognitiveaging

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