

REHAB SUMMIT

**303: Cognition & Memory Changes:
Normal vs. Abnormal Aging**

Maxwell Perkins, MS, OTR/L

#RehabSummit #RHSummit #VirtualSummit

To comply with professional boards/associations standards:

- I declare that I (or my family) do not have a financial relationship in any amount, occurring in the last 12 months with a commercial interest whose products or services are discussed in my presentation. Additionally, all planners involved do not have any financial relationship.
- Requirements for successful completion are attendance for the full session along with a completed session evaluation.
- PESI and all current accreditation statuses does not imply endorsement of any commercial products displayed in conjunction with this activity.

303: Cognition & Memory Changes: Normal vs. Abnormal Aging

Maxwell Perkins, MS, OTR/L

Financial: Maxwell Perkins is an independent consultant. He receives a speaking honorarium from PESI, Inc.
Non-financial: Maxwell Perkins is a member of the American Occupational Therapy Association.



**Cognition and Memory
Changes as we Age:
Normal vs. Adnormal**

Maxwell Perkins MS, OTR/L

Maxwellperkins@yahoo.com

“Materials that are included in this course may include interventions and modalities that are beyond the authorized practice of mental health professionals. As a licensed professional, you are responsible for reviewing the scope of practice, including activities that are defined in law as beyond the boundaries of practice in accordance with and in compliance with your professions standards. “

Disclosure

- I receive no financial or any other type of incentive from any of the resources/products discussed in this presentation.

Objectives

At the completion of this seminar, you should be able to:

- Describe at least 5 normal vs. abnormal cognitive/memory deficits throughout the aging process
- Justify how frontal lobe/executive functions relate to cognitive/memory ability.
- Identify at least four evidence-based resources related to memory/cognitive impairment that can be used for patient/caregiver education.

How do you divide a cake into 8 pieces with 3 cuts all the same size?

- Four parts in two cuts are easy.
- Now just cut the cake horizontally (split the bottom and top part).



Get a Brain Check-up

- 1 REGISTER FOR A BRAIN CHECK-UP
- 2 ANSWER QUESTIONS ABOUT YOU AND YOUR LIFESTYLE
- 3 GET YOUR BRAIN HEALTH INDEX (BHI) SCORE AND REPORT
- 4 USE YOUR DASHBOARD: TRACK PROGRESS
- 5 TEST YOUR MEMORY

What do I get?
You will get your personal:
– Brain Health Index (BHI) Score
– Individual Pillar Scores
– Brain Health Guide
– Memory Score
– Dashboard
– Recommendation and Tips
Designed For You

www.healthybrain.org

Cleveland Clinic





TALKING ABOUT
BRAIN HEALTH & AGING

THE BASICS




 ACL is an operating division of the U.S. Department of Health and Human Services.

Alzheimer's and Dementia: Is there a difference?

- Dementia: Overall term for diseases/conditions characterized by a decline in memory or other skills that affects a person's ability to perform everyday activities.
- American Psychiatric Association, (DSM-5):
 - Major Neurocognitive Disorder
 - Mild Neurocognitive Disorder (resembles MCI)

Dementia

“The general loss of cognitive abilities, including an impairment of memory, and may include one or more of the following: Aphasia, apraxia, agnosia, or disturbed planning, organizing and abstract thinking abilities.”

(Department of Health and Human Services - Transmittal AB-01-135, CM-PUB 60AB).



Greatest single risk factor for developing dementia?

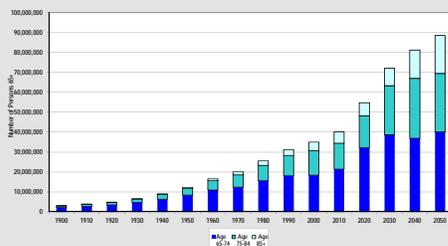
Men or Women have greatest incidence?

% of Older People with AD

- ❖ Increasing age increases %
- ❖ 3% of people age 65-74
- ❖ 17% of people age 75-84
- ❖ 32% of people age 85 or older have Alzheimer's dementia.
- ❖ Not a normal part of aging, and older age alone is not sufficient to cause Alzheimer's dementia

Alzheimer's Association 2019

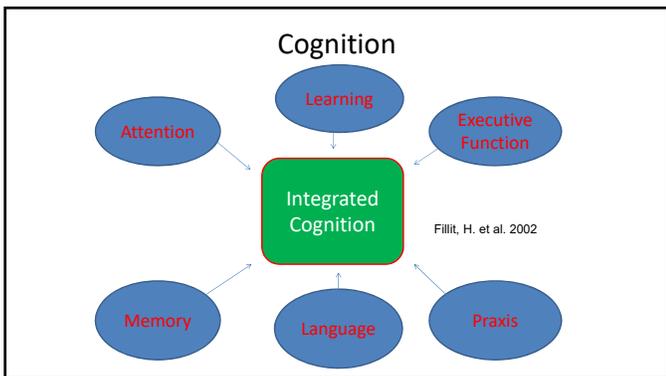
Population 65+ by Age: 1900-2050
Source: U.S. Bureau of the Census





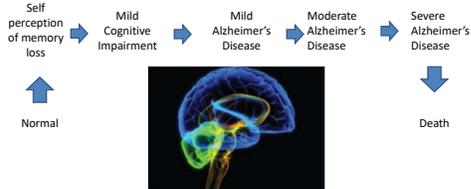
What does this mean?

Pt. is alert and O X 3



Memory/Cognitive Decline

"With age comes the increasing likelihood of developing memory loss."



Small, G. 2002

Normal Memory Lapses

- Forgetting:
 - Where you left objects
 - Names*
 - TV show; restaurants, book title, etc.
 - What you just read*
 - Why you entered a room
 - Conversation details*
- Distractibility
- "the tip of my tongue"
- Katz, 2011

Normal Memory Lapses

You eventually remember!



**Frontal Lobes and Executive Function:
What's the Big Deal?**

Executive function acts as a supervisor of all cognitive processes

Executive Functions

Life Requires Problem Solving

- Initiation
- Planning/Prioritizing
- Sequencing/Organizing
- Monitoring Own Behaviors/Responses
- Insight
- Abstract Thinking
- Judgment
- Divided attention
- Problem Solving
- Inhibition
- Cognitive flexibility/set-shifting or mental flexibility
- Anticipation

Executive Functions (EF's)

"EF's enable manipulation and active maintenance of plans and goals while monitoring performance and inhibiting environmental or internal distractions."

Kane, M. J.; et al. 2002

"In short, EF's help people navigate life"

Posner, M. I.; et al. 2007

Frontal Lobe Issues

- Negative change in judgement
- Difficulty task switching
- Task perseveration (physical and verbal)
- Emotional lability
- Decreased safety awareness/judgement
- Sexual or socially inappropriate behavior
- Off-target verbosity?
- Decreased abstract reasoning
- Poor judgement
- Changes in behavior

TBI



Increases the risk of overall dementia.

Risk increases with number of TBI's sustained

Mild TBI is associated with a two-fold increase in the risk of dementia diagnosis.

Alzheimer's Association 2019

MCI



Person has memory complaints and objective evidence of cognitive impairment but no evidence of dementia

Precursor to dementia specifically Alzheimer's

"normal part of aging" NOT!

Important as a major intervention point

MCI

- **Consistently** more forgetful
- **Frequently** forget important events
- **Loose** train of thought
- **Increased** difficulty making decisions, planning steps to accomplish a task or interpreting instructions.
- Get lost in **familiar** environments.
- **Increased** impulsivity/poor judgment.



Mayo Clinic:
www.mayoclinic.org/diseases-conditions/mild-cognitive-impairment

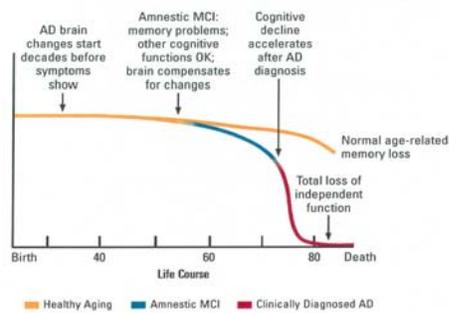
MCI

- ❖ Effects 15-20% of people age 65 or older
- ❖ 32% develop Alzheimer's in 5 years

- ❖ **Live independently**
 - ❖ **Family?**
 - ❖ Subtle declines in function
 - ❖ **Affects IADL** indep. but **not ADL** indep
- Can remain stable for years

Drugs effecting memory: Examples: Valium, Ativan, Benadryl, Tylenol PM, Advil PM, Cogentin





Alzheimer's Disease: Unraveling the Mystery. www.nia.nih.gov/alzheimers

Normal Aging vs. MCI

Normal Aging = subtle forgetfulness

MCI = Memory deficits more prominent

All other aspects of function are preserved

The forgetfulness is generally apparent to those close to the person but not to the casual observer

Peterson, R. C. 2011

Normal Memory Change vs. MCI - Impact

Normal Changes	MCI
Negative emotional experiences	Stronger negative feelings
Self acceptance/normal	Not normal but have to accept
"Camaraderie" with peers and senior moments	Social with drawl: remembering names lack of context
Relationship = partnership	Relationship = one sided
Seek out and participate in cognitively engaging activities	Decrease leisure activities
Use memory aides "simplify, simplify, simplify" focus on one thing at a time using rhyming/associations using alternate phrasing with word finding issues	Use memory aides Parikh, P., et al. 2016 Excellent Article

Comparison

	Normal	MCI
Thinking ahead	3%	29%
Task prioritization	14%	32%
Remember appointment	7%	44%
Remembering a few items w/o a list	21%	52%
Remember conversations a few days later	23%	59%
Doing 2 things at once	21%	48%
Returning to a task after being interrupted	13%	43%

Farias, S. 2006

Challenges of MCI

- Collaborated by an informant.
- Poor insight into or under-estimate the extent of deficits. **Why?**
- Remember: families members can overlook a lot
- Lack of structural support for intervention strategies
- Isolation and community withdrawal



IADL's



- Sensitive to early cognitive deterioration
- Defining feature:
- Higher likely hood of developing Alzheimer's

Peres, K. et al. 2008
Gold, D. 2012

MCI/Mild AD Interventions Home Environment

- Minimize Distractions
- Focus on one thing at a time
- Follow a routine
- Replace items after use
- More alert in am
- Use organization system
- Set medications out
- Medication reminders
- Lists/Checklists
- Journaling



- Take notes/highlight/summarize when reading
- Use sticky notes
- Visualize/make associations
- Pen/paper by phone to take notes
- Consistency is important
- Make remembering/learning multimodal
- Bright tape on walker/cane
- Pill boxes
- Calendars
- Repeat it
- Bright cell phone cover
- Timers
- Other ideas?

M
e
d
i
c
a
t
i
o
n
s

- 65-69 average ???? prescription medications/year
 - 80-85 average of ?????
 - ???? Of older adults use prescription medications
- Polypharmacy? ___ or more medications
 ed risk of negative side effects
- Increasing age corresponds to increasing medication omission errors

Ages:

65-69:	10.3%
75-79:	24%
Over 85:	38.2%

Women  Men

Stroke, depression and cognitive limitations associated with a higher risk of developing difficulty managing meds

Bleijenberg, N. et al. 2017.

Medication Adherence

- **Strategies:**
 - Avoid 2X daily (give specific times (am/pm or 9 and 3))
 - Avoid frequency (every 12 hours)
 - **MUST** involve caregiver
 - Use of an organizer and medication chart improved compliance (Park, D. et al. 1992)
- Develop a simple assessment to see if the patient can follow directions.

Montreal Cognitive Assessment (MOCA)

The image shows a portion of the Montreal Cognitive Assessment (MOCA) form. It includes sections for:

- Visuospatial/Executive:** A cube drawing and a clock face.
- Naming:** Pictures of a lion, a rhinoceros, and a camel.
- Memory:** A list of words: FACE, VEIL, CHURCH, EMERY, RED.
- Attention:** A sequence of numbers: 3 2 8 4.
- Language:** A list of words: P R A C M N K J L B A F A R D A A J I M O P A B.
- Abstraction:** A list of words: F A C E, M E M O R Y, C H U R C H, E M E R Y, R E D.

MoCA Components

- Memory: Delayed recall; orientation; forward digit span
- Visuospatial: cube/clock draw
- Language: Animal picture naming; sentence repetition
- Attention: Serial 7's; Vigilance; (A tapping test)
- Executive: Backward digit span; trail-making test word similarities; f-word list generation

MoCA vs MMSE

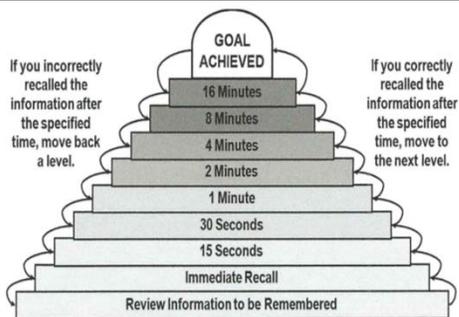
- **MoCA:** Adoption in major research studies focusing on MCI - mild AD
Study: 71 out of 94 patients (3/4's) of the MCI participants scored in the abnormal range on the MoCA but were considered normal according to the MMSE.
- **MMSE:** Superior for more advanced stages / more significant functional impairment

Nasreddine, Z. S. et al. 2005

Spaced Retrieval



What is it?



Vance, D. et al. 2007

Spaced Retrieval



Great Reference

Crowe, J. et al. 2013. Errorless learning and spaced retrieval training for clients with Alzheimer's disease. *Physical & Occupational Therapy in Geriatrics*, 31(3): 254-267



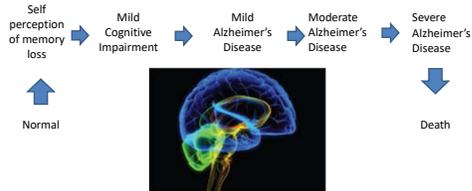
Remember: You can teach an old dog new tricks!

Alzheimer's Disease



Memory/Cognitive Decline

"With age comes the increasing likelihood of developing memory loss."



Small, G. 2002

FoUnDaTiOnAl ThEoRy!

Three Constructs:

1. Time Frame
2. Greater understanding of Neuroplasticity
3. Combination of pharmacological and nonpharmacological behavioral interventions

Mahendra, N. 2011 Great article: Cognitive-Linguistic Interventions for Persons with Dementia

➤ Memory Loss continues ---problems in other cognitive abilities appear:

- Getting lost
- Money mgt.
- Repeating questions/Stories
- Taking longer to complete normal daily tasks
- Poor judgment
- Mood/personality changes

➤ Often first diagnosed in this stage

Improving Memory, A Harvard Medical School Special Health Report.
www.health.harvard.edu

Stages:

Mild
AD

❖ Language, reasoning, sensory processing and conscious thought are effected

❖ Increased memory loss/confusion

❖ Begin to have problems recognizing family and friends

❖ Difficulty with multi-step tasks

❖ Difficulty with new situations

❖ Have hallucinations, delusions, and paranoia, and may behave impulsively.

Stages:
Moderate
AD

- Plaques and tangles have spread throughout the brain and brain tissue has shrunk significantly.
- Cannot communicate
- Completely dependent on others for their care.
- In bed most or all of the time.
- #1 cause of death of people with Alzheimer's?

Stages: Severe AD

Stroop Color Word Test

- Is a measure of inhibition
(an executive function)
- Goal is to name the **color** of the word shown, **not the word**

BLUE	ORANGE	GREEN	PINK	PURPLE	RED
PURPLE	YELLOW	GREEN	BLUE	GREEN	RED
YELLOW	ORANGE	BLACK	RED	BLUE	GREEN
BLUE	GRAY	RED	BLUE	ORANGE	RED
PURPLE	RED	PURPLE	GRAY	RED	GREEN

Quick! Count the number of times that the letter F appears in the following sentence:

“Finished files are the result of years of scientific study combined with the experience of years.”

How many letters F did you count?

Three? Wrong, there are six! Read again:

FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS

www.brainiacs.com

Speed of Processing Training

2017 Data analysis of ACTIVE Study:

Healthy older adults randomized to SOP cognitive training had a 29% reduction in their risk of dementia after 10 years of follow-up compared to the untreated control group.

Older adults at higher risk for dementia due to age, low education or MCI are more likely to benefit from SOP training.

Meta-analysis: Effects are broad: Enhanced quality of life, lower risk of depression, improved physical function.

SOP training results in improved ADL and IADL performance.
Edwards, J.D. et al. 2017

IMPACT Study

- Improvement in Memory with Plasticity-based Adaptive Cognitive Training
- Brain Fitness/Posit Science
- 487 participants
- Computer based training 1 hr/day – 5 days/wk

“Performance improvements generalized to untrained standardized measures of memory and attention”
Smith, G.; et al. 2009

Cognitive Reserve

What is it?



“The ability of an individual to compensate for advancing brain pathology and minimize symptomatology.”

“The capacity of the brain to recruit different networks” based on previous stimulation/learning

Increased connections between neurons, allowing alternate routes of communication due to the effects of Alzheimer’s

Roldan-Tapia, L. et al.; 2012




Brain Plasticity



Plasticity or neuroplasticity:

is the lifelong ability of the brain to reorganize neural pathways based on **NEW** experiences



Brain Plasticity

- Brains ability to change/keep itself vital
- What happens with Neurons?
- Older adults **can or cannot** make new connections and rewire their brains

F
A
L
L
S

MCI/EF Deficits and Falls

What's the link?



EF's and FALL's

- Older adults: ↓'ed: Walk slower, fall more and have poorer performance on complex mobility tasks.
- Good predictor of falls
- General biomarker of brain reserve/cognitive abilities and flexibility necessary to minimize falls.
- Improvement in EF's will carry over to reduce fall risk.

Seger, Jacobovici, G. et al. 2011. The interplay between gait, falls and cognition: can cognitive therapy reduce fall risk? *Expert Review Neurotherapeutics*, July; 11(7): 1057-1075.

Older adults with MCI:

- _____ fall annually (Liu-Ambrose, T. et al. 2008)
- Odds of falling are 5 X greater
- Impaired balance, balance recovery and gait
- Women and falls?
- Increased impulsivity/difficulty with problem solving / judgment
- Higher risk of nursing home admissions

Cognitive Impairment/Falls

EF and dual-task ability play a central role in recovery from trips



“Substantial evidence demonstrating that EF and related dual-task processing decline with age”

Role of cognitive training? (Smith-Ray, R. 2014)

Driving

Is someone with AD safe to drive?



Issues with giving up driving????

Driving is a complex IADL

Older Drivers

- Highest crash rate per mile
- Getting lost!
- Female physicians report less Rapoport, M. et al. 2014
- MMSE/MoCA **are or are not** designed to assess driving capacity
- Drivers passing a formal road test:
 - % with very mild dementia (MCI)
 - % with mild dementia (Carr, D. et al 2010)

Older Drivers

- Self regulation behaviors?
BUT: Lack of insight!!!!
- Who appears to have the “authority” to get someone to give up driving



Speed of Processing Training

Shown transfer to:

Positively impact IADL's

Result in safer and prolonged driving mobility among older adults (i.e. on road driving safety).

Associated with maintained health-related quality of life.

Involves adaptive training/learning Edwards, J., et al. 2017

Grandchild Test

What is your states requirement for reporting?

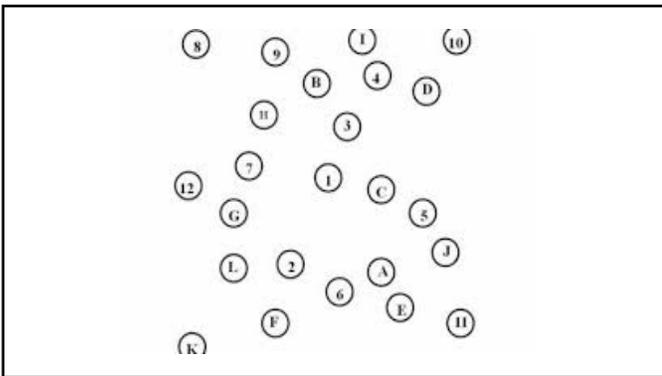


Cognitive Assessments for Driving Ability

- Trail-making test (TMT) part B
- ✓ working memory
- ✓ visual processing
- ✓ visual spatial skills
- ✓ selective and divided attention
- ✓ psychomotor coordination
- ✓ cognitive flexibility

Strongest predictor of crash risk for older drivers

Staplin, L., et al. 2014



Trailmaking B

- Safe = < 2 minutes and < 2 errors (0 or 1 error)
- Unsure = 2-3 minutes or 2 errors
- Unsafe = > 3 minutes or 3 or more errors

Cognitive Assessments for Driving Skill Ability

- Clock Drawing Test (CDT)
 - LTM
 - STM
 - Visual perception
 - Visuospatial skills
 - Selective Attention
 - Abstract thinking
 - Executive skillsAlso a good test for EF assessment

Let's pick on PT!



- Love to ambulate patients!
- Patient carries on a great conversation
- PT is very impressed with patients' memory/conversational skills
- WHAT'S THE PROBLEM?





Dual Tasking

- What is it?

“When two or more tasks need to be carried out concurrently, task performance declines at least in one of them.” (Beurskens, R. et al. 2012)

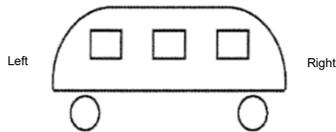


Dual-Task Complexity Study

- Hypothesis: To simultaneously performed tasks interfere and compete against each other for brain cortical resources.
- Changes in gait behavior under dual tasks are a clear marker of fall risk in older adults with MCI

Montero-Odasso, M. et al. 2012

In which direction is the bus pictured below going?



The only possible answers are "Left" or "Right"



PT Walker Dilemma

Assisted living referral due to a couple of falls

- Determine MCI/ACL Level 5
- You do the following:
 - Teach to use standard cane?
 - Teach to use walker?
 - Don't do anything as they will go down hill, and you can wait to do therapy when they fall and fx hip?



Communicating with Older Adults: An Evidence-Based Review of What Really Works.

Gerontological Society of America
www.geron.org

Patient Handouts

- Readability/comprehension level
 - Large print
 - Written at a 5th/6th grade level
 - Don't worry about offending
 - One idea per sentence
 - Don't over utilize illustrations
 - Only the "desired" way to act should be shown
 - Ask questions
 - SMOG readability formula: determines grade level
- Hoffmann T, Worrall, L. 2004 (OT and SLP)

Hippocampus

- H size linked with memory/cog func.
- Atrophy separate event from Alz.
- CVD; **Diabetes**; **Obesity**; Depression; Hypertension; Head Trauma; PTSD; Obstructive Sleep Apnea



Cognitive Stimulation
Meditation
Physical Exercise

"Dynamic structure with the potential to change in size throughout life"
Fotuhi, M. et al. 2012

Physical Activity

- Protects against and improves Cog. impairment: **Evidence Based:**
 - Alters synaptic function and # of synapses
 - Restores Neurogenesis
 - Improves Hippocampal volume
 - ↑ Neurotrophin levels
 - Inflammation and immune function +
 - + Affects circadian rhythms
 - Improves cog. in people with AD (Phillips, C. 2016, PT based)
- Overall is a marker for a healthy lifestyle

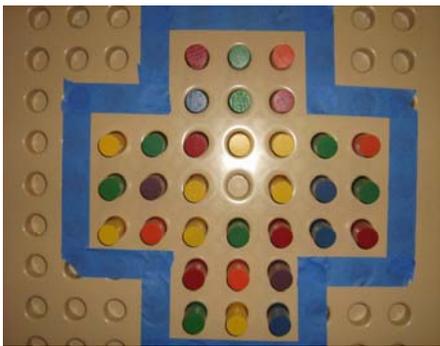
Remember This!

JAMA: A randomized trial: 138 participants indicated that:

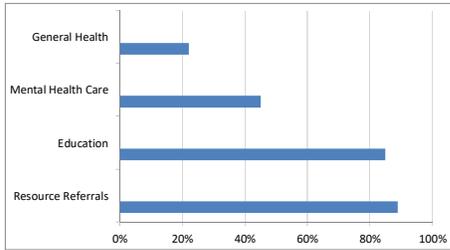
“A pa program of an additional 142 minutes of exercise per week on average modestly improved cognition relative to controls in older adults with subjective and objective memory impairment.” (Lautenschlager, N. et al 2008)

Meta-analysis of 18 clinical trials examining the impact of fitness interventions on cognition of older adults:

Combined aerobic exercise/strength training had strongest effects on EF. Women demonstrated greater gains (Williams, K 2010)



Caregiver Unmet Needs



Black, B. S. et al. 2013

Excellent Resource/Education Materials

Staying Sharp:

- Successful Aging and Your Brain
- Memory Loss and Aging
- Quality of Life
- Learning Throughout Life
- Depression

NRTA (AARP's Educator Community) www.aarp.org/nrta
The Dana Alliance for Brain Initiatives www.dana.org

Brain Health As You Age: Key Facts and Resources 2014

- Alcohol Use
- Alzheimer's Disease
- Brain Injuries
- Dementia
- Depression
- Diabetes
- Eating Right
- Exercise and Being Active
- Health Screenings
- Healthy Aging
- Heart Health/High Blood Pressure
- Medicines
- Memory
- Research on Brain Health
- Sleep
- Sleep Apnea
- Smoking
- Staying Connected
- Stroke
- Additional Resources



Continuing Education Credits

Access the Rehab Summit Evaluation on August 1st:

- An email will be sent to your registered email address
- An evaluation link will also be available on RehabSummit.com

Once you have completed the evaluation, you can choose to print, download, or email the certificate for your records.

REHAB SUMMIT

#RehabSummit #RHSummit #VirtualSummit

f #RehabSummit t #RHSummit i #VirtualSummit
