COMPANION WORKBOOK 1

Lecture 1

UNDERSTANDING THE AGING BRAIN: What is Normal and When to Worry

I CARE FOR YOUR BRAIN

with Dr. Sullivan

Pinehurst Neuropsychology

Brain & Memory Clinic

- **EXPERT** clinicians with first-rate diagnostic skills and outstanding bedside manner
- **COMPREHENSIVE** testing and review of medical records
- **PERSONALIZED** recommendations that emphasize brain health, quality of life and independence
- **COMMUNITY** resources
- **THERAPY** services for both the patient and caregiver
- **HELPFUL**, friendly staff and inviting office

What our patients say...

> This is an amazing practice and a great choice for any family addressing memory care concerns. Early and accurate diagnosis is so very important!

Karen D. Sullivan, PhD, ABPP
Board-Certified Clinical Neuropsychologist

Taeh A. Ward, PhD
Clinical Neuropsychologist

Maryanne Edmundson, PhD
Clinical Neuropsychologist

Heather Tippens, LPC
Licensed Professional Counselor

Schedule an appointment today

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www.PinehurstNeuropsychology.com

Welcome

As a board-certified neuropsychologist, I know that adults older than 50 are increasingly aware of the importance of brain health and want to learn and apply scientifically supported strategies in their everyday lives. Staying mentally sharp outranks issues, such as Social Security and physical health, as a priority. The problem is you don't know whom to trust to tell you what to do!

In 2013, I read an AARP study that said 70 percent of older adults stated while they preferred to learn from doctors how to keep their brain strong, the lack of accessible, scientifically valid information required they instead get this information instead from popular magazines and commercials. This bothered me as an older adult advocate who has evaluated and treated thousands of adults concerned about their brain. I knew this was a recipe for disaster! I think we can all agree that corporations whose sole motivation is to sell you products and sponsor media messages are not exactly the most trustworthy sources for health information.

You may be surprised to learn that there is not one brain health product in the $8-10 billion marketplace (with the exception of a handful of prescription drugs for certain types of dementia) that has ANY compelling scientific support. **NOT ONE.**

Many times corporations "publish" their own small, self-funded research studies that they then use for big headlines making it look like a real scientific finding. Science gets published in reputable journals, because the data is proven to be impartial and reviewed by a group of experts in the field who attest to the quality of the study.

In this companion workbook, you'll find:

- Lecture Slides
- Note-Taking Sections
- Strategies to reinforce your learning
- Brain Trivia
- Brain Health Articles

For years, brain scientists have been talking behind closed doors about the dangers of the "brain health" industry: how the claims are baseless and how valuable time is being lost to do something genuinely effective while chasing "too good to be true" claims.

WE HAVE A RESPONSIBILITY TO DO BETTER.

After two years of analyzing this industry, I was determined to provide a broader and more scientifically grounded conception of brain health, going beyond the simplistic approach of the current commercial marketplace and give the public access to what I offer the patients in my practice: high quality, scientific information and evidence-based recommendations that are free or low-cost that truly improve brain health.

This lecture and companion workbook represent the first step in a wonderful, fact-filled journey we are about to begin together.

LADIES AND GENTLEMEN, WE PRESENT I CARE FOR YOUR BRAIN!

Thank you for joining me,

Dr. Karen D. Sullivan

brain matters

COMPANION WORKBOOK 1

I CARE FOR YOUR BRAIN with Dr. Sullivan

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I CARE FOR YOUR BRAIN

was founded on the belief that successful cognitive aging is more than just brain health. It is a multi-dimensional concept that is not only brain-based but also rooted in physical health, social and spiritual connectedness, and vital engagement in life.

It is a state-of-the-art brain-centric education program for the 50+ crowd delivered in an engaging, easy-to-understand style that is motivating for action!

Through two interactive communities (in-person and online), Neuropsychologist Karen D. Sullivan, PhD, ABPP, provides scientifically-based information on what brain scientists know are the pillars of brain health and evidence-based recommendations that truly work. No gimmicks, no hype. Delivered in a series of nine lectures, Dr. Sullivan provides you with a science-based brain health education that includes clear, proven action steps you can take to immediately start to truly care for your brain.

Ready to get started?

> This is a much needed service to the public, and Dr. Sullivan is a gifted clinician/teacher who will deliver the truth. Her strong scientific background in neuropsychology and exceptional communication skills are evident to all who come into contact with her. Don't miss this opportunity to learn about brain health—it just may change your life!
>
> **—SUSAN MCGLYNN, PHD, ABPP**
> Board-Certified Neuropsychologist

what participants say...

"Thanks so much for providing this program. Wonderful and very important information presented in easily understood style! I now know what to do to help myself, and it's all free!"

"Your lecture on the power of socialization for brain health completely changed the plan of care for my mother."

"Thank you so much for doing this program. I have gotten so much out of it. It has made a big difference in my life!"

WHAT *will you* SAY?

join our online community

Through the I CARE FOR YOUR BRAIN program, we want to create a lively community where adults engage and discuss brain health topics you want to know about, a place where learning and action come together. Valid, research-based information and guaranteed-to-work brain health solutions are offered in empowering webinars, articles and a weekly live Question & Answer sessions with Dr. Sullivan. You may comment, ask brain health questions and vote on weekly topics.

Simply like the **I CARE FOR YOUR BRAIN with Dr. Sullivan** page on Facebook:

www.facebook.com/ICareForYourBrain

meet *Dr. Sullivan*

KAREN D. SULLIVAN, PHD, ABPP, is the creator of the I CARE FOR YOUR BRAIN program. She is one of only a small number of providers in North Carolina who is Board Certified in Clinical Neuropsychology by the American Board of Professional Psychology. Dr. Sullivan founded a private practice called Pinehurst Neuropsychology Brain & Memory Clinic in November 2013.

Prior to establishing her practice, Dr. Sullivan was an Assistant Professor at the University of North Carolina at Chapel Hill's School of Medicine in the Physical Medicine and Rehabilitation department. She received her doctoral degree at Boston University in 2009 and completed her internship and post-doctoral fellowship in Clinical Neuropsychology at the VA Boston Healthcare System through Harvard Medical School and the Boston University School of Medicine in 2010.

Dr. Sullivan has extensive training in clinical issues unique to older adults. Prior to her formal education, she worked as caregiver, nursing assistant, therapeutic companion, activities director and co-director of an adult day health program.

"I want to build a community where older adults and the people who care about them have access to a brain health expert who genuinely cares," she says, "a place where we can learn and motivate each other with valid, science-based information and guaranteed-to-work brain health solutions!"

Inspired by her grandmother, whose experience with Alzheimer's disease made a lasting impression, Dr. Sullivan has dedicated herself to advocating for older adults and improving brain health.

Brain & Behavior

The Science of Neuropsychology

by Carrie Frye | *Photography by* Diana Matthews

Solving a Sudoku puzzle, taking a brisk walk or eating more broccoli might be typical topics of conversation when it comes to better brain health. The subject is much more top of mind these days, and perhaps should be with more than 5 million Americans living with Alzheimer's disease.

Keeping busy with an engaged mind and staying connected socially are two key factors identified in a 2015 Harvard Medical School study to help stave off dementia, and a recent AARP study cites mental sharpness as a top priority for those 50 and older, even outranking concerns over Social Security and physical health. Baby boomers may be the driving force due to an increased aging population but just as prevalent is their desire for more proactive health initiatives and answers when cognitive changes in function and behavior begin affecting everyday life.

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As featured in OutreachNC *Magazine*
—Navigating Your Second 50—

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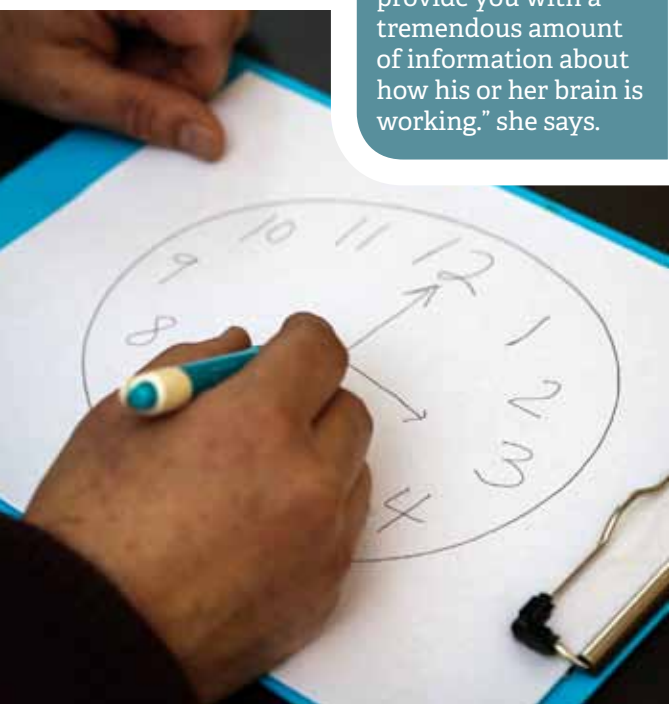
Karen D. Sullivan, PhD, ABPP, discusses a diagnosis and paper and pencil testing. "Having someone draw a clock can provide you with a tremendous amount of information about how his or her brain is working." she says.



"On the whole, older adults are becoming more aware of the importance of brain health," says Karen D. Sullivan, PhD, ABPP and owner of Pinehurst Neuropsychology Brain and Memory Clinic. "They are actively seeking to learn and employ scientifically supported strategies to improve brain health, reduce the risk of developing dementia and detect memory loss at the earliest stage possible."

Chris Contardo, PhD, ABPP at Psychiatric and Psychological Specialties in St. Joseph, Michigan, serving patients throughout southwest Michigan, also recognizes a move toward clear diagnoses by boomers as a national trend.

"If there has been a push, it is the early identification of memory loss," he says. "It really comes down to people moving away from screenings and not being OK with whatever is happening to them. Boomers are demanding research continue to enable the latest technological developments and using neuropsychology in a proactive way to help identify potential problems before a crisis, such as knowing someone shouldn't drive before there is an accident."

The Science

Neuropsychology is the science of brain and behavior. As a a specialty field within clinical psychology, neuropsychologists complete an accredited doctoral program in clinical psychology with a clinical internship and two years of post-doctoral training in neuropsychology. Although the specialty may not roll off the tongue, its providers work in tandem with primary care physicians, neurologists or other physician specialists to provide evaluation and testing when people have concerns regarding memory loss or have epilepsy, multiple sclerosis, stroke, traumatic brain injuries or a form of dementia, including Parkinson's or Alzheimer's disease.

"We also see people who may not have a known medical condition but are trying to understand why they are experiencing changes in memory, attention or word-finding difficulties," says Jill Zukerman Stuart, PhD, ABPP at Duke Neurological Disorders Clinic in Durham. "We look at cognition, at people's memory, attention, thinking and a lot of measures that correlate to different areas of the brain to determine how different parts of the brain are functioning while taking into account what makes us people: education, occupation, moods and stressors. All of these things are important to how we function, not just a test score."

It might be a specific task that has become difficult, like balancing a checkbook or forgetting to take medications, that prompts an initial conversation with your primary care doctor.

"It's important to note and discuss any cognitive changes with your physician," Dr. Sullivan says. "When you notice something that interferes with what we call instrumental activities of daily living, such as driving or getting taxes together, this is a clear sign that something is wrong and that the person should speak with a healthcare professional."

The initial screening done by a primary care physician or specialist is the beginning step in the process.

"These screenings can tell something is wrong but not exactly what the problem is," Dr. Contardo adds. "The neuropsychology testing is much more in-depth and personalized and allows for a specific diagnosis to be given, allowing the patients to not sit in an ambiguous place. It gives them answers."

Task-oriented Testing

Neuropsychologists employ a variety of task-oriented, standardized evaluations to determine how a person's brain functions. The evaluation tests a person's abilities across a wide range of areas, including:

- Attention and Concentration
- Planning
- Multi-tasking
- Reasoning
- Learning and Memory
- Speech and Language

"People should know that we are not going to poke or prod," Dr. Stuart says. "It's a paper and pencil test, and we don't do anything scary. People may come with apprehension, and that's understandable, but I am here to give you the most options to improve your quality of life."

One paper and pencil test may include asking the person to draw a clock on a blank sheet of paper.

"Some of the neuropsychological tests that we do may appear incredibly simple," Dr. Sullivan says, "but based on years of research, they are quite sophisticated. Having someone draw a clock can provide you with a tremendous amount of information about how his or her brain is working. Edith Kaplan, the godmother of neuropsychology, once said that you should be able to conduct a neuropsychological evaluation on a desert island with a stick and some sand, and I love that."

CONTINUED PAGE 12

> "When I was a teenager, my grandmother began showing signs of Alzheimer's disease, and this had a lasting effect on me professionally and personally. I don't think you can live through the experience of Alzheimer's with someone you love and not be profoundly moved."
>
> —Karen D. Sullivan, PhD, ABPP

Is neuropsychology covered by insurance or Medicare?

"As with all things related to insurance, it depends on your personal coverage," Dr. Sullivan advises. "As a general rule, most plans require a referral from your primary care physician or a specialist and reimburse for a neuropsychological evaluation based on medical necessity."

CONTINUED FROM PAGE 11

Personal & Family Interviews

In addition to the paper and pencil testing, another aspect of the complete neuropsychological evaluation includes interviews with not only the person but also a family member, caregiver or friend.

"Family members have so much valuable information to share, and to not access their expertise would be a huge opportunity lost," Dr. Sullivan adds. "It is only when we combine both sets of know-how that we can get somewhere in the care of people with brain issues."

"If there has been a day-to-day decline from a functional standpoint," Dr. Contardo adds, "a patient can be a bad reporter on that, and we need a lot of information from family members and caregivers. Their information is vital."

Including family caregivers in the process may also alleviate them from playing the role of the "bad guy," especially for difficult decisions like having to take away the car keys.

"When the opinion comes from an objective outsider and stops being a 'he said, she said' conflict, relationships vastly improve," Dr. Sullivan says.

Quality of Life Results

With the compilation of testing and interviews complete, neuropsychologists can formulate a plan of care that focuses on quality of life.

A neuropsychological evaluation can:

- Reduce uncertainty about a change in thinking or behavior
- Start disease-specific medications as soon as possible that may slow symptoms
- Reduce modifiable risks that may contribute to memory decline or functional impairment
- Provide options for planning for the future
- Provide education and support to the patient and family
- Connect patients to community-based resources
- Inform decision-making about abilities such as driving, living independently and level of supervision
- Provide a baseline for ongoing monitoring of cognitive symptoms and changing care needs

"Sometimes, you have to give patients bad news, but it's better to get the bad news early, plan and make adjustments on your own terms," Dr. Contardo says. "It is also really nice to tell someone, there is nothing wrong, or it is treatable. Those are the good ones."

Although it can be a difficult road with a dementia or Alzheimer's diagnosis, the role of the neuropsychologist includes more than mere diagnostics.

"A neuropsychologist's job is to bring clarity, understanding and care to how a certain condition affects the whole person, not just one part of their body," Dr. Sullivan says. "We care about how people and their families are adjusting to their brain

condition, how they are grieving in some instances, how they are meeting their work and family obligations and how their relationships are affected.

"I take pride in communicating the complex workings of the brain into language people can understand and framing it in a context that makes the information meaningful. If people don't understand how diabetes, high blood pressure or sleep apnea affects the brain, they aren't as motivated as they could be to manage these conditions.

"In the case of dementia, it is critical to know what specific type of brain disease is causing dementia, so treatments can be customized, and the proper information can be discussed, including what to expect in the future, what type of care and support the person needs and how family members can specifically help the person remain as happy and independent as possible.

"When I was a teenager, my grandmother began showing signs of Alzheimer's disease, and this had a lasting effect on me professionally and personally," Dr. Sullivan adds. "I don't think you can live through the experience of Alzheimer's with someone you love and not be profoundly moved. I feel so thankful to have the opportunity to serve people in this unique way. I choose neuropsychology, because it provides the best tool I have ever found to help people."

Three Reasons to Consider a Neuropsychological Evaluation

Karen D. Sullivan, PhD, ABPP, advises that there are a few good rules of thumb regarding when it might be time to consider a neuropsychological evaluation that can range from quite broad to very specific.

1. **Anyone older than 65 may benefit from a baseline evaluation**, even if he or she does not have any significant cognitive concerns at this time, especially if there is a family history of dementia. The memory medications on the market today are most beneficial when started as early as possible and the best way to know when there has been a change is through objective testing. Also, many older adults have normal age-related changes or treatable forms of memory loss, and if this is the case, we can treat the underlying condition and reassure the patient. Anxiety about changes in memory can cause memory symptoms, because they can distract us and reduce our ability to concentrate on the here and now. Worst-case scenario, there is something significant going on, such as dementia, and we make a proactive plan and give the person the best chance to live the highest quality of life. Best-case scenario, it is normal for the person's age, and we can talk about strategies to keep it that way.
2. **If someone has been diagnosed with a condition that involves the brain**, such as a stroke, Parkinson's disease, multiple sclerosis, Alzheimer's disease or brain cancer, or other medical conditions affecting the brain, including sleep apnea, heart attack with a loss of consciousness, diabetes or depression, these people should also consider an evaluation.
3. **If an individual or family member feels there has been a change in the patient's thinking or behavior**, an evaluation can provide significant benefit.

Diagnosing Dementia:
The Earlier the Better

by Karen D. Sullivan, PhD, ABPP

While dementia is more common as we get older, it is not a normal part of aging. Dementia can be caused by different underlying disease processes, such as Alzheimer's disease, vascular disease, including stroke and heavy alcohol use, to name a few. However, it can also be due to treatable conditions, such as depression, anxiety, medication side effects or infection. The early and accurate diagnosis of memory loss, including dementia, allows for:

- A better chance of benefiting from disease-specific medications that can slow symptoms
- Early intervention to reduce risks factors that contribute to further memory decline
- The ability to plan for the future and maximally benefit from care and support services
- Reducing uncertainty about a change in thinking or behavior
- Providing education, support and community-based resources to the patient and family
- Informing important decisions about driving, living independently and level of supervision
- Providing a baseline for ongoing monitoring of cognitive symptoms and changing care needs

A neuropsychological evaluation can play a major role in diagnosing dementia. Neuropsychologists, doctors of clinical psychology who specialize in how the brain works, make dementia diagnoses through detailed interviewing, a review of medical records and comprehensive and standardized paper-and-pencil testing. The goal of a neuropsychological evaluation is to determine if changes in thinking and memory are related to normal aging, a medical condition or dementia followed by making personalized treatment recommendations that promote the highest quality of life and independence.

As featured in OutreachNC Magazine —Navigating Your Second 50—

There are typically three parts to a neuropsychological evaluation:

INTERVIEW:

The first part of the evaluation typically takes one hour. It provides the neuropsychologist a chance to learn about the personal, social and medical context within which the individual's or family's concerns occur. During the interview, a neuropsychologist will review many aspects of a person's background including onset and progression of symptoms, medical diagnoses, medications, personal history, mental health, sleep, etc. It is often valuable to have both the patient and family members participate in the interview.

TESTING:

The second part of the evaluation typically takes two to three hours. A person's test performances are essential for a neuropsychologist to gain a clear understanding of how the person is doing in comparison to other people of the same age and educational background, as well as compared to their own baseline. The goal is to identify areas of cognitive strength and weakness by behavioral observation and objective assessment of all cognitive domains, such as attention, memory and language. In addition, personality and mood symptoms, including possible depression and anxiety, are often examined.

FEEDBACK:

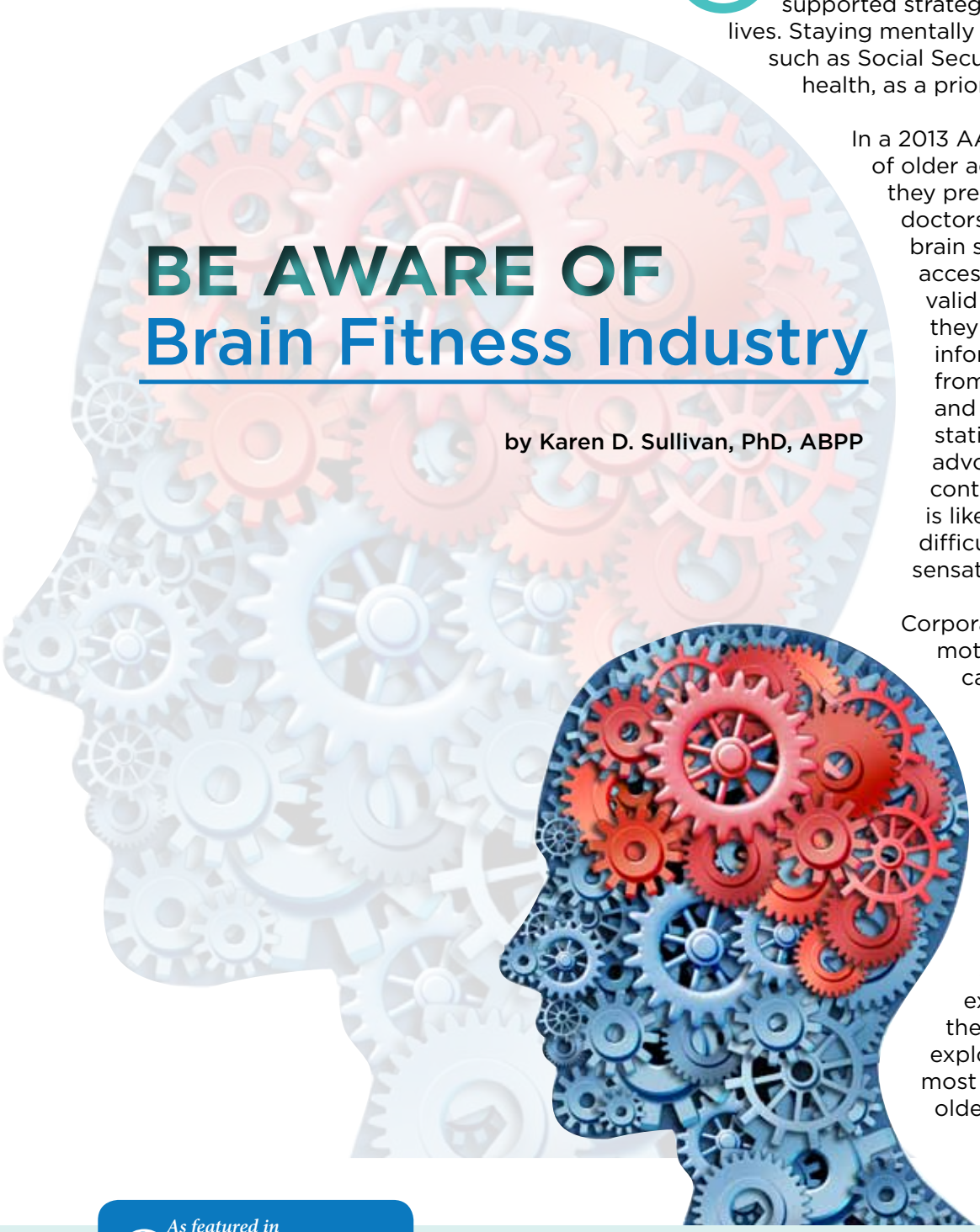
The third part of the evaluation typically takes one hour. This report is reviewed in the feedback session in detail and in everyday language. The goal of a feedback session is two-fold. First, it is important for the person to understand, in detail, the results of the evaluation. Second, it's important to discuss the personalized treatment recommendations your neuropsychologist has decided will help to support the highest quality of life possible. Recommendations range from medication suggestions, pending physician approval, strategies for managing medical conditions that are contributing to memory decline, counseling for the patient and family, level of care and supervision needed, environmental modifications, strategies for behavior change, and patient and caregiver resources, including geriatric care management and community support groups.

BE AWARE OF
Brain Fitness Industry

by Karen D. Sullivan, PhD, ABPP

Older adults are increasingly aware of brain health and are actively seeking to learn and apply scientifically supported strategies in their everyday lives. Staying mentally sharp outranks issues, such as Social Security and physical health, as a priority in older adults.

In a 2013 AARP study, 70 percent of older adults stated while they preferred to learn from doctors how to keep their brain strong, the dearth of accessible, scientifically-valid information required they instead obtain this information primarily from popular magazines and commercials. This statistic is concerning to advocates, because the content of these messages is likely both purposefully difficult to understand and sensationalized.



Corporations whose central motivation is not senior care but selling a product often sponsor these media messages. Such senior-targeted, for-profit tactics not only highlight such organizations' questionable integrity but perhaps of at least equal concern, they exponentially increase the risk of financially exploiting one of society's most vulnerable segments—older adult consumers.

As featured in OutreachNC Magazine —Navigating Your Second 50—

An $8 billion marketplace of "brain fitness" products has developed over the last 10 years. Supplements, computer games and phone apps promise to maintain and enhance brain functioning and, occasionally, prevent or reverse brain diseases, including dementia. These products offer a "one pill" solution based on the misconception that a single intervention stalls the multifactorial processes of brain aging or instruct older adults to play a "stimulating game" in front of an electronic device alone at home.

This one-size-fits-all approach neglects the complex interaction of genetic and lifestyle factors known to influence brain health throughout a lifetime (DNA, cardiovascular health, stress, education, diet, exercise, sleep) that older adults must know and understand if they are to age successfully.

Empirical support for the efficacy of brain-fitness training programs improving cognition is surprisingly poor. Experts argue that exaggerated or misleading claims exploit the anxiety of older adults for commercial purposes. In a recent survey of 1,037 older Americans, memory loss was cited as their No. 1 fear, more so than being buried alive, snakes and terrorist attacks. The American Psychological Association predicts that "dementia-related anxiety" is on the rise and may soon become its own clinical disorder. These fears create a ripe opportunity for marketers.

In 2014, 73 psychologists and neuroscientists from around the world wrote an open letter to companies marketing "brain products," stating they are exploiting customers by making "exaggerated and misleading claims" that are not based on sound scientific evidence. The authors concluded with this statement:

"Our biggest concern is that older people are making choices—both about how they spend their money and on how they spend their time—based on this kind of information that … is not well-grounded. It's a serious concern, and it can feel like people are being exploited."

TAKE YOUR POWER BACK

Be a cautious consumer of brain health news. Remember that the media generally reports news in snippets, only conveying the sensationalized highlights. Seek primary sources with google.com and inform yourself on the big picture of an issue before believing any "too good to be true" claims.

TAKE YOUR MONEY BACK

So-called "smart drugs," including "brain enhancing" over-the-counter drugs have consistently failed in clinical trials and may even be unsafe. Spend your money instead on high-quality, fresh, whole foods or new walking shoes. Diet and exercise are much more realistic—and affordable—ways to improve the health of your brain.

TAKE YOUR HOPE BACK

There are many things you can do to genuinely improve the health of your brain that are completely free and backed by science! A significant decline in brain functioning as we age is not normal and is largely related to modifiable risk factors that can be reduced by more informed decision-making. Commit yourself to becoming more aware of brain health by seeking out trustworthy and reliable sources of information. Feel confident and hopeful that YOU can make a difference in the health of your brain.

Lecture 1

UNDERSTANDING THE AGING BRAIN: What is Normal and When to Worry

Slide Presentation Begins

I CARE
FOR YOUR BRAIN
with Dr. Sullivan

Lecture 1
LEARNING TOPICS

- Let's define successful aging
- Brain basics
- What changes in the aging brain, what doesn't and when should you worry?
- Dementia explained and a gold standard evaluation explained
- 4 strategies to maximize the success of this program

SEVEN ELEMENTS OF SUCCESSFUL AGING

- **A low level of physical disability**
- **Maximum independence**
- **Intact cognitive function**
- **Active engagement in life**
- **Social and spiritual connectedness**
- **Positive life review**
- **Self determination**

GRADE YOURSELF

on these

Seven Elements of Successful Aging

	A	B	C	D	F
A low level of physical disability					
Maximum independence					
Intact cognitive function					
Active engagement in life					
Social and spiritual connectedness					
Positive life review					
Self determination					

Successful aging largely depends on gene - environment interaction.

Nearly all diseases result from a complex interaction between our genes and the environment.

This includes brain health!

THE SECRET BRAIN SCIENTISTS KNOW

The only true methods to achieve brain health involve behaviors driven by YOU.

Lowering Your Risk Factors

Increasing Your Cognitive Reserve

TWO TYPES OF RISK FACTORS

Non-modifiable (things we can't change)

- Age
- Specific gene mutations

Modifiable (things we can change)

- Hypertension
- Type II diabetes
- High cholesterol
- Untreated sleep apnea
- Repeat head injury
- Hearing/Vision loss
- Too much alcohol
- Smoking
- Not enough exercise
- Poor Diet
- Social isolation
- Low mental stimulation

NOTES

THE CONCEPT OF COGNITIVE RESERVE

- Up to 25% of older adults whose memory testing was normal meet full pathological criteria for Alzheimer's disease at autopsy, why?

- Stern (2006) says our education, job experience, and participation in mentally stimulating activities, particularly early in life:

  - **Builds stronger and more connected brain cells**
  - **This increases the resistance to brain damage at the cellular level and enhances our ability to compensate**
  - **The more cognitive reserve, the more brain changes are needed to result in cognitive impairment**

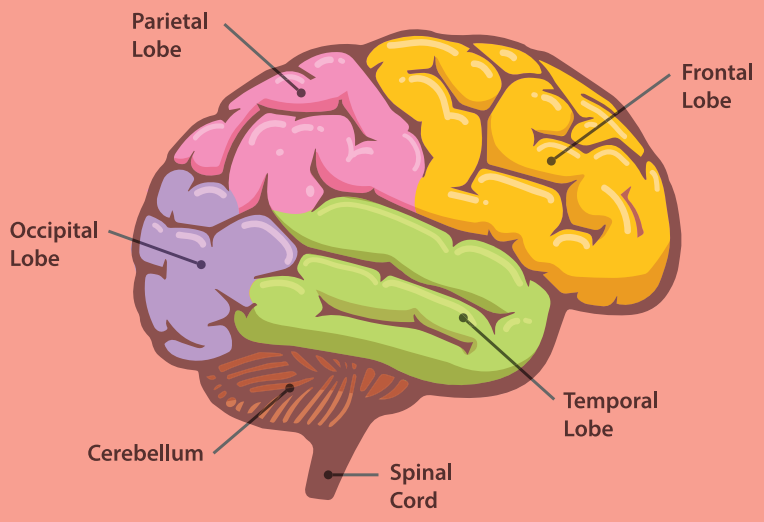
NOTES

At any point in our life,

WE CAN INCREASE

our Cognitive Reserve!

BRAIN BASICS

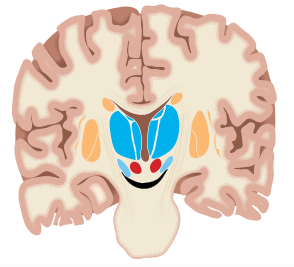


WHAT'S THE MATTER?

60%

White matter (subcortical)

Where information is learned and retrieved



40%

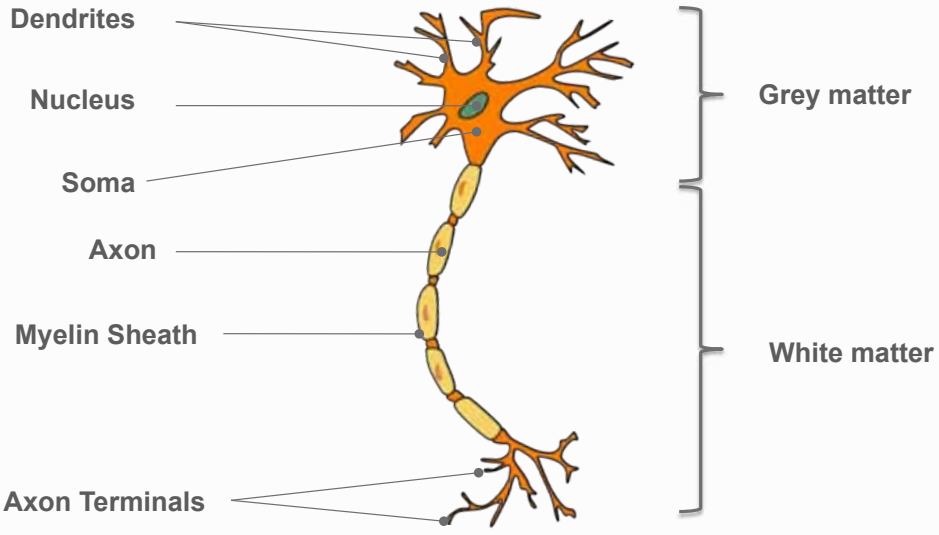
Gray matter (cortex)

Where information is stored

NOTES

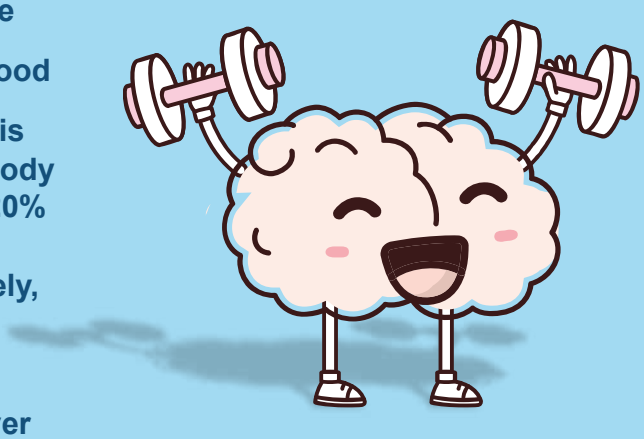
Our 100 billion brain **neurons**

process and send information amongst each other and to the muscles and organs throughout the body



WHAT IS THE MAIN FUEL FOR THE BRAIN?

- **Oxygen and glucose**
- **Delivered via the blood**
- **Although our brain is about 2-4% of our body weight, it requires 20% and 50% of these supplies, respectively, to function**
- **Brain cells cannot store these fuels over time and need a steady supply**



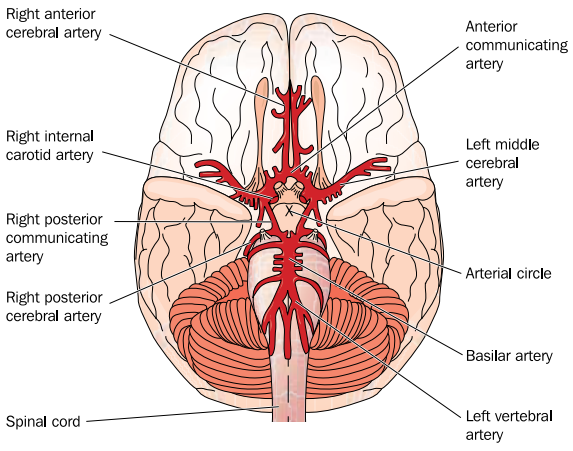
NOTES

BRAIN'S FUEL DELIVERY SYSTEM

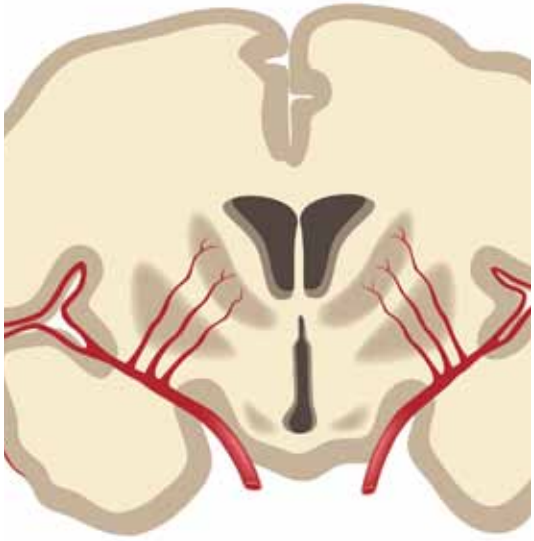
Two blood supplies to the brain: Front and back

The internal carotid arteries supply the front of the brain and the vertebral arteries supply the back of the brain and brainstem

The circulation from the front and the back join together in the Circle of Willis



Critical concept: SMALL VESSELS



KEY SUPPORTS

GLIAL CELLS

Surround, support and protect neurons, 1:1 ratio with neurons,

CEREBROSPINAL FLUID

A clear liquid surrounding the brain and spinal cord; protects the brain by cushioning, “cleans” the brain by removing waste

LYMPHATIC VESSELS

Carries fluid continuing immune cells from cerebrospinal fluid to brain

Network of large and very small BLOOD VESSELS that carry the blood, oxygen, nutrients and gases to and throughout the brain

NOTES

NORMAL CHANGES IN BRAIN

Big differences in the ages at which brain changes happen, suggesting it is not just an aging process

- Younger older adults (50-60, 60-70) show less decline which may be due to more educational opportunities, improved nutrition and better medical care throughout life
- Most people experience some mild cognitive loss by age 60 and more decline by age 75 (Schaie, Willis, & Caskie, 2004).
- Most changes that occur above and beyond normal aging are related to modifiable risk factors

NOTES

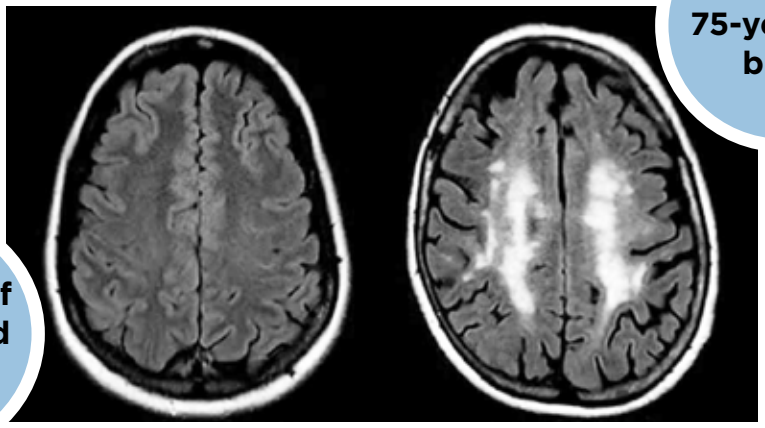
The difference between structure and function in the brain

NOTES

NORMAL CHANGES IN BRAIN STRUCTURE

- Mild loss of brain volume (white matter > gray matter)
- Less connections between cells
- Less chemical messengers
- Less blood and oxygen travel to the brain
- More inflammation

MRI Scan of 75-year-old brain



MRI Scan of 25-year-old brain

NOTES

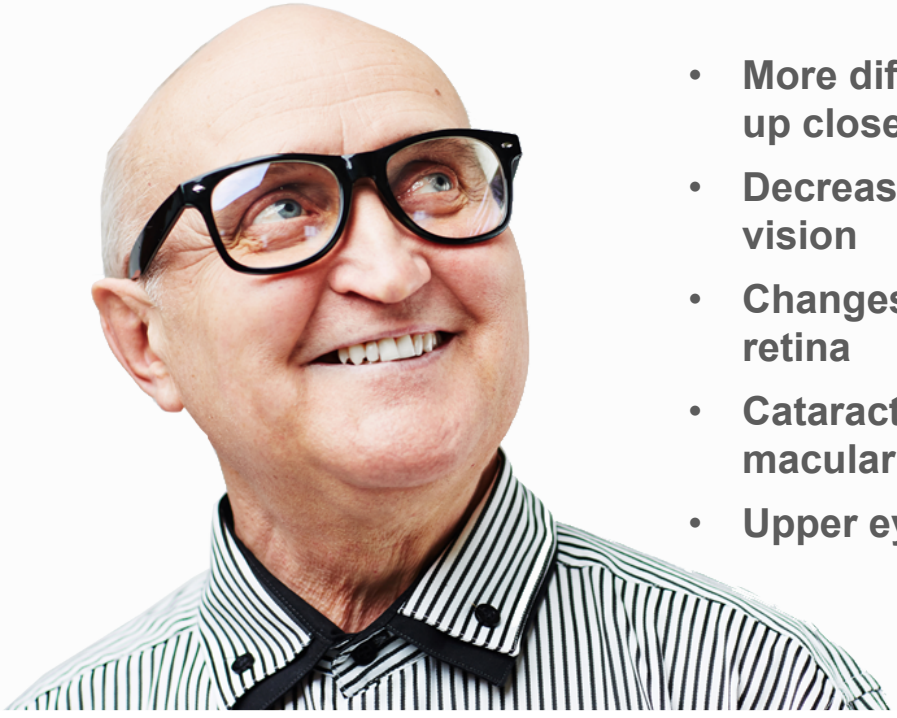
NORMAL CHANGES IN BRAIN FUNCTION

- ↓ Seeing and hearing
- ↓ Processing speed
- ↓ Multitasking
- ↓ New learning

Mild changes that do not interfere with everyday life

NOTES

VISION CHANGES

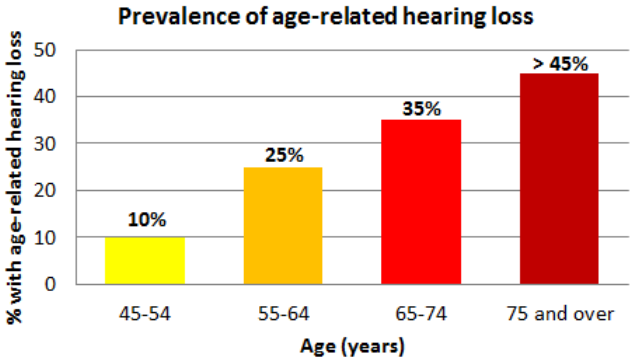


- More difficulty focusing up close
- Decreased peripheral vision
- Changes in lens, pupils, retina
- Cataracts, glaucoma, macular degeneration
- Upper eyelid skin

NOTES

HEARING LOSS

- Age-related hearing loss and noise-induced hearing loss
- Sounds or speech becoming dull, muffled
- Particular difficulty using the telephone and with background noise
- Strongly related to quality of life and social health



NOTES

PROCESSING SPEED AND MULTITASKING MILDLY DECREASE

What happens?	Examples	Why?
More difficult to start and stop tasks quickly; harder to ignore irrelevant information and switch between tasks successfully	Trouble remembering names, finding words quickly, thinking "on the spot", harder to calculate a tip, work on bills with the TV on	Changes in the speed of brain cell communication due to white matter loss and decreased blood flow in small vessels

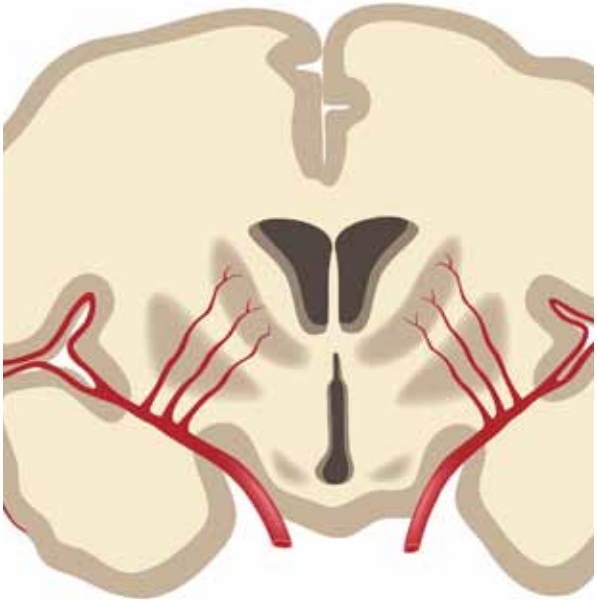
NOTES

LEARNING IS A BIT HARDER

What happens?	Examples	Why?
More difficult to make short term memories	Harder to remember what you had for breakfast, where you heard about a story	Hippocampus shrinks as we age with decline increasing after age 70

NOTES

WHY DOES "NORMAL" BRAIN AGING HAPPEN?



- **Most adults over 65 have chronic ischemic small vessel disease in the white matter in the brain.**
- **Occurs when the small blood vessels that lead to the brain do not receive an adequate supply of blood over time.**
- **Related to cardiovascular health, especially high blood pressure.**

NOTES

MANY BRAIN FUNCTIONS DO NOT CHANGE WITH AGE

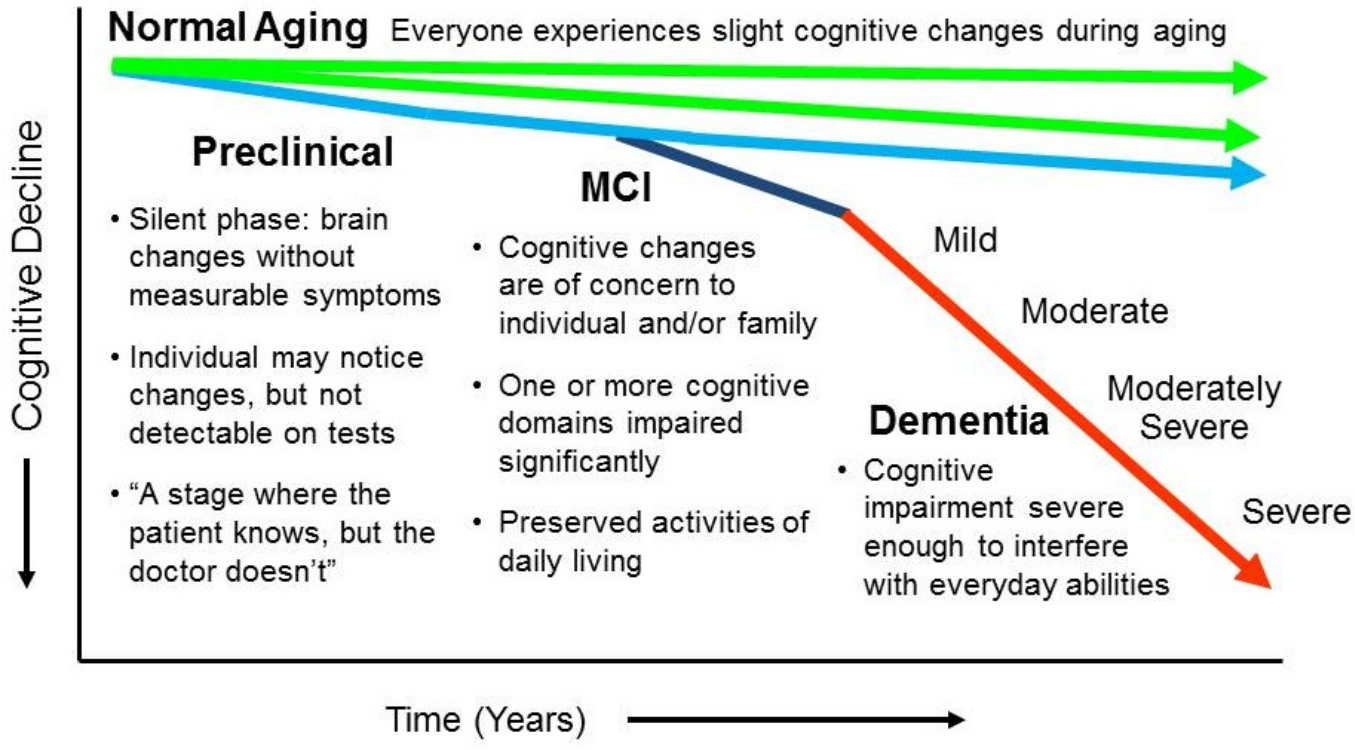
Older adults have extensive expertise to draw upon and can find connections between information that young adults have a harder time seeing.

- ✓ Focused attention remains
- ✓ Verbal comprehension remains
- ✓ Judgment remains
- ✓ Vocabulary increases
- ✓ Crystallized intelligence increases (knowledge and wisdom)
- ✓ Social cognition increases

NOTES

The SPECTRUM

# of COGNITIVE HEALTH with AGE


Normal Aging
Everyone experiences slight cognitive changes during aging
Cognitive Decline
Preclinical
• Silent phase: brain changes without measurable symptoms
• Individual may notice changes, but not detectable on tests
• "A stage where the patient knows, but the doctor doesn't"
MCI
• Cognitive changes are of concern to individual and/or family
• One or more cognitive domains impaired significantly
• Preserved activities of daily living
Mild
Moderate
Moderately Severe
Severe
Dementia
• Cognitive impairment severe enough to interfere with everyday abilities
Time (Years)

NOTES

MILD COGNITIVE IMPAIRMENT

- Problems with memory, language, thinking and judgment more than expected for age but not enough to interfere with everyday life
- A statistical definition
- Static or progressive symptoms?
- Requires two evaluations over time to assess for objective change
- Controversial diagnosis
    - Is it really early Alzheimer's disease?

DEMENTIA IS NOT A NORMAL PART OF AGING

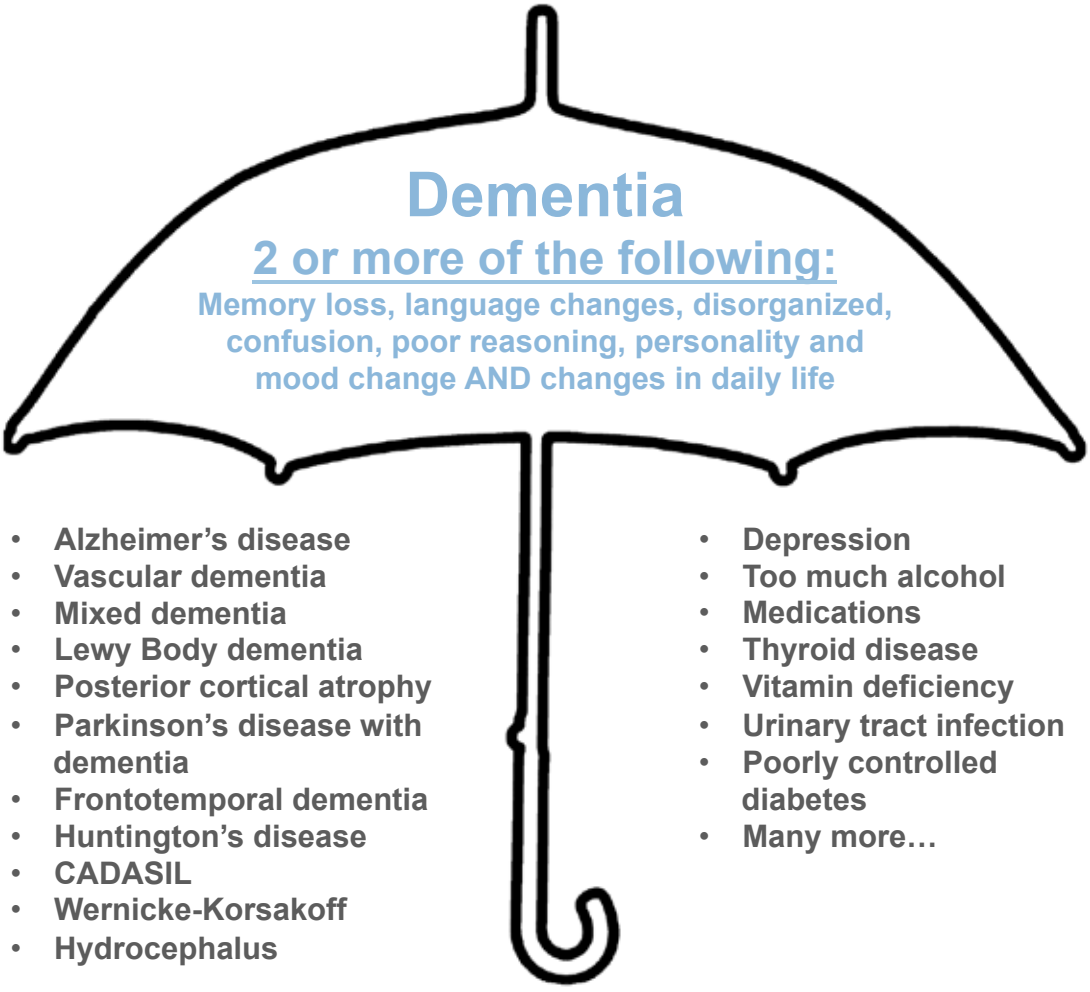
Dementia is the loss of the ability to think, remember, or reason to the extent that it interferes with ones ability to do everyday activities like driving, managing medications and/or finances.

Occurs when once-healthy brain cells die or stop working well and lose connections with other brain cells.

Caused by different diseases in the brain.

DEMENTIA DEFINED

COGNITIVE	BEHAVIOR	DAILY LIFE
Short term memory loss	Less interested	Trouble with money
Word-finding difficulties	Moody	Forgetting medication
Disorganization	More irritable	Driving decline
Loss of insight	Agitated at times	Cooking changes


Dementia
2 or more of the following:
Memory loss, language changes, disorganized, confusion, poor reasoning, personality and mood change AND changes in daily life
• Alzheimer's disease
• Vascular dementia
• Mixed dementia
• Lewy Body dementia
• Posterior cortical atrophy
• Parkinson's disease with dementia
• Frontotemporal dementia
• Huntington's disease
• CADASIL
• Wernicke-Korsakoff
• Hydrocephalus
• Depression
• Too much alcohol
• Medications
• Thyroid disease
• Vitamin deficiency
• Urinary tract infection
• Poorly controlled diabetes
• Many more…

NOTES

NORMAL BRAIN AGING	WHEN TO WORRY
Needing to write to-be-remembered information down and being able to successfully use the strategy	When problems with thinking or memory effect your ability to manage your finances, remember to take your medications or drive
Mild trouble remembering parts of an experience	Trouble remembering whole experiences
Having trouble remembering names of acquaintances, typically comes to you later	If a trusted friend or loved one tells you they are worried about you
Taking a bit longer to learn something new	If you ever feel confused
Need to reduce distractions in order to focus well on a task	If you have a strong family history of dementia. The earlier a person's dementia started, the more likely it is to be strongly genetic

NOTES

WHAT TO DO IF YOU ARE WORRIED?

5 ELEMENTS of a gold standard evaluation of the BRAIN

- Physical examination/ lab tests
- Neuroimaging
- Interview of person and loved one
- Neuropsychological evaluation
- Integration of findings

PHYSICAL EXAMINATION & LAB TESTS VIA YOUR PRIMARY CARE PROVIDER

Laboratory tests (blood and urine)

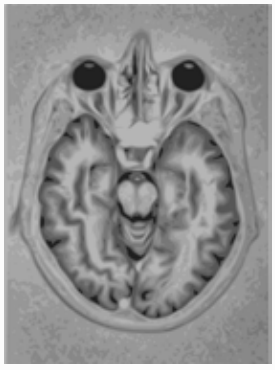
- Complete blood cell count
  Electrolytes (sodium, potassium)
- Glucose (blood sugar)
- Kidney function
- Vitamin B12
- Thyroid hormones
- Liver function
- Any infection (urinary tract infection)

NEUROIMAGING

CT

X-ray technique that produces images of brain

MRI



Uses magnetic fields and radio waves to produce higher quality images

Limited in what information it gives

Remember the difference between structure and function in the brain

COMPREHENSIVE INTERVIEW OF THE PERSON AND LOVED ONE

NEUROPSYCHOLOGICAL EVALUATION

- **Doctors of Clinical Psychology who specialize in the brain**

- **We make diagnoses about the brain by using:**

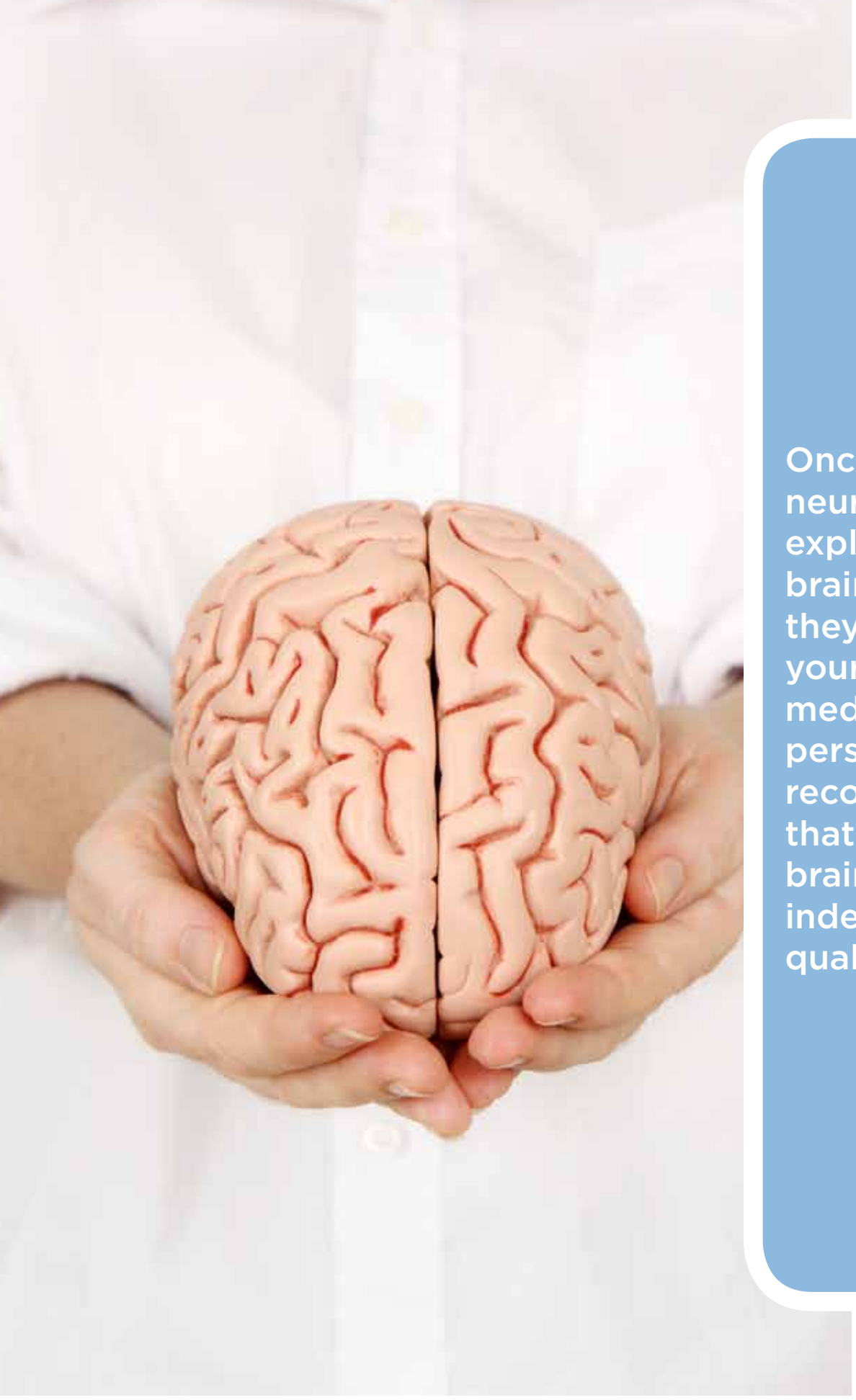
  - Review of medical records and medications
  - Interviews
  - Behavioral observation
  - Comprehensive paper and pencil testing

INTEGRATION OF FINDINGS

For example,

- Recent surgery
- New learning impaired
- Untreated sleep apnea
- Uncontrolled blood pressure
- Mild depression
- Wife says more moody
- Military trauma

NOTES



Once a neuropsychologist explains how your brain is working, they offer you, your family and medical providers personalized recommendations that improve brain health, independence and quality of life.

4 STRATEGIES

to Maximize the I CARE FOR YOUR BRAIN Program

1.

Engage with the material, make it personal, and relate it to your own life

2. GET TO KNOW YOUR WORKBOOK

- PowerPoint slides (purposely dense with information)
- Space for notes
- Behavior tracking sheets
- Motivation to keep you focused
- Follow up on primary sources at https://scholar.google.com

3.

Define your motivation early and often

What is your why?

The more personal and specific the better

4.

Stay calm and know you will soon have the tools to think like a brain scientist!

SMALL GROUP DISCUSSION TOPICS

1. Do you agree with Dr. Sullivan's definition of successful aging? Discuss which areas you are doing well in, and where do you need to put in more effort? Are there any areas where acceptance is needed?

2. Discuss the differences between brain structure and function.

3. Review the normal changes in brain function, and discuss which of these you have experienced.

4. Identify care providers in your community who have expertise in older adults and/or the brain with whom you may discuss any of your concerns.

5. Discuss your experience with discussing brain concerns about yourself or a loved one to a medical provider? Was a gold standard evaluation done?

NOTES

brain trivia

SEE ANSWERS PAGE 63

1. Draw a line to the correct answer:

NON-MODIFIABLE RISK FACTOR	Something you can change
MODIFIABLE RISK FACTOR	Something you cannot change

2. Fill-in Your Personal Risk Factors For More Than Just Normal Brain Changes

NON-MODIFIABLE	MODIFIABLE

TRUE or FALSE:

Are these statements true or false? Cognitive Reserve...

_____ **3.** Is related to our education, job experience and participation in mentally stimulating activities, particularly early in life

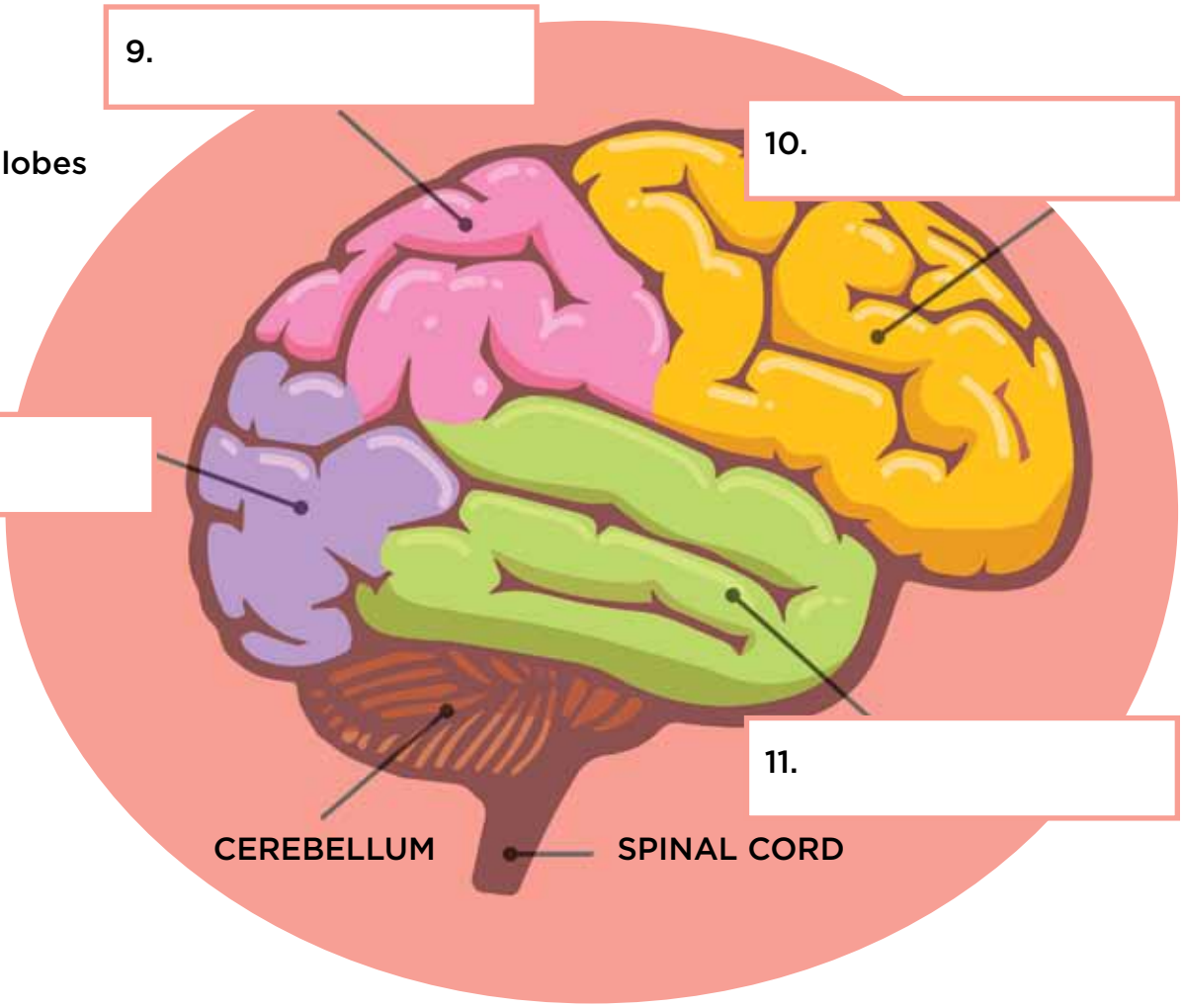
_____ **4.** Builds stronger and more connected brain cells

_____ **5.** Increases the resistance to brain damage at the cellular level and enhances our ability to compensate

_____ **6.** The more cognitive reserve, the more brain changes are needed to result in cognitive impairment

_____ **7.** Stops mattering after age 50

Label the four lobes of the brain:
Frontal
Parietal
Temporal
Occipital



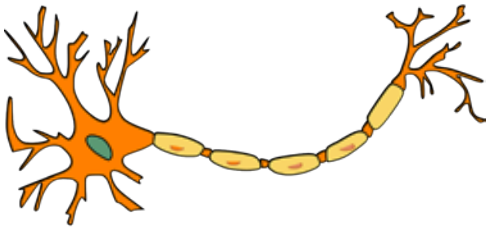
White vs. Grey Matter

12. Which one stores information? _____

13. Which one retrieves information? _____

14. How many billions of neurons are in the human brain?

10
100
1,000
10,000



15. What are the main fuels of the brain? _____

16. How are they transported throughout the body? _____

17. There are big differences in the ages at which brain changes happen, suggesting it is not just an _____ **process.**

18. Dr. Sullivan says there is a big difference in brain structure and function. Do you agree?
YES or NO

Draw a line to the correct answer:

19. BRAIN STRUCTURE	How the brain works at the biological level
20. BRAIN FUNCTION	How the brain works in real life

---

21. What have been the most complex and rich experiences of your life?

22. Normal age-related changes in brain structure include (circle all):

- Mild loss of brain volume (white matter > gray matter)
- Less connections between cells
- Less chemical messengers
- Less blood and oxygen travel to the brain
- More inflammation

23. Normal age-related changes in brain function include (circle all):

- Seeing and hearing
- Processing speed
- Multitasking
- New learning

24. Which of these do you think you have experienced?

TRUE or FALSE:

These functions do not normally change with age

_____ **25.** Focused attention
_____ **26.** Verbal comprehension
_____ **27.** Seeing
_____ **28.** Judgment
_____ **29.** Vocabulary
_____ **30.** New learning
_____ **31.** Crystallized intelligence (knowledge and wisdom)
_____ **32.** Social cognition
_____ **33.** Multitasking

Draw a line to the correct answer:

34. PRE-CLINICAL	One or more cognitive domains impaired significantly but without effect on everyday abilities
35. MILD COGNITIVE IMPAIRMENT	Cognitive impairment severe enough to interfere with everyday abilities
36. DEMENTIA	Silent phase: Brain changes without measurable symptoms

brain trivia

37. Is dementia a normal part of aging? YES or NO

Choose words from the list to complete each sentence:

Brain cells	**Dementia**	**Disorganization**	**Behavior**
Word-finding difficulties	**Diseases**	**Driving**	**Managing finances**

38. _____is the loss of the ability to think, remember, or reason to the extent that it interferes with one's ability to do everyday activities, like remembering to take medications.

39. Dementia is caused by different _____ in the brain.

40. Dementia occurs when once-healthy_____die or stop working well and lose connections with other brain cells.

41. _____and_____are two cognitive symptoms common in dementia.

42. Moodiness is a _____that often occurs in individuals with dementia.

43. Dementia affects one's ability to perform daily life tasks, such as _____ and_____.

44. Circle all problems that are NOT results of normal aging

Feeling confused	**Language changes**	**Hearing loss**	**Memory loss**
Slower learning	**Personality changes**	**Poor reasoning**	**Vision changes**

Draw a line to the correct answer:

45. PHYSICAL EXAMINATION	CT and MRI brain scans
46. NEUROIMAGING	Combine all information to form plan
47. COMPREHENSIVE INTERVIEWS	Lab tests (including blood and urine)
48. NEUROPSYCHOLOGICAL EVALUATION	Talks with individual and loved ones
49. INTEGRATION OF FINDINGS	Comprehensive testing with specialists

"The flower of health blooms when all parts work together."

—Kurdish Saying

answers

1. Non-Modifiable Risk Factor—Something you cannot change

Modifiable Risk Factor—Something you can change

2. Non-Modifiable: Age, Genes
Modifiable: See Slide Presentation, Page 23

3. True
4. True
5. True
6. True
7. False

8. Occipital
9. Parietal
10. Frontal
11. Temporal

12. Gray
13. White

14. 10,000
15. oxygen and glucose
16. blood
17. aging

19. Brain Structure—How the brain works at the biological level

20. Brain Function—How the brain works in real life

22. Circle all
23. Circle all

25. False
26. True
27. False
28. True
29. True
30. False

31. True
32. True
33. False

34. Pre-clinical—Silent phase: Brain changes without measurable symptoms

35. Mild Cognitive Impairment—One or more cognitive domains impaired significantly but without effect on everyday abilities

36. Dementia—Cognitive impairment sever enough to interfere with everyday abilities

37. No

38. Dementia
39. Diseases
40. Brain cells
41. Word-finding difficulties, Disorganization
42. Behavior
43. Driving and Managing finances

44. Feeling confused
    Personality changes
    Poor reasoning
    Significant memory loss

45. Physical examination—Lab tests

46. Neuroimaging—CT and MRI

47. Comprehensive interviews—Talks with individual and loved ones

48. Neuropsychological evaluation—Comprehensive testing with specialists

49. Integration of findings—Combine all information to form plan

It is a privilege to translate advances in brain science and the psychology of aging into high-quality information and easy-to-follow recommendations for adults, their families and the staff in retirement communities who care for them.

There is such rich understanding of the brain at the scientific level that genuinely improves quality of life that doesn't typically trickle down to benefit the individual.

I began my career in community care, and I am proud to provide a bridge from the academic world back to the 'real' world.

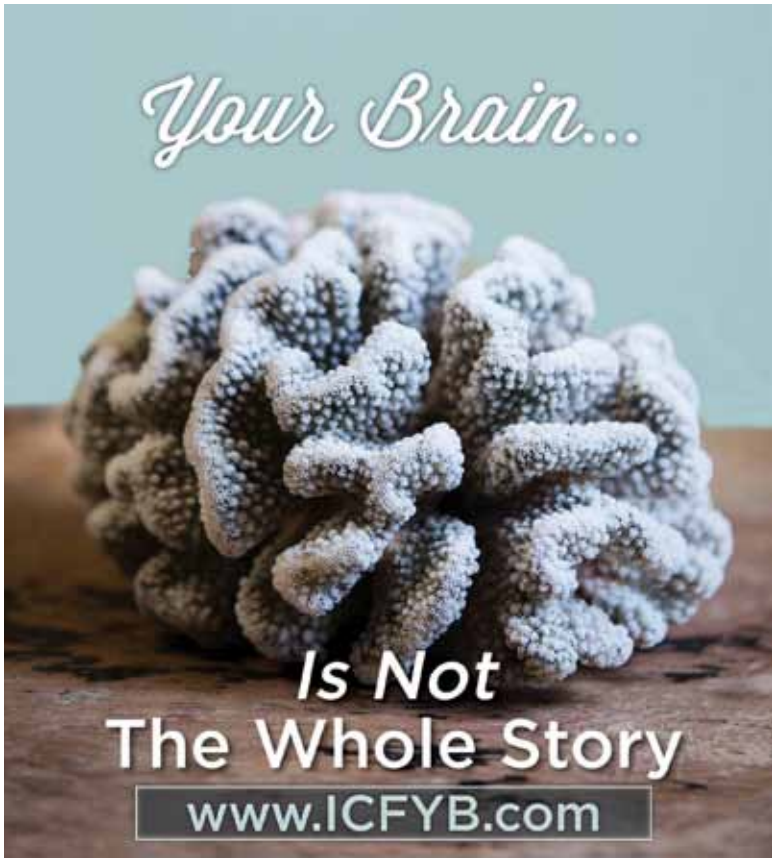
—KAREN D. SULLIVAN, PHD, ABPP

REFERENCES

- Fehm, H. L., Kern, W., & Peters, A. (2006). The selfish brain: Competition for energy resources. Progress in Brain Research, 153, 129-140.
- Neuropathology Group of the Medical Research Council Cognitive Function and Aging Society [writing committee: Esiri, M. M., Matthews, F., Brayne, C., & Ince, P. G.] (2001). Pathological correlates of late-onset dementia in a multicentre, community-based population in England and Wales. Lancet, 357, 169-175.
- Scahill, R. I., Frost, C., Jenkins, R., Whitwell, J. L., Rossor, M. N., & Fox, N. C. (2003). A longitudinal study of brain volume changes in normal aging using serial registered magnetic resonance imaging. Archives of Neurology, 60(7), 989-994.
- Schaie, K. W., Willis, S. L., & Caskie, G. L. (2004). The Seattle longitudinal study: Relation between personality and cognition. Aging, Neuropsychology and Cognition, 11, 204-234.
- Shulman, R. G., Rothman, D. L., Behar, K. L., & Hyder, F. (2004). Energetic basis of brain activity: Implications for neuroimaging. Trends in Neurosciences, 27(8), 489-495.
- Stern, Y. (2006). Cognitive reserve theory and application. New York, NY: Psychology Press.

THINK
like a
BRAIN
SCIENTIST!

I CARE
FOR YOUR BRAIN
with Dr. Sullivan



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   HOW TO MINIMIZE YOUR RISKS
3. HEART HEALTH = BRAIN HEALTH
   HOW TO TAKE CONTROL OF YOUR BLOOD FLOW
4. HOW DO SUBSTANCES AFFECT THE AGING BRAIN?
   WHAT TO DO ABOUT DIET, MEDICATIONS, ALCOHOL AND SUPPLEMENTS
5. THE PSYCHOLOGY OF AGING: STRATEGIES FOR BETTER COPING
6. THE IMPORTANCE OF SOCIAL CONNECTION IN OLDER ADULTHOOD
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7. NORMAL MEMORY CHANGES WITH AGE
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8. HOW SLEEP CHANGES WITH AGE: EFFECTS ON MEMORY AND MOOD
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