MemoryCare
Caregiver Education Program

What is Dementia?
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We gratefully acknowledge the Duke Endowment and the Fullerton Foundation for supporting the development of this material.
“My mother’s plunge into senility reminds me of that toboggan ride”

“the extraordinary thing about her descent into senility is that there are occasional wild, brilliant flashes which reveal more of my mother-Madeleine than I ever knew when she was simply my mother.”
Objectives

• Define dementia
• Take a brief tour of the brain
• Understand how dementia alters the brain to impact functional abilities, personality and behavior
• Distinguish normal aging, Mild Cognitive Impairment and dementia
• Outline the most common types of dementia
Defining Dementia

Dementia is a *syndrome* characterized by *permanent deterioration* of previously acquired intellectual abilities that *interferes* with social and occupational function.

There are many types of dementia and Alzheimer’s disease is then most common type of dementia; others include vascular, Lewy body, frontotemporal, and mixed.
How the Brain Works

Clockwise from top left: reading, hearing, thinking about, saying words

Marcus E. Raichle, Department of Radiology, Washington University, St. Louis, Missouri.
Brain Hemispheres

Photo Courtesy of Jannis Productions. Stacy Jannis
The Human Brain

- Approximately 3 pound organ
- Neurons, glial cells and neural transmitters
- Processes and stores information, the “mind palace”
- Cognitive reserve

Neurons or Nerve Cells

Alzheimer's Disease Education and Referral Center, a service of the National Institute on Aging
Four Lobes of the Brain

Cognition: ability to process and use information

Image by Alan Branigan, Eastern Area Health Education Center, Greenville NC. © 2012, Memorycare.org. All rights reserved.
Four Lobes of the Brain

Image from BodyParts3D/Anatomography, Ministry of Education, Culture, Sports, and Technology (MEXT) Integrated Database Project, Japan
Brain Lobe Functions

**Frontal Lobe: Executive function**
- Judgment and foresight
- Insight and abstract reasoning
- Perspective and perseverance
- Mental flexibility and curiosity
- Initiative and drive (abulia)
- Planning and sequencing
- Delayed gratification
- Self control - Inhibition of inappropriate behaviors
- Perception
- Personality and affect

Image by Alan Branigan, Eastern Area Health Education Center, Greenville NC. © 2012, Memorycare.org. All rights reserved.
Brain Lobe Functions

Parietal Lobe: Apraxia

- Spatial memory
  - Orientation mapping
- Skilled movements
**Temporal Lobe**

- Memory
  - Hippocampus
- Language - Aphasia
  - Expressive & Receptive
    - Written vs. verbal skills
    - Naming, vocabulary and fluency
    - Sound, structure and tone

Image by Alan Branigan, Eastern Area Health Education Center, Greenville NC. © 2012, Memorycare.org. All rights reserved.
Brain Lobe Functions

**Occipital Lobe: Agnosia**

Interprets visual information to recognize shapes and objects

Image by Alan Branigan, Eastern Area Health Education Center, Greenville NC. © 2012, Memorycare.org. All rights reserved.
Types of Memory

• Many classifications

• Differentiated by the time between the experience and recall
  – Working memory
  – Short term and long term memory
  – Semantic – “Who was our first president?”
  – Procedural – Riding a bike
  – Episodic – “What did you have for breakfast?”
Working Memory - Attention

- Hear a phone number, dial it and forget it
- “You weren’t listening”
- Calculations, sentences, instructions
- Vulnerable to distraction

Illustration courtesy of Posit Science
Temporal Lobe and Short Term Memory

• “The Filing Cabinet”
• Necessary for new learning

Hippocampus

Image from BodyParts3D/Anatomography, Ministry of Education, Culture, Sports, and Technology (MEXT) Integrated Database Project, Japan
Memory & the hippocampus

The Anatomy of Memory
Hippocampus Size in Aging and AD

Normal 25 Years
Normal 76 Years
MCI 75 Years
AD 75 Years
Normal Aging vs. Alzheimer's Dementia

![Graph showing cognition over age with different stages: Normal, Preclinical, AD]
Changes in Mental Prowess with Age

Seven-year study of 2,000 healthy people aged 18-60 at the University of Virginia

- Mental powers start to dwindle at 27 after peaking at 22
- Reasoning, spatial visualization and speed of thinking decline in our late 20’s
- On average, memory stayed intact until age 37
- Abilities based on accumulated knowledge, such as vocabulary or general information, increased until the age of 60.

Salthouse, T. Neurobiology of Aging, 3/09
Normal Aging

• Processing time is measurably slower
• May misplace things at times
• May forget names on occasion
• Multi-tasking more difficult
• May have difficulty remembering details
• Most recently learned knowledge subject to age related decline
• Annoying NOT disabling
Normal Aging
Are Older Brains Wiser?

Albert Einstein, 1875-1955
Mild Cognitive Impairment (MCI)

- A decline from previous function, BUT able to perform most daily activities
- Still possess compensatory abilities
- Affects 10-20% of those 65 years old
- Annual conversion rate from MCI to dementia
  - 10-15% of specialty clinic population with MCI
  - Early dementia or pre-Alzheimer’s state?
- Some with MCI stay the same and some improve
- Who will progress?
  - Biomarkers of Aβeta deposition and neuronal injury
  - Amnestic MCI increases risk for progression to AD
  - Non-amnestic MCI may be more common with cerebrovascular disease and Parkinson’s.

N Engl J Med 2011; 364:2227-34 Petersen, R.
10 Warning Signs of Dementia

1. Memory loss that disrupts daily life
2. Challenges in planning or solving problems
3. Difficulty completing familiar tasks at home, at work or at leisure
4. Confusion with time or place
5. Trouble understanding visual images and spatial relationships
6. New problems with words in speaking or writing
7. Misplacing things and losing the ability to retrace steps
8. Decreased or poor judgment
9. Withdrawal from work or social activities
10. Changes in mood and personality

Alzheimer’s Association
Every person who has dementia is affected uniquely.
Why Dementia Can Be Difficult to Diagnose in the Early Stages

- Intact social graces
- Poor self-awareness and denial of illness
- Confabulation – makes up answers
- Task avoidance
- Decreased socialization
- Family reluctance
Benefits of an Early Diagnosis of Dementia

Lessen the adverse impact, decrease stress and maximize quality of life

• Interact more effectively
• Enhance our empathy and tolerance
• Establish realistic expectations and goals
• Improve relationships
• Initiate treatment while still effective
• Promote preparation for the future
Most Common Types of Dementia

• **Alzheimer’s Dementia**
  – Gradual onset and decline, short term memory loss, anosmia, dysfunction in other cognitive domains, plaques and tangles, global effect, most cases sporadic. Early onset rare and more likely to be inherited

• **Lewy Body Dementia**
  – Vivid visual hallucinations, Parkinsonism, fluctuations in cognition
  – Use caution with some medications, α-synuclein pathology
  – High association with REM Behavior Disorder

• **Vascular Dementia** (*CVA/TIA/multi-infarct dementia/SIVD*)
  – Reduced blood flow to the brain, abrupt and stepwise or insidious, variable, often mixed with other dementias, may be asymptomatic

• **Frontotemporal Lobar Dementia** (*multiple subtypes*)
  – Shrinkage of frontal and temporal lobes, changes in personality and language, higher genetic component, earlier onset in 40-60’s, different disease proteins

• **Mixed Dementia**
  – A mix of Alzheimer’s with vascular disease but may include other dementias (*LBD and FTD*)
  – Can accelerate the severity of symptoms
Prevalence of Dementia Types

Alzheimer's 70%
Vascular 17%
LBD, FTLD, Other 13%
Mixed Dementia

NIH Study
- 43% AD+VaD
- 16% AD+PD
- Pure AD 30%
- Infarcts 12%

Alzheimer’s Disease
Current and Projected Prevalence

- More than 5 million people are affected
- 13% of age 65 and older
- Over 40% of age 85 and older

Alzheimer’s Association
Memory Loss

Why is it important now?

• AGE is the #1 risk factor
• Aging population
  – People living longer
  – Baby boomers
  – Oldest old
• Rising social & economic costs
  – Currently spending over 200 billion a year in aggregate costs
  – Almost 3 fold increased Medicare and 19 fold increased Medicaid costs
  – >50% of nursing home beds for dementia
Alzheimer’s Disease
Plaques and Tangles

Jannis Productions. Rebekah Fredenburg, computer animation; Stacy Jannis, illustration/art direction
Alzheimer’s Disease
Losing Connections

Normal

Alzheimer’s
Alzheimer’s disease

### Stages of Decline: The Stages of AD

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
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</thead>
<tbody>
<tr>
<td><strong>ADLs</strong></td>
<td>Problems with complex tasks</td>
<td>Needs help with more basic ADLs (e.g., feeding, proper dress for weather, toileting)</td>
<td>Progresses to total dependence on caregiver (e.g., feeding, toileting)</td>
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<tr>
<td><strong>Behavior</strong></td>
<td>Decreased time with hobbies, social withdrawal</td>
<td>Changes in personality, anxiety, suspicion, pacing, insomnia, agitation, wandering</td>
<td>Agitation</td>
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<tr>
<td><strong>Cognition</strong></td>
<td>Short-term memory loss, i.e.,</td>
<td>Confusion, difficulty recognizing family and friends (moderate-severe)</td>
<td>Loss of speech</td>
</tr>
<tr>
<td></td>
<td>• Misplacing objects</td>
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<tr>
<td></td>
<td>• Forgetting names</td>
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<tr>
<td></td>
<td>• Disorientation</td>
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Adapted from Alzheimer’s Association: [http://www.alz.org/AboutAD/Stages.asp](http://www.alz.org/AboutAD/Stages.asp)
MEMORY

University of Alabama 1995
The Brain: Normal vs. Alzheimer’s
Diagnostic Work-up For Dementia
Initial Assessment

History
The health care provider will need to talk to the patient AND someone who knows them well

Physical exam
With emphasis on neurological exam

Cognitive testing
MSE, word fluency, clock drawing, depression screening and others

Labs
– Basic labs: CBC, chemistry profile, TSH and B12/folate
– Optional labs: lipid panel, RPR, Vitamin D & others

Neuro-imaging scan
Options include:
– Head CT
– Brain MRI
– Functional studies
– Other
Risk Factors for Memory Loss

- Age
- Genetics and family history
- Head trauma
- Medications
- Vascular Risk Factors - work on the modifiable ones
  - Medical illness: Hypertension, stroke, heart disease, diabetes, obesity, tobacco, cholesterol, sleep apnea/sleep deprivation
  - Environmental factors: Diet, lack of exercise, excessive alcohol use, chronic stress
- Lower education level – possibly poor nutrition, more toxic exposures, less health care or less cognitive reserve
• There are different types of dementia
• Dementias can co-exist
• Prevalence of dementia increasing
• Each person with dementia is unique
• No definitive diagnostic tests available
• Some risk factors are modifiable
• Seek medical help when abrupt changes occur
Summary

• Dementia is impairment of memory, cognition and behavior
• The impairments reflect damage occurring in the brain
• The damage in the brain is generating the negative changes in the individual who cannot control them
• We have to go to where the person is intellectually and emotionally because they can no longer come to us
• Early diagnosis is beneficial
• Dementia is often progressive so the individual will continue to change and decline over time
• *Dementia is not curable but it is also not hopeless as there are treatments, support and ongoing research*