



An Interdisciplinary Approach to Falls Prevention (Medical to Therapy)

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Objectives

- Identify the scope of the problem as it relates to impact of falls
- Identify the components of our rehab program that works in conjunction with a medical provider with the same overall focus of fall prevention
- Address fall prevention and intervention programming



A Little About Us....

- On With Life was the dream of eight Des Moines area families who came together to support each other and help build a post-acute (our inpatient) program for their loved ones and others with brain injury
- From this we have continued to grow to include multiple branches of our program:
 - Post Acute Inpatient
 - Long Term Care for Youth and Younger Adults
 - Supported Community Living
 - Neuropsychology Services
 - Outpatient Neuro Rehabilitation
- Working with individuals with neurological deficits and diseases as well as those with brain injuries from accidents, strokes, etc.



The Facts



- 1 in every 3 older adults (65+) fall every year.
 - Less than half tell their doctor
 - Falling once doubles your chances of falling again
- 1 in every 5 falls causes serious injury (broken bones or a head injury)
- Every year, 2.5 million older adults are seen in ER's for injuries from falls
- Over 700,000 older adults are hospitalized from fall injury every year
 - 250,000 of these being hip fractures
 - Medical costs are \$34 Billion every year
- Falls are the most common cause of head injuries

Statistics from CDC - 2013

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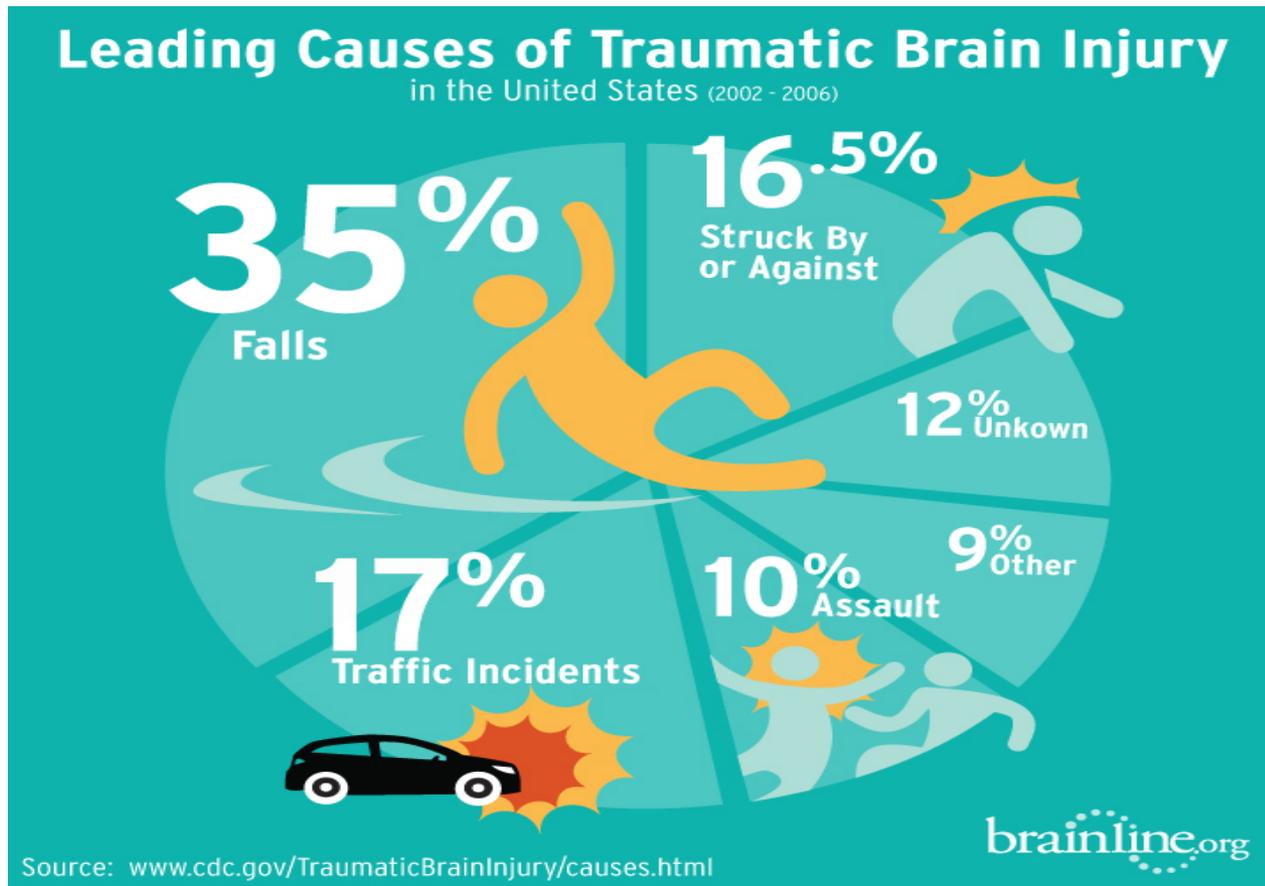
What Happens After.....



- **What Can Happen After a Fall?**
 - Not all falls cause injury – but they do instill fear
 - Limits everyday and social activities
 - Increased weakness from decreased activity
 - Depression and anxiety
 - Injuries can happen
 - Limited mobility
 - Limited independence
 - Broken bones (most common are wrist, arm, ankle, hip)
 - Head injuries (particularly when using blood thinners)



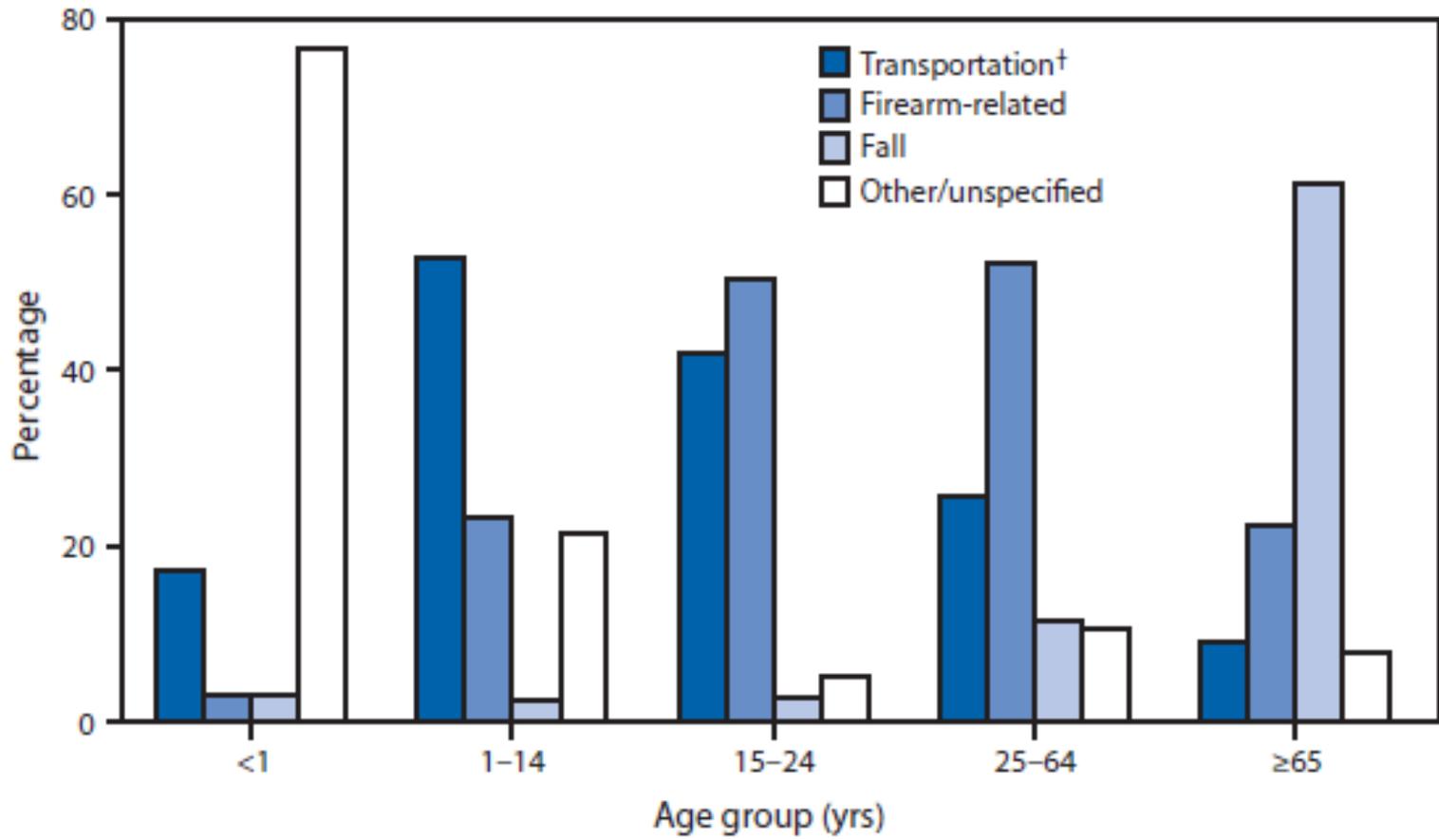
Leading Causes of Brain Injury



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Centers for Disease Control, 2013

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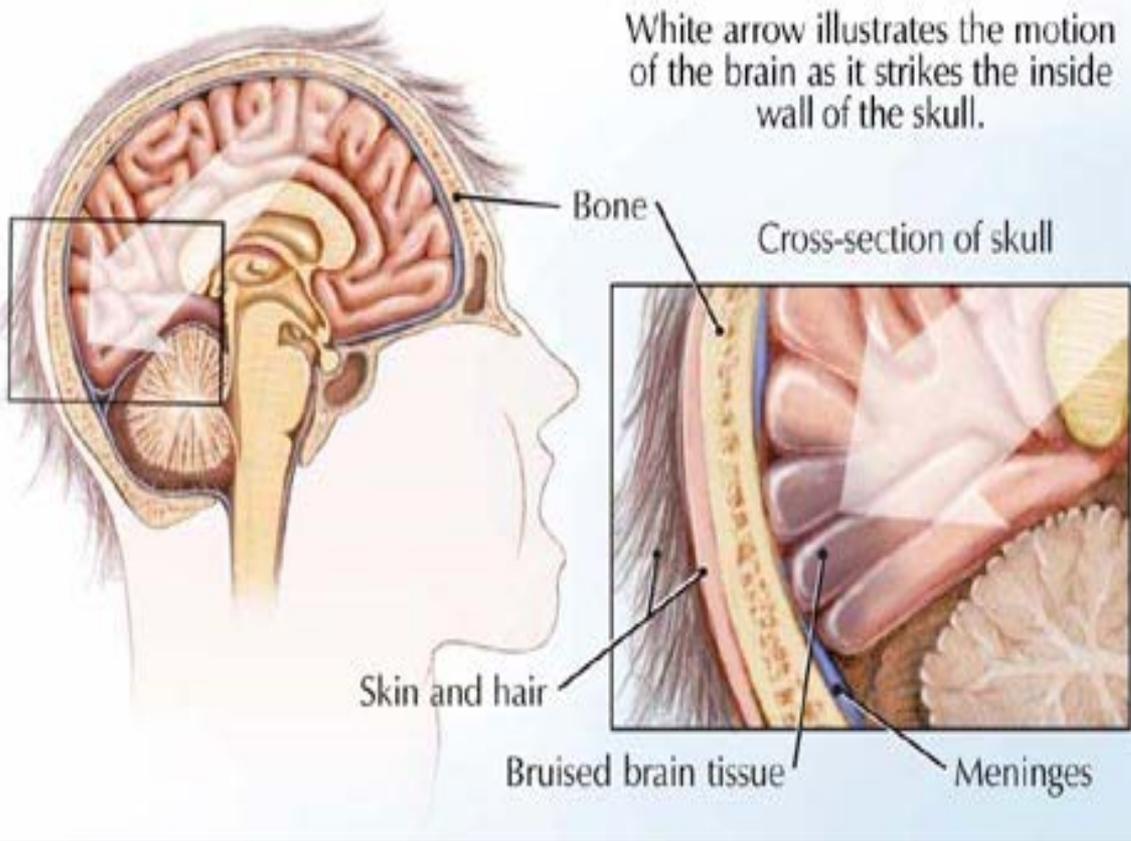
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Cause of Concussions



Fig. 1





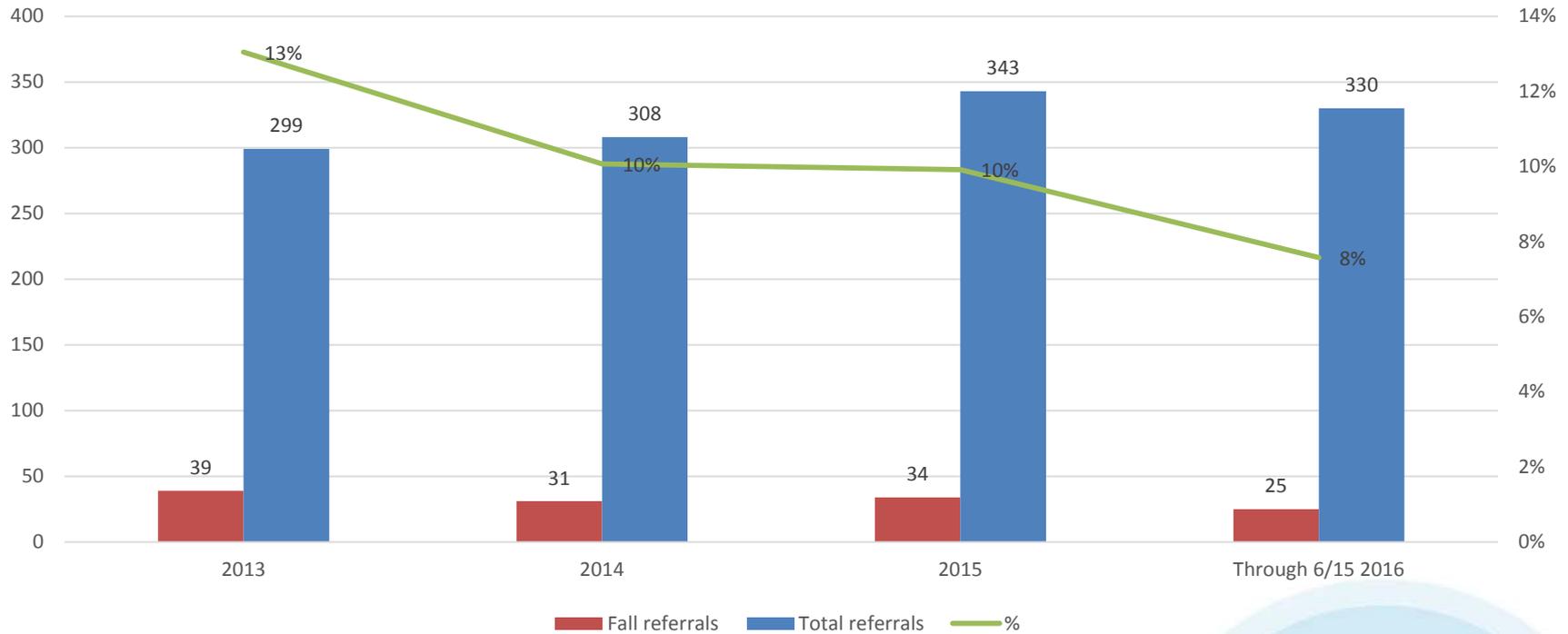
Fall Related Referrals vs. Total Referrals

ON WITH LIFE (Moderate/Severe BI)

11% total

Runs between 8% and 15% historically

*Does not reflect falls as etiology in MILD BI cases

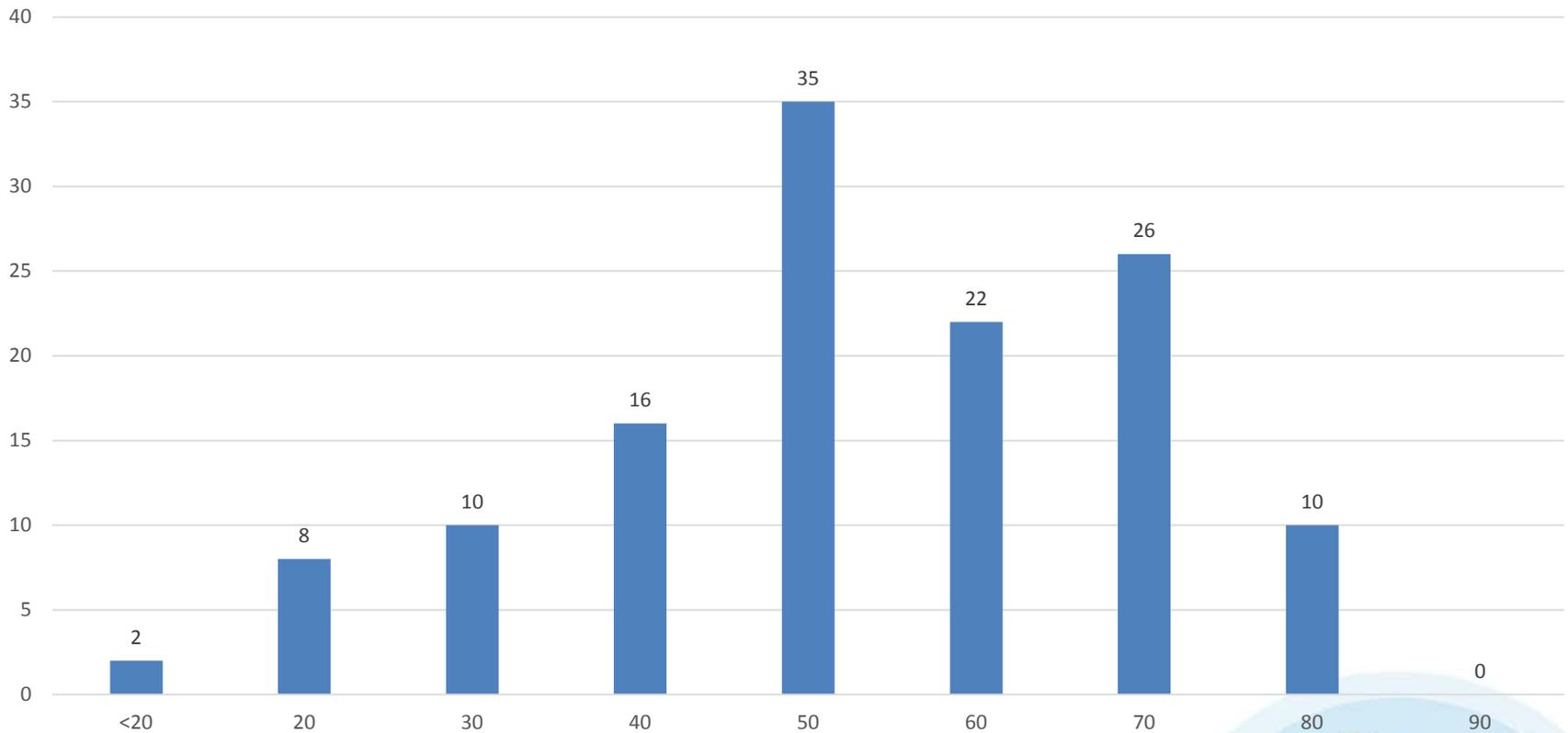


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Age Groupings

Age Breakdown of On With Life Fall Referrals, July 2012 - June 2016
Total Number of Referrals by Age Groupings – Decade Groupings



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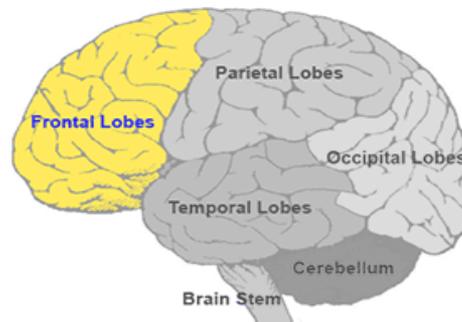
Neuropsychology and Falls

- Gait and cognition are interrelated in older adults – declines in attention, psychomotor processing, problem-solving, and spatial awareness can have significant impacts on fall probability
- Gauchard et al. (2006); persons with cognitive deficits mildly beyond normal aging were twice as likely to have fallen in the past and showed twice as many falls
- Depression correlates with the incidence of falls (Delbaere et al., 2010), and severity of depression correlates with greater incidence rates (Eggermont et al., 2012)
- Depression is related to a higher chance of recurrent falls – 1.3 to 2.2 times more likely (Stalenhoef et al., 2002)



Normal Brain Changes, Related to Fall Risk

- While approaching older age (>65), cerebral volume decreases by 0.23%/year (one of the factors in examining for Alzheimers Disease)
- Shrinkages of the frontal and pre-frontal lobes are the most significant



- What does the frontal lobe do? “Executive function” – planning, attention, decision-making, judgment, self-regulation, inhibiting impulsivity, ‘multi-tasking’



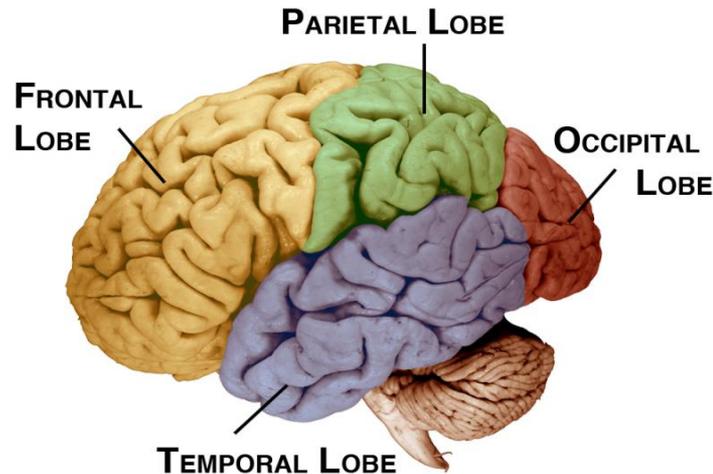
Mild Cognitive Impairment (MCI)

- 3% of the population has Mild Cognitive Impairment (MCI); a precursor between normal aging and Alzheimer's Disease.
- Structural differences are seen in persons with MCI – decreased white matter integrity in posterior areas of brain and gray matter reductions in the temporal lobe and other areas.
- MCI is associated with greater cognitive dysfunction and these brain changes and with an increased risk of falls. Mechanisms not well understood, however.



Back to Normal Aging

- Even in healthy adults, there is significant loss in gray and white matter, especially in the frontal, and next, in the parietal lobe



- What does the parietal lobe do? Visual-spatial/visual-perceptual skills are primary, navigation/'pathfinding,' spatial sense/spatial awareness



- Loss of white matter over time – associated with reduced mental processing speed and working memory. White matter hypointensity on scanning predicted falls over the following 12 months (Ren et al., 2013)
- As we age, what has been automatic needs to become more under conscious control – have to pay attention more, in driving, in walking, in problem-solving (though ‘overlearned’ skills are still in play). ‘Motor automaticity’ is reduced – it’s why older persons start looking at their feet more.
- BUT – guess what we use to attend in a more focused fashion? The frontal lobe! (You’re screwed if you do; you’re screwed if you don’t)



What's psychological and what's biological...?

Evidence of Hippocampal Atrophy and Loss in MDD Patients



Images reprinted with permission of JD Bremner.

- Compared to controls, patients with depression had smaller hippocampal volumes¹
- Decreased hippocampal volume may be related to the duration of depression²⁻⁴

1. Bremner JD, et al. *Am J Psychiatry*. 2000;157(1):115-118.
2. Sheline YI, et al. *J Neurosci*. 1999;19:5034-5043.
3. Sheline YI, et al. *Proc Natl Acad Sci USA*. 1996;93:3908-3913.
4. Sheline YI, et al. *Am J Psychiatry*. 2003;160:1516-1518.



More regarding depression

- In depressed patients, gray and white matter integrity is reduced in the frontal areas
- White matter pathology is observed in the prefrontal region in depressed patients



- Taken overall, deteriorations in the frontal regions with resulting declines in frontal functions are most likely to contribute to the increased risk of falling in aging adults
- Brain aging is strongly associated with (or is even a predictor of) an increased incidence of falling
- Gray and white brain matter changes are associated with change in function and increased incidence of falls
- Cognitive training in the aging population is showing promising results in reducing fall risk – “Neuropsychological mechanisms of falls in older adults,” Liu, Chan, and Yan, 2014.
- In one study, benefits lasted even 5 years after the cessation of the intervention (Willis et al., 2006)

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Our Program



- Our comprehensive program looks to:
 - To decrease risk of injury
 - Improve independence
 - Increase quality of life
- Utilizes a medical and therapy component



Treatment Course



- **Medical Evaluation**
 - From this, if appropriate you are referred for additional assessment by PT/OT
- **Physical and Occupational Therapy Assessment**
 - Strength, Vision, Balance, Coordination, Cognition
 - Home modification recommendations
 - Home exercise program



The Medical Perspective

Detailed Medical History

- Acute, chronic, aging

Medications

- Side effects, dosages

Falls Checklist/Questionnaire

- Identify their frequency of falls, concerns, issues



Medical (continued)

Recommendations for continued care (as appropriate):

- Metabolic/Bloodwork
- Cardiac:
 - EKG, Echo, Holter Monitor
- Neurologic:
 - EEG
- Other:
 - Podiatry Consult
 - Formal Vision Evaluation
- PT/OT Eval and treatment
- Primary Care Physician Follow Up



Physical and Occupational Therapy Evaluation, Treatment, Recommendations

- Evaluation
 - Falls History
 - How often? Reasons? Injuries?
 - Home Environment
 - Layout? Steps? Flooring? Lighting?
 - Family/Caregiver Supports
 - Education
 - Pain
 - Where? Frequency?
 - Personal Goals
 - What's important to them?



Physical Therapy

- Strength
- Range of Motion
- Coordination
- Sensation
- Vestibular Function/Dizziness,
- Balance
- Gait/Walking



Occupational Therapy

- Activities of Daily Living
 - Bathing, Dressing, Grooming
- Instrumental Activities of Daily Living
 - Homemaking Skills: Cooking, Cleaning, Laundry
 - Home Maintenance: Yardwork, Fix-it Projects
 - Driving
- Strength
- Range of Motion
- Coordination
- Vision/Visual Perception
- Cognition
- Reaction Time



Physical and Occupational Therapy Evaluation, Treatment, Recommendations

- Physical Therapy
 - Exercise
 - Stretching
 - Balance Training
 - Gait Training
 - Vestibular Training
 - Proprioceptive Training



- OT Treatment
 - Safety Training
 - Adaptive Equipment Training
 - Organization and Planning
 - Planner/Calendar
 - Exercise
 - Home program
 - Reaction Time Training
 - Vision Training



- Recommendations
 - Neuropsychological Evaluation
 - Speech Therapy Evaluation
 - Home Exercise Programs
 - Home Modification Recommendations
 - Optometrist Evaluation
 - Communication to PCP



Insurance

- **Medical Evaluation**
 - Billed through the medical provider as a regular appointment
- **Therapy Assessment**
 - PT/OT benefits through insurance plan



To Get Started....

- Medical Evaluation Scheduled
- Physical Therapy Evaluation
- Occupational Evaluations
- Specialist Referrals
- Contact with PCP

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Questions?



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