

Exercise and the Brain

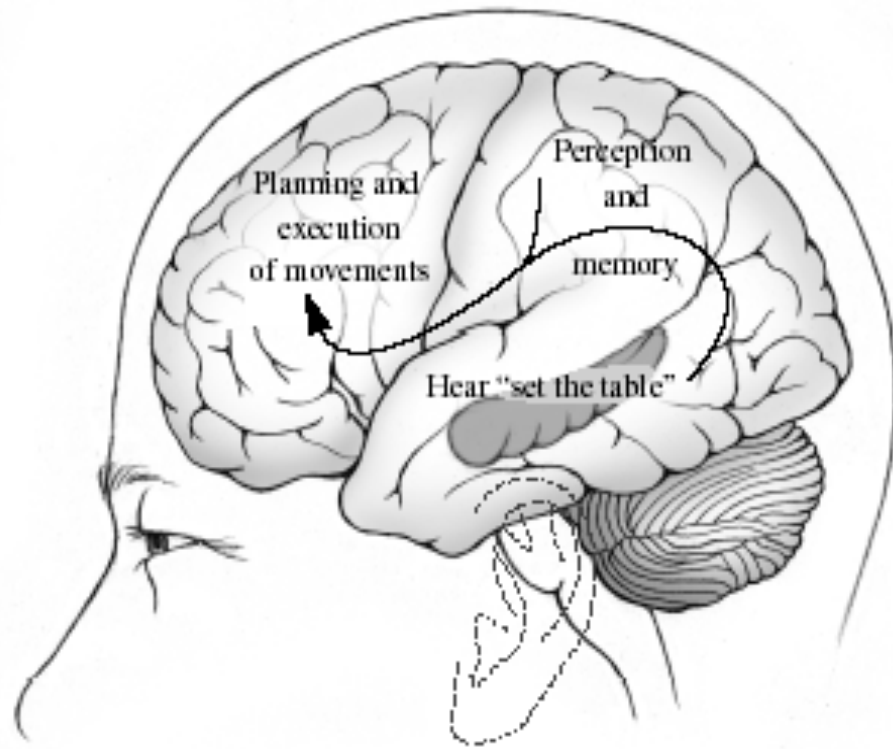
Majid Fotuhi, MD PhD

Baltimore Psychological Assoc.
March 15, 2015

Objectives

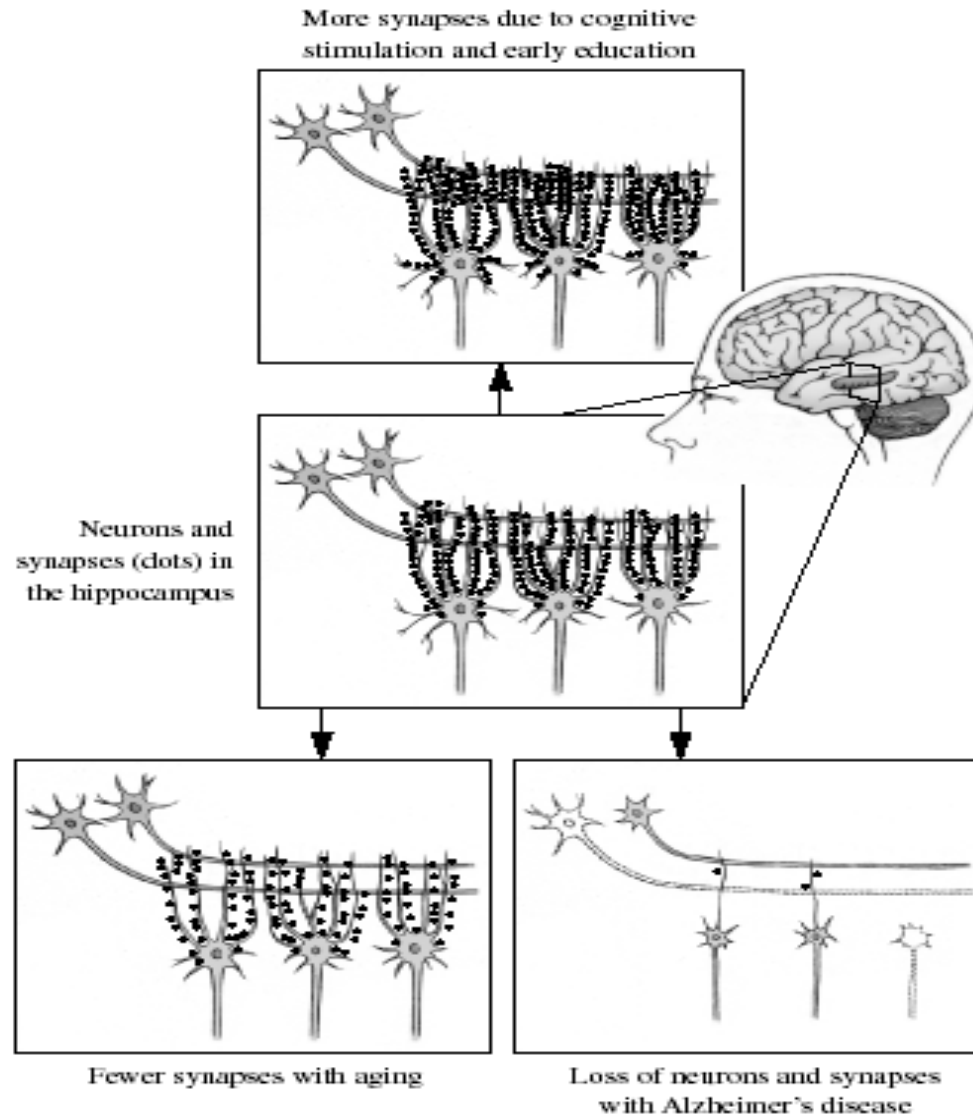
- What are cognitive functions and brain reserve?
- How do vascular disease damage the brain?
- How does exercise boost brain size and function?

Cognitive Functions

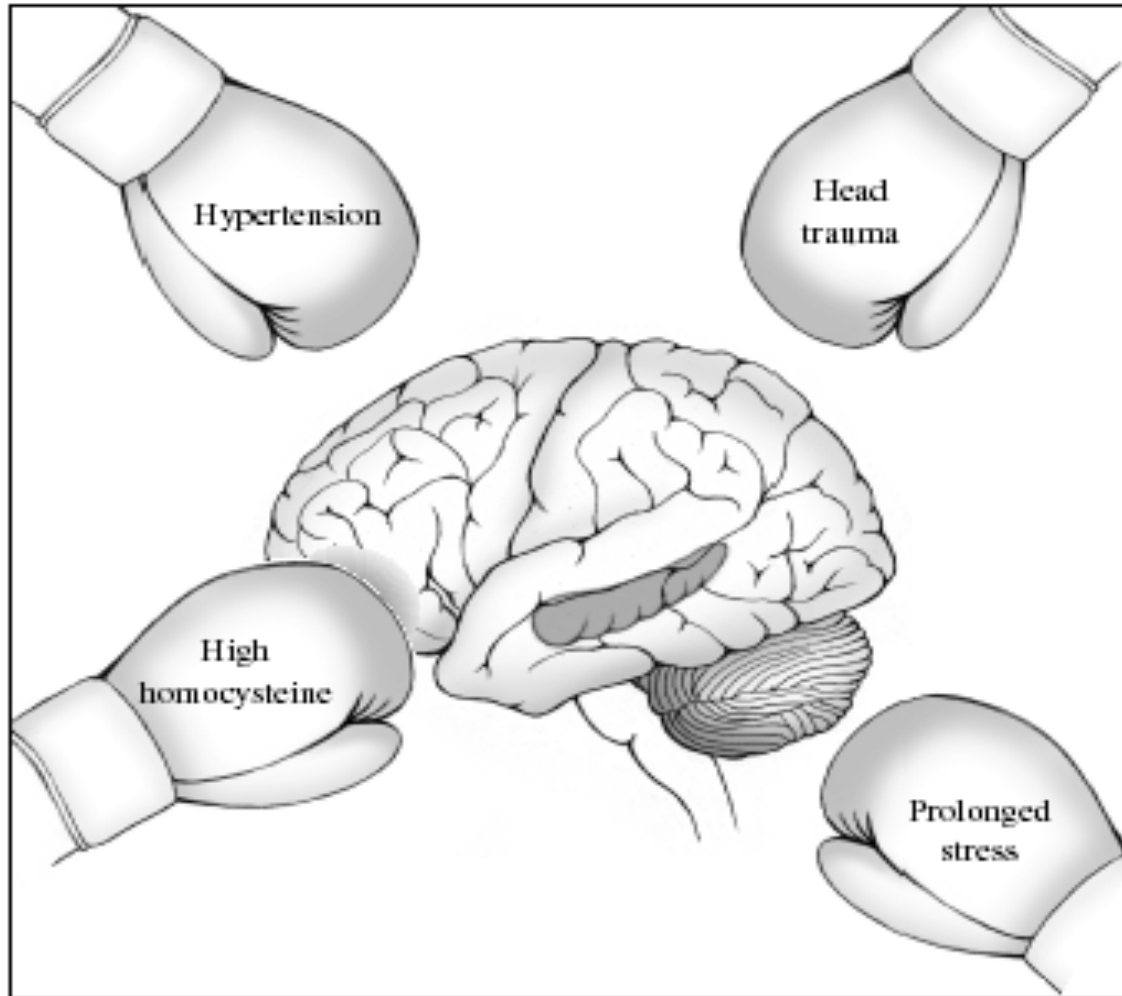


- Learning & Memory
- Language
- Orientation
- Calculation
- Recognizing faces and objects
- Executive functions
- Abstract thinking

“Cognitive Reserve”

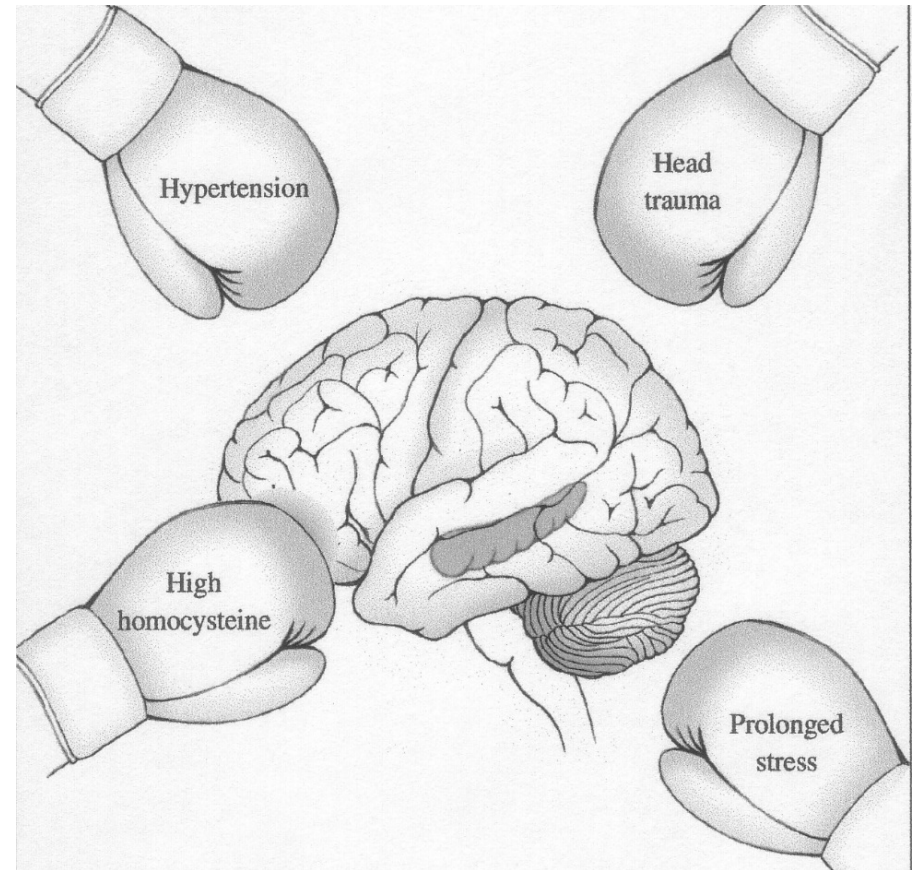


Multiple Hits Can Knock Out the Brain Reserve

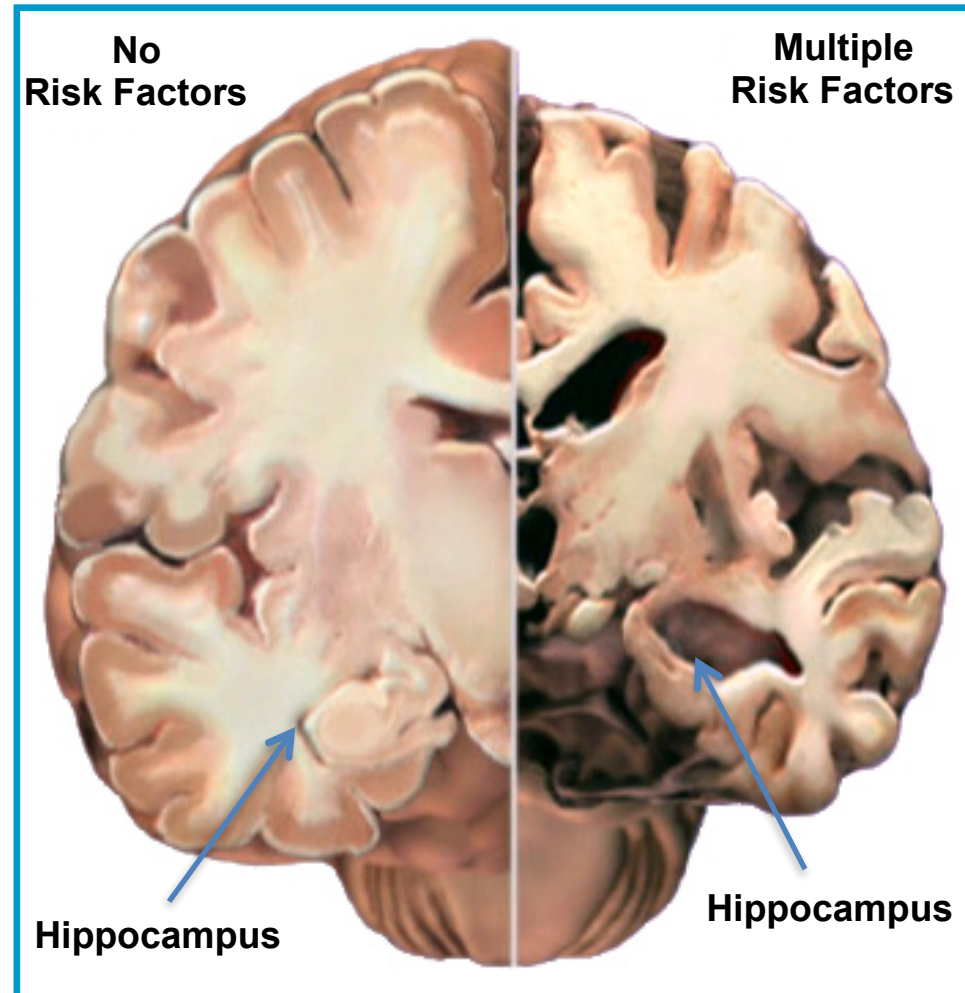


Multiple Risk Factors

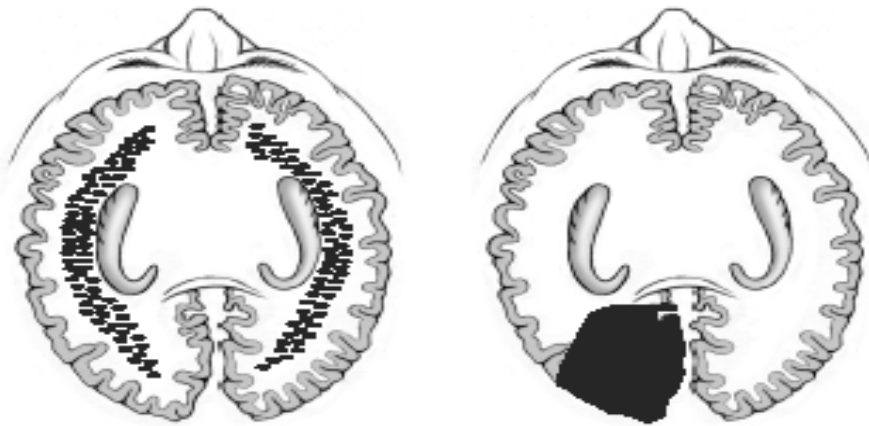
- Each negative risk factor lowers the brain's threshold to withstand the effects of Alzheimer's plaques and tangles
- An elderly person with multiple risk factors is more likely to lose memory at a younger age



Multiple Risk Factors Shrink the Hippocampus

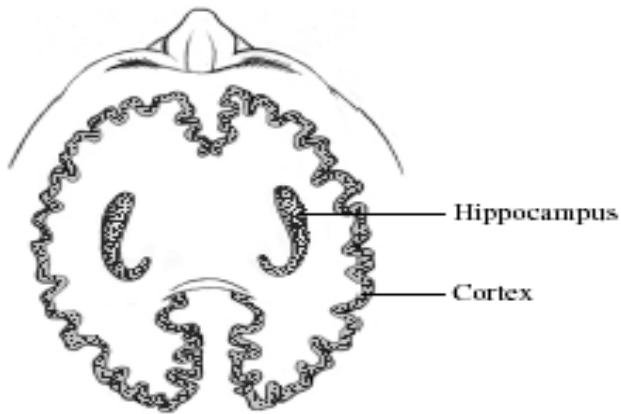


Alzheimer's vs. Strokes



Multiple ministrokes
(Vascular Dementia)

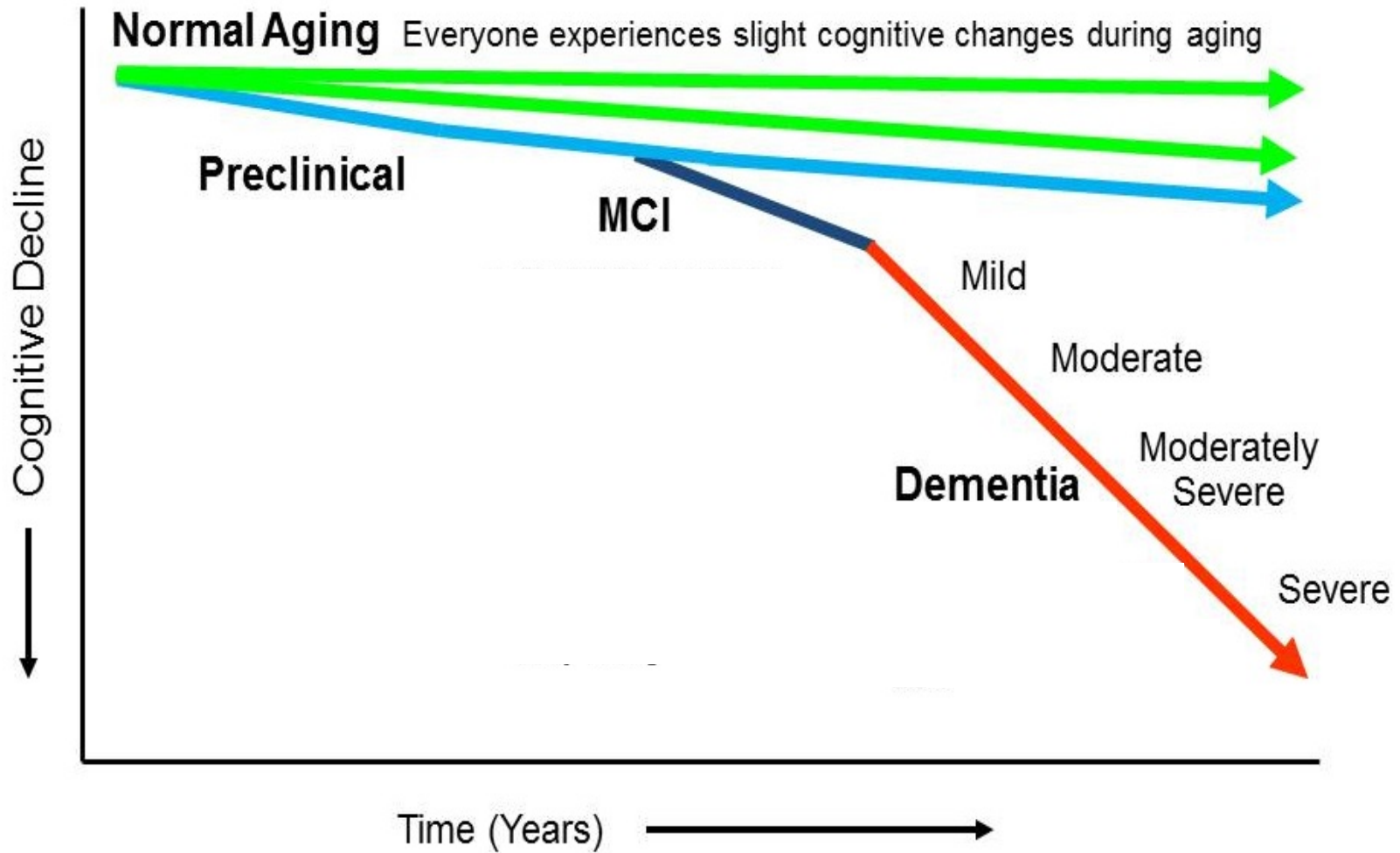
One large
stroke



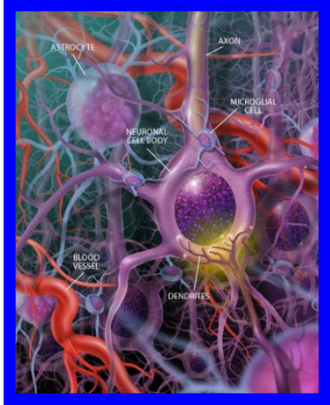
Plaques and tangles (dots)
(Alzheimer's disease)

- Alzheimer's disease first causes atrophy in the cortical areas in and around the hippocampus
- Later, it spreads to other cortical areas
- Can happen together with small or large strokes
- Elderly who have both strokes and Alzheimer's become demented at a younger age

Memory Loss & Cognitive Impairment



Brain is a Highly Vascular Organ



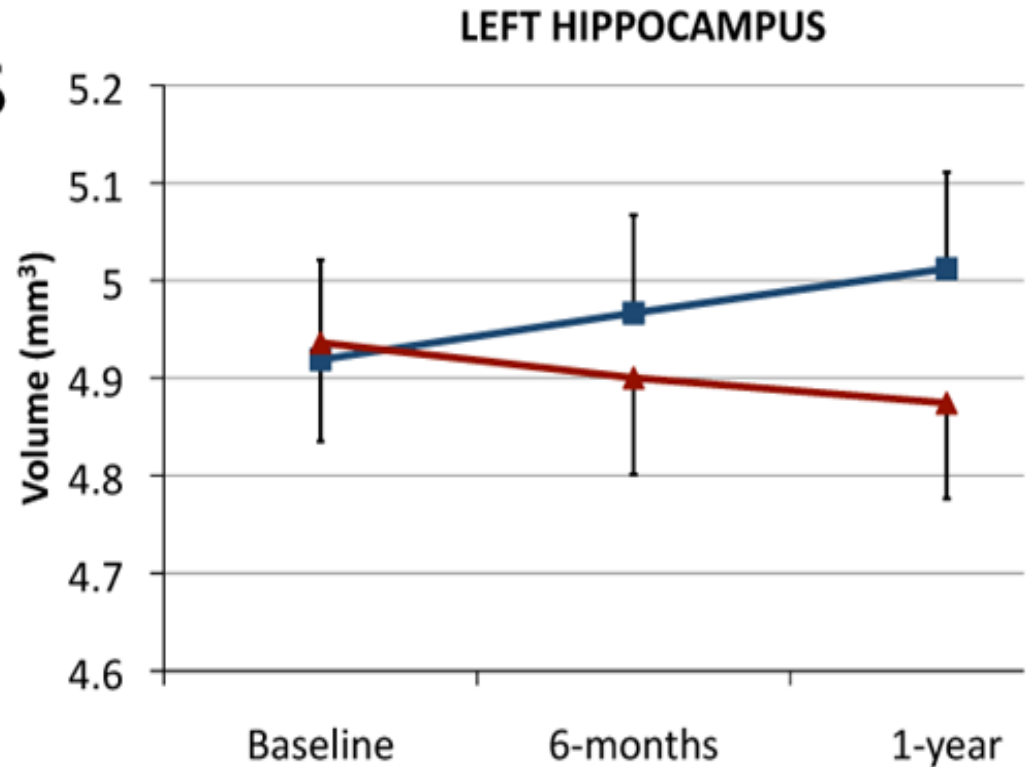
Zlokovic et al. *Neurosurgery* 43(4), 877-78, 1998

Objectives

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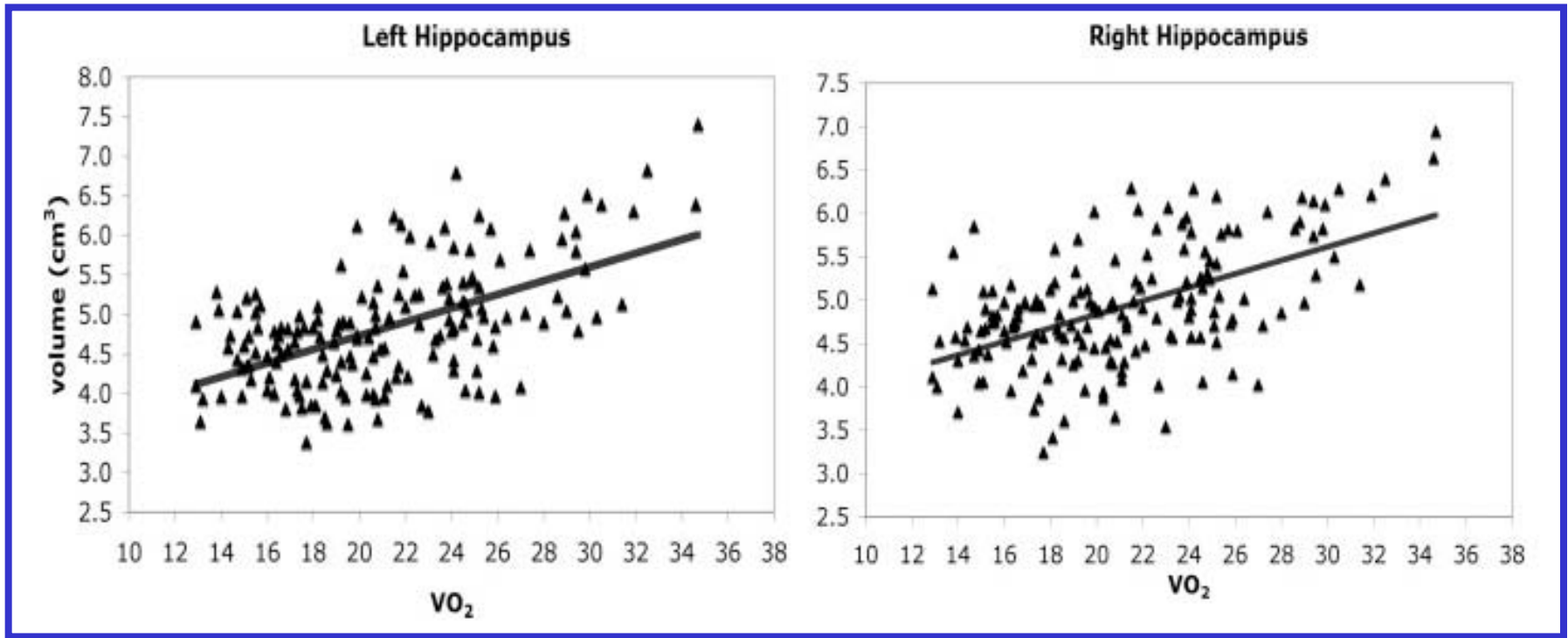
Hippocampus Grows Bigger with Walking Three Times a Week

Hippocampus



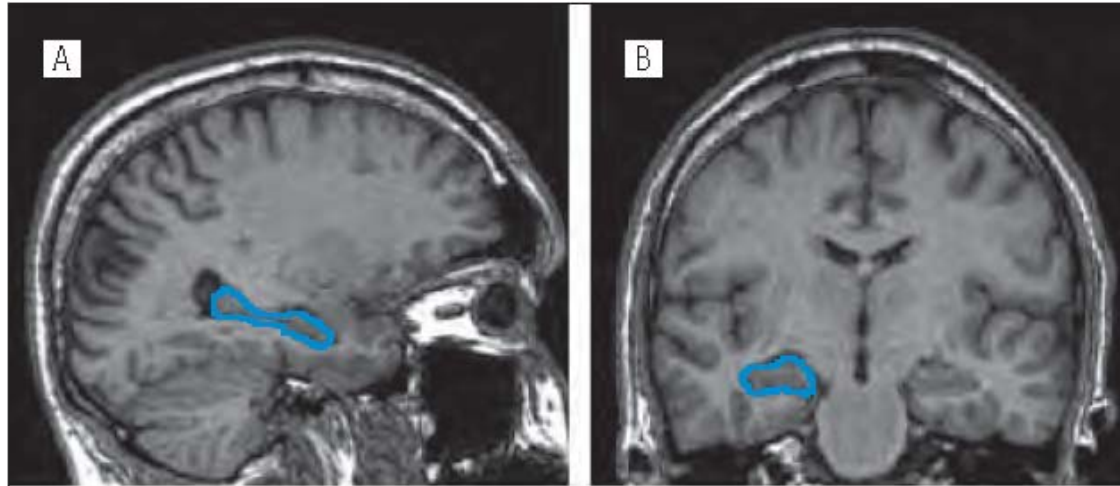
Erikson, PNAS 2011

Exercise Expands Hippocampus

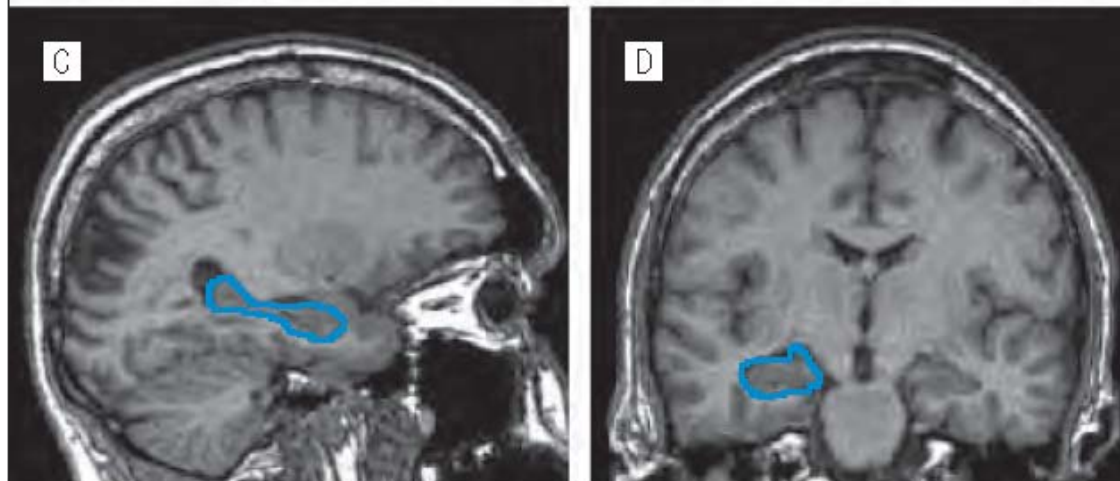


Hippocampus Grows Bigger with Exercise, Even After 3 Months

Before

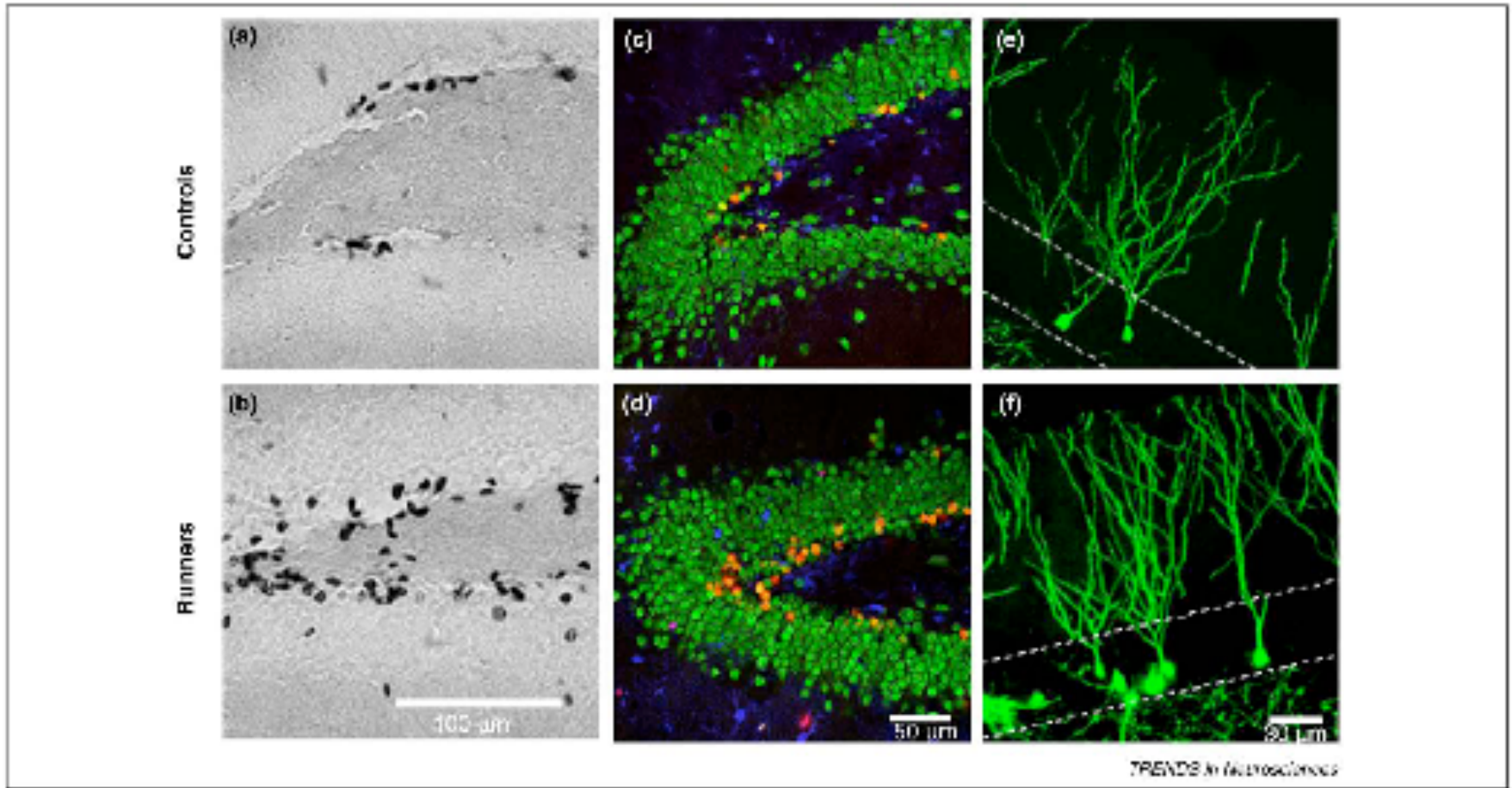


After

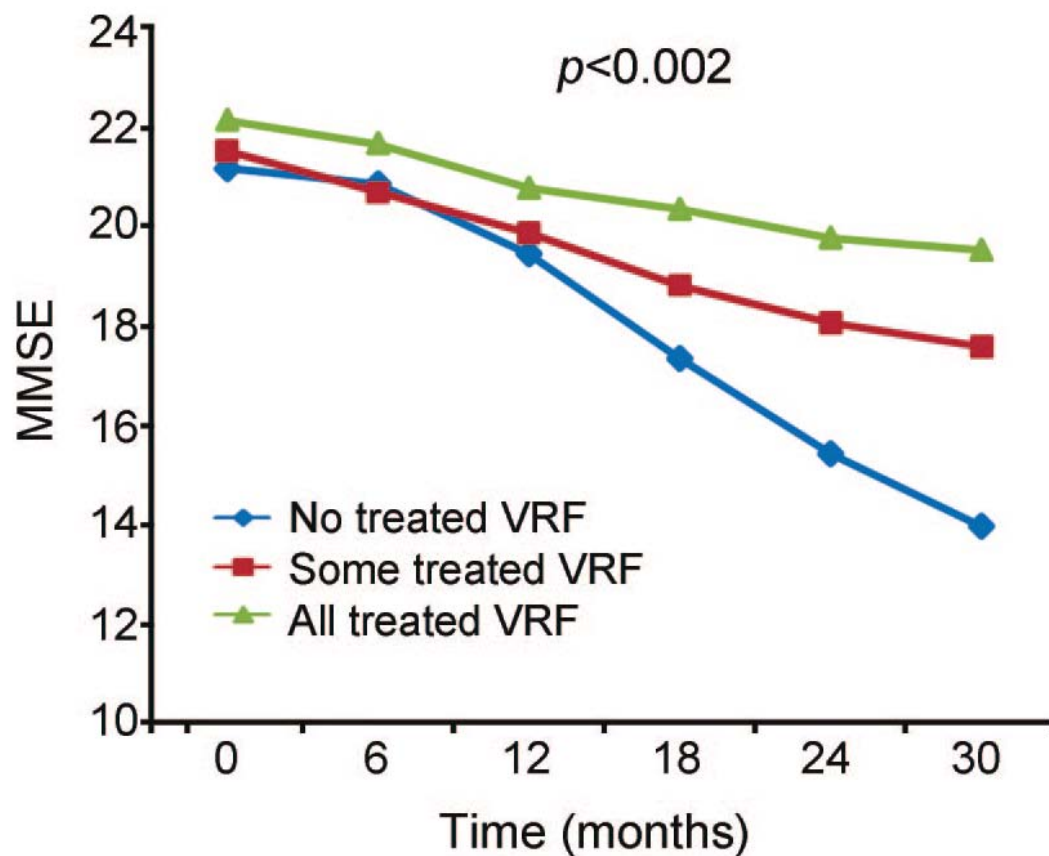


Arch Gen Psychiatry, 2010

More Exercise: More Brain Cells



Treating Vascular Risk Factors Slows Decline in Dementia



Deschaintre et al., Neurology 73:674-80, 2009

Walking 1 Mile a Day...



Reduces Your Risk of Alzheimer's ~50%

Raji C, et al. *Presented at:* RSNA 96th Annual Meeting; Chicago, IL: 2010.

Workshop

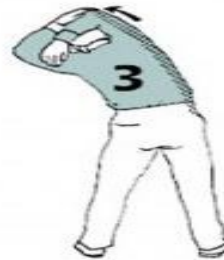
COMPUTER AND DESK STRETCHES



10-20 seconds
2 times



10-15 seconds



8-10 seconds
each side



15-20 seconds



3-5 seconds
3 times



10-12 seconds
each arm



10 seconds



10 seconds



8-10 seconds
each side



8-10 seconds
each side



10-15 seconds
2 times



Shake out hands
8-10 seconds

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Daily Physical Activity

Ask yourself: How much physical activity do you perform each day?



Making Small Changes

Increasing Steps at Work

1. Go for walk at lunch time and on your breaks. Set a reminder on your calendar
2. Replace a coffee break with a brisk 10 minute walk, don't want to go alone, ask a co-worker to go with you
3. Take the stairs instead of the elevator, even if you work in a 3 story building you can take the stairs
4. Find a new restroom, copy machine or water fountain on another floor or even the other side of the floor
5. Get off the bus, subway or train earlier than usual and walk the rest of the way home/work
6. Park your car as far away from your company entrance
7. Try a new walking route from work or home to add variety to your daily walk

Increasing Steps at Home

8. Wake up half an hour early and go for a walk
9. Stand up and march in place or walk around during commercials
10. Pace every time you have a phone call
11. After dinner, take a walk around the neighborhood. Bring your spouse and/or kids, it's a great time to reconnect and bond.
- 12 If you are going to dinner, park far away or leave early and take a longer route to get there
13. Visit and walk local trails, the mall, farmers market or museums.

Accountability



10,000 steps per day

Exercise

‘Time set aside to condition the body’



Ask yourself: How much exercise do you perform weekly?

ACSM Guidelines for Exercise for Healthy Adults

Training Component	Frequency	Intensity	Time (Duration) or Repetitions	Type (Activity)
Cardiorespiratory	>5 or >3 or 3-5	Moderate (40% to <60% VO ² R/HRR) Vigorous (>60% VO ² R/HRR) Combination of moderate and vigorous (40% to <60% VO ² R/HRR; or >60% VO ² R/HRR)	>30 minutes* 20-25 minutes* 20-30 minutes	Aerobic (cardiovascular endurance) activities and weight bearing exercise
Resistance	2-3	60-80% of 1 RM Or RPE= 5 to 6 (0-10 scale) for older adults	2-4 sets of 8-25 repetitions (e.g., 8-12, 10-15, 15-25; depending upon goal)	8-10 exercises that include all major muscle groups (full body or split routine); Muscular strength and endurance, calisthenics, balance, and agility exercise
Flexibility	>2-3	Stretch to the limits of discomfort within the ROM, to the point of mild tightness without discomfort	>4 repetitions per muscle group Static: 15-60 seconds; PNF: hold 6 seconds, then a 10-30 second assisted stretch	All major muscle tendon groups Static, PNF, or dynamic (ballistic may be fine for individuals who participate in ballistic activities)

Finding Motivation/New Mindset

HEALTH BENEFITS OF EXERCISE:

- Lowers blood pressure
- Reduces fatigue
- Improves mood/decreases depression
- Improves attention/alertness
- Lowers risk for heart attack, stroke, and most disease

Exercise Prescription

Majid Fotuhi, MD, PhD
1205 York Road—Suite 18
Lutherville, Maryland 21093
410-494-0191
Fax: 410-494-0259

Name: _____

Date: _____

Exercise

5 days / week for 30-45 minutes

Refills lifetime

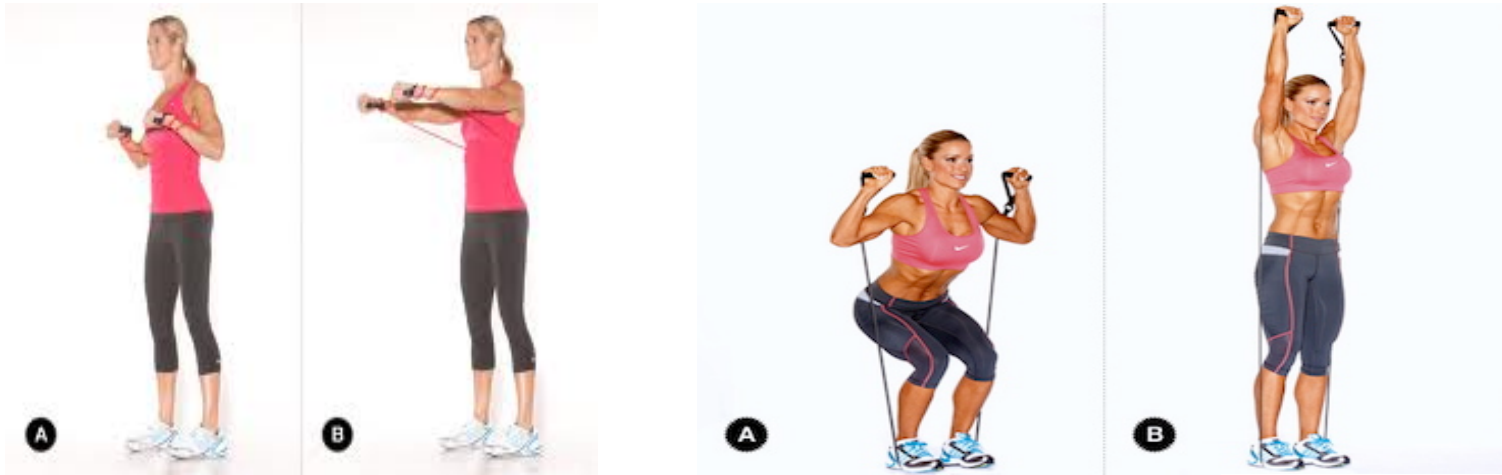
Brand Medically Necessary ☐ Yes ☐ No

Signature *J. Fotuhi* MD

Printed Signature _____

NPI Number 1174573356

In Office Exercises



Final Thought

**DON'T FIND
TIME TO EXERCISE,
MAKE THE
TIME TO EXERCISE.**

"The hardest thing about exercise is to start doing it. Once you are doing exercise regularly, the hardest thing is to stop it." – Erin Gray

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