# Six Steps To Boost Your Memory

Majid Fotuhi, MD PhD Medical Director: NeuroGrow Brain Fitness Center Affiliate Staff: Johns Hopkins Medicine

# My Father: There Is No Limit in What Your Brain Can Do



### Neuroplasticity in the Brain





#### The 6-Step Age-Defying Program

Majid Fotuhi, M.D., PH.D. Director of Center for Memory and Brain Health, Sinai Hospital Assistant Professor, Harvard-MIT Division of Health Sciences and Technology

Introduction and Puzzles Edited by Will Shortz

BOOST BRAIN

Foreword by Michael F. Roizen, M.D. author of the RealAge series

THE NEW ART + SCIENCE BEHIND ENHANCED BRAIN PERFORMANCE

Majid Fotuhi, M.D., Ph.D. with Christina Breda Antoniades



HOW TO PROTECT YOUR BRAIN AGAINST MEMORY LOSS AND ALZHEIMER'S DISEASE

MAJID FOTUHI, M.D., PH.D. Neurology Community Disease Reasonal Center Johns Upplane Usepital



# Objectives

- 1. Basic Anatomy of Memory in the Brain
- 2. Effects of Aging on Your Brain
- 3. Six Ways to Sharpen Your Brain
- 4. Brain Fitness Program

# Cortex: Long-term memory Hippocampus: Short-term memory



# Hippocampus



#### Neurons in Hippocampus



# **Objectives**

- 1. Basic Anatomy of Memory in the Brin
- 2. Effects of Aging on Your Brain
- 3. Six Ways to Sharpen Your Brain
- 4. Brain Fitness Program

With aging, hippocampus and cortex shrink faster than the rest of the brain

- They atrophy by about 0.5% per year after age 50
- With advancing age, we have more difficulty with
  - Memory
  - Sustained attention
  - Processing information quickly

# What Causes Atrophy in the Cortex & Hippocampus?



### Multiple Risk Factors, Much Smaller Cortex & Hippocampus



#### More Depression, Obesity, Stress, and Insomnia, Smaller Hippocampus

Depression<sup>1</sup>



(1) Sheline, (1996). *PNAS*, 93(9);3908-13.

(2) Brain Research, 2009, Pages 186–194



(4) Ho et al; J Clin Neurol. 2012 Jun;8(2):130-8

# More Traumatic Brain Injury (TBI), Smaller Cortex & Hippocampus



# More Football Concussions, Smaller Hippocampus



Singh, JAMA Neurology, 2014

# Objectives

- 1. Basic Anatomy of Memory in the Brain
- 2. Effects of Aging on Your Brain
- 3. Six Ways to Sharpen Your Brain
- 4. Brain Fitness Program

#### The brain has lots of blood vessels



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

# 1. More Exercise, Bigger Hippocampus



#### Three Months of Vigorous Exercise, Bigger Hippocampus

Before Exercise



After Exercise



### 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.

# 2. More Omega-3 Fatty Acids, Bigger Hippocampus



# More Omega-3 Fatty Acids, Bigger Hippocampus



### 3. More Learning, Bigger Hippocampus



Draganski et al. J Neurosci 2006; 26:6314-7

# More Dancing, Bigger Hippocampus



https://www.frontiersin.org/articles/10.3389/fnhum.2017.00305/full

### Learning to Play Golf Grows Your Cortex



Bezzola, Landina 2009

### 4. Better Sleep, Bigger Hippocampus



Canesa, American Journal of Respiratory Medicine, 2011

# 5. More Meditation, Bigger Hippocampus



Holzel, Psychiatric Research, 2011

### 6. Having a "Sense of Purpose in Life" Bigger Hippocampus



# Hippocampus Grows Bigger When You Start Early



# Objectives

- 1. Basic Anatomy of Memory, Attention, and Decision Making
- 2. Effects of Aging on Your Brain
- 3. Six Ways to Sharpen Your Brain
- 4. Brain Fitness Program

#### Brain Fitness Program



#### Brain Fitness Program Twice Weekly (90-minute) Treatments, 12 Weeks

#### Neurofeedback



#### Brain Training



#### **Meditation Training**



#### **Nutrition Counseling**



**Exercise Training** 



Weekly Monitoring



#### Brain Fitness Program



#### **MRI** Results



#### Sustained Benefits



# Brain Fitness Program: Statistical Analysis of 127 Patients with MCI



# Published in Journal of Prevention of Alzheimer's Disease

The Journal of Prevention of Alzheimer's Disease - JPAD©

#### A Personalized 12-week "Brain Fitness Program" for Improving Cognitive Function and Increasing the Volume of Hippocampus in Elderly with Mild Cognitive Impairment

TIME

M. Fotuhi<sup>1,2</sup>, B. Lubinski<sup>1,3</sup>, N. Hausterman<sup>1,4</sup>, T. Riloff<sup>1</sup>, M. Hadadi<sup>5</sup>, C.A. Raji<sup>6</sup>

# You CAN Defy Aging



Stress/anxiety Insomnia Sleep Apnea Obesity/diabetes Depression Concussion



Physical Fitness Quality sleep Brain-healthy Diet Cognitive Stimulation Meditation Sense of Purpose

#### **Brain-Body Connection**



# THANK YOU

