Cognition, Brain Health and Exercise

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We’ve Come a Long Way Baby!

“I take my only exercise acting as a Pallbearer at the funerals of my friends who exercise regularly!”
Mark Twain

“The only way you can hurt the body is not use it.” “Inactivity is the killer and, remember, it's never too late.”
J LaLanne

“Exercise is bunk. If you are healthy, you don’t need it, and if you are sick, you shouldn’t take it.”
Henry Ford

If Exercise were a pill, it would be the most widely prescribed medication EVER!
David Butler, MD
The Brain

- Highly dynamic, constantly reorganizing and malleable across the lifespan
- Continues to generate new cells
- Demands 25% of the blood and nutrients from each heart beat
There is growing consensus that midlife (40 – 60) is a crucial time for addressing dementia risk factors and that many factors such as physical and mental activity likely have an influence across the lifespan.
Normal Cognitive Aging: What should you expect?

- Gradual decline in attention, memory and concentration; similar to balance
- As you age, risk increases
- Mild Cognitive Impairment:
  - Loss of memory, attention and cognition that is more than what would be expected of other people of the same age and education, but does not interfere with activities of daily living
    - 10-20% of people with MCI transition to dementia/year
• Short term memory is like a bookshelf. You put new books (memory) on one side which pushes off the oldest book on the other side.
Prevention of Cognitive Decline: What can you do?

★★★★ Reduce vascular risk in midlife (high blood pressure, diabetes, high cholesterol and obesity all increase risk of dementia)
★★ Increase intellectual activity
★ Eliminate depression
★★★★★★ Regular physical activity
BENEFITS OF PHYSICAL ACTIVITY
IF EXERCISE WERE A PILL....

- Adult-onset asthma (Gly16)
- Ischemic stroke
- Diabetic coronary heart disease
- Total diabetic cardiovascular events
- Colon cancer
- Type 2 diabetes
- Gallstone disease
- Coronary heart disease
- Mortality
- Breast Cancer

% reduction in these conditions by moderate physical activity
And if you’re not convinced

- Walking 72 blocks/week (7 miles) increases gray matter and decreases risk of cognitive impairment 2-fold (Erickson KI et al 2010)

- Any amount of physical activity protects against cognitive decline, but the highest levels protect the most (Sofi F et al 2011)
How does exercise do it?

• Keeps your heart and blood vessels healthy
• Reduces the risk of type 2 diabetes, high blood pressure, high cholesterol and obesity
• Improves mood
• Keeps your muscles and bones strong
How does exercise prevent brain disease and improve brain function?

• Improves the structural integrity of the brain through growth of new neurons and blood vessels
How does exercise work?

- Increased production of neurochemicals that promote growth, differentiation, survival and repair of brain cells
- Improves neurotransmitters that may prevent or slow some neurological disease states
Brain Reserve

- Serves as a protection from disease and degeneration
- Brain needs a rich environment to develop which helps:
  - develop new dendrites that branch and connect to other dendrites
Creating Brain Reserve

- Lifestyle behaviors
  - Physical activity and Exercise (Etgen T et al 2011)
  - Consumption of fatty fish
  - Consumption of green, leafy vegetables
  - Mediterranean diet (Etgen T et al 2011)
  - Moderate alcohol consumption (Etgen T et al 2011)
  - Mental stimulation
    - Computer work + exercise (Geda YE et al, 2012)
  - Socialization
  - Lowering stress
  - Vitamin D
Create Brain Reserve: Engage and Challenge Your Brain

• Passive activities (TV – watching) are not good, especially if eating salty snacks!
• Learn new and novel tasks, especially those you have never done before
  – Square dancing
  – Chess
  – Tai-chi
  – Yoga
  – Sculpture
• It needs to be challenging (HARD vs easy)
Improving Long Term Memory

• Rehearsal, rehearsal, rehearsal
• Short term memory is about 18 seconds without rehearsal
• Attention is what drives short term memory into long term memory
What Kind of Exercise

How Much?
Physical Activity

• Move! Just do it!
• Decrease time spent watching TV.
• Park further away from your destination.
• Take stairs instead of the elevators.
• Take brisk, brief walks several times a day.
• Set easy attainable short-term goals.
  – Increase time spent in moderate-intensity activity by no more than 5% per week to eventual 30-60 min/day.
General Exercise Guidelines

• 150-300 minutes/week of moderately intense exercise
• Or 5000 steps/day
• Make it challenging, mix it up
• Include aerobic, strengthening, balance, flexibility activities
• If its easy – it probably isn’t doing the job
• Include socialization
Aerobic Exercise

- Benefits motor function, thinking speed, auditory and visual attention (Angevaren M et al 2008)
- Intensity needs to be enough to make you breathless
- Minimum of 2x/week – more is better
- Progressive – step up the intensity when it gets easy – remember the brain needs to be challenged!
Resistance Exercise

• A bit equivocal, but……higher intensities seem to promote cognitive benefits – ESPECIALLY in those with objective, mild memory impairment.

  Busse AL et al 2008

  – Improves selective attention  Liu-Ambrose T et al 2010

  – Improves conflict resolution performance  Liu-Ambrose T et al 2010

• Can see benefits in cognition in 1 month  Anderson-Hanley C et al 2010
Resistance exercise

• Combine with aerobic exercise (do on days you don’t do aerobic exercise)
• Needs to be an intensity of HARD
• Major muscle groups (chair sits, lunges, leg press, back exercises such as a plank; chest press, latissimus pull-down
HEALTHY LIFESTYLE = 💡 🧠 🏋️‍♂️
And may you have a healthy brain for all of your days!

Thank You!