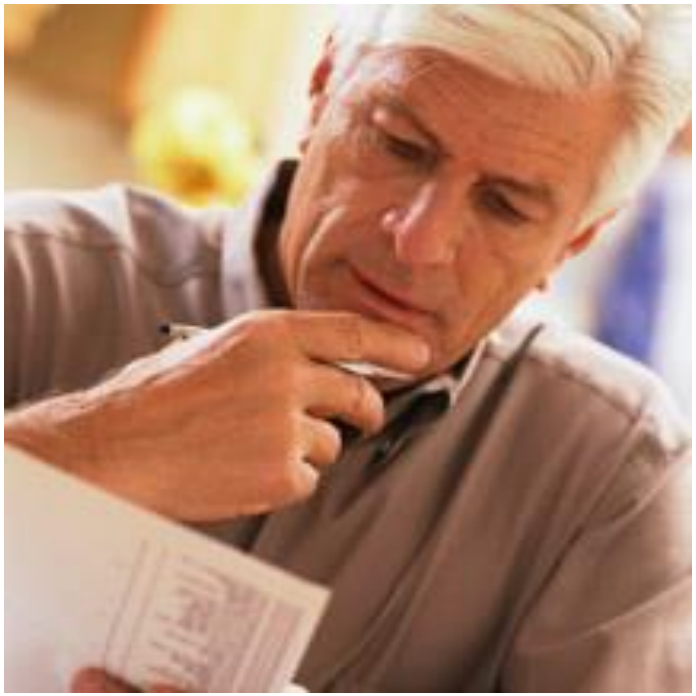
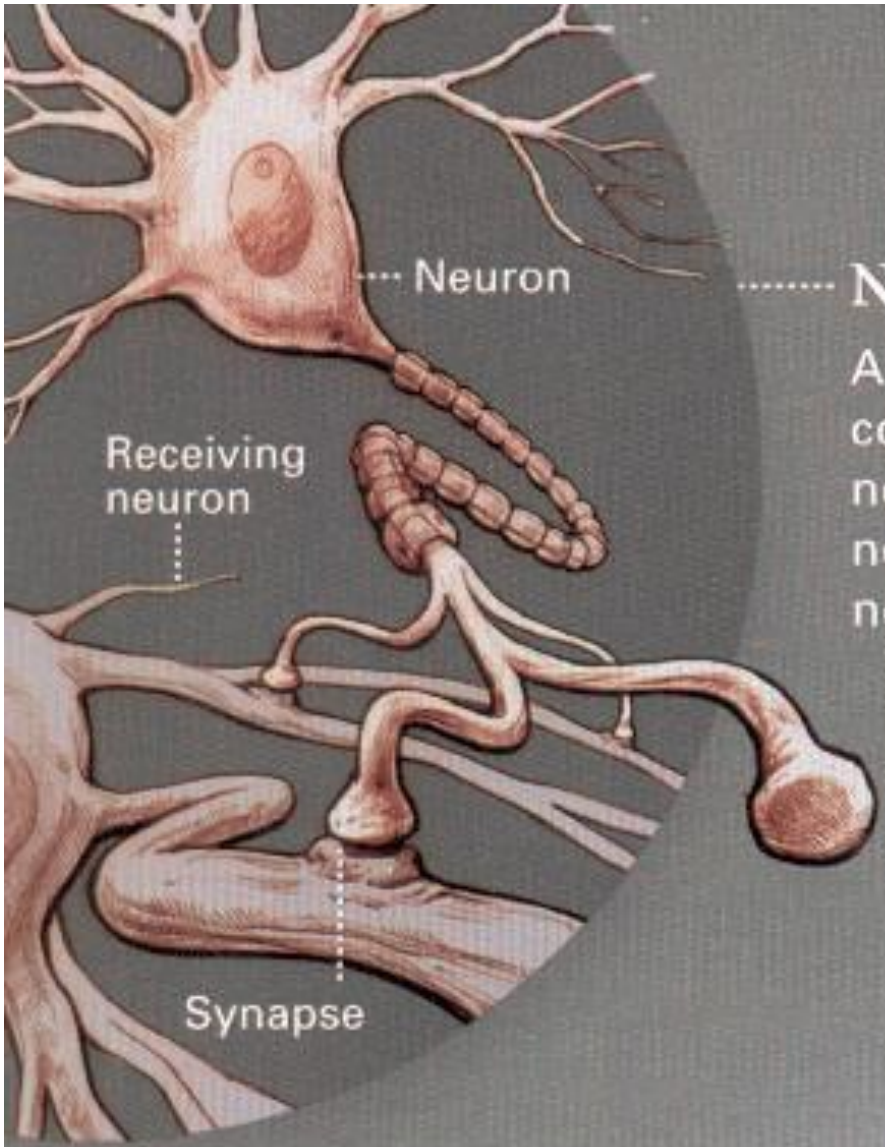
“Assessing and Enhancing Cognitive Performance"



Goals for This Presentation

- **PART 1:**
  - What is cognition? What are risk factors for cognitive decline?
- **PART 2:**
  - How to assess cognitive performance?
- **PART 3**:
  - How to enhance cognition performance and slow cognitive decline?

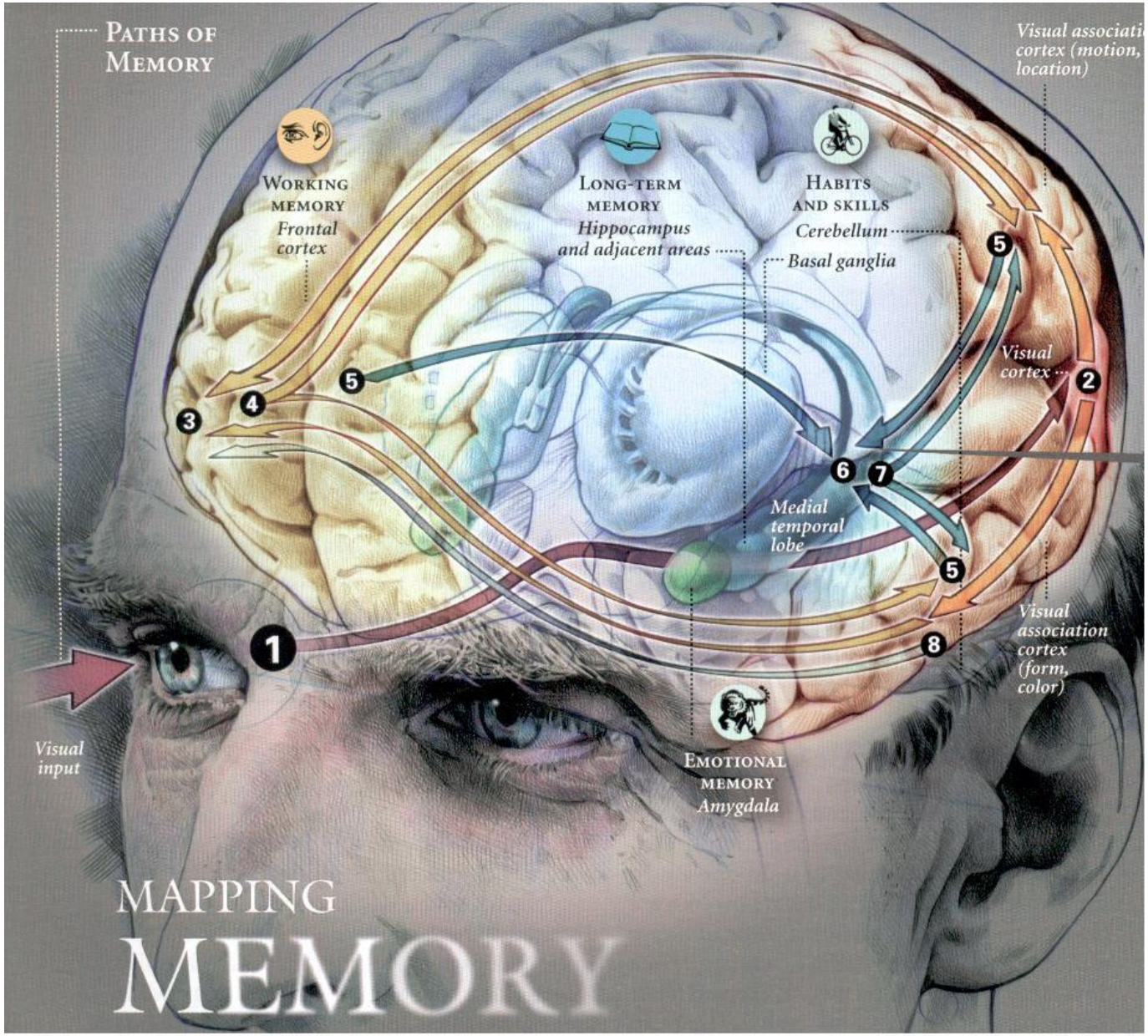


Neurons

A memory is a stored pattern of connections formed by the brain's neurons, or nerve cells. A chemical neurotransmitter released by one neuron signals another. Each point of connection is called a synapse, and the average adult brain holds trillions (right).

What Is Cognition?

- Cognition refers to mental function and is an act of knowing or thinking
- For proper mental function to occur
  - ❑ You need to properly input information
  - ❑ Process the information
  - ❑ Respond appropriately and timely
  - ❑ Remember the activity


PATHS OF MEMORY
Visual associati cortex (motion, location)
WORKING MEMORY
Frontal cortex
LONG-TERM MEMORY
Hippocampus and adjacent areas
HABITS AND SKILLS
Cerebellum
Basal ganglia
Visual cortex
Medial temporal lobe
Visual association cortex (form, color)
Visual input
EMOTIONAL MEMORY
Amygdala
MAPPING
MEMORY

What Happens with Normal Aging?

- Gradual, nearly linear drop in mental speed, reaction time, and cognitive flexibility each decade after age 40, usually peaking between age 30 and 40
- Attention and memory do not change linearly and can be maintained into the 80s or drop rapidly by age 50

What Are the Signs of Accelerated Cognitive Loss?

- Short term memory drops
- Mental speed slows
- Reaction time increases
- The ability to jump from one task to another decreases



Stages of Memory Loss Occur Over 20 Years

- Stage 1: Pre-symptomatic; 5 years. No symptoms, declining cognitive function.
- Stage 2: Subjective Cognitive Impairment; 10 years. More forgetful, but not impaired. Without change, will progress to MCI.
- Stage 3: Mild Cognitive Impairment; 5 years. Modestly impaired. May lose employment.
- Stage 4: Dementia, now disabled with memory loss, no longer able to care for self.

With Long Term Cognitive Decline

- The brain loses brain cells linearly over time
- With Alzheimer's the brain essentially shrinks, something like the way a grape shrinks to a raisin
  - ❑Likely this helps explain why Alzheimer's therapies with nearly 200 Rx have been ineffective to date
    - **So what we need is to be much better at identifying early cognitive decline to make a difference**

Alzheimer's Disease (AD) Is Increasing at Epidemic Rates

- >6 million people have Alzheimer's disease in the USA
- It is the most expensive disease in the western world, US spending now tops $215 billion annually
- The prevalence will increase by ~200% by 2030, double the current rate of AD.
- Globally, >36 million have AD, and by 2050, 115 million will be afflicted, a 320% increase.

Factors Associated with Cognitive Decline

1. **Insulin resistance and diabetes**
2. **Low fitness and Inactivity**
3. **CVD risk factors (carotid IMT is the best marker)**
4. **Nutrient deficiencies, especially B12, folates, Vit D**
5. **Omega-3 fat deficiencies**
6. **Mercury or other heavy metal toxicity**
7. Low thyroid function
8. Depression
9. History of head injuries
10. Inflammation (elevated hs-CRP level)
11. Unique genes that predispose you to nutritional or detoxification problems (ApoE4, methylation defect)

#1 Insulin Resistance

- The combination of eating too many refined carbs with inadequate exercise forces us to produce more insulin to control blood sugar
- Over time, cells become resistant to excess insulin production—they stop listening = insulin resistance
- As shown on functional MRI, when brain cells are insulin resistant, they can't bring glucose into the cell, and they can't use the glucose they have as fuel, causing brain cell dysfunction and decline

What Removes Excess Insulin?

- Excess insulin is dangerous, as it could cause a sudden drop in blood sugar levels when energy wasn't available
- The problem is that the enzyme that removes insulin, is the same enzyme that removes beta amyloid, the sticky-toxic protein that forms on brain cells with Alzheimer's disease
- Therefore, high insulin levels also promote beta amyloid formation on brain cells, causing even more destruction

This is Why Insulin Resistance Is the #1 Cause for Memory Loss and Alzheimer's Disease

- If you want to protect your brain, you must keep your blood sugar regulation well controlled.
- Recent publications by Dr Schilling at NY University outline how preventing insulin resistance would avoid 60% of Alzheimer's disease today Schilling MA. Unraveling Alzheimer's: Making Sense of the Relationship between Diabetes and Alzheimer's Disease. *Journal of Alzheimer's Disease* 2016; 51: 961-977.

Other Causes for Accelerated Cognitive Decline

Brain Function Needs Activity

- Better electrical brain function with a work out daily
- 5-6 workouts per week in your aerobic zone increases cognitive performance more than exercising for 2-3 days per week, substantially
- The best measure of fitness would be testing your VO_2max (MET level)
- Building muscle mass also helps you to prevent memory loss
- The best combination is a mix of aerobic activity 5 days / week and strength training 2-3 days / week

Vitamin B12 Deficiency

- B12 deficiency can cause irreversible neurological injury and memory loss
- B12 deficiency is much more common as people take OTC acid blocking agents regularly
- Many people need not the RDA of 2 ug daily, but 50-1,000 mcg daily meet their needs
- If you have normal B12 levels, randomized trials show that more won't help—the key is avoiding deficient states
  - ❑Don't miss it!

Chronic Stress Results In:

- Decreased cognitive function
- Rise in cortisol
  - ❑Cortisol levels in particular injury the hippocampus
  - ❑Gain in visceral fat mass
  - ❑Elevated blood glucose levels
- Rise in adrenaline (blood pressure & heart rate)
- DHEA levels are depleted

Tips to Proactively Manage Stress

- Get a daily workout
- Get a good night sleep (feel rested)
- Add daily meditation
  - ❑Many are very ineffective at meditation
  - ❑Biofeedback, such as Heart Math, can be very effective in improving meditation benefit

Sources of Brain Toxins

- **Obvious**
  - Tobacco
  - Excess alcohol
  - Pesticides
  - For 20% of people: **GLUTEN**

- **Hidden Toxins**
  - **Mercury** (big mouth fish)
  - **Lead** (buildings built before 1978)
  - **Inorganic Copper** (plumbing and cheap supplements)
  - **Nitrosamines**

30% of Patients at the MOHC Have Elevated Mercury Levels

- Mercury elevations are common
- Usually associated with large mouth fish intake (grouper, tuna, snapper, bass, swordfish)
  - ❑ Most people can tolerate 2-3 servings per month, 1-2 servings of these fish per week cause elevations

Inorganic Copper

- In mice, inorganic copper supplements showed increased beta amyloid production in the brain, plus an elevated rate of Alzheimer's disease vs placebo.
- People with the highest intake of inorganic copper in supplements had 6X the Alzheimer's rate compared to low intake from supplements. (Morris 2006. Arch Neurol 63:1085-88.)
- Cu++ piping in home construction started in the 1960s, at the same time, we saw a big jump in cases of Alzheimer's disease. Now, >90% of homes built after 1970 have copper pipes. Water with pH <6.5 corrode copper pipes, similar to what happened in Flint, Michigan (Dr. George Brewer, MACN)

Nitrosamines

- Nitrosamines are the chemicals they put on most **sandwich meats**, sausage, peperoni, **ham**, and **bacon** to extend their shelf life.
- Associated with > risk for cancer and death
- When injected into mice, they immediately acquired insulin resistance, and showed signs of brain injury. (Tong et al. Nitrosamine exposure causes insulin resistance diseases: relevance to type 2 diabetes mellitus, NASH, and Alzheimer's disease. J Alzheimers Dis 2009; 17:827-44.)
- In humans, strongly associated with neurodegenerative injury
- **ACTION PLAN: Absolutely avoid NITROSAMINES**

PART 2



Assess your cognitive performance

MEASURING YOUR COGNITION

- Symptom testing
  - ❑ Mini-mental status exam testing may be too late a finding to prevent early decline
  - ❑ Cognitive symptom scores utilizing higher function make more sense but are not fully validated
- Computerized testing

Brain Symptom Score

1. Do I lose things often? (keys, pens, cell phone, glasses)
2. Is it harder to find my car in a big parking area?
3. Is it difficult to remember a 7 digit phone number to dial it?
4. Do I find myself writing lists to help my memory more than I used to?
5. Am I forgetting names of movie and sport stars I once knew well?
6. Is it easier to remember an event from 20 years ago than 2 days ago?
7. When reading, do I have to re-read passages because I forgot what I was reading?
8. Am I challenged when I have to learn new things? (software programs, instructions to put together a new barbecue)
9. During a detailed lecture or meeting, does my mind start drifting sooner than it used to?
10. When working on a project, do I find it hard to get back into the groove after being interrupting by a phone call or office visitor?

How'd You Do?

- Here's how to score yourself. If you've answered **yes** to:
  - **None of these questions**: You're doing great!
  - **1-2 questions:** you're fine, but should watch for further cognitive loss
  - **3-4 questions:** This would be concerning. Check with your doctor.
  - **5 or more questions:** Further mental function testing might be necessary.

Beyond the Brain Symptom Score Would Be Objective Measures of Cognitive Performance

Computerized Cognitive Testing

- Originally designed for pharmaceutical studies treating memory loss (end stage) and for brain injury patients
- As the data base has grown, tests can now be used to compare with age cohorts
- The best use is assessing your “best” baseline and measuring yearly or every two years to ensure minimal drop with time

Cognitive Testing typically includes the following domains

The next step will be measuring Complex Information Processing, CIP, which is a direct measure of executive function and a drop in CIP is associated with cognitive decline.

Index Score	
Memory	
	Verbal Memory Test
	Visual Memory Test
Complex Information Processing	
	Symbol Digit Coding
	Stroop Test
	Shifting Attention Test
Effortful Attention	
	Stroop Errors
	Continuous Performance Test
Motor Speed	
	Finger Tapping Test
	Simple Reaction Time

Basic Laboratory Tests to Consider for Reversible Causes of Cognitive Impairment

- Fasting glucose, insulin
- Thyroid function
- Chemistry profile (looking at sodium)
- B_{12} level, hs-CRP
- Mercury level (whole blood or RBC), Lead
- Long chain omega-3 level (RBC)
- Head CT or MRI
- Don’t forget to measure fitness

PART 3



Enhance your cognition performance while preventing cognitive decline: I'll share results from five studies on cognitive function.

Study 1: How Does Seafood Intake Impact Cognitive Function?

Masley, Masley, Gualtieri. Effect of Mercury and Seafood Intake on Cognitive Function. *Integrative Medicine* 2012;11:32-40.

- Reported cognitive benefits from long change omega-3 fats
- Reported cognitive harm from mercury in big mouth fish
- Epidemiologic studies have shown decreased Alzheimer's rates with fish intake, and increased rates with mercury toxicity

STUDY DESIGN, SETTING, SUBJECTS, & MEASUREMENTS:

Masley, Masley, Gualtieri. Effect of Mercury and Seafood Intake on Cognitive Function. *Integrative Medicine* 2012;11:32-40.

- A retrospective, cross-sectional analysis of 384 men and women attending an all-day comprehensive physical evaluation. **(Database now exceeds 1000 subjects)** At their initial evaluation, measurements were made of body composition, cardiovascular status, fitness and diet (including specific types of seafood intake), and laboratory measures, including whole blood mercury. Each subject was tested with a computerized neurocognitive test battery, which is a computerized neurocognitive test battery comprised of seven familiar neuropsychological tests that generate ten independent scores.

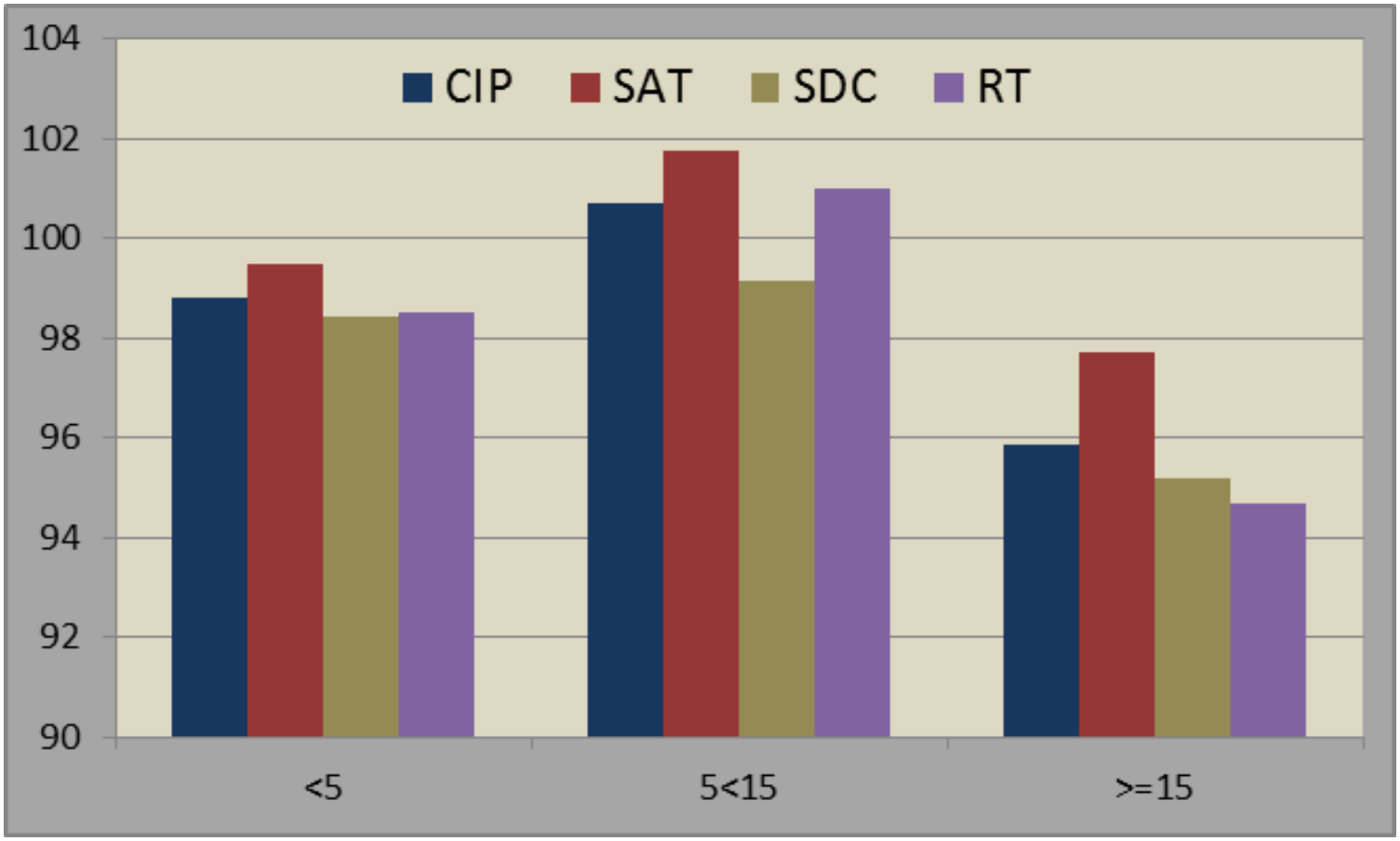
Study Demographics: (I assume my clinic is very similar to other Age Management Practices) for a "first visit".

	ALL	
	Mean	SD
Number	384	
Mercury level	7.2	6.5
AGE	48.2	7.4
%MALE	71.4%	
%WHITE	94.5%	
EDUCATION YEARS	16.8	2.1
COMPUTER EXPERIENCE SCORE	2.8	0.4
N (Men)	274	
Mercury level	7.0	6.4
AGE	48.7	6.8
%WHITE	94.5%	
EDUCATION	16.9	2.1
COMPUTER EXPERIENCE	2.8	0.4
N (Women)	110	
Mercury level	7.8	6.7
AGE	46.9	8.7
%WHITE	94.5%	
EDUCATION YEARS	16.5	2.1
COMPUTER EXPERIENCE SCORE	2.8	0.5

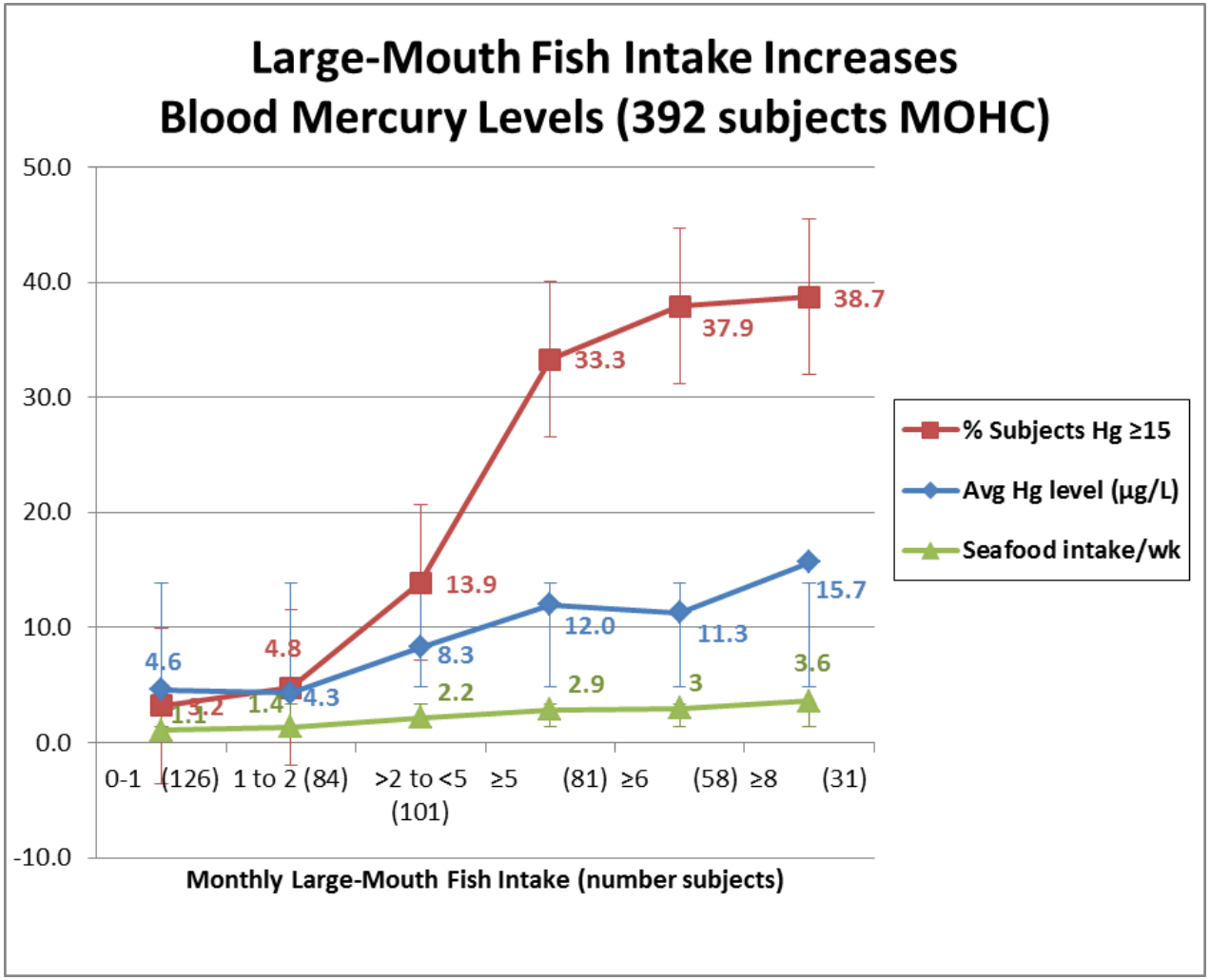
COGNITIVE TEST RESULTS RELATIVE TO LONG CHAIN OMEGA-3 INTAKE AND MERCURY (HG) INTAKE USING MANOVA ANALYSES CONTROLLING FOR COVARIATES: AGE, RACE, GENDER, EDUCATION, COMPUTER FAMILIARITY, AND MOTOR SPEED. Masley, Masley, Gualtieri. Effect of Mercury and Seafood Intake on Cognitive Function. *Integrative Medicine* 2012;11:32-40.

	Long Chain N3FA Intake		Whole Blood Hg Level	
Cognitive Domain Scores:	F	Sig.	F	Sig.
Memory	1.952	.001	.737	.971
Complex Information Processing	4.915	<.001	1.911	<.001
Effortful Attention	1.025	.432	1.256	.075
Complex Reaction Time				
Verbal Memory	2.108	<.001	.715	.981
Visual Memory	.924	.609	.707	.984
Shifting Attention Test	2.310	<001	1.413	.015
Symbol Digit Coding	3.615	<.001	1.453	.009
Response Time	4.206	<.001	1.675	.001
Stroop Test	.802	.807	.861	.824
Choice Performance Test	.992	.489	.980	.547

NORMAL, ELEVATED, AND HIGH WHOLE BLOOD MERCURY LEVELS (µG/L), COMPARED WITH COMPLEX INFORMATION PROCESSING (CIP), SHIFTING ATTENTION TEST (SAT), SIMPLE DIGIT CODING (SDC), AND RESPONSE TIME (RT) SCORES.



Specifically, >4 servings/month of Large Mouth Fish Intake (grouper, tuna, bass, snapper, swordfish, shark) is Strongly Associated with Elevated Mercury Levels



Conclusions regarding seafood and mercury intake:

- Excessive seafood intake, particularly large mouth fish, elevates mercury levels and causes cognitive dysfunction, especially at a mercury ≥15 μg/L.
- Higher N3F3 intake is associated with improved cognitive function, yet N3FA intake from fish exercises a moderating effect that is ultimately overwhelmed by rising mercury levels.
- You should measure whole blood or RBC mercury levels if your patients eat ≥3 large mouth servings per month of big mouth fish, or ≥3 servings of seafood per week of any fish.
- I'd also encourage that you measure long chain omega-3 levels to ensure optimal intake without mercury toxicity.

Study 2: How Do Cardiovascular Biomarkers and Carotid IMT Scores Predict Cognitive Function? Masley, Masley, Gualtieri, Submitted for Publication October 2012

- Multiple cardiovascular risk factors are associated with early cognitive decline.
- Measures of complex information processing provide one of the earliest signs of cognitive decline and appear related to arterial plaque growth.
- The following study will clarify how cardiovascular risk factors and carotid intima media thickness (IMT) scores are associated with cognitive function and complex information processing scores.

Correlation Between Cognition and CVD Biomarkers, 536 subjects

Index= Total Score
Mem=Memory
CIP= Complex Information Processing
EA= Effortful Attention
Mspeed= Motor Speed

(Coefficients as Person Product-moment Correlation)

Two asterisks P < .01.
One asterisk P < 0.05.

Correlations	INDEX	MEM	CIP	EA	MSPEED
AGE	.241**	.130**	.403**	.117**	.250**
RACE	.001	-.019	.023	-.014	-.023
EDUCATION	.013	.008	.037	.015	.016
GENDER	.037	-.018	.015	.024	.020
BMI	-.019	-.026	-.005	-.044	.026
SYSTOLIC BLOOD PRESSURE (BP)	.023	.039	-.078	.005	-.065
DIASTOLIC BP	.036	.038	-.039	.009	.013
WAIST CIRCUMFERENCE (cm)	.013	-.054	.019	.001	.004
BODYFAT PERCENTAGE	-.058	-.047	-.062	-.049	-.075
CAROTID IMT SCORE	-.131**	-.090	-.200**	-.056	-.169**

Correlation Between Cognition and CVD Biomarkers, 536 subjects

Index= Total Score
Mem=Memory
CIP= Complex Information Processing
EA= Effortful Attention
Mspeed= Motor Speed

(Coefficients as Person Product-moment Correlation)

Two asterisks P < .01. One asterisk P < 0.05.

Correlations	INDEX	MEM	CIP	EA	MSPEED
Stress Exercise Treadmill Testing Fitness Markers					
VO2max	.041	.003	.113*	.030	.151**
DIASTOLIC BP CHANGE	-.032	.026	-.063	-.031	-.081
1-MINUTE HEART RATE ↓	-.108*	-.058	-.048	-.094*	-.053
ETT DURATION (minutes)	.001	-.010	.054	-.014	.109*
Nutritional Intake					
Fiber (gm/day)	-.045	-.038	-.120**	.011	-.048
Saturated fat (mg/day)	.039	-.023	.032	.058	.025
Long Chain N3FA (gram/day)	-.083	-.046	-.153**	-.047	-.042
Folate (gram/day)	-.059	-.025	-.087*	-.007	-.051
B12	-.073	-.060	-.118**	-.006	-.123**
VITAMIN D IU	-.080	-.065	-.083	.006	-.069
CAFFEINE	-.007	.010	-.008	-.003	.014
ALCOHOL	.038	.014	.058	.014	.003
Fasting Laboratory Levels					
TOTAL CHOLESTEROL	-.036	-.088	-.006	.018	-.077
LDL cholesterol	-.004	-.066	.011	.033	-.061
TC/HDL ratio	.084	.085	.047	.034	.038
GLUCOSE	-.006	-.014	-.044	-.005	-.053
Homocysteine	.008	-.061	-.014	.025	-.037
HS-CRP	-.024	.007	-.014	-.046	-.021

Conclusion: CVD Biomarkers & Cognition

- **Carotid intima media thickness (IMT) scores are the most sensitive cardiovascular biomarker associated with overall cognitive function and with complex information processing (CIP) and were independent of demographic and other biometric variables**
- Other factors associated with better cognitive function are: aerobic fitness, and nutrient intake (fiber, long chain n-3 fatty acids, B12, mixed folates), and vitamin D was nearly significant

Study 3: The Ten Years Younger Study

Masley, Weaver, Peri, Phillips, EFFICACY OF LIFESTYLE CHANGES IN MODIFYING PRACTICAL MARKERS OF WELLNESS AND AGING. *Altern Therapies.* 2008;14(2):24-29

- Initial published study with 60 subjects randomized to a control group or an intervention group
  - (Over time, seven groups ran through the same protocol, >200 subjects, achieving the same results)
- Subjects were asked to:
  1. **Enhance their dietary intake:**
     - Increase dietary fiber to 30 grams daily,
     - Switch from bad fat to smart fats (not Low Fat)
     - Avoid high glycemic load foods
  2. **Meet their key nutrient needs**
     - Quality multivitamin with adequate vitamin D, mixed folates, B12),
     - Plus magnesium, fish oil, and a probiotic
  3. **Exercise**
     - Aerobically 5 days per week,
     - Strength train 2-3 days per week,
  4. **Schedule 10 minutes of peace** and calm daily
  5. **Avoid Brain toxins:** Mercury and nitrosamines

Cognitive Improvements with the Ten Years Younger Study

	Mental Speed	Reaction Time*	Attention*	Cognitive Flexibility
Control Group at Entry	171	692	8	43
Control Group post 10 Wks (% Improvement)	176 (3%)	666 (3.7%)	8 (0%)	45 (4.6%)
Intervention Group at Entry	176	667	11	44
Intervention post 10 Wks (% Improvement)	183 (4.6%)	637 (4.5%)	6 (45%)	50 (11%)
Intervention Group At Entry, Activity 5+ d/wk	175	681	9.7	39.9
Intervention Group post 10 Wks, Activity 5+ d/wk (% Improvement)	184 (5.1%)	619 (9.1%)	5.4 **(44.3%)**	49.7 (24.6%)

**A decrease in reaction time score and attention score indicates an improvement.*

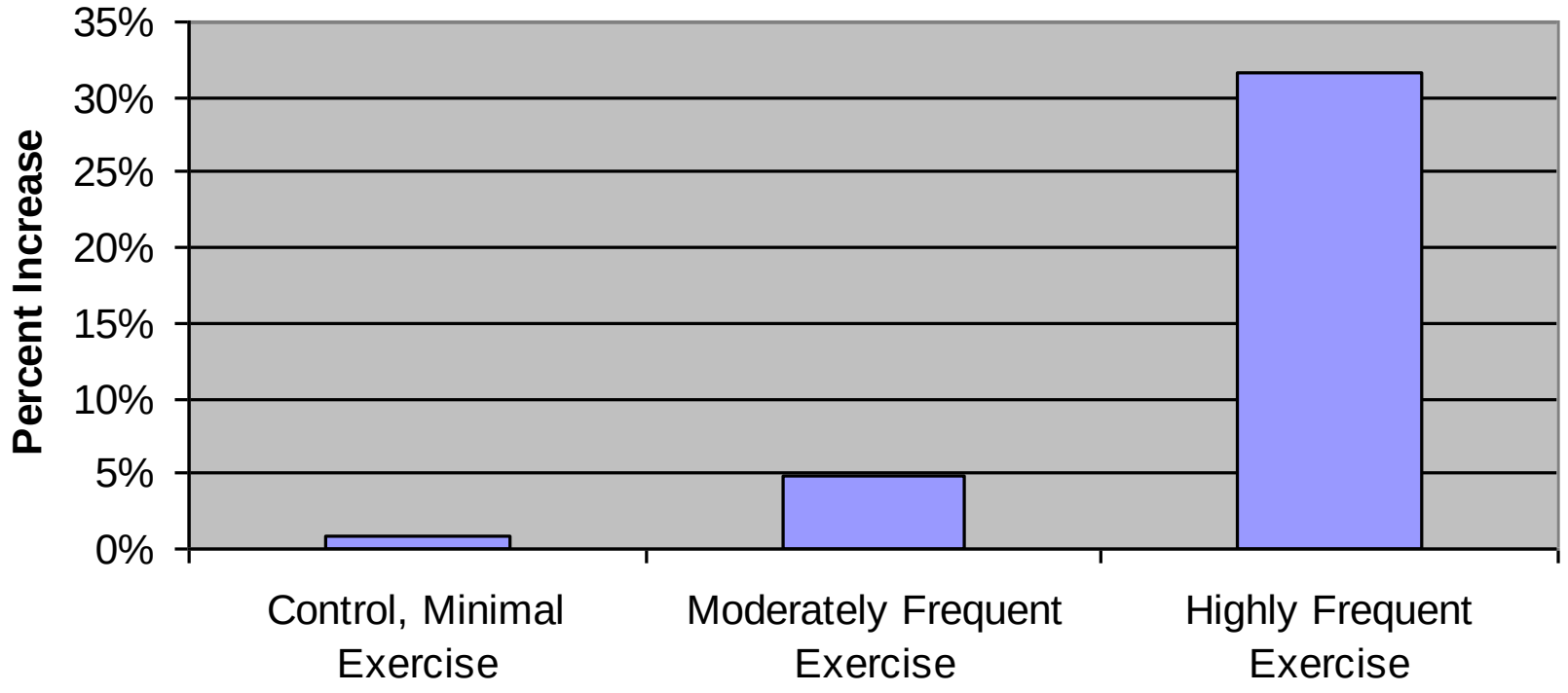
Study 4: Ten Years Younger, Part 2:

- Subjects were 91 healthy adults enrolled in a wellness center. Over a 10-week intervention, controls were aerobically active 0-2 days per week. Half the intervention group was active 3-4 days/week and half 5-7 days/week. Outcome measures included memory, mental speed, reaction time, attention, and cognitive flexibility.

Effects of Exercise upon Changes in Cognition Using Paired t Tests

	CONTROLS		MODERATE EXERCISE Frequency		INTENSE EXERCISE Frequency	
	t	P	t	P	t	P
MEMORY	.940	.359	.442	.662	-2.408	.021
PSYCHOMOTOR SPEED	-1.385	.182	-2.929	.007	-4.432	<.001
REACTION TIME	2.111	.480	.637	.529	4.060	.001
COGNITIVE FLEXIBILITY	-.048	.962	-2.062	.048	-5.197	<.001
ATTENTION	.361	.722	.381	.706	3.577	.001

Percent Increase in Cognitive Flexibility with Increasing Frequency of Aerobic Exercise



Masley SC, Roetzheim R, Gualtieri T. Aerobic Exercise Enhances Cognitive Flexibility. T*he Journal of Clinical Psychology* 2009;16:186-93.

Study 5: Which Lifestyle Factors Predict Cognitive Function? (Masley et al, J Am Coll Nutr Jan 2018)

- After evaluating cognitive function with 100 markers of health in ~ 1000 subjects, the following factors predicted better cognitive performance:
  - ❑Fasting glucose levels
  - ❑Fitness (both aerobic and strength measures)
  - ❑Lower body fat
  - ❑Carotid IMT scores
  - ❑Moderate alcohol intake (largely red wine, and not excessive intake, >3 servings per day)
  - ❑Avoidance of tobacco
  - ❑Nutrient factors noted previously (n-3 fatty acids, B12, mixed folates, fiber, vitamin D)

The Theme Take Home Message from these Five Studies Is This:

- Step 1: Add Fabulous Foods
- Step 2: Meet Essential Brain Nutrients
- Step 3: Get Physical and Mental exercises
- Step 4: Proactive Stress management
- Step 5: Avoid brain toxins
- Combine as many steps as feasible. Individual steps have real but minimal benefits—all combined show dramatic improvements (FINGER trial)

TOP 12 FOODS TO ADD FOR YOUR BRAIN

1. Green leafy vegetables
2. Other colorful vegetables
3. Omega-3 rich seafood
4. Olive oil and other healthy cooking oils
5. Organic berries and cherries
6. Cocoa and dark chocolate
7. Tea and coffee in moderation
8. Red wine in moderation
9. Nuts
10. Spices and herbs
11. Beans (they have a low glycemic load)
12. Probiotic sources

Carbs Are Not the Enemy



- There are good carbs and bad carbs
  - ❑ Everyone agrees that we should eliminate bad carbs from the American diet
- Ensure you get your fiber
- Avoid high glycemic load foods.
  - ❑ For mild cognitive impairment, consider partial carb fasting and avoid medium glycemic load foods

FOODS TO AVOID

- Partially hydrogenated (trans) fats
- Foods that cause your blood sugar levels to rise, especially all "High-Sugar-Load" foods
  - ❑Eat more foods with a low-glycemic-load
    - All fruit except bananas, and all vegetables except potatoes, have a low glycemic load (GL)
    - Others with a low GL: beans, nuts, and protein sources: free-range steak, cage-free, organic poultry and eggs, wild seafood, yogurt
  - ❑Keep medium-sugar-load foods moderate (max 1 cup/meal once per day)
    - Sweet potato, whole grain pasta, quinoa, corn tortilla

FOR 30 DAYS: Avoid ALL Foods with High-Glycemic-Load; to Reset Blood Sugar Control

- Anything made with sugar and/or grain flour (a donut, ice cream, chips, candy bars, cookies, pudding, cakes
- Especially, don't drink beverages with sugar (soda, sweet tea, diet sodas)
- Avoid baked potatoes, mashed potatoes, rice, white pasta, cereal; whole grain bread, crackers, granola

Meet Your Essential Nutrient Needs

- Vitamin D (at least 2000 IU daily), aim for a level ~ 50
- Long chain omega-3 fats,,,, commonly called fish oil (3 servings of omega-3 rich fish, or 1 gram of high-quality fish oil daily)
- A probiotic source (initially 25-50 billion per day); long term at least 5 billion per day
- Magnesium (at least 400 mg daily, preferably a protein bound source, not magnesium oxide)
  - ❑Magnesium L-threonate may have special benefit in crossing the blood-brain barrier
- And don't forget, a good quality multivitamin with mixed folates, adequate vitamin B12, and chromium

Summary

- Make sure you have normal blood sugar and insulin regulation
- Avoid causes of accelerated cognitive decline (Insulin resistance, inactivity, nutrient deficiencies, excess intake: Hg, Cu-2, nitrosamines)
- Assess cognitive performance over time—don't wait until mild cognitive impairment has occurred
- Add foods and activities that improve cognitive performance, starting today

Thank You

- For further questions
  - Visit www.DrMasley.com
  - Contact steven@DrMasley.com

MCT Oil for Your Brain?

- People who do not have the APO E4 gene, with mild cognitive impairment, benefit short term from adding 20 grams of MCT oil daily
- Side effect for some is loose stools (diaper pants)
  - ❑Start with 10 grams daily and gradually increase
- Considering fasting for 12-15 hours with MCT oil in the am to boost ketosis
- So far, only shown to help those with early impairment

Curcumin

- Potent anti-inflammatory agent, with benefits for arthralgias and DJD, lowering hs-CPR levels
- Being studied for cancer prevention and adjunct cancer Rx (MD Anderson)
- Being studied for dementia and cognitive decline (UCLA and Colombia University)
- The challenge is obtaining an adequate dosage and having it absorbed (Turmeric curcumin absorption is typically only 2%)

Curcumin for Cognition

- Dr. Katherine Cox, Australian team, randomized 60 healthy adults to 400 mg of well-absorbed curcumin or a placebo
- After only 3 hours, and after 4 weeks, the Rx group receiving curcumin showed improvements in cognitive function.
- Other human studies have shown that curcumin decreased beta amyloid levels, and in mice, enhanced hippocampal neurogenesis, resulting in increased brain size

Mixed results with Curcumin

- Not all the results to date have been favorable, as one 48-week study using a poorly absorbed form of curcumin showed no cognitive benefit, and 21% of the 36 subjects dropped out due to GI side effects
- This emphasizes that curcumin quality really matters
- Aim for 500 to 1000 mg daily