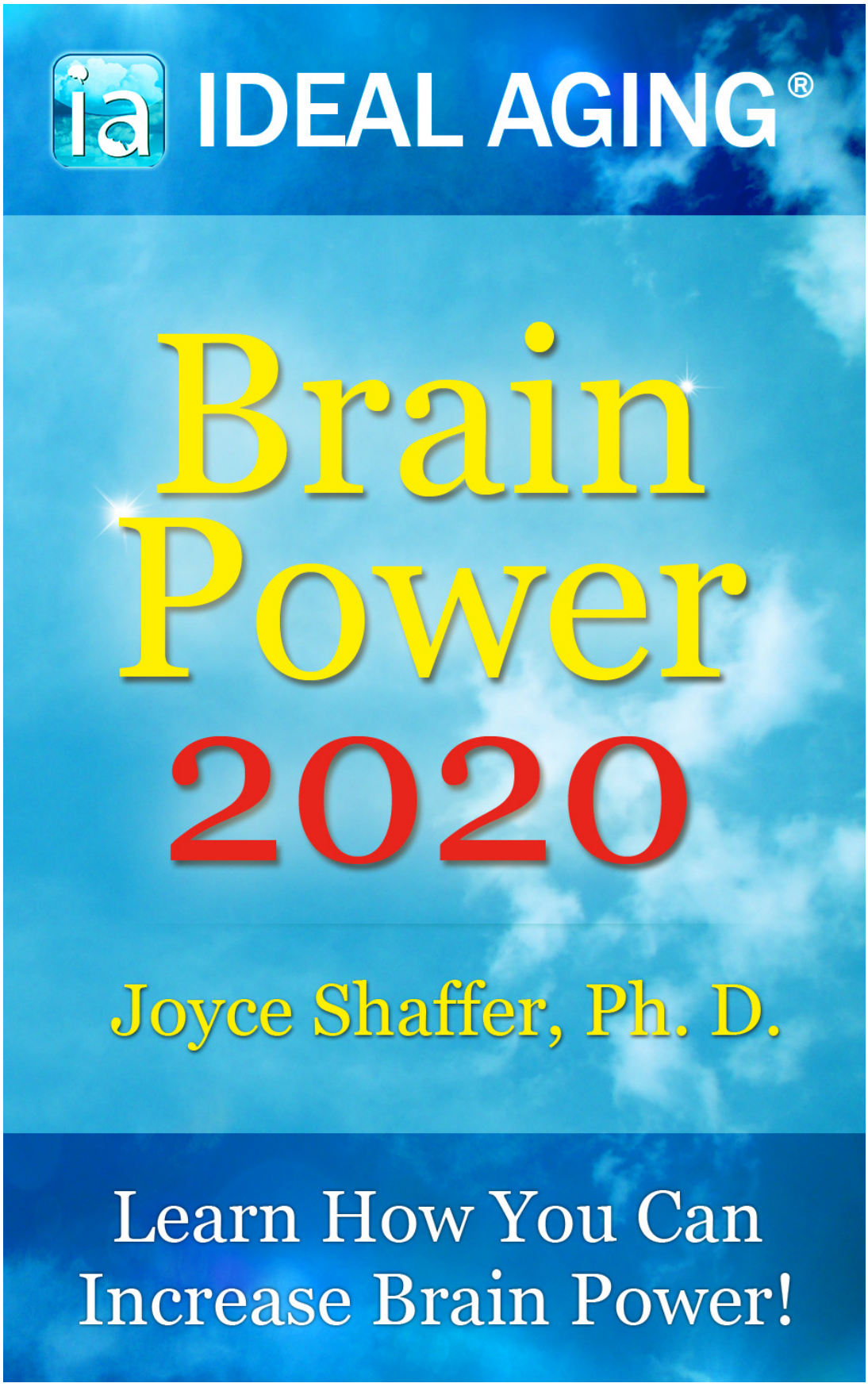

IDEAL AGING: BRAIN POWER 2020

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In other words:
Don't do as I do.
Don't do as I say.
Use science and your healthcare provider to determine YOUR own way.

Brain Power 2020

Forward

Increasing human intelligence is referred to as the Flynn effect (Flynn, 1984; 1987). It has been documented in several countries.

At the very least that can be considered evidence of environmental influence on how our brains perform. It raises many questions.

Is there a limit to how much we can increase our intelligence? This eBook series has several goals.

It is a serious effort to share evolving neuroscience that addresses that topic. That will include cutting edge science as well as groundbreaking science that gave us a foundation to build on.

It is an invitation to you to use this science along with wise counsel from your healthcare provider AND your own best judgment about how to set your unique strategic plan to increase your brain power. It's a suggestion that you surround yourself with as many people as possible that share this commitment to an evolving personal best. It's a wish that you pursue these efforts with joy and celebration!

It's an offer to keep you updated through my blog on IdealAging.com. Last but not least it only the beginning of sharing my passion for this topic through answering questions addressed to me through that website.

"Do not fear to be eccentric in opinion,
for every opinion now accepted was once eccentric."
Bertrand Russell, philosopher, mathematician,
Nobel laureate (1872-1970)

Be a stranger in your own land. Confuse them with boldness.

This is my only guarantee: We can continue to learn something new from evolving neuroscience. That can include learning how to increase brain power; it can also include learning how to work smarter; and using this science in your own life in ways that increase your happiness could also purchase improved general health. Improving your brain power and general health is likely to also improve your economic situation as well as your quality of life.

Let's set the stage with research that caused a paradigm shift.

It was awe at first sight as she strode toward me in my seat of an otherwise vacant front row. She, an elegant version of Marilyn Monroe in business blue, and the gent with her who also looked like a movie star, studied me (in jeans and t-shirt) with barely perceptible confusion and amusement but didn't hesitate to sit at my elbow.

Fortunately, I'd failed to see the sign "Reserved for Presenters." It was incredibly more fortunate that I was gifted at that Washington State Psychological Association convention in the mid-1980s with the knowledge, perspective and wisdom of this woman who has played a pivotal role in moving brain research to a whole new level.

The elegant gent, who I later learned is her husband, agreed with me that she is brilliant beyond belief.

That is how Marian Diamond forged my commitment to use neuroplasticity in all personal and clinical endeavors from that day forward. Neuroplasticity is the capacity of your brain to change in positive and negative directions for better or for worse. Diamond did prove that the rats with the most toys actually do win in measurable, significant and positive changes in brain architecture and performance. When afforded an enriched environment these brain gains were found even in elderly rats. She has frequently written about her belief that similar increases in brain power are possible in humans at any age. Her book, *Enrich Heredity* (1988) provides more scientific data for the scientists among my readers.

We need to embrace the recommendation of Thomas Insel, MD, our Director of NIMH (White, 2011). He advocates for mental health interventions that use neuroplasticity to "revolutionize" diagnosis and treatment of mental health issues in the twenty-first century. The goal of this writing is to explore new neuroscience that can empower you to make informed decisions about how you influence your neuroplasticity in ways that might help you enrich your heredity.

What is Brain Power 2020?

Clarity.

Brain power 2020 is seeing clearly; remembering more; better judgment; making the best decisions; thinking quickly; continually enjoying increasingly complicated new learning; being so happy in your mission and purpose that time evaporates; celebrating progress; and using your knowledge with such efficiency that your personal best keeps evolving to be even better across time. It's thinking fast on the go so you simply get more out of life. It's the laughter, real, shared or simulated (Mora-Ripoll, 2011) that promotes and celebrates health.

It's mastering the balance between independence and interdependence so that the bulk of your time is enjoyed in the midst of a supportive crowd that thrives on being the wind beneath each other's wings. It is juice! It results in you feeling better about yourself; having better energy; and looking forward with confidence to the next bend in your life's highway.

And what if an unexpected blow to your basic being seems to have altered life as you know it? Consider the case of Jill Bolte Taylor, PhD.

Her postdoctoral training at Harvard as a neuroanatomist gave her exceptional acuity in observing her own brain functions as they shut down when she suffered a stroke on December 10, 1996. She was invited to speak at the TED (Technology, Entertainment, Design) 2008 conference on her personal story and an idea that's capable of changing the world. This talk is so valuable, awe inspiring and engaging that it has been viewed about ten million times. Until you get a chance to see that remarkable video at TED.com, here are a few quotes of awe and passion from that talk by Dr. Jill:

"I realized, 'Oh, my gosh! I'm having a stroke! I'm having a stroke!'
The next thing my brain says to me is, 'Wow! This is so cool!
How many brain scientists have the opportunity
to study their own brain from the inside out?'"

"Then it crosses my mind,
'But I'm a very busy woman! I don't have time for a stroke!'"

"In the course of four hours,
I watched my brain completely deteriorate in its ability to process all information.
On the morning of the hemorrhage,
I could not walk, talk, read, write or recall any of my life.
I essentially became an infant in a woman's body."

When she could finally mobilize herself to call for help, she couldn't remember the phone number of her office, had trouble recognizing the business card that had that number on it, lost her place while dialing the phone, couldn't remember which numbers she had already dialed, eventually got the number dialed after 45 minutes of struggling, couldn't understand the voice that answered and couldn't say anything she could understand. Somehow someone sent help.

Major brain surgery to remove the clot, extensive rehabilitation and eight years of effort helped her recover her capacity to walk, sing and talk. With her recovery, energy and advocacy for the possibility of rebuilding brain power after brain injury, it is deliciously fitting that she was chosen by TIME Magazine as one of the 100 Most Influential People in the World for 2008. She's the author of the 2008 New York Times bestselling memoir *My Stroke of Insight: A Brain Scientist's Personal Journey*.

In essence, then, brain power 2020 is multifaceted. Sometimes it's those extraordinary moments of clarity when you celebrate that you know what you know and that it serves you exceedingly well. Sometimes it's the "genius" that comes with 10,000 hours of focused effort it can take to excel (Gladwell, 2011).

"I've missed more than 9000 shots in my career.
I've lost almost 300 games.
26 times, I've been trusted to take the game winning shot...and missed.
I've failed over and over and over again in my life.
And that is why I succeed."

Michael Jordan

Sometimes it's the capacity to rebuild a battered brain to an astonishing level of recovery that might be even better than pre-insult. All things considered, I believe we haven't seen anything yet in terms of brain power. The goals of this and subsequent writings will include translating new neuroscience that you might want to apply in to your own unique strategic plan for increasing your brain power. It is not unusual after

one of my speeches for someone in an audience to say, “You’ve just added 10 years to my life!” They then explain the new ways that they will build a better brain.

Why Do *You* Want Brain Power 2020?

You want it because you want to play harder, work smarter, remember more, make better decisions faster, love longer, laugh and keep up with the best of them. No one enjoys “senior moments,” stumbling to find the right words, or realizing too late that you made a worse decision that you would have if your brain was turbocharged. Nobody wants to suffer the indignity of being the person who ages the least gracefully.

You want brain power 2020 because, even when you are enjoying your personal best performance, you can look forward to an upward trend of success as a result of doing what it takes to increase your brain power. You want it because you want to win more deals, influence more people to excel with you and play an active role in making our world a better place. In essence, you do want to get more life out of life *at any age* … because maybe you can.

When I look back on the longest bicycle ride I ever did, I think that must have required that quality of brain power at the same time that it built it for some participants. I was one of 247 riders that pedaled for an entire year with the Odyssey 2000 (O2K) bicycle trek in 45 countries on 6 continents. Without question that was the most stunning AND strenuous year of my life! It included enough complicated new learning to be a serious stretch for my brain. Years later most of the O2K riders are like a supportive and happy family.

How Do You Get Brain Power 2020?

This is where the fun begins because you have so many options! That’s the best news.

The other news is that change is inevitable. To influence yours in the positive direction will either take work or play, depending on how you envision it.

I’m looking for the name of the famous person who said: “You could either say I’m a workaholic or you could say I never worked a day in my life.” The first person to identify the source of that quote gets a copy of the eBook of their choice from the eBooks in this series. In the interim, rest assured that my mission is to 1) help you identify the changes that can have the most return on your investment of time, energy and effort AND 2) to attempt to fashion these changes in ways that generate the most happiness.

Will it be easy? Probably not!

If it were easy, you would most likely be doing it already. But we can consult on how you can begin to see it as the greatest gift you can give to yourself and to those you love. By inviting friends and family to join you in a shared effort to increase the brain power of our people one person at a time, it can be comforting to have others

help you remember: the factor that separates those outliers who far exceed the performance of others is time on task … about 10,000 hours of time on task for some tasks.

Jump in. Fasten your seat belt. Enjoy the wild and raucous ride for aging with grace and joy.

Aerobics

Shall we dance? Absolutely!

Why? Because dancing can give you the best of at least two worlds: aerobics and neurobics.

The word "neurobic" was coined by Lawrence Katz & Manning Rubin (1999) to capture the concept of giving your brain cells, neurons, a workout of the same vigor and intensity that is required to maintain an aerobic pace. Their book, *Keep Your Brain Alive*, is worth owning. The illustrations are priceless. The information is empowering.

"Just as ideal forms of physical exercise
emphasize using many *different muscle groups*
to enhance coordination and flexibility,
the ideal brain exercises involve
activating many *different brain areas* in novel ways
to increase the range of mental motion."
Katz & Rubin in *Keep Your Brain Alive*

In his use of this term Dr. Katz encourages activities that combine multiple senses in novel ways. To the usual list of senses – sight, sound, touch, taste and smell – he adds emotions as a sixth sense. He believed that episodically changing your path to work and to home as well as modifying your ways of doing things would forge new connections in your brain that would serve you well across time.

Learning to dance qualifies as a neurobic when it requires you to learn something new. It could give your brain cells a vigorous workout whether you dance alone or along with a mate.

Perhaps the best brain power impact of dancing comes from being aerobic. You've heard a great deal about how much aerobics can improve your heart health. Much more exciting to me are the many ways aerobics improve brain health.

Just for starters aerobics help refute the myth that "it's all downhill after" a certain age. An increasing number of scientists are recommending that regular aerobic activity is the prescription of choice for preventing, slowing and reversing the so-called "normal course of aging," meaning decline.

After only six months of aerobic activity, women with mild cognitive losses had improved executive function (Baker et al, 2010). These included executive control processes of multitasking, cognitive flexibility, information processing efficiency, and selective attention.

Fortunately, they maintained the aerobic pace on cardio machines since the study took place in Seattle where the sun can seem like a foreign visitor, blind the eyes of the unaccustomed or even send them to the malls or to the mountains.

Numerous other studies have found improved brain function associated with increased brain volume after aerobic exercise (Erickson et al, 2009; 2010; 2011; Flicker et al, 2010). That is particularly significant in light of the "normal" atrophy that is observed in the human brain with aging.

I've had a long career as an expert in medical and psychiatric matters for court systems. Expert witnesses serve the trier of fact on issues that go beyond the expertise of the court. In my role as court expert it has often been necessary to testify about noninvasive brain studies. It is no comfort to the listener to hear that the patient's brain "shows the normal atrophy of aging."

My passion for sharing new neuroscience with you is fueled in part by the hope that we can increase our use of evidence-based interventions that make brain atrophy with aging a relic of the past. My goal is to influence a revolution in human habits to increase human brain power across the ages.

It is significant that these researchers found increased brain volume with aerobic exercise. Perhaps it is more noteworthy that they also report the gains in brain volume are associated with an array of improved cognitive skills.

The important point is that many studies support prescribing regular and intense aerobic exercise for preventing, slowing and potentially reversing the "normal course of aging." One hope fueling my passion is to do away with "senior moments." Aerobic exercise is a non-pharm prescription with so many positive side effects that I'll cover it in detail in a later eBooks in this series. Also, check for frequent updates on my blog on IdealAging.com. Stay tuned.

Stress Mastery

Meanwhile, let's get back to the non-pharm. There are several ways to reduce depression and protect your precious brain cells from the ravages of the chemistry of stress. Stress Mastery will also be a separate writing in this series because the choices are many, invaluable and varied. Certainly reducing depression is a top priority. Duration of depression is more powerful than age in predicting loss of volume in the human hippocampus, the part of your brain that is associated with learning and memory (Sheline et al, 1999).

"My Friend, you were right about aerobic exercise!
At first, I had to force myself past grief and low energy to even get on the trainer.
Then the saddle chafed so much I thought I
just couldn't stay there no matter what!
By force of will alone, I began to pedal.

But … around ten minutes,
it was like – I could see clearly
now that the sun was gonna come up.

THEN … around twenty-two minutes the sun did come up.
I felt so much better that I knew I could make it to the goal of thirty minutes.

AND THEN … as I was finishing the thirty minutes,
I remembered that you said staying to forty was sometimes even better.
So I stayed. At forty minutes it was like the SUN was GLORIOUS!

A verbatim quote from a recent convert to the value of aerobic activity in changing the chemistry of grief.

Aerobic exercise is at the top of the anti-depressant list. Humans create the chemistry of fight or flight to contend with REAL threat to life or limb. That is adaptive when it enhances your run for your life if your life depends on it.

Most of the time, however, you probably use good conflict-resolving and/or problem solving skills and/or superior PR skills … and then get back to the task at hand. Even if that was good judgment, superior time management and excellent personal relationship skills, it can leave your chemistry ready for the run of your life. That's one of many reasons that wise business owners have a cardio machine readily available and reward employees for using it.

Since telomere length is considered a form of measuring biological aging as well as a correlate of severe stress, Epel and associates (2012) looked at the relationship between telomere length and their participants' pattern of staying present as compared to letting their mind wander. Shorter telomeres were found in women who experienced a lot of mind wandering than was true of women who reported low mind wandering. This was the case in spite of level of stress. These researchers suggest that a healthier biochemistry and better cell longevity may result from maintaining attention on the present. Being mindful and attentive to the present moment are components of meditation that has been associated with improvements in mental, emotional and physical health.

"The secret of health for both mind and body
is not to mourn for the past,
worry about the future, or anticipate troubles
but to live in the present moment wisely and earnestly."

Buddha

A recent study was the first to find brain changes in emotional processing outside the meditative state in participants that had been trained in a specific type of meditation (Desbordes et al, 2012). These changes were evident in the amygdala, a brain part that is important for emotion and memory. Individuals with no previous experience in meditation participated for 8 weeks in either compassion meditation or mindful attention meditation. People in the control group spent 8 weeks in a health education course.

Functional magnetic resonance imaging (fMRI) scans were done while participants viewed visual images that were emotionally positive, negative or neutral. Anxiety and depression were also assessed. Right amygdala response decreased to all images after training in mindful attention training.

Compassion meditation training also decreased right amygdala activity in response to positive or neutral images while it tended to increase with negative images of human suffering. Interestingly, the increased amygdala response also correlated with lower depression scores in the group that practiced compassion meditation. Thus, greater compassion for others might be mutually beneficial.

In any case, beneficial changes in brain function can result from meditation. These benefits can endure, they might be apparent even outside the meditative state, and this could be especially true of emotional processing.

For all of the information on the hazards of time on screen, research by Veerman and colleagues (2012) might be the most metric. They found that people whose life pattern includes watching TV 6 hours a day can expect to survive 4.8 years less than people that do not watch TV. They reckon that "every single hour of TV viewed after the age of 25 reduces the viewer's life expectancy by 21.8 minutes! They conclude that time viewing TV may be comparable to other major chronic disease factors such as obesity and inactivity in risk of loss of life. Of course, this was research done down under in Australia. All things considered, that might leave Americans at even greater risk for lifespans shortened by time on screen. This study did not factor in time spent on computer screens. There are both cautionary and encouraging findings in the realm of computer use. More on that shortly

Although a time of stress is prime time to do some type of aerobic activity to work off that chemistry, get the antidepressant chemicals aerobics produce and probably improve your sleep, timing is a factor. The changes described in the quote above imply that earlier in the day would be preferable so you can enjoy those benefits during your waking hours.

The Perfect Sleep

Speaking of sleep, let's talk about amount and quality of sleep that is best in order to increase your brain power. There are several ways to determine that. How much sleep are you getting now? How quickly do you go to sleep when you go to bed? How rested do you feel on awakening? How rested do you feel during the day?

Research suggests that about seven hours of sleep is essential for good overall health. Quality of sleep is as important as quantity. Sleep is so important to your brain power that there will be a separate eBook in this series just on this topic because I want to help you get the best from your rest. To be continued …

Until then, you might want to start by answering the questions above, measuring your hours of sleep, estimating the quality of your sleep, establishing a bedtime routine that can give you a habit of going to sleep quickly and soundly, avoiding stimulants AND doing your aerobic exercises several hours before you go to bed. The reasons for that last suggestion are at least twofold: aerobic exercise creates a "sleep debt" so you are more likely to sleep soundly; however, it also elevates your core body temperature which will interfere with your sleep if done to close to the time you go to bed. Sleep well and happy dreams.

Happiness

Happiness might be the most portable and easily shared non-pharm way to increase brain power. Twenty-four/seven you can bring a smile to your face that can be contagious in your community. That's behind my motivation described earlier to help you enjoy playing at (rather than working at) the changes you choose.

Research is helping identify choices aimed specifically on increasing happiness. By keeping a list of positive experiences and sharing them with close friends, happiness increased, especially when the listener responded with enthusiastic support (Lambert et al, 2012). Positive psychologists have found that some techniques were associated with happiness (Seligman et al, 2005) that endured for as long as six months. One technique was the bedtime routine of making a list of three good things that happened that day. Another is using your signature strengths in a new way. Gratitude letters increased happiness that lasted for a month. Even simulated laughter could have health benefits (Mora-Ripoll, 2011). Spontaneous or planned laughter sessions can be added to your list of healthy behaviors.

"Three things in human life are important.
The first is to be kind.
The second is to be kind.
The third is to be kind."

Henry James

One of my earliest workshops was on loneliness. It filled to standing room only inside the room. The lonely crowd flowed out into the hallways. The large number of people suffering from loneliness is a public health concern because of the associated greater risk of health problems. Wrosch and colleagues (2012) measured cortisol, a stress chemical that can damage cells, and C-reactive protein (CRP), a measure of inflammation, before and after teaching senior citizens ways of changing negative thoughts to a positive perspective. This intervention reduced cortisol measures. Four years later the CRP in these seniors was improved. Since many health issues such as cardiovascular disease, hypertension, diabetes and dementia are associated with inflammation and stress, that reduction in CRP can also include a significant improvement in quality of life.

Cocoa and Other Brain Foods

This rich topic deserves a writing of its own. It will be one of the eBooks in this series.

There's good research support for considering other oral intake in addition to fruits and vegetables. Cocoa is one of my favorites. In a dose-dependent way it has shown increased blood supply through the brachial artery. If that were its only benefit that could bring more essential nutrients to your hungry brain. To be continued.

Studies in healthy humans (Narendran et al, 2012) supplemented with omega-3 that contained 750 mg per day of docosahexaenonic acid (DHA) and 930 mg per

day of eicosapentaenoic acid (EPA). Working memory improvements after six months of supplementation were significant.

Calorie restriction that includes good nutrition has shown significant gains in many lower animals. Anderson & Weindruch (2012) conclude that "the take-home message from" calorie restriction research is: "the rate of aging can be manipulated." With calorie restriction and good nutrition, animals remain "younger longer" with less disease, less adiposity, better regulation of insulin and glucose, and continued good functioning of mitochondria (little energy factories in cells). How this relates to humans cannot be answered with the current research. Meanwhile, staying active and eating wisely so that you balance energy in with energy out is one of many efforts necessary to improve and maintain health.

It also means choosing foods wisely. The fast-food egg, cheese, bacon, high-fat and high salt breakfast available at the drive through has already been highlighted as bad for long term health. More recently research found 15 to 20 percent decreased blood flow within two hours of eating this type of meal according to Todd Anderson addressing the Canadian Cardiovascular Congress.

Better to have healthy meals at home in the company of happy family members as part of a routine to avoid obesity that includes getting good quality of sleep and limiting screen time (Taveras et al, 2012). Fat cells increase inflammation that can influence much of your body. Inflammation is bad for brain function and is a risk factor for dementia.

Etc.

Combining healthy behaviors could be the most powerful influence on successful aging (Sabia et al, 2012). Their list of healthy behaviors includes never smoking, moderate alcohol consumption, being physically active and daily consumption of fruits and vegetables. Their 5100 participants aged 42 to 63 years had no evidence of cancer, coronary artery disease or stroke at the beginning of the study.

After approximately 16 years, 953 had aged successfully. This included good functioning on cognitive, physical, respiratory and cardiovascular measures along with no disability, mental health problems or chronic disease (coronary artery disease, cancer, stroke or diabetes). It is noteworthy that individuals that engaged in all four healthy behaviors had 3.3 times greater likelihood of successful aging compared to people who did none of these healthy behaviors.

The take home message from their research is that even though each healthy behavior is moderately associated with successful aging, there is substantial impact in combining all four healthy behaviors. More is better when it comes to variety in health choices.

What's Ahead?

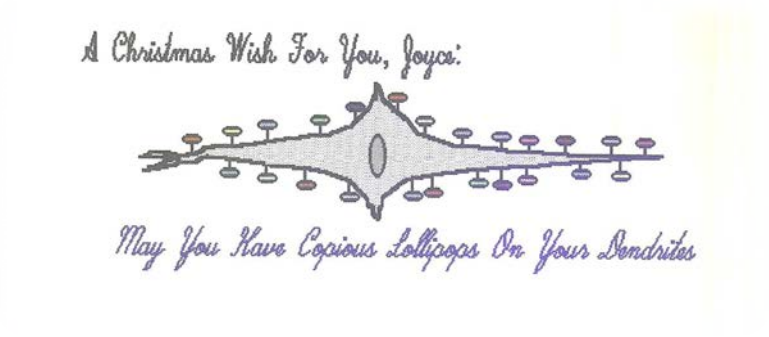
The teenager's tension visibly mounted as she waited for the first opportunity to interrupt. "Am I going to have to buy a bigger hat?" Obviously outlining the many

values of neuroplasticity needs to be tailored to the audience. I got better at presenting this information across the years of teaching it.

I drew rough illustrations of brain cells complete with axons, dendrites and spines (some of which were called lollipop spines). I explained that the research had only been done with lower animals. I taught a model of personal empowerment that framed troublesome behaviors as evidence of strong capacity to learn what was useful back when that behavior served you well.

I taught hope through neuroplasticity, your ability to change your brain by learning new behavioral default options, to learn new behaviors that could serve you better in your present situation. That could be a good thing if that would also modify the lollipops on the dendrites handling the new behaviors as it did in rats. In any case, it's a nice visual to focus on while you work through sufficient rehearsal of the new behaviors until they became your new and healthy habits.

Most people appreciated that as a model of hope and personal empowerment. So much so that I would get handmade greeting cards such as this:



I believe we have never had as much leverage as we have today. We know more about how we can define our own Ideal Aging and influence our own vigorous longevity with increasing brain power. With the brevity of this writing on some benefits of neuroplasticity, you're primed to take a learned look at what might be ahead for you and your community. I believe that we haven't seen anything yet in the potential for human intellectual growth.

Marian Diamond's research with rats starts us out on a firm foundation in science. We see that driving neuroplasticity in a positive direction is possible at any age through providing the enrichment of complex new learning in the company of others.

I believe the wisest use of this information is to use every one of these variables she isolated in rats in our efforts to maximize increasing our brain power in our individual and corporate lives. Waiting through the years required for essential human research is an unnecessary cost to the human community at large.

The rats' enriched environments were full of opportunities for complex new learning in the company of their cage mates. For most humans those opportunities abound. Many can be at little cost.

The sole addition of holding the rats on the worker's lab coat and talking with the rats resulted in fifty percent increase in lifespan. These elderly rats continued to enhance their brain architecture and performance through their longer lives. They enriched heredity.

Having friends with whom touch and talk are heartwarming might be an equivalent of the TLC that resulted in her rats showing enriched heredity even while living to the equivalent of our 90 years of age. Diamond believes that these same gains are possible in humans at any age. Her book *Enrich Heredity* is rich with the details of her studies.

Centenarian studies add to the reasons to take rat research seriously while awaiting refinements in human studies. The Okinawa Centenarian Study, begun in 1975, is available at okicent.org.

The Blue Zones by Dan Buettner is certainly worth owning. It is a sobering account of the impact of lifestyle choices. Three of the four centenarian centers portrayed have fewer people becoming centenarians in recent years. Buettner recommends nine things you can do to earn vigorous longevity for yourself. Provided here in his words they are: "Move Naturally: Be active without having to think about it … Hara Hachi Bu: Painlessly cut calories by 20 percent … Plant Slant: Avoid meat and processed foods … Grapes of Life: Drink red wine (in moderation) … Purpose Now: Take time to see the big picture … Down Shift: Take time to relieve stress … Belong: Participate in a spiritual community … Loved Ones First: Make family a priority … Right Tribe: Be surrounded by those who share Blue Zone values." At BlueZones.com you can learn more about this project.

Human longevity studies of our oldest old such as the Okinawa Program and the Blue Zones are a rich complement to the new neuroscience I bring to you in many formats. Review their websites to be encouraged by living evidence of enjoying getting more life out of life. Integrate that with my efforts to get new neuroscience from bench to your benefit as quickly as possible.

Some of the most exciting news for the purposes of this writing comes from studies on aerobic exercise. As described above, simply being aerobic has been shown to improve brain chemistry, architecture and performance (Brain CAP). This has been found with healthy adults, in individuals with mild cognitive impairment and in young as well as elderly humans.

Be aerobic. How much? How often? What time of day? While these details are still being determined, there is a suggestion that there are diminishing returns on being aerobic for more than an hour at any given session. Common recommendations are that you get 150 minutes of vigorous exercise a week or that you are aerobic for 30 minutes five days a week. The argument for this plan seems to be that people will be more likely to try to achieve this smaller amount, less likely to quit if they even start, and less likely to feel overwhelmed and discouraged.

That's not good enough for me.

Since the increases in brain power with aerobics are so impressive and are thought to be dose-dependent with diminished returns after an hour, why do less than an hour every day? Maybe you're thinking that you don't have time?

Overheard in the gym:
"Hey! Check out that gal.
She's got it all goin' on!"

That comment came from two young men on the elliptical machines behind me.

To prepare for the next business meeting, I was on a stationary bicycle typing on my laptop in addition to scratching notes on the paper copy of the article I had just finished. The truth of the matter is that time evaporates while I'm on a cardio machine because I bring along multiple choice options. Either I read, write, meditate, create a To Do List or visit with a neighbor who's on the next machine. The scenario above was the first time ever of also typing on my laptop. Since that first time was such a success, that'll probably help me pass the time on cardio machines again. These multiple choice complex new learning options account for why I get my aerobic quotient in an exercise room in lieu of bicycling around Lake Washington.

This is my version of why that's wise use of my time. We know that aerobic exercise can increase neurogenesis, the birth of new brain cells (Pereira et al, 2007). Research shows that only about half of the new neurons survive. What a waste when you consider research showing that the best way to increase the survival rate is complex new learning (Kempermann, Gast & Gage, 2002)!

Scientists tell us that it takes about two weeks after birth before the survivors begin to integrate. That suggests to me that the complex new learning that I love getting while on a cardio machine today is helping to integrate more of the cells that were birthed weeks ago while simultaneously increasing the birth rate of new neurons today.

I am speculating. But this speculation follows logically from what I know of science. Also, it adds to my happiness as I continue my habit of getting an hour of aerobic exercise each morning before most people in my time zone have gotten out of bed.

The critical point here is that you find your own enticements, entertainment and reinforcements for doing the amount of aerobic exercise you and your healthcare provider decide is best for you. I am convinced that my routine has enhanced my brain CAP so significantly that it takes something pretty major to prevent me from continuing to do the things that increase my physical, mental, emotional and social gains of regular aerobic exercise.

As a result, I earned Gold on the President's Challenge on February 29, 2012. That took 1 year, 3 months and 1 week with frequent vigorous exercise (most of which slipped by my awareness as I was reading and writing).

Currently I am on target to earn my second Gold on the President's Challenge in less than one year. That's a case study example of a positively evolving personal best. As soon as I achieve that, you'll find that celebration on my blog on IdealAging.com.

I strongly recommend that you go to PresidentsChallenge.org to monitor your own physical fitness under the guidance of your healthcare provider. Behaviors that are monitored change, often for the better. For even more powerful change, organize a group of people on that website so that you afford each other social reinforcement for increasing your physical fitness in ways that build better brains.

I have always believed that research most favorable to building better brains was of extreme value. If studies had only been done with lower animals and the interventions could be easy, inexpensive, portable and fun while the side effects might only be improved general health, why would I wait for the essential progression of research through humans before fitting these interventions into life? We do want considered, random controlled trials and exacting research. We don't

want to rush the studious experimental process. This is not the place to throw caution to the wind. However, there's no purchase, only potential loss, in ignoring animal research that finds increases in brain power and longevity from TLC and enrichment.

Laugh a lot and meditate. Happiness can be beneficial for your brain chemistry. Include in your strategic plan some of the evidence-based methods that can increase enduring happiness.

At PHQScreeners.com you can access free screening tools to help you assess your emotional status. Rather than using these to self-diagnosis, take them to your healthcare provider to help refine your care. In the event that this link is changed, you can search for the PHQ-9 for access. A routine checkup of your mental health is equally as important as your yearly physical exam.

But wait. It gets even better with computer-based research. People tend to be sedentary, minimally involved while watching TV. This might leave them at risk for reducing their lifespan perhaps as much as 21.8 minutes for "every single hour of TV viewed after the age of 25" (Lauritzen et al, 2012). However, time on a computer screen can reap positive benefits.

We've long known that reinforcement can increase learning. The closer the reinforcement is to the desired behavior, the greater the impact on learning. It goes without saying that a properly functioning computer program can exceed any human capacity for speed and accuracy of reinforcement. Thus, there's a growing body of random controlled trials showing improvements in memory, speed and executive skills in humans. Some of these gains were realized with as little as ten one-hour sessions (Berry et al, 2010).

It's my distinct opinion that this research may mean we can achieve "genius" with less than the 10,000 hours Gladwell asserts in *Outliers*. I take that position because cognitive gains through computer training have endured.

"It is not the strongest of the species that survive,
nor the most intelligent,
but the one most responsive to change."

Charles Darwin (1809-1882)

The Flynn Effect of increasing scores on various measures of human intelligence has been documented in many developed and developing nations. This can be considered evidence of environmental impact on human intelligence. For example, it's impressive that Dutch data found that in only 30 years a measure of intelligence increased 20 points. Can we accelerate that trend? This writing is an invitation to join in the focused strategic plan with the intent to maximize that trend.

Summary

What's ahead for brain power 2020 can be continually improving brain power through increasing brain volume in strategic and focal areas while enjoying complex

new learning in the specialty of one's choice to fine tune brain architecture even on the level of the molecules of communication such that the trend of upwardly evolving human intelligence globally skyrockets off the charts for a human communion infused with happiness in peaceful coexistence.

A common thread in many areas of research is that the Outliers make smaller gains for greater efforts. Let's make full use of psychology and restate that in the positive (Shaffer, 2009; 2010; 2012). Even the Outliers have improved their personal best. All things considered, it may be a balancing act with greater personal empowerment than we've ever known. You get to decide how much effort and how narrow a focus you will put on improving your personal best in your current areas of competence. And you get to decide which skills you want to build from the beginning. The data are in. Environmental influences can enrich heredity. Choose wisely, get healthcare counsel, and celebrate your efforts as well as your progress.

Leave an arm of support extended to all who want to join you in evidenced-based choices. Make your model of vigorous longevity a ray of hope for those of little faith in growth. Let your actions speak louder than words. You define, you evolve. In those rare moments that you feel overdosed with new science in this information explosion, pause to celebrate how much you've already learned and changed. Since you've read this far it is likely that your personal best is floating up with gains that could be noticeable in many realms: social; personal; commercial; financial; intellectual; memory; speed; intellectual function …

I wish you the very best health with continually increasing brain power. I look forward to sharing new neuroscience with you in my blog on IdealAging.com, in episodic postings on YouTube.com and in the eBooks in this series.

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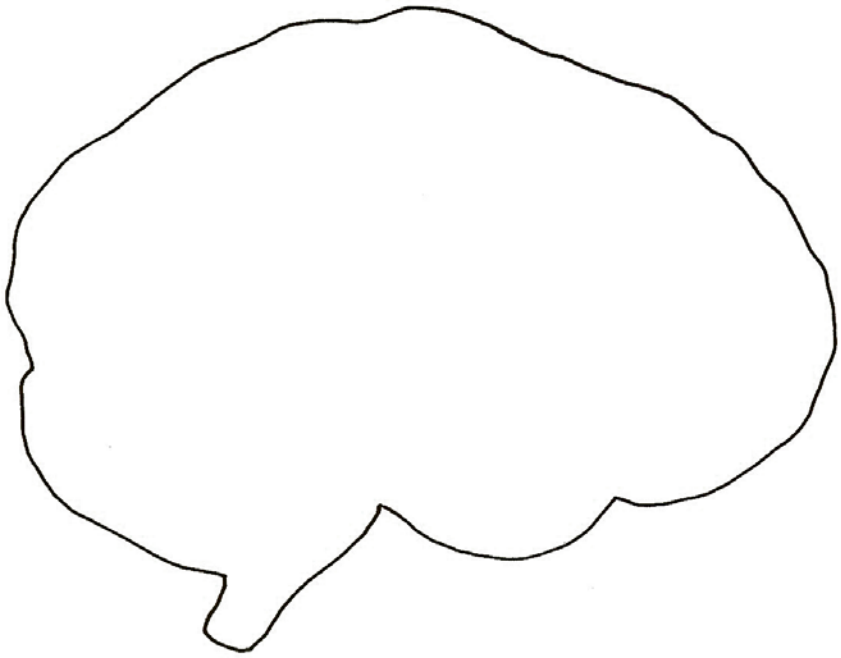

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Joyce Shaffer, Ph.D., is a psychologist, nurse, speaker, global bicyclist, and author.

Dr. Joyce is uniquely qualified to write, teach, and speak about Ideal Aging®. She received a Doctorate in Psychology from Hofstra in 1978. In 1961 she graduated from Thomas Jefferson University and is licensed as a registered nurse. She has earned diplomate status with the American Board of Professional Psychology. Currently she is a Clinical Associate Professor at the University of Washington.

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Bicycling with the Odyssey 2000 trek that averaged 80 miles a day pedaling in 45 countries on 6 continents during the entire year 2000 is testament to her Ideal Aging.

