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Change

What is healthy aging?

And how do we achieve it?

I have been thinking a lot about healthy aging lately, as my fall last year was taken up with moving my elderly parents into a senior living community. What is healthy aging? And how do we achieve it? Therein lies the million dollar question, especially with the growing rate of Alzheimer's disease. We are living in a virtual epidemic of dementia, not to mention cancer. Everywhere we look around more and more older people are ill. It feels like there are so many bullets to dodge. How can we do it? How can we continue to be happy and healthy for years to come even as we are seeing an increasing number of ailments in the general population? On a more mundane level, how do we make sure we can still get up off of the couch well into our nineties?

What We Do Now Matters

The key, of course, is how we live our lives each and every day now. **What we do now affects our aging process**, including the food we eat, the stresses we suffer, our levels of exercise, and most importantly, how our attitude about all of it is. Attitude, I firmly believe, is the most important part of aging well. Truly we are mind/body creatures, to the point where it is irrelevant to speak about one without the other. Toward that end, I will start our exploration of healthy aging with the body, from the inside out, and end with the mind.

What happens on a molecular level when cells grow old? The bottom line of aging is the balance between oxidants and antioxidants inside the cells. Our health on a molecular level comes down to the ability of our cells to repair the damage caused by free radicals and oxidative stress. Free radicals are essentially unpaired electrons that damage the molecules of the body (proteins, fats, and the like) by stealing an electron from them. This leaves the body's electrons unpaired, which essentially punches holes in our proteins and in our cells, making them leaky and structurally unsound. This process is called oxidative stress. The worse kind of oxidative stress is free radical damage to DNA, because damaged DNA leads to producing cancer cells rather than healthy cells. Oxidative stress is a huge part of the aging process because it essentially corrodes our bodies from the inside out.

One class of free radicals that are particularly damaging are reactive oxygen species, or ROS. Reactive oxygen species are compounds that contain oxygen with an unpaired electron. Oxygen typically has four electrons, but if a fifth electron comes along it is turned into superoxide, which is one example of a ROS. Our bodies are designed to handle ROS because they are produced as our cells make energy. Our cells are like factories, producing both product (molecules of energy), and waste, in the form of ROS. When we are stressed and we are driving our metabolism to go very fast, the body will produce even more ROS. If the body has antioxidants on board such as vitamin C or Coenzyme Q10, the damage can be repaired because the antioxidant will donate an electron to the atom in the cells and the cell will now be whole again. The most powerful of all of the antioxidants is glutathione. Glutathione is needed by every cell in the body to clean up the damage caused by free radicals. As we age and as we are exposed to toxins in the environment, less glutathione is available to the cells. This accelerates the wearing down of the body.

> *What we do NOW affects our aging process*

Aging at the Cell Level

Another important piece to aging is the whole concept of scheduled cell death. It is a normal part of the process of living that every cell in the body dies and is replaced. We have a brand-new gut lining every three days, brand-new skin once a month, and a completely new body every seven years because

the cells in the body are constantly turning over. If our cells are constantly renewing, then what is it that makes them stop regenerating? How is it that we even "grow-old?" The answer lies in telomeres. Telomeres are like little caps on the ends of the chromosomes inside of the cells. Each time the cell needs to copy its DNA in order to replicate or to make a new protein, the telomeres must be removed so that the DNA can be unwound. With each removal, the telomeres become shorter and shorter. After about fifty replications the telomeres become critically short. This is the signal that tells the cell its life is over and it dies, a process called "apoptosis." There is a lot of research on how to keep telomeres long because longer telomeres would increase the life of the cell and hence our life. A major discovery was the enzyme "telomerase." This enzyme functions to extend telomeres to their former length. Telomerase is active in embryonic stem cells and helps to accomplish the massive cell replication and growth that occurs as we are forming as fetuses in the womb. It is mostly turned off when we are born and stays turned off for most of our lives. Clearly, learning to harness the activity of telomerase would be an amazing leap forward for anti-aging medicine, however there is a catch. When telomerase is not controlled it can convert regular cells into cancer cells that grow uncontrollably. Clearly there needs to be a lot of research on how best to unlock and utilize the power of telomerase without unleashing the potential for cancer.

What Can We Do Now To Help?

Happily there are regular, everyday things we can do to help keep the telomeres in our cells as long as possible, and many of them are just plain common sense. A small pilot study in 2013 from the University of California, San Francisco studied men with prostate cancer and had them make changes in lifestyle that included: a plant-based diet that was high in fruits, vegetables and unrefined grains, and low in fat and refined carbohydrates; moderate exercise (walking 30 minutes a day, six days a week); stress reduction that included gentle yoga-based stretching, breathing, and meditation; and also a weekly group support. When compared to the control group, the group that made the lifestyle changes "experienced a 'significant' increase in telomere length of approximately 10 percent. Further, the more people changed their behavior by adhering to the recommended lifestyle program, the more dramatic their improvements in telomere length." A study quoted in the prestigious New England Journal of Medicine demonstrated that androgenic hormones such as testosterone and DHEA improve telomere length. Finally, there are certain nutrients that have been shown to increase telomere length including vitamin B12, zinc, vitamins C, D and E, and omega-3 fatty acids.

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When Metabolism Slows Down

Now that we have reviewed what happens as we age on a cellular level, let's zoom out and think about what happens to metabolism as we age. Starting around the age of 25, our metabolism starts to slow down. "Metabolism" is the body's process of converting food into energy. Metabolism increases as we are more active, for example during exercise; however, even when we are not active, the body still uses energy for processes like breathing and thinking. This is called the "basal metabolic rate"--or BMR--and it is largely determined by how much muscle versus fat the body has, because of course muscle burns more fuel than fat. BMR is a big deal because it makes up 60% of the body's entire metabolic rate. When we are young the body is still growing and developing which requires a lot of energy from food, so even if we are not exercising a lot, a young body will burn fuel more quickly. Around the age of 25 the body is mostly done with this process, so while thermogenesis - the body's overall metabolism of food -stays the same throughout the lifetime, our basal metabolic rate decreases. If we don't increase energy expenditure by the body either by increasing muscle or increasing exercise, we start to gain weight because our BMR is lower.

The increase in fat further slows our metabolism because fat doesn't burn as much fuel as muscle. So the double-whammy as we age is that our BMR intrinsically decreases because we are no longer growing, and the ratio of fat to muscle in the body increases. Basically, we have to work harder to maintain a higher BMR and keep our metabolism overall at a higher rate.

Interestingly enough, many people try to counteract their slower metabolism with food restriction, but this just ends up confounding the problem. Restricting food encourages the body to further slow down metabolism as it tries to conserve energy and hold onto every last calorie. Food restriction also sets up a state of stress in the body, which releases cortisol and other hormones that promote a slower metabolism and weight gain.

The Importance of Various Exercises

Clearly, maintaining a healthy BMR is an important part of healthy aging. There are many ways to maintain a healthy BMR. Of course **exercise** is a biggie. The most efficient form of exercise to keep our BMR higher is **High-Intensity Interval Training (HIIT)**. HIIT training involves bursts of exercise performed at 90% of VO2 max (the maximum rate of cellular oxygen consumption), followed by periods of rest. For example, 45 second bursts of exercise with a 15 second recovery, repeated over fifteen to twenty minutes, has been shown to be more effective for improving BMR that 30 minutes of aerobic exercise. HIIT has been shown to improve insulin sensitivity and sugar utilization, oxygen uptake by cells, increase growth hormone production, build muscle, burn visceral fat, and best of all, increase BMR for up to 48 hours after the exercise. **Building muscle** in general helps to raise metabolic rate, so lifting weights is an important component of exercise as well. Of course building muscle also helps to build bone, which is of huge benefit to healthy aging. One-quarter of all patients over fifty who suffer a hip fracture die within two years, and one-half of these patients will never return to their former independent living. Studies have also linked bone loss with an increased risk for Alzheimer's disease, so by increasing bone mass we are keeping the brain healthy.

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The last ingredient in the exercise mix is **stretching**. This is the solution for being able to get up off the couch without stiffness! As we age the water content of the body decreases, and this includes the water content not only of skin (argh, those wrinkles!) but also the water content of tendons. Not only the water content, but collagen levels also decrease throughout the body as we age. As the water and collagen content of tendons fall, they become less "stretchy" – literally, the ability of tendons to flex with the body decreases. Stretching exercises are one of the key ways that we increase the water content of tendons. Our sex hormones – estrogen for women and testosterone for men, help to increase the collagen content throughout the body, and a supplement called hyaluronic acid has also shown some promise in increasing both water and collagen content in tendons.

A Healthy Diet of Whole Foods

Foundational to a healthy metabolism and health aging is, of course, diet. It goes without saying that eating real, whole foods is essential for aging well. Whole foods contain the nutrients and the antioxidants that our bodies need to do the work of metabolism and to scavenge the free radicals that damage our cells. What we are importantly avoiding in whole foods are food additives and preservatives that steal nutrients from cells and cause more damage. Trans-fats are particularly bad, because they change the very nature of the membranes of cells and intracellular structures, rendering them impermeable and dysfunctional. That's right, trans-fats make the cells in your brain and everywhere else in the body not work well.

Supplementation

Of course you knew that I would mention supplementation as an important part of healthy aging. I wish that we could get all of the nutrients that the body needs from food alone, but at this point in history we are so stressed and so very toxic that to keep the body functioning well we need to take supra-physiologic doses of some nutrients. I have already discussed antioxidants such as **vitamin C**, **coenzyme Q10** and **glutathione** to keep the balance of oxidants versus antioxidants on the good side. I also mentioned **vitamin E**, **B12**, and **omega-3 fatty acids** to keep our telomeres long. To help maintain a healthy metabolism we can supplement with **vitamin D** and magnesium, because they both work to reduce insulin resistance and decrease fat production. Finally on the short list of supplements to promote healthy aging, I feel very strongly about adding a **B complex** and minerals to help the liver process toxins.

Prioritize Sleep

Other ways to improve metabolism and promote healthy aging are getting enough sleep and balancing hormones. Without enough sleep, the body slows down metabolism to conserve energy – just like it does without enough food. Lack of sleep puts the body in stress-mode, where it increases its production of our stress hormone cortisol. When levels of cortisol are too high (or too low, for that matter – as in adrenal fatigue) the body slows down metabolism and accumulates fat. Cortisol is just one of the hormones that is responsible for cellular metabolism. Thyroid, estrogen, progesterone, and testosterone all affect metabolism as well. As we age, there is a decline in all of these hormones, which negatively impacts metabolism. Balancing cortisol levels through exercise, diet, sleep, and destressing helps to balance our other hormones; however, at some point many of us will need hormone replacement therapy to continue having a healthy metabolism.

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A Positive Attitude

Speaking of de-stressing brings me to my final area of recommendation in this newsletter on healthy aging, and that is having a **healthy attitude**. I have already discussed some of the ways that feeling stressed promotes aging, namely through increasing ROS, which damage cells, and slowing down metabolism. Hopefully with age comes the wisdom to take life with a grain of salt, but for many of us this is still a challenge. The world can be a scary place, and society, as well as our families, can put pressure on us to behave in certain ways that make us feel stressed. When we are responding to outside pressures rather than living the lives we want to live, we can never be happy, and we will grow old resenting the very people we should be cherishing. To break out of this trap so that life can be fulfilling for us might take a bit of work in therapy, but it is well worth it. Living to our fullest potential and directing our lives as we choose, without caring too much about what others think, is the foundation of a healthy attitude as we age.

Relax and Destress

Much of the media works to engender fear in us, because news of scary events sells better than news of happy events. We are bombarded through television, the internet, and social media with all of the terrible things that are taking place in the world. How can we live happily and harmoniously when everywhere we turn we learn of yet another terrifying, horrific event? **I think that the only way to do it is to limit our consumption of news.** Of course it is important to know what is going on in the world, but we don't need to be bombarded by it. Limit your news to thirty minutes or less per day, and unplug the rest of the time. With all of that newfound free time you can spend more time cultivating a feeling of happiness, or even sending your body powerful messages that it is working well, that it is flexible and strong, and that your mind is sharp and clear. It is so important to be able to not live in fear – to somehow know that everything always works out for you. Whether that means meditating to quiet your mind, turning stress over to a higher power, or remembering that we are in part spirit and not just bodies, knowing that life is really okay is a huge part of healthy aging.

G-R-E-A-T D-R-E-A-M

Working toward spending more time feeling happy has many positive effects on health and on aging. Blood pressure decreases, the immune system works better, and sleep improves as well. A wonderful acronym for the list of ten top habits that have been scientifically proven to help generate feelings of happiness is G-R-E-A-T D-R-E-A-M, which stands for ***Giving*** (doing things for others), ***Relating*** (connecting with people on a deeper level), ***Exercising*** (taking care of your body), ***Appreciating*** (noticing the world around you), ***Trying*** (keep learning new things), ***Direction*** (having goals to look forward to), ***Resilience*** (find ways to bounce back), ***Emotion*** (take a positive approach), ***Acceptance*** (be comfortable with who you are), and ***Meaning*** (be part of something bigger).

So after all of that, what does it take to age well? 1) A healthy diet of whole foods, 2) Supplementation with vitamins C, D, E and the B vitamins, omega 3 fatty acids, magnesium, coenzyme Q10, and glutathione, 3) Exercise in a few different forms including HIIT, strength training and stretching, 4) Get enough Sleep 5) Balanced hormones, and 6) A positive attitude. These are the keys to living a long, happy, healthy life. My favorite phrase when it comes to aging well is "Happy, healthy, happy, healthy, happy, healthy, dead!"