Central Drug
COMPOUNDING & WELLNESS

Nutrients and Lifestyle

A Look at Anti-Aging & Longevity Benefits

In functional medicine, we attempt to keep individuals healthy and functioning regardless of their age. Most of us want to live as long as we possibly can. However, do we want to add years to our life or life to our years, or better yet—BOTH. Choices we make every hour of every day can impact the quality of our life for years to come.

Americans plan for so many occurrences in life, but few of us plan for our inevitable aging. Consider this, the World Health Organization reports that the number of individuals worldwide over 60 years old is expected to double by 2050. (1) Let's take a deeper dive into the factors that impact health and disease as we age so we can support our own longevity and quality of life.

While aging is a normal process, many chronic diseases associated with aging can be prevented and even reversed (2)(3)(4). Alzheimer's, Parkinson's disease, osteoarthritis and atherosclerosis are among the several chronic health conditions for which risk increases with age (5) Lifestyle and dietary modifications can help to support longevity and health throughout the lifespan. (4)

Defining Aging and Longevity

Answering the question as to why we age is tantamount to answering the question of what is life itself. Aging is the progressive and normal deterioration of anatomic structures and physiological processes in the body, (6) while longevity is simply defined as "a long duration of individual life". (7) Healthy aging and longevity involve not only extending an individual's lifespan but also improving health and quality of life while aging.

An individual's progression of aging can be understood by their phenotype, which is a combination of their genotype (genetic makeup) and how it interacts with their environment, diet, and lifestyle. (2) So how do we measure how well we are aging? Many researchers are looking at the length of our telomeres, the strands at the end of chromosomes, to

correlate our chronological age with our biological age. Others are looking at our genetics and the role our genes play in our aging. Still others are looking at how well our bodies function metabolically, in such areas as methylation. Finally, we also look at our levels of wear and tear commonly referred to as "oxidative stress." Cellular damage, inflammation, and atherosclerosis (8) are all contributors identified that contribute to biological aging.

Targeting these biological processes may help prevent disease and promote healthy aging and longevity. Lifestyle changes and including specific nutrients in the diet can help promote longevity and healthy aging.

Diet and Lifestyle in Aging and Longevity

Lifestyle factors that may reduce morbidity and mortality include:

- regular physical activity
- moderating intake of alcohol
- consuming a healthy diet
- social engagement
- protecting your sleep

Again, our focus here is diet and nutrients. A healthy diet can improve some aging-related changes by reducing inflammation and positively impacting metabolic health. Foods that have been associated with reduced systemic inflammation include fish high in omega-3 fatty acids, and fiber-rich foods, such as whole grains, vegetables, and fruit. (9) Outlined below are some of the top nutrients for longevity and the food sources in which they are found.

Top Nutrients For Longevity

B Vitamins

Elevated homocysteine levels, a biomarker of aging in the body, have been linked to reductions in the brain's grey matter, (10) as well as an increased risk of cardiovascular disease, Alzheimer's disease, (11) bone loss and fractures. (12) The body requires certain nutrients to metabolize homocysteine, including pyridoxine (vitamin B6), folate (vitamin B9), and

cobalamin (vitamin B12). Dietary sources of B vitamins include red meat and poultry, eggs, tuna, lamb, legumes, whole grains, leafy dark greens, seeds, nuts, milk, and yogurt. (13)(14)(15) The Heart Outcomes Prevention Evaluation (HOPE 2) study found that combined supplementation of vitamins B6, B12, and folate reduced homocysteine and risk of stroke by approximately 25%. (16)

Coenzyme Q10

Coenzyme Q10 (CoQ10) is a fat-soluble compound found in the heart, kidneys, liver, and pancreas of humans. Levels of CoQ10 are depleted by age-related oxidative stress, mitochondrial diseases, and statin use. We generally suggest 100 mg of CoQ10 supplementation in all our patients over the age of 50, even if they are not on any known CoQ10 depleting prescriptions. Deficiency in CoQ10 has been associated with diabetes, fibromyalgia, cancer, neurodegenerative, and cardiovascular diseases. (17) CoQ10 is synthesized in the body and may be obtained from several food sources, including organ meats (e.g., liver, kidney, heart), fatty fish, spinach, cauliflower, broccoli, and legumes. (18)

Omega-3 Fatty Acids

The three main omega-3 fatty acids are alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). ALA is found mainly in plant oils such as flaxseed, soybean, and canola oils. DHA and EPA are found in fish and other seafood. EPA and DHA, considered to be the main health-promoting omega-3s, have been shown to increase levels of anti-inflammatory cytokines. (19) High amounts of EPA and DHA fatty acids are found in fatty fish, such as salmon, sardines, herring, mackerel, anchovies, and cod liver oil. (20) Chronic health conditions, such as breast cancer, cardiovascular diseases, and osteoporosis (21)(22)(23) appear to be reduced by regular fish consumption. The heart protecting mechanisms appear to be lowering of blood pressure, reduction of triglyceride levels and finally, decreased platelet aggregation (22) or “stickiness”. Not to mention, the EPA and DHA found in fish oil are considered to be potent anti-inflammatories.

Probiotics and Prebiotics

Supporting a balanced and diverse population of microbes that inhabit the gastrointestinal tract “our microbiome” is associated with

immunomodulation, regulation of body mass index, and healthy homeostasis. Homeostasis is our ability to maintain a relatively stable internal state despite changes in the world outside. Furthermore, greater diversity in microbiota is commonly considered an indicator of overall health. (24)

Our microbiome feeds on prebiotics, a type of carbohydrate found in foods such as leeks, garlic, onions, asparagus, chicory, oats, wheat, and soybeans. (25) A diet high in prebiotic fiber is associated with increased short-chain fatty acids produced by gut bacteria. This can protect against behavioral and inflammatory conditions. For example, a Mediterranean-style diet is high in prebiotic fiber, as it includes plenty of vegetables, fruits, and legumes. (26)

Resveratrol

Grape skins, red wine, grape juice, berries, and peanuts contain the polyphenol resveratrol. . Research has found resveratrol to exhibit antioxidant, anti-inflammatory, anti-aging, and anti-cancer effects. Resveratrol supplementation has been shown to reduce biomarkers associated with inflammation, including reactive oxygen species (ROS), tumor necrosis factor alpha (TNFα) and interleukin-6 (IL-6). (27)

Conclusion

While our aging experience is determined by genetics (our genotype), lifestyle and dietary factors can play a significant role in healthy aging, longevity and the prevention of age-related conditions. Nutrients such as CoQ10, omega-3 fatty acids, prebiotics, B vitamins, and resveratrol can help to promote longevity. Including these nutrients in your diet or obtaining them through supplementation may help to prevent some of the chronic conditions associated with aging.

Central Drug
COMPOUNDING & WELLNESS

REFERENCES

1. World Health Organization. (2015, October 01). *WHO: Number of people over 60 years set to double by 2050; major societal changes required*. Retrieved from https://www.who.int/mediacentre/news/releases/2015/older-persons-day/en/
2. da Costa, J. P., Vitorino, R., Silva, G. M., Vogel, C., Duarte, A. C., & Rocha-Santos, T. (2016). A synopsis on aging – Theories, mechanisms and future prospects. *Ageing research reviews*, 29, 90–112.
3. Fontana L. (2009). Modulating human aging and age-associated diseases. *Biochimica et biophysica acta*, 1790(10), 1133-1138.
4. World Health Organization. (2014, October 06). *Diet, nutrition and the prevention of chronic diseases: Report of the joint WHO/FAO expert consultation*. Retrieved from https://www.who.int/dietphysicalactivity/publications/trs916/summary/en/
5. McGeer, P. L., & McGeer, E. G. (2006). Inflammation and the degenerative diseases of aging. *Annals of the New York Academy of Sciences*, 1035(1), 104-116.
6. Baker, E. J., Miles, E. A., Burdge, G. C., Yaqoob, P., & Calder, P. C. (2016). Metabolism and functional effects of plant-derived omega-3 fatty acids in humans. *Progress in Lipid Research*, 64, 30-56.
7. Longevity [Def. 1]. (n.d.). Merriam-Webster Online. Retrieved from https://www.merriam-webster.com/dictionary/longevity
8. López-Otín, C., Blasco, M. A., Partridge, L., Serrano, M., & Kroemer, G. (2013). The hallmarks of aging. *Cell*, 153(6), 1194–1217.
9. Quach, A., Levine, M. E., Tanaka, T., Lu, A. T., Chen, B. H., Ferrucci, L., … Horvath, S. (2017). Epigenetic clock analysis of diet, exercise, education, and lifestyle factors. *Aging*, 9(2), 419-446.
10. Ford, A. H., Garrido, G. J., Beer, C., Lautenschlager, N. T., Arnolda, L., Flicker, L., & Almeida, O. P. (2012). Homocysteine, grey matter and cognitive function in adults with cardiovascular disease. *PLoS ONE*, 7(3).
11. Kumar, A., Palfrey, H. A., Pathak, R., Kadowitz, P. J., Gettys, T. W., & Murthy, S. N. (2017). The metabolism and significance of homocysteine in nutrition and health. *Nutrition & metabolism*, 14, 78.
12. Stone, K. L., Lui, L. Y., Christen, W. G., Troen, A. M., Bauer, D. C., Kado, D., … Manson, J. E. (2017). Effect of combination folic acid, vitamin B6, and vitamin B12 supplementation on fracture risk in women: A randomized, controlled trial. *Journal of bone and mineral research*, 32(12), 2331-2338.
13. National Institutes of Health. (2019). Folate: Fact sheet for health professionals. Retrieved from https://ods.od.nih.gov/factsheets/Folate-HealthProfessional/
14. National Institutes of Health. (2019). Vitamin B6: Fact sheet for health professionals. Retrieved from https://ods.od.nih.gov/factsheets/VitaminB6-HealthProfessional/
15. National Institutes of Health. (2019). Vitamin B12: Fact sheet for health professionals. Retrieved from https://ods.od.nih.gov/factsheets/VitaminB12-HealthProfessional/
16. Saposnik, G., Ray, J. G., Sheridan, P., Mcqueen, M., & Lonn, E. (2009). Homocysteine-lowering therapy and stroke risk, severity, and disability. *Stroke*, 40(4), 1365-1372.
17. Garrido-Maraver, J., Cordero, M. D., Oropesa-Avila, M., Vega, A. F., de la Mata, M., Pavon, A. D., … Sanchez-Alcazar, J. A. (2014). Clinical applications of coenzyme Q_{10}. *Frontiers in Bioscience*, 19(4), 619.
18. Rodick, T. C., Seibels, D. R., Babu, J. R., Huggins, K. W., Ren, G., & Mathews, S. T. (2017). Potential role of coenzyme Q10 in health and disease conditions. *Nutrition and Dietary Supplements*, 10, 1-11.
19. Quach, A., Levine, M. E., Tanaka, T., Lu, A. T., Chen, B. H., Ferrucci, L., … Horvath, S. (2017). Epigenetic clock analysis of diet, exercise, education, and lifestyle factors. *Aging*, 9(2), 419-446.
20. USDA. (n.d.). USDA food composition databases. Retrieved from https://ndb.nal.usda.gov/ndb/nutrients/index
21. Zheng, J., Hu, X., Zhao, Y., Yang, J., & Li, D. (2013). Intake of fish and marine n-3 polyunsaturated fatty acids and risk of breast cancer: Meta-analysis of data from 21 independent prospective cohort studies. *Bmj*, 346, f3706.
22. Kris-Etherton, P. M., Harris, W. S., & Appel, L. J. (2002). Fish consumption, fish oil, omega-3 fatty acids, and cardiovascular disease. *Circulation*, 106(21), 2747-2757.
23. Farina, E. K., Kiel, D. P., Roubenoff, R., Schaefer, E. J., Cupples, L. A., & Tucker, K. L. (2011). Protective effects of fish intake and interactive effects of long-chain polyunsaturated fatty acid intakes on hip bone mineral density in older adults: the Framingham Osteoporosis Study. *The American journal of clinical nutrition*, 93(5), 1142-1151.
24. Kong, F., Hua, Y., Zeng, B., Ning, R., Li, Y., & Zhao, J. (2016). Gut microbiota signatures of longevity. *Current Biology*, 26(18).
25. Slavin, J. (2013). Fiber and prebiotics: Mechanisms and health benefits. *Nutrients*, 5(4), 1417-1435.
26. Santoro, A., Ostan, R., Candela, M., Biagi, E., Brigidi, P., Capri, M., & Franceschi, C. (2018). Gut microbiota changes in the extreme decades of human life: A focus on centenarians. *Cellular and molecular life sciences*, 75(1), 129-148.
27. Smoliga, J. M., Baur, J. A., & Hausenblas, H. A. (2011). Resveratrol and health – A comprehensive review of human clinical trials. *Molecular Nutrition & Food Research*, 55(8), 1129-1141.