myDNA Longevity Health Report

Welcome to the future of health and human potential

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TEST METHODOLOGY AND LIMITATIONS

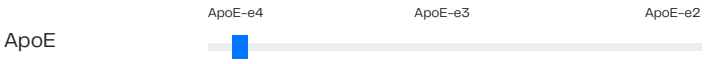
Recommendations in this report apply to all ages, however for any patient under 18 years, a guardian must purchase the test and be present for the report recommendations. The information in this report is not intended to treat, diagnose or cure any medical condition or disease.

This test is used for clinical purposes. It should not be regarded as investigational or for research. Only the genomic regions listed below were tested; there is a possibility that the tested individual is a carrier for additional, undetected mutations. Although molecular tests are highly accurate, rare diagnostic errors may occur that interfere with analysis. Sources of these errors include sample mix-up, trace contamination, and other technical errors. The presence of additional variants nearby may interfere with mutation detection. Genetic counseling is recommended to properly review and explain these results to the tested individual.

LONGEVITY

Longevity

APOE Status: 3/4



Apolipoprotein E (ApoE) is a lipid-binding protein that transports triglycerides and cholesterol in multiple tissues, including the brain. The e4 allele is common in hunter-gatherer communities, while the e3 and e2 alleles are most common in agricultural communities. When compared to the e3 allele, the e4 allele was associated with a shorter lifespan and the e2 allele was associated with a longer lifespan with the exception of e2/e4.

- About 25% of people carry one copy of APOE-e4, and 2 to 3% carry two copies
- APOE-e4 includes trade-off strengths and weaknesses from the hunter-gatherer period and continues to persist in the modern era
- APOE-e4 may become a compounding problem with the following factors: a sedentary lifestyle, a high-calorie diet leading to obesity and cardiometabolic risk factors, exposure to high levels of air pollution, and living in an environment without climatic extremes or parasitic risk that serves to balance total cholesterol levels
- The APOE-e4 allele has consistently been associated with higher levels of total cholesterol, LDL, and oxidized LDL, but lower levels of C-reactive protein
- While APOE-e4 carriers do have higher lipid levels, these may be beneficial for immune response and unlikely to increase cardiovascular risk in a population without other cardiometabolic risk factors
- E4 carriers have lower antioxidant defense from pollution (increased dementia 92% in female e4 carriers) and other toxic threats
- E4 carriers have lower beta carotene levels and a lower response to plant bioactive compounds, and may benefit more from the antioxidant activity of the fat-soluble vitamins and increasing endogenous antioxidant levels
- In a Costa Rican population, a high saturated fat intake was associated with a 49% increased risk of a heart attack in the e3/e3 genotype, whereas, the e4/e4 was associated with a 110% increased risk of a heart attack
- A study of 224 people from western Mexico found carriers of the e4 allele with a combined high dietary omega 6 to low omega-3 ratio underwent a worse glycemic control as measured by HbA1c, which was not observed for the other genetic groups
- A study of 8,506 Chinese people over 14 years reported that a high fish intake was associated with a lower risk of mortality only among the APOE-e4 carriers
- A hunter-gatherer diet focused on protein, choline, omega-3's, uridine, creatine, berries, fiber, nuts, seeds, antioxidants, lower in carbohydrates, high in potassium, and avoiding alcohol currently appears to be the best strategy for e4 carriers with northern heritage

Longevity

Genome-wide association studies have linked extreme longevity with the APOE e2/e3 genotype, and reduced longevity in e4 carriers with cognitive impairment.

- The risk of cognitive decline conferred by carrying the e4 allele is greater among those with Caucasian and Asian ancestry from the northern hemisphere
- In Africans and Hispanics, e4's influence on Alzheimer's risk is much less pronounced and even absent
- In Australia, elderly e4 carriers showed similar cognitive performance and even higher verbal fluency compared to e3 carriers
- The e4/e4 genotype has the strongest risk factor gene for Alzheimer's disease, although inheriting a single or double APOE-e4 genotype does not mean a person will develop the disease
- The Mediterranean diet is associated with a decreased risk of Alzheimer's disease, but this only applied to e3 carriers and not e4 carriers, and may be due to e4 carriers with primarily northern ancestry
- In a Chinese population, a high meat intake was significantly associated with higher risks of mortality in e2 and e3 carriers, but not APOE-e4 carriers
- A review looking at the effects of the ketogenic diet found that patients with APOE-e4 alleles showed little statistical significance between cognitive improvements and ketone body levels
- Cardio exercise for 30 minutes a day, five days a week, has been found to dramatically reduce the risk of e4 and Alzheimer's disease and improve lipid markers
- Endurance training, high repetition strength training, and HIIT sessions are all recommended for e4 carriers as the most effective strategies to improve cardiovascular markers and cognitive longevity
- E4 is associated with reduced neural repair, especially from head injuries and poor sleep patterns
- Eight hours of sleep per night should be a priority for healthy APOE expression
- Lower creatine levels in the brain have been found in e4 carriers later in life
- Lower antioxidant defense from pollution (increased dementia 92% in female e4 carriers) and other toxic threats
- APOE-e4 carriers appear to have impaired brain transport of free DHA but not of DHA-lysoPC, making DHA in phospholipid form from fish, fish roe, and krill oil superior for e4 carriers
- Researchers were able to prove that a formulation with DHA, choline, uridine, B vitamins, vitamin C, and vitamin E improved memory scores and the connectivities between brain regions among patients with early Alzheimer's Disease
- Several compounds isolated from medicinal mushrooms have been shown to promote neurite outgrowth, including those from Lion's mane mushroom, reishi, tiger milk mushroom, Ganoderma neo-japonicum, and Cordyceps militaris

Longevity

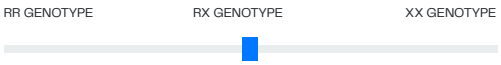
FOXO3 (Males)

FOXO3 is one of the few genes that has shown consistent associations with longevity in diverse human populations. FOXO3 gene expression plays a pivotal role in longevity by protecting against Type 2 diabetes, cardiovascular disease, cancer, neurological disorders and bone fractures. This gene has been found to protect against oxidative stress, increases the expression of SOD2 and catalase, influences the DNA damage and repair response, regulates genes involved in cell detoxification and survival, boosts stress resistance, and is a major target of how caloric restriction increases lifespan. The FOXO3 rs2802292 T-allele may require targeted strategies. Researchers have hypothesized that the FOXO3 rs2802292 SNP might help identify responders vs non-responders to conventional therapies, calorie restriction or dietary supplements, as well as predict the outcome of personalized approaches for age-related diseases.

- You have the GG genotype for FOXO3, associated with the highest probability of becoming a centenarian
- The GG genotype confers a odds ratio for extreme longevity of 2.75, biological markers of successful aging, and a lower incidence of age-related disease
- Several meta-analyses conducted on FOXO3 have found that the association with longevity and age-related diseases revealed that this association is stronger in males
- The G-allele is associated with lower circulating IGF-1 levels, which are protective against insulin resistance-related diseases and mortality
- The GG genotype is associated with a lower prevalence of coronary artery disease, cancer, and a lower frequency of age-related diseases in centenarians
- G allele carriers had a combined (Japanese, white, and black populations) risk reduction of 10% for total all-cause mortality, was consistent across populations and was mostly contributed by a 26% lower risk for cardiovascular disease death
- Under nutrient, genotoxic, and oxidative stress, the GG genotype increases FOXO3 expression through HSF1 and activates its antioxidant, metabolic, and DNA repair transcriptional programs both in the nucleus and in the mitochondria, leading to increased tolerance to stress

Longevity

Exercise Programming

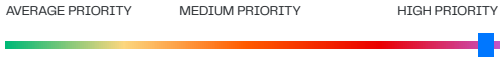


Physical fitness is considered to be the single best predictor of life expectancy and healthspan. The ACTN3 gene affects the rate and response of Type II muscle fibers and is beneficial for exercise programming by increasing the chances of consistency, results, and injury prevention for longevity. Type-II muscle fiber atrophy is a hallmark of sarcopenia. Muscle mass decreases approximately 3 to 8% per decade after age 30 and declines even more after age 60.

- You have the RX genotype that may represent the best of both ACTN3 genotypes for strength training, maintaining lean muscle mass later in life, endurance, and longevity
- The RX genotype is a high responder to strength training and increased muscle hypertrophy
- Faster sprint times
- Protection from eccentric training-induced muscle damage
- Reduced risk of sports injury and improved flexibility
- High testosterone response after resistance training
- Higher muscle mass improves insulin sensitivity
- The RX genotype has the most flexibility for programming strength training and cardiovascular exercise
- For longevity, 30-60 minutes of resistance training a week is going to be sufficient for maintaining strength and muscle mass into old age
- All-cause mortality, cardiovascular mortality and total cancer reductions were highest when strength training and cardio exercise were combined

Longevity

Glutathione

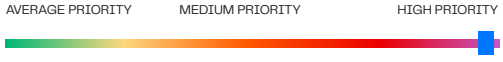


Glutathione is the master antioxidant system involved in oxidative stress, detoxification, and immunity. Glutathione status parallels telomerase activity, an important indicator of lifespan.

- Your genotype combinations of GSTM1 and GSTP1 are associated with decreased baseline glutathione levels
- Glutathione decreases with age, and low levels of glutathione are associated with chronic exposure to chemical toxins, heavy metals and excess alcohol, immunocompromised conditions, and neurodegenerative disorders
- Glutathione has been found to increase by 20% with deep breathing practices like Tai Chi or yoga
- For exercise, a combination of aerobic exercise and circuit weight training produced the highest glutathione effect
- Selenium, glycine, cysteine, vitamin C, and cruciferous vegetables all improve glutathione levels
- Chicken or bone broth, herbs, and spices are some of the best dietary ways to maintain higher levels of glutathione
- Some of the all-stars include cinnamon, anise, sage, and thyme due to also containing the antiviral compound caffeic acid

Longevity

Superoxide Dismutase



The current leading theory on aging is that oxidative stress within the mitochondria of the cell leads to a vicious cycle in which damaged mitochondria and increased amounts of reactive oxygen species, leading in turn to progressive damage to the body. Researchers have theorized that "if aging results from oxidative stress, it may be corrected by environmental, nutritional and pharmacological strategies." The SOD2 gene is responsible for superoxide dismutase levels, an important protector of the mitochondria.

- You have the homozygous genotype that is associated with reduced mitochondrial protection
- Manganese, boron, vitamin A, C, E, omega-3 fatty acids, CoQ10, lutein, lycopene, milk thistle, cordyceps, holy basil, reishi and cryotherapy all increase mitochondrial protection
- A high level of SOD leads to the activation of longevity-promoting transcription factors

Longevity

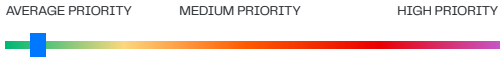
Catalase

CAT makes an enzyme called catalase, which helps reduce oxidative stress. CAT is present in all aerobic cells while research has found the highest correlation to prostate, breast, liver, and blood health.

- You have the wild-type genotype is associated with improved catalase levels

Longevity

Glutathione Peroxidase

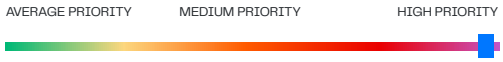


Superoxide dismutase (SOD) transforms the inflammatory superoxide to hydrogen peroxide (H2O2), and the next step is for glutathione peroxidase (GPX1) to transform it to water (H2O). When GPX1 function is modulated by polymorphisms and other factors affecting its function, a hydroxyl radical may be more likely to form which attacks DNA and causes strand breaks.

- You have the wild-type genotype for GPX1 that is associated with improved selenium status and glutathione peroxidase to boost DNA protection, heat stress tolerance, skin protection and longevity

Longevity

Choline and Betaine



SNPs involved in the methylation process govern the micronutrient requirements for maintaining healthy homocysteine levels. Plasma homocysteine levels have been associated with all-cause mortality risk, with high homocysteine connected to depression, blood clots, inflammation, macular degeneration, dementia, and cancer. Choline and betaine play a crucial role in homocysteine metabolism, especially for those with variants in MTHFR.

- Your genotype combinations in PEMT are associated with a higher than average requirement for choline and betaine to maintain healthy methylation and homocysteine levels
- Low choline intake can manifest as memory issues, NAFLD, anxiety, neurological disorders, breast cancer, histamine issues, gallbladder issues, and SIBO
- Choline may be depleted by nighttime pain relievers, antihistamines, sleep aids, antidepressants, incontinence drugs and narcotic pain relievers
- Intense endurance exercise depletes choline levels, and increasing phosphatidylcholine has been found to improve exercise capacity during high-intensity cycling and running, as well as reduce muscle soreness

Longevity

Folate

SNPs involved in methylation process govern the micronutrient requirements for maintaining healthy homocysteine levels. Plasma homocysteine levels have been associated with all-cause mortality risk, with high homocysteine connected to depression, blood clots, inflammation, macular degeneration, dementia, and cancer. Choline and betaine play a crucial role in homocysteine metabolism, especially for those with variants in MTHFR. MTHFR 677 and MTHFR 1298 genotypes determine your folate requirements to assist normal homocysteine levels.

- Your genotype combination in MTHFR 677 and MTHFR 1298 is associated with a higher than average requirement for folate to maintain healthy homocysteine levels
- If your homocysteine is elevated, check that you are getting enough folate
- High homocysteine has been implicated in amyloid buildup, DNA damage and cancer, mitochondrial dysfunction, cardiovascular disease, age-related macular degeneration, apoptosis of neurons and depression

Longevity

Vitamin B6

SNPs involved in methylation process govern the micronutrient requirements for maintaining healthy homocysteine levels. Plasma homocysteine levels have been associated with all-cause mortality risk, with high homocysteine connected to depression, blood clots, inflammation, macular degeneration, dementia, and cancer. Vitamin B6 plays an important role in homocysteine metabolism and CBS gene function.

- Your genotype combination in NBPF3 and CBS is associated with a higher than average requirement for B6 to maintain healthy methylation and homocysteine levels
- Many medications deplete B6 including antibiotics, oral contraceptives, ACE inhibitors, antacids, and proton pump inhibitors

Longevity

Serum Vitamin B12

SNPs involved in the methylation process govern the micronutrient requirements for maintaining healthy homocysteine levels. Plasma homocysteine levels have been associated with all-cause mortality risk, with high homocysteine connected to depression, blood clots, inflammation, macular degeneration, dementia, and cancer. Vitamin B12 plays an important role in homocysteine metabolism.

- You have the wild-type FUT2 genotype that is associated with lower B12 levels and a higher requirement for B12 to maintain healthy methylation and homocysteine levels
- B12 is depleted by antacids, antibiotics, proton pump inhibitors, Metformin, oral contraceptives, and yeast overgrowth

Longevity

Riboflavin (B2)

SNPs involved in methylation process govern the micronutrient requirements for maintaining healthy homocysteine levels. Plasma homocysteine levels have been associated with all-cause mortality risk, with high homocysteine connected to depression, blood clots, inflammation, macular degeneration, dementia, and cancer. Vitamin B2 plays a special role in stabilizing the MTHFR gene for homocysteine metabolism.

- You have the heterozygous MTHFR 677 genotype that is associated with a higher than average requirement for riboflavin to maintain healthy methylation and homocysteine levels

Longevity

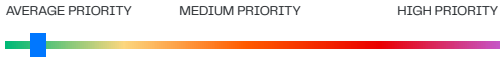
Magnesium

Catechol-O-methyltransferase (COMT) is a magnesium and SAMe-dependent, catecholamine-metabolizing enzyme, including dopamine, epinephrine, estrogen, and dietary catecholamines. Approximately 95% of SAMe is used in methylation reactions that influence the activity of DNA, RNA, proteins, phospholipids, hormones, and neurotransmitters.

- You have the wild-type COMT genotype that is associated with faster enzymatic activity and requires an average magnesium intake
- One study found that centenarians have higher total body magnesium and lower calcium levels than most elderly people

Longevity

Lp(a)

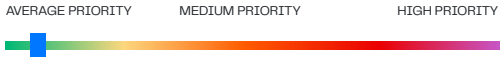


Lp(a)is a sticky form of LDL that appears to affect plaque growth and LDL particle size and increase the risk of plaque rupture and blood clotting. Researchers have shown that genetically determined Lp(a) levels are associated with life span and age at the end of the health span. Genetically determined and absolute Lp(a) levels are associated with the long-term risk of all-cause and cardiovascular mortality. The mortality risk for those with Lp(a) levels equal to or above the 95th percentile was equivalent to being 1.5 years older in chronological age. The LPA SNPs rs3798220 and rs10455872 were shown to be significantly associated with Lp(a) concentrations and coronary artery disease.

- You have the wild-type genotypes that are not associated with genetically elevated Lp(a)

Longevity

Fasting Insulin



Insulin resistance increases with aging, but centenarians usually preserve normal glucose tolerance, low levels of fasting insulin and higher insulin sensitivity when compared with adults greater than 75 years of age. The homozygous 9p21 rs1333049 SNP has been shown to increase fasting insulin levels by 40% in those following a low-fiber diet compared to a high-fiber diet, whereas this was not seen in those without the risk allele.

- You do not have the homozygous 9p21 genotype, therefore reducing the risk of elevated fasting insulin levels

Longevity

Soluble and Insoluble Fiber

A systematic review and meta-analysis of 3,512,828 subjects found that a higher consumption of total dietary fiber significantly decreased the risk of all-cause mortality, cardiovascular-related mortality, and cancer-related mortality by 23%, 26% and 22%. The consumption of insoluble fiber tended to be more effective than soluble fiber intake in reducing the risk of total mortality, and dietary fiber from nuts and seeds reduced the risk of cardiovascular-related death by 43%.

- You have the heterozygous genotype for 9p21 that is associated with a higher than average requirement for raw fruit and vegetable fiber to maintain a healthy heart
- The risk of heart attacks and cardiovascular disease conferred by the 9p21 gene appears to be modified by a prudent diet high in raw vegetables and fruits for South Asian, Latin American, Arab, Chinese and European populations for variants in rs4977574
- The recommended amount of fiber is up to 25 grams per day for women and up to 38 grams per day for men

Longevity

Prebiotic Fiber

Prebiotic dietary fiber refers to a type of dietary fiber that modifies the composition and function of the gut microbiota through its fermentation by microorganisms in the intestine, thereby providing a favorable physiological effect. Short-chain fatty acids (SCFAs) are produced when gut bacteria ferment dietary fiber. SCFAs have anti-inflammatory and immunomodulatory effects and offer preventive effects against cardiovascular disease, obesity, diabetes, and cancers, reducing mortality rates.

- Your genotype combination of FUT2 and TC7FL2 is associated with a slighter higher than average requirement for prebiotic fiber
- Prebiotic foods include onions, garlic, leeks, chicory, pistachios, bananas, asparagus, artichokes, yacon syrup, and Tiger nuts
- For further metabolic benefits, these genes will also benefit from glycine, omega-3 fatty acids, olive oil, turmeric, and cinnamon

The Longevity Panel has been designed to address genetic susceptibilities of the most common cause of disease and shorter lifespans through oxidative stress. The SNPs chosen for this panel start with the highest impact SNPs – FOXO3 and APOE – followed by SNPs found or influenced by the pathways governed by FOXO3 and APOE.

The functional capacity of immune cells and the ability to cope with oxidative stress have been proposed as significant markers of health and longevity. In both animals and humans, those who reach exceptionally old age have immune markers the same as young adults.

Research shows that people who live the longest have the best-preserved antioxidant system and the highest glutathione levels.[1] A study looked at a variety of biomarkers in old people (age 85–99), centenarians (100), semi-supercentenarians (105+), and supercentenarians (110+) and found that low inflammation was the only biomarker that predicted survival and cognitive capabilities across all age groups.

In another study looking at centenarians' antioxidant status compared to those of healthy young (aged 25–35) and middle-aged (aged 65–75) men and women, centenarians showed the same glutathione levels as young adults and the highest catalase activity of the three groups.[2]

Longevity Panel Modules and SNPs

The Longevity Panel analyzes SNPs that influence the susceptibility to the most common diseases and causes of mortality globally. Starting with FOXO3 and APOE, we review SNPs that affect baseline levels of endogenous antioxidant levels, oxidative stress and DNA damage, genetic risks of elevated Lp(a), the microbiome, metabolic responses, methylation, and detoxification.

Modules

- Exercise Programming
- Glutathione
- Superoxide Dismutase
- Catalase
- Glutathione Peroxidase
- Fasting Insulin
- Lp(a)
- Folate
- Choline and Betaine
- Serum B12
- B6

- B2
- Magnesium
- Soluble and Insoluble Fiber
- Prebiotic Fiber

SNP List

- APOE
- FOXO3
- ACTN3
- GSTM1
- GSTP1
- SOD2
- CAT
- GPX1
- PEMT
- MTHFR 677
- MTHFR 1298
- NBPF3
- CBS
- FUT2
- COMT
- LPA
- 9p21
- TCF7L2

Gene Highlight: FOXO3

FOXO3 is a master regulator of the response to oxidative stress. It increases the expression of SOD2 and catalase, maintains the stem cell pool, boosts or lowers stress resistance, influences insulin sensitivity, modulates DNA damage, coordinates cell detoxification and survival, and more. FOXO3 gene expression plays a pivotal role in longevity by protecting against Type 2 diabetes, cardiovascular disease, cancer, and neurological disorders.

The FOXO3 rs2802292 SNP has the strongest association with longevity, with carriers of the protective G-allele having a 1.9-fold increased probability of living past 95 years of age, and an odds ratio for extreme longevity of 2.75 when compared to TT genotype[3].

We are discovering that personalized medicine is becoming dependent on understanding how certain genotypes respond or do not respond to specific therapies.

Researchers have stated that “the FOXO3 SNP rs2802292 might help identify responders vs non-responders to conventional therapies, calorie restriction and/or dietary supplements, as well as predict the outcome of personalized approaches for age-related diseases.

Researchers have also hypothesized that “FOXO3 agonists could potentially be used to protect adult stem cells and so prevent their loss with aging,” but this strategy may only be effective for those with reduced FOXO3 gene function.

The same is true of other genes in this panel, which enables the practitioner and patient to narrow the focus and increase the probability of a successful approach.

Gene Highlight: APOE

APOE is a lipid-binding protein that transports triglycerides and cholesterol in multiple tissues, including the brain.

Genome-wide association studies have linked extreme longevity with the APOE e2/e3 genotype and reduced longevity in E4 carriers with cognitive impairment. The current data shows having one APOE e4 gene doubles or triples the risk of getting Alzheimer's disease, while two e4 alleles increases the risk of eight to twelvefold[4].

However, research has also shown that APOE-e4 is highly responsive to diet, exercise, and environmental strategies where the risk can be reduced to that of the average population. For example, cardio exercise alone for 30 minutes a day, five days a week, has been found to dramatically reduce the risk of e4 and Alzheimer's disease and improve lipid markers.

Inflammation

Low inflammation is the most predictive biomarker for survival and cognitive capabilities across all age groups. Factors that promote systemic chronic inflammation can lead to several diseases that collectively represent the leading causes of disability and mortality worldwide. These include infections, physical inactivity, poor diet, environmental toxins, and psychological stress. In turn, chronic inflammation is associated with cardiovascular disease, cancer, Type 2 diabetes, chronic kidney disease, non-alcoholic fatty liver disease, and autoimmune and neurodegenerative disorders[5].

The Longevity panel’s foundation maps the genes with the highest impact on inflammatory markers. APOE affects infection risk, the LDL dietary response, and environmental toxin sensitivity for cognitive health. FOXO3 is the gatekeeper for the oxidative stress response to the brain and the body, influencing the endogenous antioxidant system genes and affecting how we respond to numerous stressors.

Each gene highlights the biochemical pathways for the main routes of inflammation through the requirements for endogenous antioxidant systems, methylation, physical training, Lp(a), and pancreatic function. This panel provides one of the most precise genetic panels for the most significant inflammatory pathways of disease.

Heart Disease

The leading cause of death in the world is heart disease for both men and women. From the year 2000–2019, it has had the most significant increase in death, rising by more than 2 million to 8.9 million deaths, with strokes being the 2nd leading cause of death[6].

All SNPs in the longevity profile are related to cardiovascular outcomes.

FOXO3 protects the heart and blood vessels and regulates autophagy, proliferation, cell size, and cell survival in cardiac cells.

Long-lived men with the GG genotype of FOXO3 rs2802292 showed a lower prevalence of cancer and cardiovascular diseases along with greater insulin sensitivity compared to younger controls[7].

One example of cardiovascular disease risk is targeting FOXO3 gene expression for T-allele carriers. This includes any of the following based on other individual requirements: calorie-restricted diets, curcumin, green tea, piceatannol, chrysin, genistein, olive oil, garlic, Moringa oleifera extract, tart cherry extract, blueberry extract, apple peel extract, pomegranate juice extract, berberine, astaxanthin, malate, melatonin, luteolin, fisetin, phosphatidylcholine, n-acetyl-cysteine, NAD, PQQ, rhodiola rosea, quercetin, and Metformin.

Cancer

As of 2022, lung cancer is the most commonly occurring cancer worldwide. Female breast cancer ranked second, followed by colorectal cancer, prostate cancer, and stomach cancer.

Low levels of FOXO3 protein expression have been associated with poor prognosis in several types of tumors, including lung cancer, breast cancer, stomach cancer, ovarian cancer, and liver cancer.

BRCA1 and FOXO3 are considered two core tumor suppressors in breast cancer. BRCA1 deficiency is associated with downregulation of the expression of FOXO3, affecting breast cancer growth.

High FOXO3 expression is associated with low histological grades, low tumor stages, lymph node negativity, and better survival in breast cancer patients, and suppresses the estrogen-dependent breast cancer tumorigenesis in vivo.

This suggests that agents that activate FOXO3 may be novel therapeutic agents that can inhibit and prevent tumor proliferation and development.

As mentioned in the heart disease section, FOXO3 has improved gene expression from calorie-restricted diets, curcumin, green tea, piceatannol, chrysin, genistein, olive oil, garlic, Moringa oleifera extract, tart cherry extract, blueberry extract, apple peel extract, pomegranate juice extract, berberine, astaxanthin, malate, melatonin, luteolin, fisetin, phosphatidylcholine, n-acetyl-cysteine, NAD, PQQ, rhodiola rosea, quercetin, and metformin[8].

Alzheimer's Disease

Alzheimer's disease and other forms of dementia are currently the 7th leading cause of death.

While the current data shows having one APOE-e4 gene doubles or triples the risk of getting Alzheimer's disease and having two e4 alleles increases the risk eight to twelvefold, research has also shown that APOE-e4 is highly responsive to diet, exercise, and environmental strategies.

APOE-e4 increases sensitivity to oxidative stress. FOXO3, glutathione, catalase, SOD2, PEMT, methylation SNPs, and TCF7L2 will all assist with a comprehensive patient plan to address all potential ways to reduce the risk of Alzheimer's disease and other forms of dementia.

The longevity panel provides numerous strategies that have been proven to target APOE and reduce the risk of Alzheimer's disease. This also includes new research on FOXO3.For example, researchers found that the reduction of cognitive disability from tea was dependent upon the FOXO3 genotype, with carriers of the T allele for rs2802292 displaying significantly reduced risk for cognitive disability at advanced ages compared to non-risk carriers[9].

Type 2 Diabetes

Type 2 diabetes is now the 9th leading cause of death, which increases the risk of heart disease, cancer, and Alzheimer's disease. Insulin resistance increases with aging, but centenarians usually preserve normal glucose tolerance, low levels of fasting insulin and higher insulin sensitivity when compared to adults greater than 75 years of age.

All SNPs in the longevity profile are related to improving the oxidative stress and metabolic profile for Type 2 diabetes. The standout genes include FOXO3, TCF7L2, and 9p21.

The anti-diabetic drug Metformin and the polyphenol resveratrol have been identified as calorie restriction mimetics that trigger FOXO3 expression by activating AMPK. Nicotinamide may be protective through targeting FOXO3, protecting pancreatic β-cell function.

The TCF7L2 gene has become the strongest indicator of Type 2 diabetes and gestational diabetes risk for multiple ethnicities in studies. A meta-analysis also found an association with breast, prostate, and colon cancer risk. This gene is highly responsive to dietary macronutrient changes, including glycine, omega-3 fatty acids, olive oil, turmeric, and cinnamon.

The homozygous 9p21 rs1333049 SNP has been shown to increase fasting insulin levels by 40% in those following a low-fiber diet compared to a high-fiber diet, whereas this was not seen in those without the risk allele.10 Discovering this genotype may help patients comply with dietary changes.

Discussion

The Longevity Panel is a revolutionary approach to preventative medicine. Through genetic analysis, we now have the technology and research to provide individualized protocols with a higher likelihood of success. The panel's application provides the opportunity to reduce the risks of the top causes of mortality while pushing the boundaries of what will be considered exceptional longevity in the future.

Sources

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