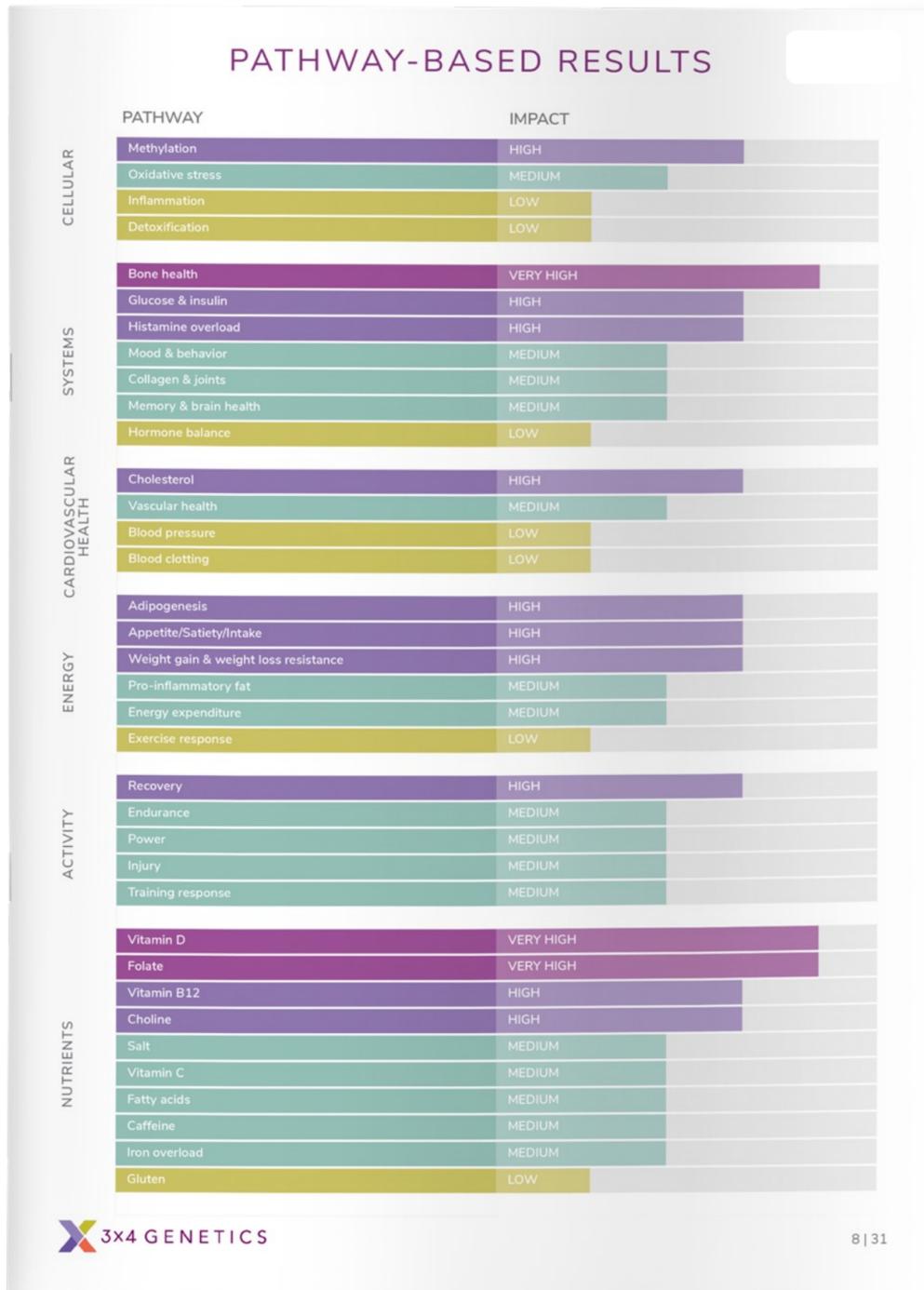


BRAIN HEALTH

ANXIETY CASE REPORT

40 y/o married mother of 2, managerial position, endurance athlete



PRIMARY CONCERNS

- Anxiety and apathy.
- Chronic fatigue exacerbated by extreme exercise.
- Weight gain despite low-calorie meal replacement shakes.
- Family history of addiction, depression, and both parents died of cancer.

GENETIC FINDINGS

- Poor methylation contributes to reduced ability to make dopamine (apathy).
- Reduced ability to calm neuroexcitation (anxiety and adrenal fatigue).
- High impact on glucose & insulin, bone health, and recovery pathways.
- Need to focus on rest and recovery, glucose levels, and resolving oxidative stress from exercise (chronic fatigue).

THERAPEUTIC INTERVENTION

- Foods to support methylation and blood glucose control.
- Allow for recovery days after exercise.
- Supplements: GABA at bedtime, Adaptogens e.g. Rhodiola/Ashwagandha, Sulforaphane

FOLLOW-UP & OUTCOMES

- Targeted blood testing confirmed adrenal fatigue.
- After 1 month anxiety had resolved and energy levels improved.
- Better focus and coping ability.
- Efficient recovery from exercise, and improved results in endurance events.

KEY LEARNINGS

- The 3X4 Genetics report gave insight into how she processes neurotransmitters, impacting her response to high work pressure, and the balance between overstimulation and calm.
- Supporting glucose and insulin regulation and reducing oxidative stress improved energy levels.
- Despite her desire to take part in high-intensity endurance events, she is likely to see better performance in medium-intensity & duration events.
- To continue with a high training load, and to prevent fatigue, there is an increased requirement to support recovery.
- Consider bone health to prevent stress fractures and bone loss later in life.

COST SAVING

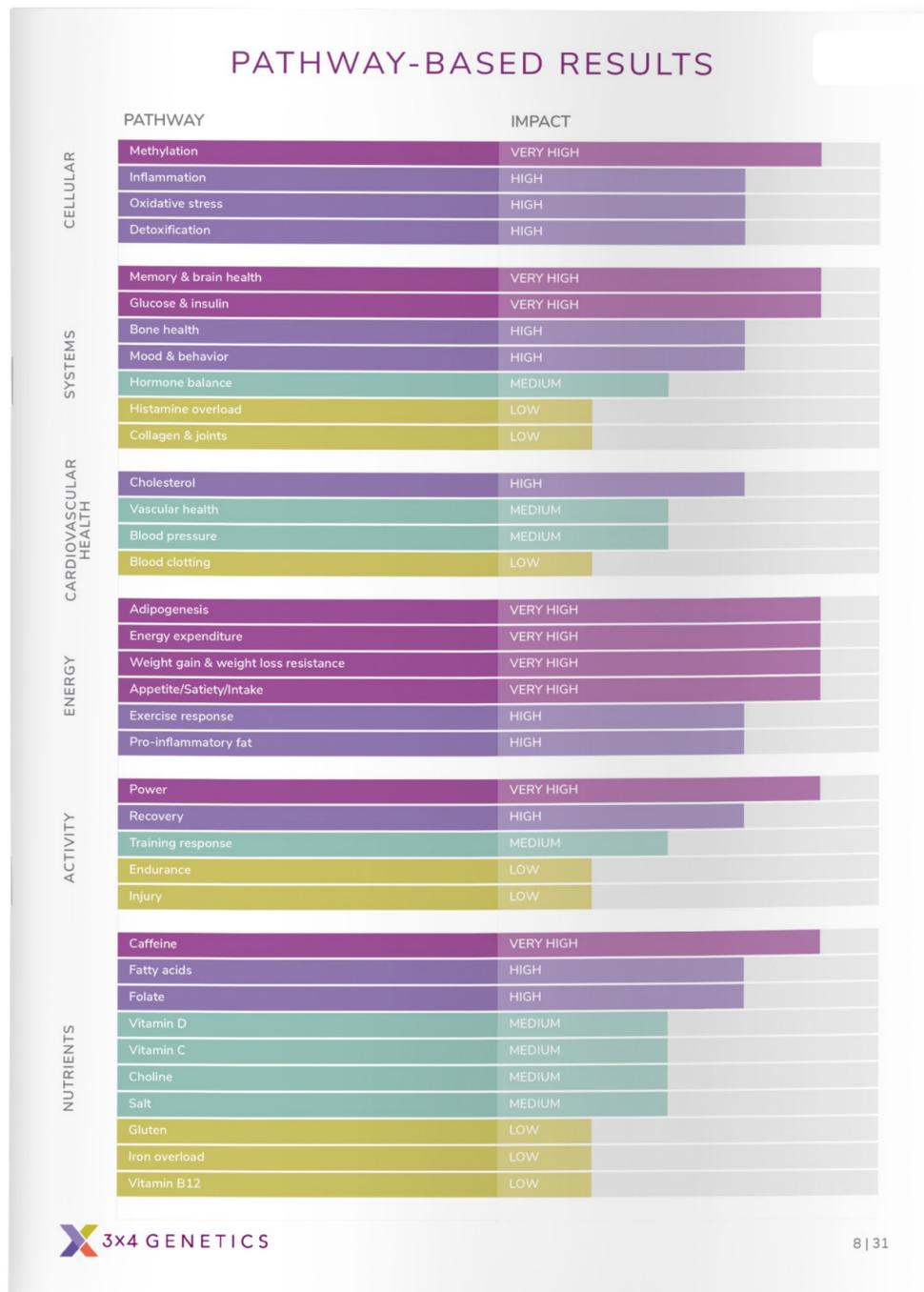
- Lost productivity due to depression and anxiety has been estimated to cost the global economy US\$ 1 trillion per year, reaching \$16 trillion by 2030.
- Depression costs US employers approximately \$187 billion a year, including \$134 billion in health care, \$20.9 billion in absenteeism, and \$32.9 billion in lost productivity.
- Direct medical costs associated with anxiety disorders were estimated at \$1657 per person, or \$33 billion in total annually.
- Lost productivity due to fatigue is costing American businesses about \$136 million annually.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*

BRAIN HEALTH

COGNITIVE DECLINE PREVENTION

CASE REPORT

24 yo Single female, Graduate Biomedical Engineer & Student of medicine



PRIMARY CONCERNS

- Recent weight gain, and elevated cholesterol.
- Family history of Alzheimer's, dementia, and Type 2 diabetes.

GENETIC FINDINGS

- Glucose and insulin pathway highlights propensity towards type 2 diabetes and possible contributor to weight gain.
- Very high impact in memory and brain health pathways, including APOE E3/E4 genotype, may have contributed to her family history of Alzheimer's and dementia.
- High impact in cholesterol pathway, including APOE E3/E4, explains elevated cholesterol.
- All pathways in the energy category are highly impacted. This combined with changes in eating habits may have contributed to recent weight gain.
- High impact in mood & behavior pathway gives insight into comfort/stress eating.

THERAPEUTIC INTERVENTION

- More home-cooked meals including fatty fish and dark green leafy vegetables.
- Avoid high-fat processed convenience foods.
- Increase daily physical activity for dopamine support, stress management, and to prevent cognitive decline.
- Good sleep hygiene for stress management, brain health, and weight loss.
- Supplements: Methylated B-complex, Sulforaphane, SOD-activated *Cucumis melo* extract, Omega-3 fatty acids

FOLLOW-UP & OUTCOMES

- Observed increased self-awareness to manage diet and lifestyle choices to reduce susceptibility to family-associated conditions.
- She is making diet and lifestyle changes to mitigate the risk associated with family health concerns, and to manage her current symptoms.
- She has lost weight, especially visceral fat.

KEY LEARNINGS

- The 3X4 Genetics report gave insight into her family history, and her propensity for associated conditions like cognitive decline, dyslipidemia, and type 2 diabetes.
- In addition to addressing glucose control and cholesterol levels, it is imperative that upstream pathways like methylation, inflammation, oxidative stress and detoxification be addressed.
- She has always had a slender physique, but the genetic report made her aware that she has a predisposition to gain weight when making poor diet and lifestyle choices.
- The potentially impaired ability to regulate neurotransmitters may contribute to her mood, and impact eating behavior.

COST SAVING

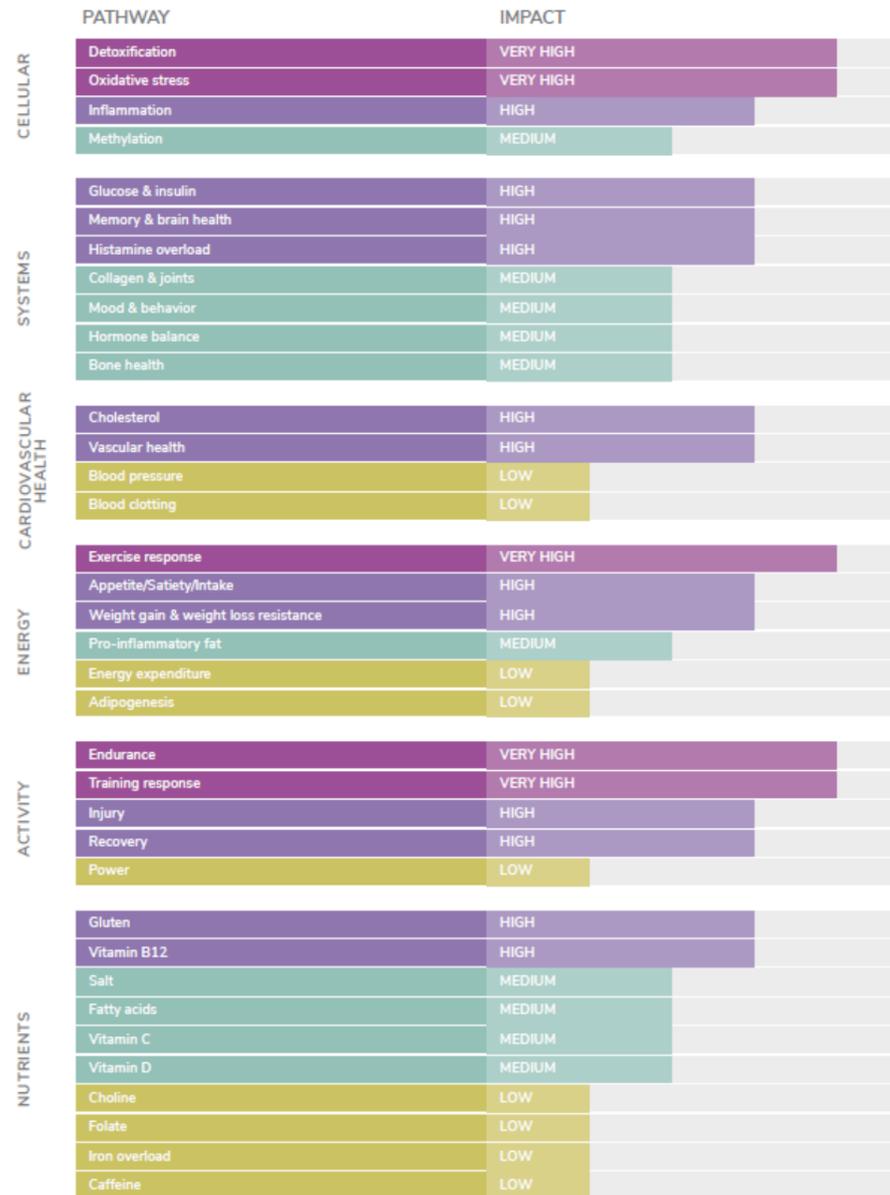
- The American Diabetes Association found the annual cost of diabetes in 2022 to be \$412.9 billion, \$306.6 billion in direct medical costs and \$106.3 billion in indirect costs.
- Diabetics incur medical expenditures of \$1644 each month
- Avoid and delay assisted living residential care (memory or other chronic disease) \$6,160/month, or 44 hours a week of in-home care is \$4,957.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*

BLOOD SUGAR REGULATION

CARDIOMETABOLIC CASE REPORT

56 y/o male, working in food import and export, travels a lot

PATHWAY-BASED RESULTS



PRIMARY CONCERNS

- Known diabetic with a history of strokes, high blood pressure, and cholesterol.
- Complete occlusion in the femoral arteries for which a stent was placed.
- Sister had a heart attack in her 40's.
- Weight loss resistance – could not sustain weight loss on a ketogenic diet and felt unwell.

GENETIC FINDINGS

- High impact in detoxification, inflammation, and oxidative stress cellular pathways, underlie chronic disease.
- APOE E3/E4 genotype impacts inflammation, vascular and, cholesterol health.
- High genetic impact in cholesterol and vascular health pathways contributed to stroke, hypertension, and dyslipidemia, and gives insight into his family history.
- Glucose & insulin and energy pathways contribute to his weight challenges. The ketogenic diet may have helped with glucose regulation, but its high saturated fat profile may contribute to poor insulin sensitivity and rebound weight gain.

THERAPEUTIC INTERVENTION

- Mediterranean-type diet with quality fruit and vegetables, and fatty fish to support glucose/insulin balance, vascular health and APOE E3/E4 responds exceptionally well to this type of intervention.
- Removed processed foods, include whole-grain starchy carbohydrates, and low-sugar fruits like berries.
- Gentle walking or swimming to increase mobility, circulation, and cardiovascular fitness.
- Supplements: High dose Omega-3, Sulforaphane, SOD-activated *Cucumis melo* extract, and Methylated B vitamins

FOLLOW-UP & OUTCOMES

- Weight loss and energy improvements.
- Recovering well from stent surgery.
- Planned a detoxification protocol intervention soon as he is well enough.

KEY LEARNINGS

- The 3X4 Genetics report helped to identify/confirm the complications associated with diabetes including dyslipidemia, vascular disease, and highlighted possible contributors to his sister's heart attack at a young age.
- Understanding the genetic pathways that contribute to weight gain, enabled targeted intervention and the best eating plan for sustained weight loss.
- Key upstream factors detoxification, inflammation, and oxidative stress, identified in the genetic report, are all contributors to cardiometabolic disease, and weight gain. These need to be resolved before any downstream pathways can be resolved.

COST SAVING

- More than 877,500 Americans die of heart disease or stroke every year—that's one-third of all deaths. Costing the health care system \$216 billion per year, and \$147 billion in lost productivity.
- More than 2 million stents were implanted in the US, up from 170,000 stents in 2016, and almost none in 2010.
- The average cost of cardiac stent procedures ranges from \$11,000 to \$41,000, or more.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*

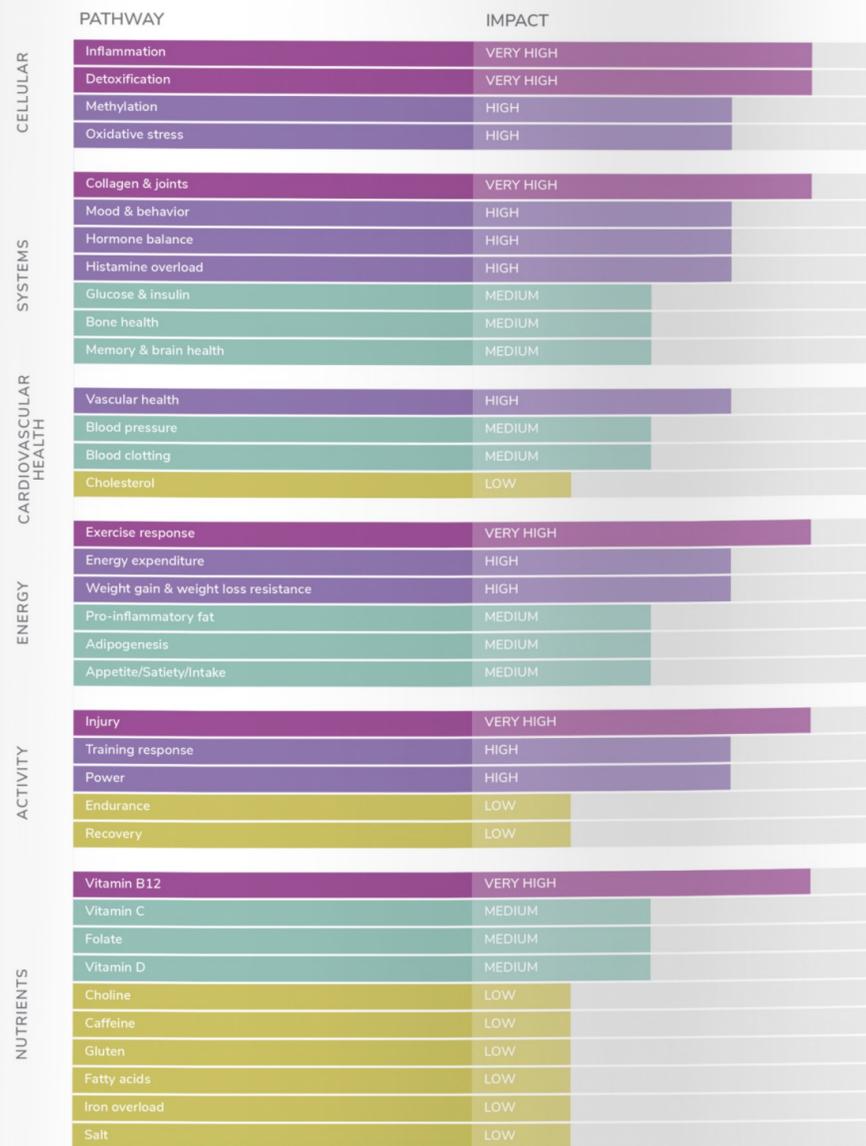
CARDIOVASCULAR

CORONARY ARTERY DISEASE

CASE REPORT

57 y/o post-menopausal female executive in a high-stress environment.

PATHWAY-BASED RESULTS



PRIMARY CONCERNS

- Diagnosed age 40 with CVD with a coronary calcium scan.
- No dyslipidemia. Prescribed a statin as part of a standard protocol but discontinued due to side effects. Still concerned about vascular health.
- Presented with dermatitis, autoimmune markers, and gut dysbiosis.
- Frustrated with unsuccessful attempts to address her health concerns.

GENETIC FINDINGS

- Highly impacted cellular pathways, histamine overload, vascular health, and hormone balance. Together these would contribute to vascular damage, autoimmunity, and dermatitis.
- Low impact in cholesterol pathway indicates that statins were not necessary, and focus could be shifted to vascular health and endothelial cell repair.
- Detoxification and histamine genes contribute to gut dysbiosis.
- Collagen and joint, and Vitamin B12 pathways contribute to gut and skin dysfunction.
- High impact on mood and behavior flags the importance of stress management and support, impacting gut and cardiovascular health.

THERAPEUTIC INTERVENTION

- Following a low histamine diet and supporting histamine breakdown.
- Included foods that support detoxification, methylation, and hormone balance to help reduce autoimmune markers.
- Introduced moderate exercise and relaxation techniques to manage stress and support methylation, inflammation, and connective tissue.
- Add foods rich in nutrients that support connective tissue.
- Supplements : Vitamin D3, B12, collagen and Omega 3

FOLLOW-UP & OUTCOMES

- At 6-month follow-up a coronary calcium scan revealed no progression of cardiovascular lesions.
- Autoimmune markers were reduced and gut dysbiosis resolved.
- Improved energy levels and ability to deal with daily stressors in her work environment.

KEY LEARNINGS

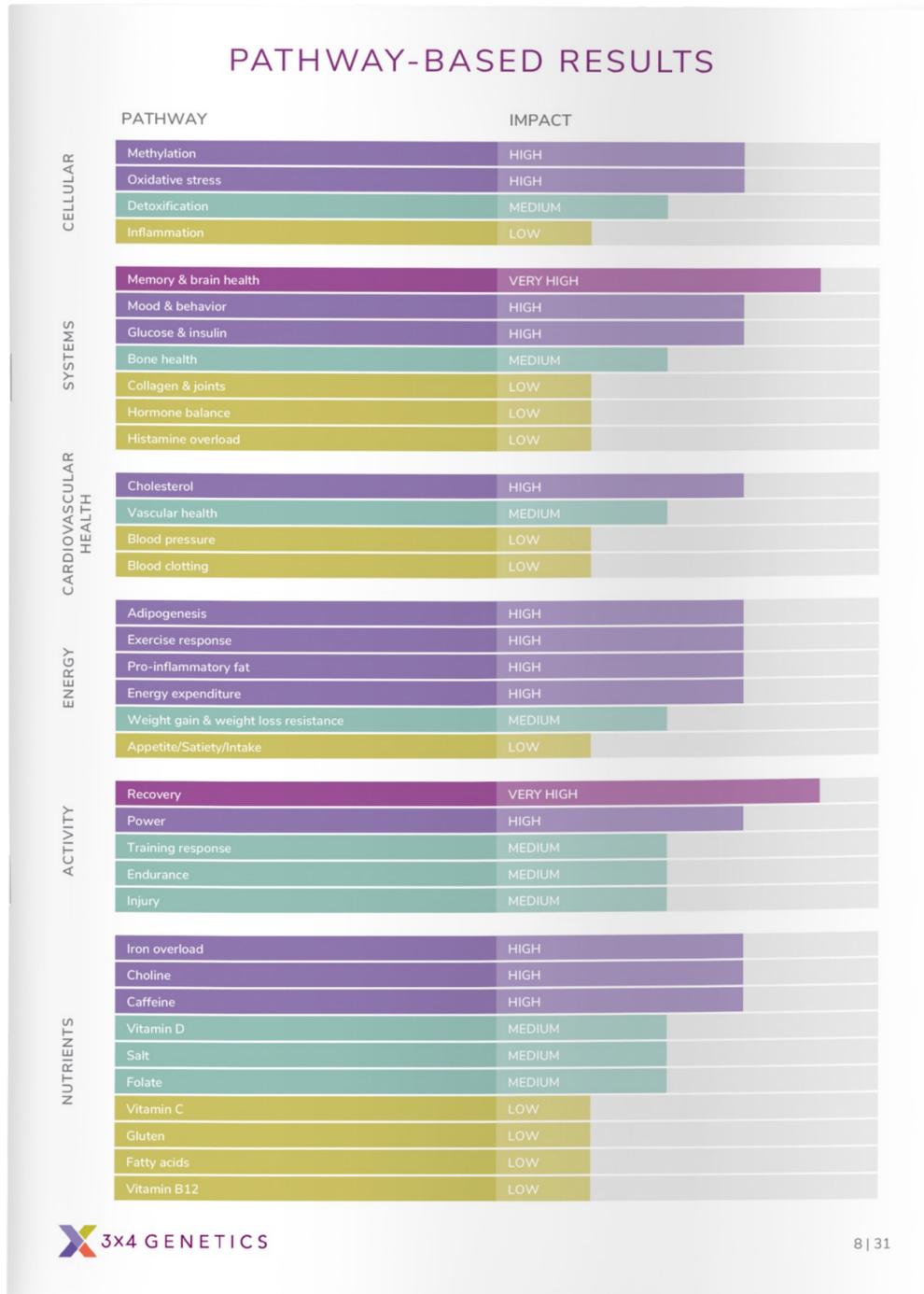
- The genetic test highlighted that to support vascular health and reverse CVD, the upstream cellular functions; inflammation, methylation, detoxification, and oxidative stress need attention, as they are crucial for the repair of endothelial tissue.
- Optimizing cellular pathways for the repair of epithelial cells is also imperative in resolving gut dysbiosis and supporting immunity.
- The test revealed possible dysfunction concerning histamine overload, hormone balance, connective tissue repair, neurochemical balance, and vitamin B12 metabolism. All may contribute to dermatitis and gut dysbiosis.
- Understanding the genes that contributed to vascular dysfunction, gave insight into the use of diet and lifestyle intervention, rather than a statin.

COST SAVING

- Statin use increased by 149%, from 37 million in 2012–2013 to 92 million users in 2018–2019.
- Statins prescriptions increased from 461 million to 818 million between 2008 and 2019.
- Brand-name statins range from \$200–\$500 per month.
- In 2022, Medicaid spent \$314.3 million on 28.6 million pharmacy prescription claims for statin medications.
- There are several side effects from statins.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*

BLOOD SUGAR REGULATION HEMOCHROMATOSIS CASE REPORT

37 y/o male retired athlete



PRIMARY CONCERNS

- Diagnosed with early adult-onset Type 2 Diabetes at age 36.
- Goal is optimal blood sugar management and prevention of complications.
- Has experienced fatigue, joint pain, and weight gain.
- Previously diagnosed with ADHD and experienced brain fog.
- Family history of cardiovascular disease.

GENETIC FINDINGS

- High genetic impact in oxidative stress, methylation, glucose & insulin, and memory & brain health pathways, contribute to a predisposition to diabetes, brain fog, fatigue, and joint pain.
- High risk for hemochromatosis, an iron overload condition, often undiagnosed. High levels of iron cause oxidative stress, organ damage, and fatigue.
- High impact in the recovery pathway requires active recovery strategies after training.

THERAPEUTIC INTERVENTION

- Confirmed hemochromatosis through a blood test. Advised phlebotomy.
- Diet, lifestyle, and supplements to support oxidative stress, inflammation, brain function, glucose regulation, and iron levels. Encouraged to follow a plant-based diet, high in fiber, including foods that bind iron.
- Avoid alcohol, sugar, saturated fats, & caffeine.
- Adjust exercise regimen to include recovery.

FOLLOW-UP & OUTCOMES

- At 2 months, reduced fatigue and joint pain, blood glucose normalized, and iron levels improved.
- At 6 months iron levels normalized, and diabetes was managed on diet and exercise alone.
- Cycling and running pain-free for the first time in 5 years.
- Mental clarity and energy levels improved.

KEY LEARNINGS

- The high impact of the Iron overload pathway led to the diagnosis and treatment of hemochromatosis.
- Iron overload causes damage to organs such as the liver and pancreas and contributes to the development of diabetes early in life despite following a healthy lifestyle.
- In addition to the hemochromatosis diagnosis, the combination of genes in the glucose and insulin, oxidative stress, methylation, and brain health pathways gave insight into resolving brain fog and fatigue, and preventing complications associated with diabetes such as cognitive decline, nerve and kidney damage.
- Optimal recovery after training reduced oxidative stress, muscle pain and fatigue. Resulting in greater athletic performance and productivity at work.

COST SAVING

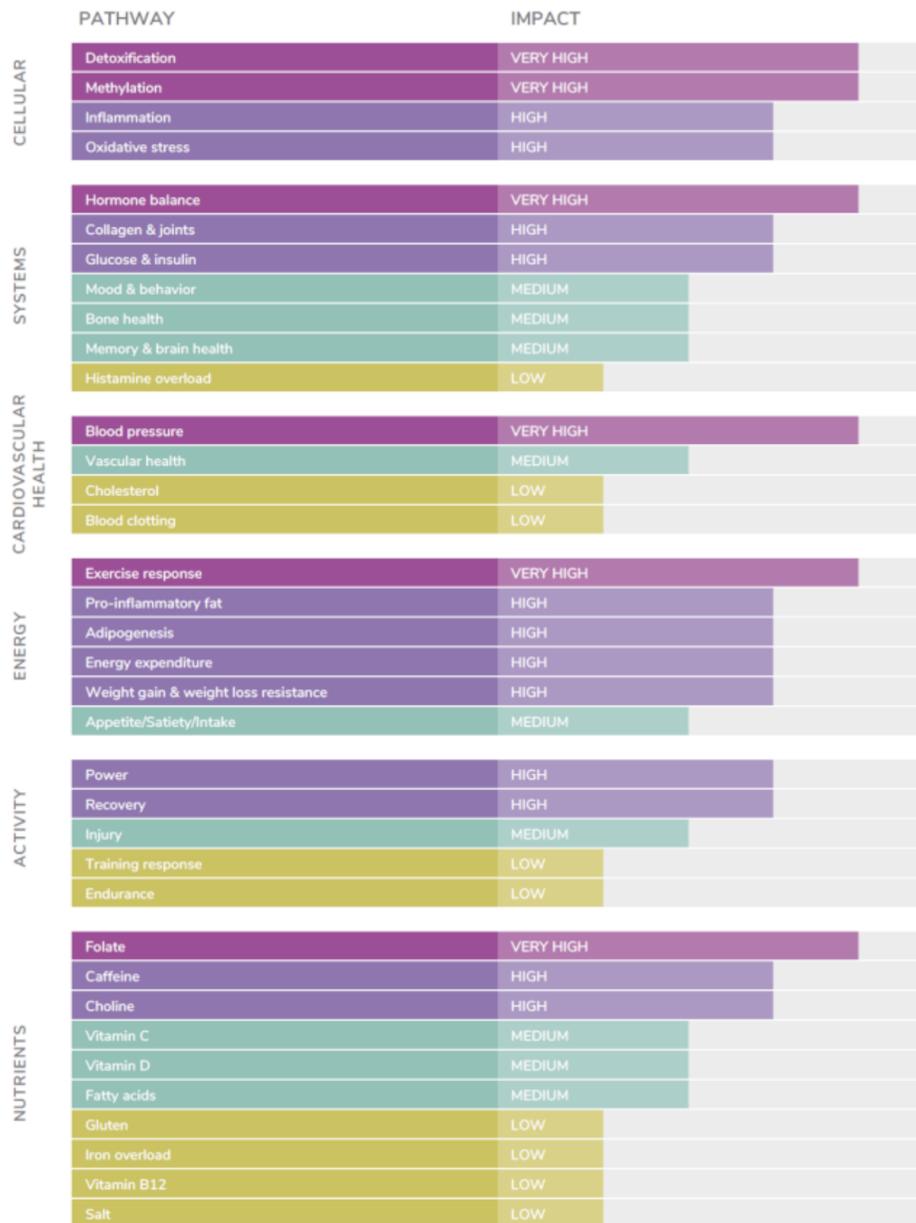
- Hemochromatosis (HH) is preventable and treatable, justifying early case screening (UK Biobank).
- Screening for HH by liver biopsy costs between \$1,500 to \$8000 per case.
- The cost of HH DNA test is between \$533 - \$699 at commercial laboratories.
- A 3X4 Genetic test (\$300) can identify HH, confirmed with serum transferrin (\$48 - \$200).
- The Canadian Hemochromatosis Society proposes early HH screening saving the healthcare system tens of millions of dollars.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*

HORMONE HEALTH

HAIR LOSS CASE REPORT

41 y/o married female nurse

PATHWAY-BASED RESULTS



PRIMARY CONCERNS

- Menopausal symptoms of which hair loss was greatest concern.
- Hair thinning with no success from any products or treatments.
- History of irregular menstrual cycles and infertility.
- Family history of breast and prostate cancer.

GENETIC FINDINGS

- High-impact detoxification and oxidative stress pathways.
- Hormone balance revealed a genetic impact on the methylation of estrogen, detoxification of testosterone and prostaglandins, androgen metabolism, and removal of toxins. All contribute to hair loss.
- Additional contributors include glucose & insulin, and collagen synthesis.
- High folate, choline, and methylation pathways may contribute to infertility and hormonal imbalance.

THERAPEUTIC INTERVENTION

- Focused on detoxification, hormone balance, glucose & insulin, and collagen for hair health.
- Blood tests revealed raised blood glucose levels, hormonal imbalance, and low T3 levels.
- Diet, lifestyle & supplement recommendations focused on phase 2 detoxification and methylation support for the balance of hormones, catecholamines, blood glucose, and collagen formation.
- Supplements included vitamin A, D3, sulforaphane, berberine, choline, methyl-folate, & selenium.

FOLLOW-UP & OUTCOMES

- At 1 year - hair loss diminished, hair was thicker and healthier.
- Menstrual cycle shorter and more regular.
- Lost 10 lbs. and sleeping better.
- Advised on annual cancer screening and to monitor blood glucose.

KEY LEARNINGS

- Hair loss in females is associated with various etiologies including autoimmune conditions, aging, stress, hormonal imbalances, infections, nutrient deficiencies, and thyroid disease.
- The genetic test highlighted areas that may contribute to thinning hair and hormonal imbalances, and targeted testing further helped to ensure the most personalized treatment strategies.
- Knowing which genes impacted hormone balance and glucose and insulin, was considered for an effective support plan.
- Supporting detoxification, methylation, and oxidative stress supports the prevention of cancer and facilitates weight loss.

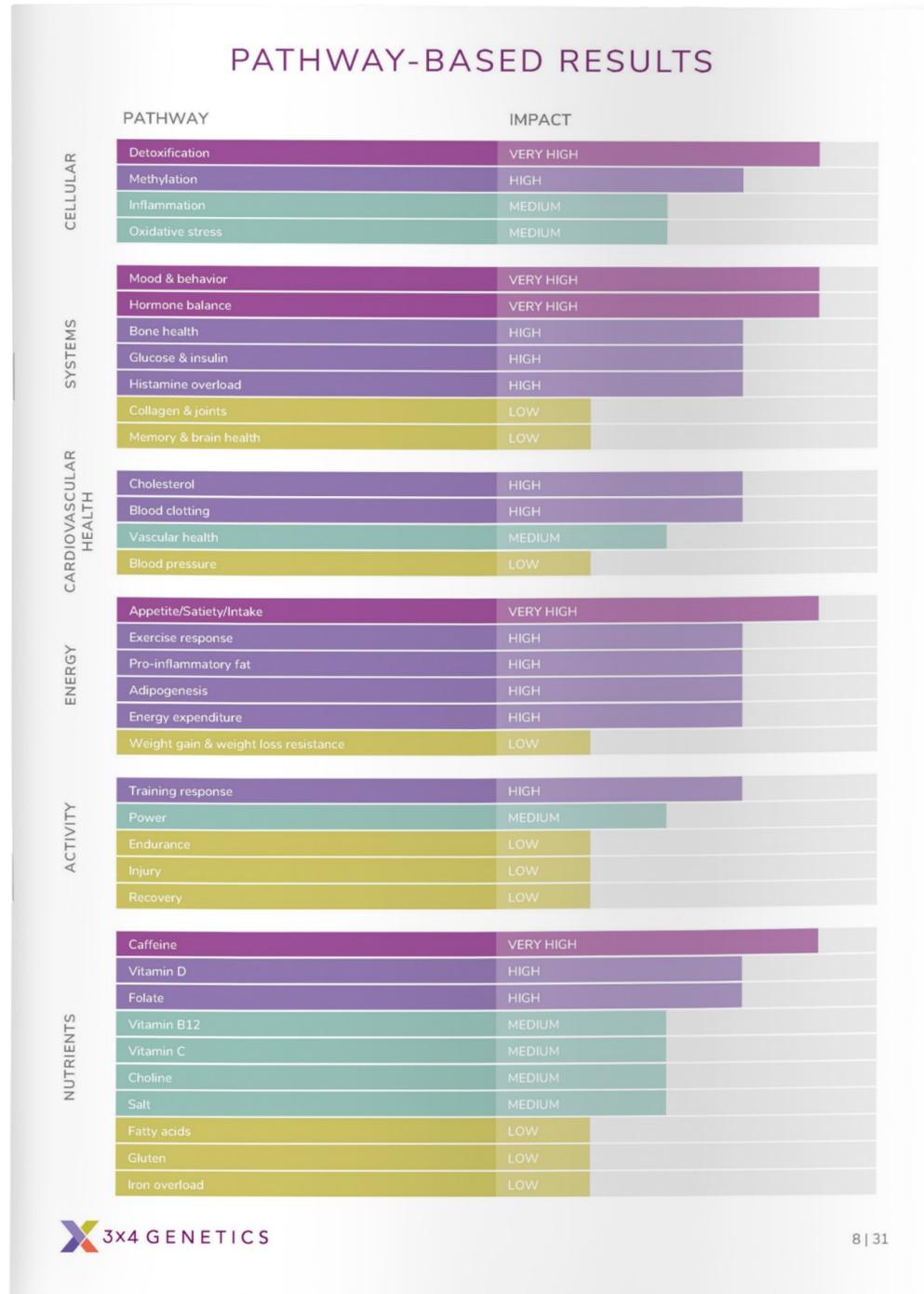
COST SAVING

- Alopecia treatment ranges from \$200 to \$7500 each month.
- Monthly costs include: Topical (\$40-\$1000), oral medication (\$2500-\$5000), corticosteroid injections (\$200-\$1000), platelet-rich plasma therapy (\$2500+), mesotherapy (\$250-\$600 per session) or a hair transplant (\$7500+)
- A stand-alone DNA test for hair loss is \$300. Relevant genes for hair loss, and diet and lifestyle recommendations are included in the 3X4 Blueprint.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*

CARDIOVASCULAR

DYSLIPIDEMIA CASE REPORT

38 y/o male, high-stress shift work and active lifestyle



PRIMARY CONCERNS

- Presented with extreme dyslipidemia, suddenly and inexplicably, accompanied by chronic pain impacting daily activities.
- Was following a popular high-fat keto-style diet which he modified to being oxalate-free with very few plant foods.
- Took large numbers of popular supplements.
- Family history of cardiovascular disease.

GENETIC FINDINGS

- High genetic impact in cholesterol, detoxification, methylation, glucose, and insulin pathways. Together with poor dietary choices, and shift work which impacts circadian rhythm, likely contributed to dyslipidemia, and inflammation, associated with chronic pain.
- Homozygous Factor V Leiden gene along with others in the blood clotting pathway increased the risk for thrombosis, compounding the risk for cardiovascular disease.
- The high histamine pathway may contribute to inflammation and chronic pain and requires diet adjustments.
- Thyroid function is potentially subclinical, flagged by homozygous DIO2 SNP.

THERAPEUTIC INTERVENTION

- Replace saturated fats with omega-3-rich foods.
- More plant foods for detoxification, methylation and to reduce blood clotting potential.
- Interventions to support detoxification like sweating and massage.
- Reduce clotting risk-associated activities such as travel by recommending pressure stockings and mobility.
- Tested thyroid, confirming the need to support thyroid function to increase T3.
- Moderate consumption of foods that trigger histamine or are high in histamine.
- Supplements: Omega – 3/Pro resolving mediators, Nattokinase, CoQ10, methylated B-complex with niacin

FOLLOW-UP & OUTCOMES

- After 6 months, TC of 812mg/dL came down to 340mg/dL and LDL from 600mg/dL came down to 243mg/dL.
- Chronic pain subsided, and he could resume his active lifestyle.

KEY LEARNINGS

- The results highlighted the factors that caused the sudden inexplicable hyperlipidemia and chronic pain, and how harmful his dietary choices were for him.
- Detoxification, methylation, glucose control, and cholesterol transport highlighted by genetics helped to formulate the treatment plan.
- A significant finding was the homozygous Factor V Leiden genotype which is associated with an up to 18-fold increased risk for thrombosis. Preventative measures could be implemented.
- High impact on the glucose and insulin pathway suggested the increased risk for the development of diabetes which is associated with shift work and poor dietary choices.

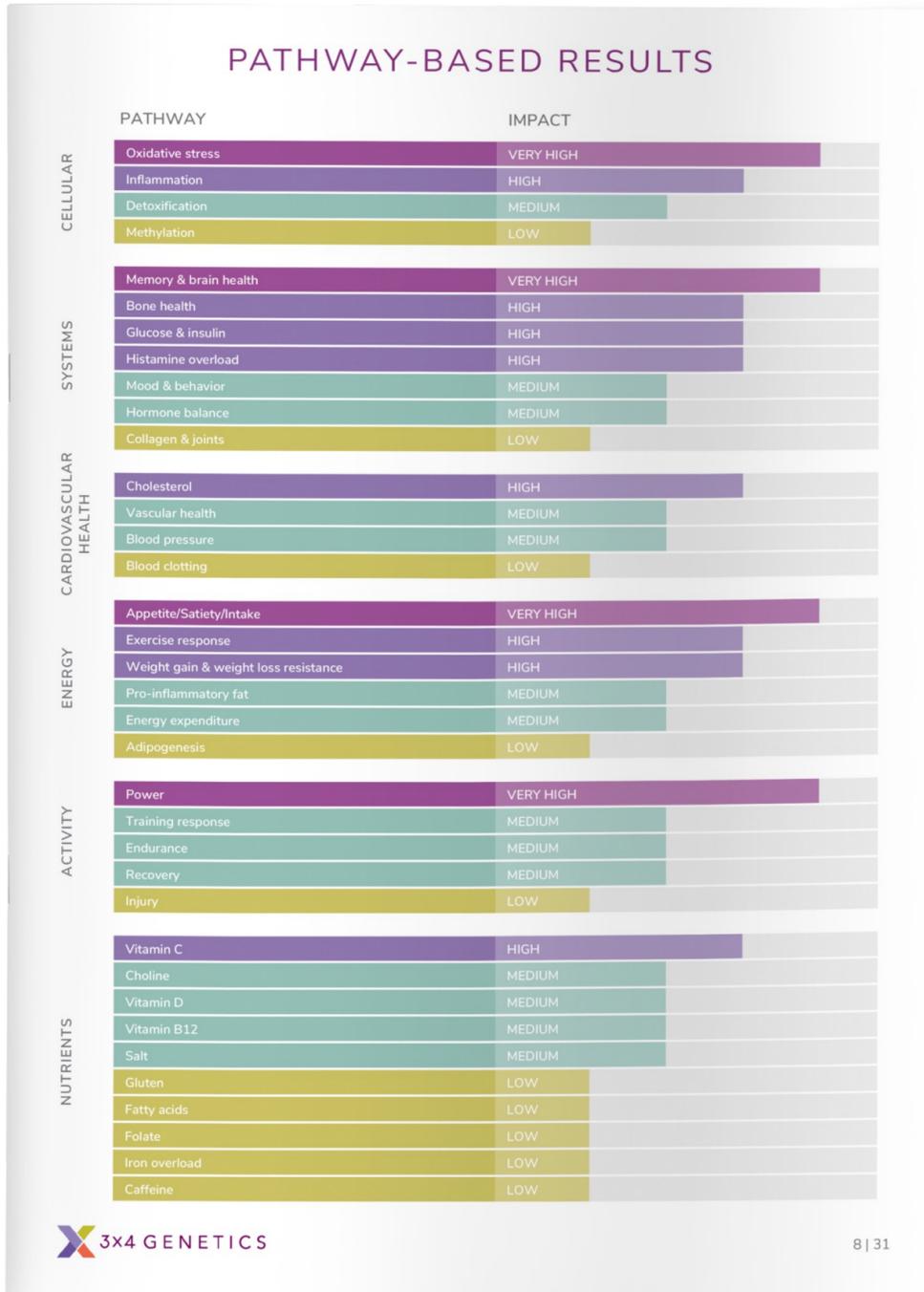
COST SAVING

- The cost-effectiveness of screening for blood clotting genes ranges from \$13,000 to \$23,000 / QALY (for 1 year of life in perfect health).
- A thrombophilia panel from Quest Diagnostics ranges from \$1311 to \$2429.
- The 3X4 genetic test includes a blood clotting pathway, enabling identification of DVT risk before the first event.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*

HORMONE BALANCE

MENOPAUSE CASE REPORT

50 y/o female, medical practitioner, ex-military position



PRIMARY CONCERNS

- Anxiety and apathy.
- Chronic fatigue was exacerbated by extreme exercise.
- Weight gain despite low-calorie meal replacement shakes.
- Family history of addiction, depression, and both parents died of cancer.

GENETIC FINDINGS

- Poor methylation contributes to reduced ability to make dopamine (apathy).
- Reduced ability to calm neuroexcitation (anxiety and adrenal fatigue).
- High impact on glucose & insulin, bone health, and recovery pathways.
- Need to focus on rest and recovery, glucose levels, and resolving oxidative stress from exercise (chronic fatigue).
- Thyroid function is subclinical, flagged by a DIO2 SNP.

THERAPEUTIC INTERVENTION

- Foods to support methylation and blood glucose control.
- Allow for recovery days after exercise.
- Supplements: GABA at bedtime, Adaptogens e.g. Rhodiola/Ashwagandha, Sulforaphane

FOLLOW-UP & OUTCOMES

- Targeted blood testing confirmed adrenal fatigue.
- After 1 month anxiety had resolved and energy levels improved.
- Better focus and coping ability.
- Efficient recovery from exercise, and improved results in endurance events.

KEY LEARNINGS

- Histamine overload contributed to headaches, anxiety and hormone imbalances.
- High impact in the detoxification, oxidative stress, and hormone balance pathways highlighted the areas to consider for personalized management of her menopausal symptoms.
- Focus on glucose & insulin regulation and thyroid/hormone balance highlighted by genetics, and improved symptoms.
- Very high impact in memory & brain health and high impact in glucose & insulin highlighted the need for preventative interventions to mitigate cognitive decline/type 3 diabetes.
- Supplement and medication recommendations were adjusted for better management.

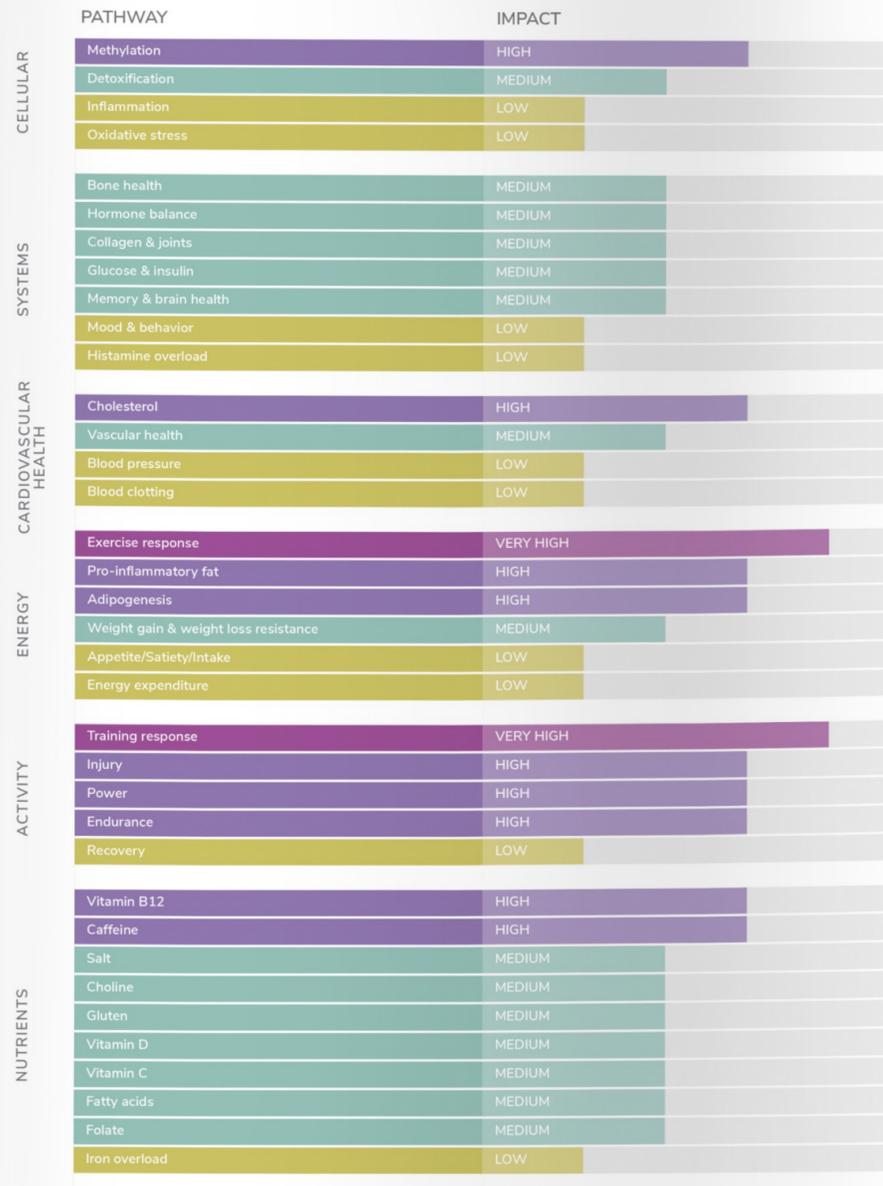
COST SAVING

- The Mayo Clinic estimates that menopause costs American women \$1.8 billion in lost working time per year, and nearly \$25 billion in medical costs can be attributed to menopause.
- Migraines require 3.8 - 5.6 bed rest days each year, costing employers about \$13 billion a year because of missed workdays and impaired work function.
- The financial cost of migraines in the USA is \$78 billion annually.
- Migraine treatment costs between \$2,500 to \$9,500 a year.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*

TISSUE HEALTH INJURY & GLUTEN CASE REPORT

15 y/o female student, rising basketball star

PATHWAY-BASED RESULTS



PRIMARY CONCERNS

- Asthma after two back-to-back bouts of COVID.
- Impact injuries to foot causing bone bruising.
- Hamstring injury.
- Poor recovery from injury and illness, negatively impacting her sports performance and training.
- Daily stomach aches.

GENETIC FINDINGS

- Genes in collagen and joint pathway show potential for hypermobility and ligament laxity which contributes to instability in the joints, increasing injury susceptibility.
- High impact in the injury pathway highlights the importance of conditioning ligaments, strengthening muscles and protecting bone.
- Very high impact in training response, and high in both power and endurance pathways infers superior fitness potential and the potential to excel in her chosen sport.
- HLA genes for gluten sensitivity contribute to immune and gut symptoms.

THERAPEUTIC INTERVENTION

- Include eggs & wild game more frequently, increase intake of non-starchy vegetables
- Remove gluten, choose naturally gluten-free carbohydrates like sweet potato, potato & rice instead.
- Avoid overstretching, work on strengthening muscles to support bones, joints and ligaments.
- Supplements: Methyl B-Complex, Pro-resolving mediators/Black Cumin Seed Oil, GABA at bedtime, Sulforaphane and Pomegranate extract

FOLLOW-UP & OUTCOMES

- Was only sick once this year compared to other flu seasons where she was frequently ill.
- Within 2 months daily intense stomach pain was significantly reduced, on some days absent.
- Recovered rapidly from two knee injuries in the summer basketball season, resulting in no downtime. Missed no practices or games.

KEY LEARNINGS

- Genetics confirmed the ligament laxity that the physical therapy staff suspected, allowing them to strengthen her body and make her more resilient to injury.
- The HLA gene result gave insight into the stomach pain. Removing gluten easily remedied the stomach aches.
- Having these insights made it possible to target the contributors to poor immunity and stomachache, and to keep her on the court and injury-free.

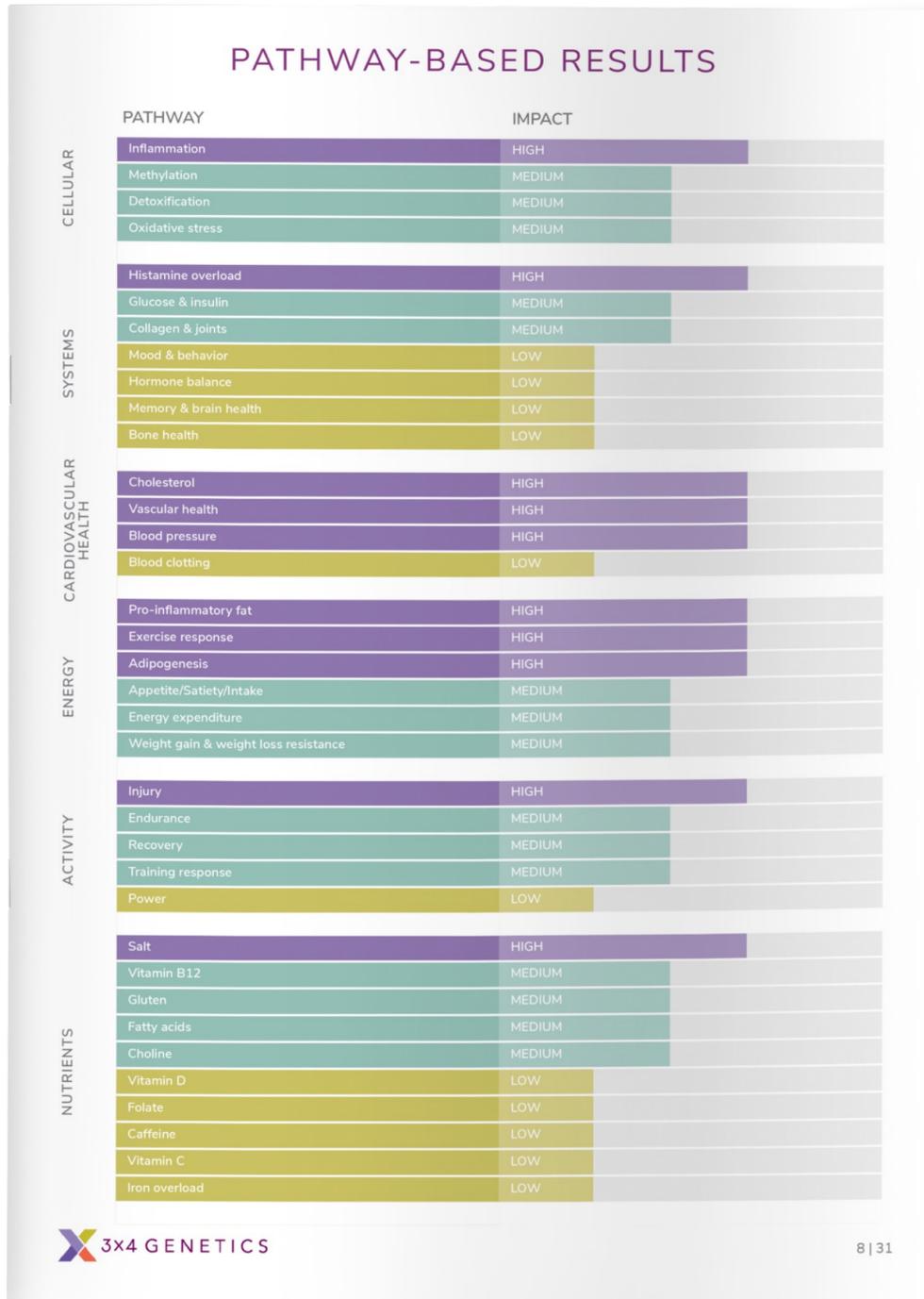
COST SAVING

- The annual cost of the common cold is between 25-40 billion USD per year and approx. 70-120 million lost work days (excludes COVID).
- In 2018, the annual US healthcare expenditure associated with abdominal pain was estimated to be \$9.5 billion.
- An estimated 12 million youths suffer a sport-related injury annually, leading to 20 million lost days of school and approximately \$33 billion in health care costs.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*

TISSUE HEALTH

INJURY & IMMUNITY CASE REPORT

20 y/o male struggling to transition into working life due to injury and illness



PRIMARY CONCERNS

- Struggled with recovery from illness and injury all his life.
- Mold exposure when very young.
- Multiple head and back injuries from sport and physical trauma.
- Most recent injury a herniated trapezius muscle from snowboarding.
- Fatigue when exercising.

GENETIC FINDINGS

- Poor ability to resolve inflammation, potentially contributing to compromised immunity and inadequate recovery from exercise.
- High histamine overload pathway further drives inflammation and compromises immunity.
- High-impact pathway for injury highlights susceptibility.

THERAPEUTIC INTERVENTION

- Removed highest-histamine foods and histamine-liberating foods, added foods known to help break down histamine.
- Worked on gut health using a specialized gut protocol.
- Gentle exercise program with extended recovery times.
- Supplements: DAO enzyme and Pro-resolving mediators
- B-complex with niacin

FOLLOW-UP & OUTCOMES

- Within the first week, he participated in a family event.
- After 6 weeks he was able to travel for a week with good energy.
- After 3 months took on a part-time job and reduced the frequency for massage from a total of 7 sessions in 2022 to only requiring 2 in 2023.
- After 4 to 6 months, he was able to exercise without extreme fatigue.
- After 7th month recovered faster than ever before from injury.
- Better immunity results in fewer sick days.

KEY LEARNINGS

- Genetics highlighted histamine as a driver of inflammation, decreased immunity, and fatigue.
- A reduced ability to recover from illness and injury may be attributed to his poor ability to resolve inflammation.
- Putting in place diet and lifestyle changes to support histamine breakdown has improved wellness, energy, and recovery from injury.

COST SAVING

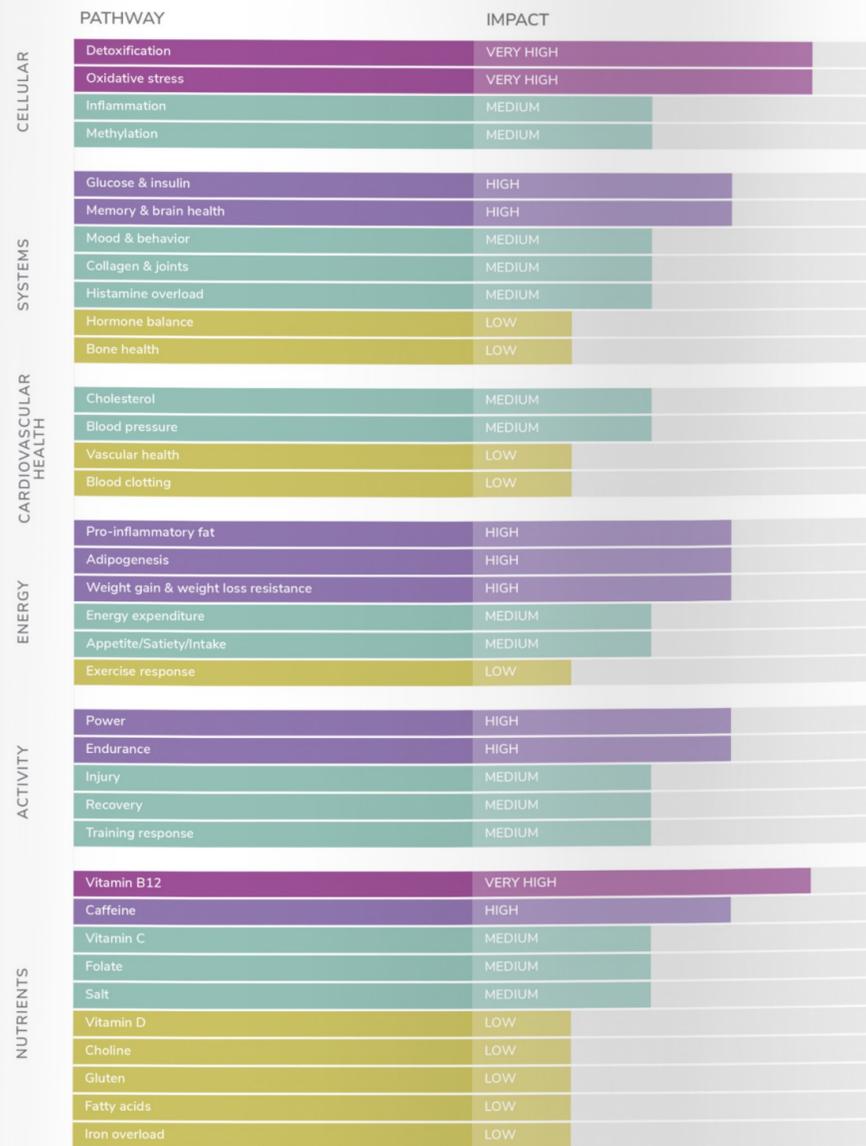
- A Dutch study estimated the costs of reduced immune fitness at \$4.7 billion for absenteeism and \$7.0 billion for presenteeism.
- General fatigue is prevalent at 42.3% and 5.5% for chronic fatigue.
- Lost productivity due to fatigue is costing American businesses about \$136 million annually.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*

WEIGHT MANAGEMENT

WEIGHT LOSS CASE REPORT

28 y/o male plumber, with 2 small children, loves extreme sport.

PATHWAY-BASED RESULTS



PRIMARY CONCERNS

- Gained 30 lbs. of weight over the past 2 to 3 years.
- Used to train regularly, to maintain an optimal body composition but the demands of work, and starting a family meant that he trained much less.
- Fatigue, joint pain, and insomnia.

GENETIC FINDINGS

- High impact in detoxification and oxidative stress. This contributes indirectly to joint pain, weight gain, and fatigue.
- High impact in glucose and insulin balance further impacts weight balance. Glucose/insulin tests should be advised.
- Energy balance is impacted by propensity for pro-inflammatory adipose tissue, and adipogenesis. Results indicate increased potential for weight gain in an obesogenic environment.
- The high impact in caffeine and vitamin B12 pathways indicates that these need to be considered.
- Thyroid function is subclinical, flagged by a DIO2 SNP.

THERAPEUTIC INTERVENTION

- Sleep apnea and insulin resistance were diagnosed.
- Diet and lifestyle support was initiated to reduce insulin resistance, support detoxification and manage oxidative stress.
- A diet rich in plant foods was recommended.
- He was advised to avoid extreme exercise, caffeine, and alcohol and to do sauna and cold exposure sessions.
- An appropriate training program was provided to support his goal of improving strength and fitness.
- Vitamin B12 metabolism was optimized.

FOLLOW-UP & OUTCOMES

- He lost 27 lb. in 12 months and body fat decreased from 25% to 19%.
- Sleep, energy levels, and the ability to keep up with work and family improved.

KEY LEARNINGS

- Targeted treatment areas for weight management were detoxification, oxidative stress, glucose and insulin support. These impact adipokine balance and considering his high impacts in pro-inflammatory fat and adipogenesis, impacted his ability to manage weight.
- Sleep apnea, increases insulin resistance risk. In addition to his genetic risk for oxidative stress, poor detoxification and glucose dysregulation, this led to a cycle of sleep deprivation which caused more oxidative stress and reduced detoxification further.
- Reducing caffeine, alcohol and increasing vitamin B12 were important for his treatment.
- Following a training program according to his gene results supported his weight loss journey and improved his fitness rapidly.

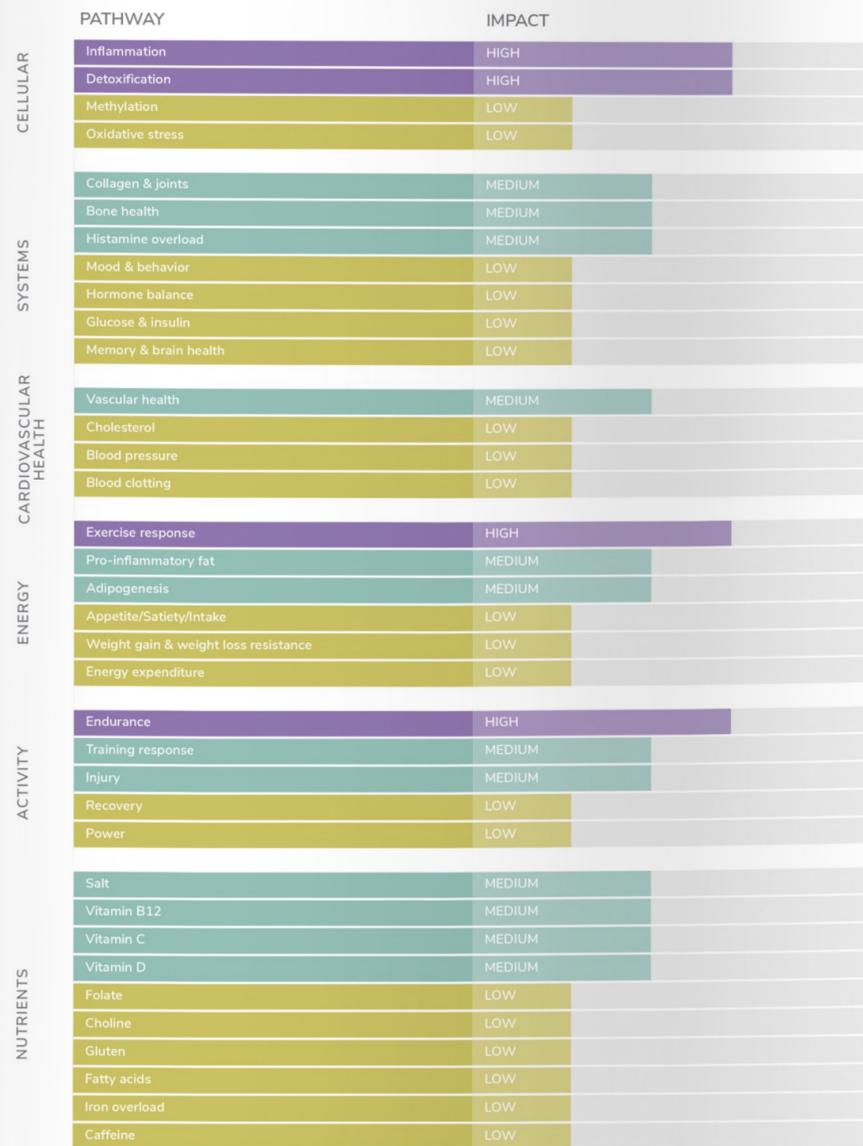
COST SAVING

- Obesity negatively impacts individuals, healthcare systems, employers, and the economy as a whole.
- The cost of US adult obesity ranges from \$147 billion to nearly \$210 billion per year.
- Obese individuals miss more days of work and work at less than full capacity when they are at work.
- In 2020, 14.5% of adults had trouble falling asleep most days or every day in the past 30 days.
- Individuals with insomnia cost businesses an excess of 11.3 workdays each year in presenteeism, and approximately \$2,548 in lost productivity costs each year.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*

WEIGHT MANAGEMENT CHRONIC PAIN & WEIGHT LOSS CASE REPORT

63 y/o female managing a stressful family business.

PATHWAY-BASED RESULTS



PRIMARY CONCERNS

- Gained more than 100 lb. over the last 13 years, with resistance to weight loss on an exercise program.
- Chronic back pain, disrupted sleep, anxiety & depression, high blood pressure, sinusitis, constipation and hypothyroidism.
- Family history of cancer and depression.
- On multiple prescription medications which she would like to reduce.

GENETIC FINDINGS

- High impact in the detoxification and inflammation pathways and medium impact in histamine overload and collagen & joints, combined with her stressful lifestyle, poor diet, and medication, contributed to weight gain and chronic pain.
- The high impact in the exercise response pathway helped explain why she was not losing weight when focusing on exercise to manage weight.
- The DIO2 gene variant that impacts thyroid hormone balance was detected and highlighted the need for further investigation.
- Thyroid function is subclinical, flagged by a DIO2 SNP.

THERAPEUTIC INTERVENTION

- Diet, lifestyle, and supplement recommendations to reduce inflammation, and support detoxification, glucose and insulin balance, and thyroid hormone health.
- Reassessed medication and adjusted prescription with her medical practitioner.
- Connective tissue support with appropriate exercise plan and protein intake.
- Supplements: Vitamins A, D, and C plus collagen peptides
- B-complex with niacin

FOLLOW-UP & OUTCOMES

- Reduced the amount of medication she was taking and adjusted her thyroid medication according to test results.
- Despite the previous weight loss resistance, she managed to shift 7 lbs. within the first 2 months.
- She reported less back pain, improved bowel habits, and fewer episodes of anxiety.

KEY LEARNINGS

- Targeted treatments for weight management were detoxification, reducing inflammation, and thyroid balance.
- Adjusting medication helped to reduce toxin exposures and ensured a more targeted approach.
- Implementing lifestyle strategies to reduce stress and inflammation helped to support mood reducing her dependency on medication.
- The treatment strategies and the initiation of weight loss helped to reduce the insomnia that contributed to her symptoms.

COST SAVING

- Lower back pain (LBP) is listed among the top 10 diseases and injuries that account for the highest number of disability-adjusted life years worldwide.
- The direct medical and indirect costs of LBP are between \$50 billion and \$100 billion per annum.
- 34% of men and 28% of women are overweight. More than 42% of adults have obesity.
- The cost of US adult obesity ranges from \$147 billion to nearly \$210 billion per year.
- *Personalized and targeted treatment decreases the costs of supplements, laboratory testing, unnecessary HCP visits, and medication.*