Introduction

To understand Shae™ and it's proven results, as demonstrated in short and long term studies, the below offers a background into the evidence-based science and medicine used in a complicated algorithm to compute users unique needs as generated in their Shae™ App profile.

A Concise History of Personalized Health

The use of individual constitutions goes back to the times of Hippocrates, who systematised a reference paradigm of different human temperaments based on proportions of four main elements (black bile, yellow bile, blood and phlegm) that make up an individual's constitution. There are references to physical constitutions as determinant factors for physical and psychological disharmonies in many ancient cultures and practices.

Looking at relatively more modern times when standard scientific practices were applied, it is possible that the earliest recorded attempt to investigate the human form for medical or scientific purposes was by the naturalist Johann Sigismund Elsholtz (1623 -1688). His methods applied a new quantitative approach to the investigation of the relationship between body proportions and the incidence of disease.

For a time, the skull was designated the most significant component of the body and became the most interesting object of

mathematical and statistical inquiry. Then, between the end of the 19th century and the first decades of the 20th century, anthropometry emerged in the fields of forensics and criminal anthropology, anthropometric auxology (the study of human physical growth), military services, and clinical anthropometry in medicine known as constitutional medicine.

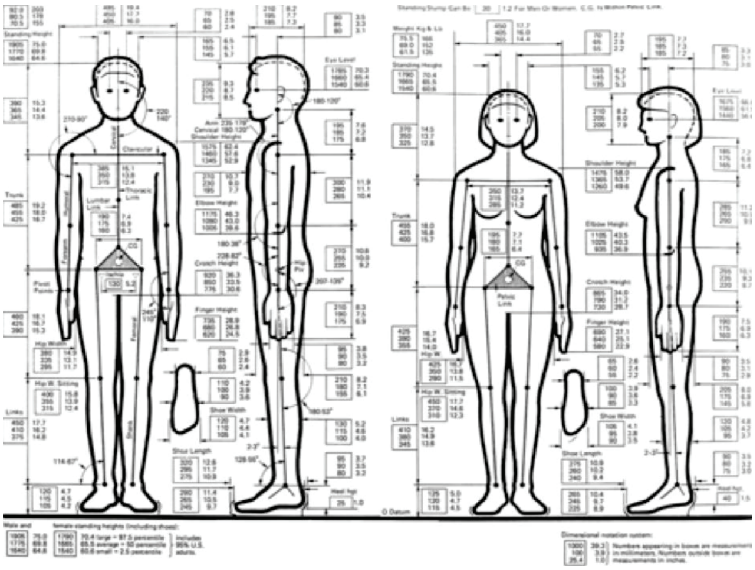
In the second half of the 19th century, the French anatomist and physician Paul Broca (1824-1880) became an important contributor to the anthropological movement that included studying the whole body's measurements. In 1859 he founded the Societé d'Anthropologie in Paris, with the intention of giving a new institutional status to anthropology. By combining precise methods of measurements and calculations, he was able to obtain medium values for different populations identifying the typical and common traits of a group of individuals. In the second half of the 19th century, such institutes emerged in England, Italy, Spain, Russia, Germany, and Austria.

With the introduction of a specific method of studying human proportions, Francis Galton (1822-1911) played a relevant role in the progress of anthropology by creating a theory of trait inheritances that could be statistically analyzed. Around the same time, Paul Topinard (1830-1911), Broca's pupil, was beginning to study the relationship between the linear dimensions of a living human body, with its faculties and mental characteristics.

The notion that temperament was the determinant factor for human diseases remained well into the 19th century, until the advent of microbiology and bacteriological research provided a new explanation for diseases such as tuberculosis and cholera: the germ.

The field of constitutional analysis rose in competition with the microbiological paradigm until Achille De Giovanni (1838-1916) began a series of visceral investigations on cadavers. His application of anthropometric measures played a fundamental role in the clinical field by making constitutions appreciable as scientifically valid for diagnostic, preventive and therapeutic purposes. De Giovanni upheld the importance of constitutional factors in the causal process of many diseases and focused his studies on constitution, temperament, individuality and predisposition to underline the fact that diseases may present themselves differently in different constitutions, and that, different constitutions may be predisposed to different diseases (De Giovanni, 1891, p. 1-2, 10) thereby creating a clear relationship between morphology and pathology. Nicola Pende (1880-1970) then developed the constitutional doctrine in the field of endocrinology based on the work of De Giovanni. Through his description of endocrinologic temperaments, he structured four characteristics: habit, temperament, character and intelligence.

As knowledge of genetics entered the field of science and medicine so did it in the understanding of individual anthropometric differences. In 1940, William H. Sheldon, S.S.Stevens and W.B.Tucjer introduced their method for somatotyping. This is the study of categorising people based on the physical representation of their combined genetic and environmental influences, while remaining a genetically inherited entity. They coined the three major groups, based on embryonic layers, as endomorphy, mesomorphy and ectomorphy.



Soon after, Richard W. Parnell was able to relate an individual's physical aspects to their behaviour, achievement and temperament, and creating age-adjusted scales for rating Fat (F), Muscularity (M) and Linearity (L). Similarly, colleagues of W.H. Sheldon, Lindsay Carter and Barbara Heath (1990), refined the approach of somatotyping into a precise protocol of measures to systematise health trend analyses in their countless studies.

The study of human measurements as physical signs of inherited and adopted traits with their relationship to disease and temperament continues. Old and new methods are being used, compared and confronted in the continuous endeavour to understand, treat and even predict disease, achievement, performance, behaviour and human tendencies in statistically significant ways (Fornari 2014).

Shae has used similar scientific pattern-matching of body shapes and physical traits to determine HealthTypes that go beyond rating fatness, muscularity and linearity, focusing on the underlying phenotype and its health trends. Combined with layers of insights from a long list of scientific approaches including, epigenetics, phenomics, endocrinology, molecular biology, anthropometry, chronobiology, embryology, embryology, endocrinology, exposomics, geomedicine, lifestyle medicine, neuropsychology, phenotypology, semeiotics, ayurveda, ancestry and genetic lineage and traditional chinese medicine, Shae™ provides a completely personalized recommendation for each user.

Below is a more detailed explanation of some of the sciences used within Shae™

Personalized Medicine

Personalized Medicine takes a systems biology approach to disease, which means it looks proactively at finding out the cause of a disease rather than reacting to the symptoms of the disease. This is currently referred to as functional medicine, or P4 Medicine which is further detailed below.

> "Personalized, Predictive, Preventive and Participatory."

Personalized Health

Personalized health is the principle that every single person on the planet is unique, and therefore requires a unique protocol for them to achieve their best health.

Predictive Phenomics

Phenomics is the systematic measurement and analysis of qualitative and quantitative traits, including clinical, biochemical, and imaging methodologies, for the refinement and characterization of a phenotype. An Individual's genotype and phenotype are quantifiable using predictive phenomics.

Preventive Analytics & Bioinformatics

Bioinformatics research is characterized by voluminous and incremental datasets and complex data analytics methods. With the recent advancements in analytics and big data mashup, it is possible to track and monitor several personal biometrics that assist in real-time interpretation of an individual's health data. Personal health data can be compared to personal history and to the data of other individuals to identify early warning signs of dysfunction or disease and proactively act to change the course of an individuals health state.

Participatory - Digital Health & Biotechnologies

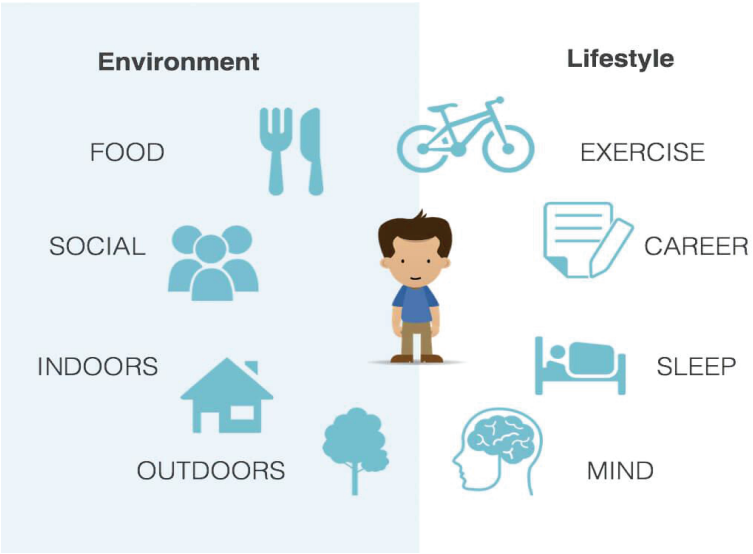
Health-care providers and patients work in partnership, using modern information-based and communications tools, to increase the active participation of the patient in medical decisions related to their health. The landscape of health and medicine is changing rapidly; doctors can perform a full physical with a smartphone, a person's family and physician on opposite sides of the world can be notified simultaneously when their blood sugar level drops, surgery is possible using 3D printed human tissue.

Genetics

Genetic science is the study of heredity and variations, which are correlated to genes. Understanding an individual's genetic code aids the ability to interpret and predict the response of the body in a given environment.

Epigenetics

Epigenetics is the study of changes in organisms caused by modification of gene expression rather than alteration of the genetic code itself. Epi, meaning 'on' or 'around' refers to signalling proteins that influence gene expression. After an input of stimulus from the environment, the configuration of these signalling proteins and protein structures around the genome itself, otherwise known as 'junk DNA', change shape in turn changing the genes that are activated, specifically how that gene will activate, and for how long that gene will activate for. The configuration of these proteins is specific to different environments; and, the gene then produces proteins that meet the demands of that environment.



Geomedicine and Environmental Influences

The study of Geomedicine focuses on taking a geographic location and environment into account when analyzing an individual and public health. Where in the world a person lives, the seasons to which they are exposed to, and the internal climate within their home, workplace or even in modes of transport all affect an individual's physical organism.

The expression of a person's genes is triggered by specific physical and biochemical stimuli. These triggers may alter the pigments in a person's skin (i.e. melanin is produced in higher quantities to darken the skin as a protection against the sun for those living in a location with more sun exposure), regulate internal body temperature, change the ability to absorb nutrients from food, and even influences the immune system.

Semeiotics

Semeiotics studies signs and symptoms of the human body to correctly identify, collate and interpret the origin of simple or complex diseases. It can also identify the patterns of normality and therefore those conditions that could be pathologic (result in disease) in certain constitutions and normal for others. Semiotics offers great insight into deficiencies or dysfunctions in many systems of the body and corresponding levels of vitamins, minerals and biochemical balances or imbalances.

Chronobiology

"Chrono" means time and "Biology" means the study of life. 'Life' continually changes due to the the planet revolving around its axis and around the sun, meaning people are exposed to different forces periodically and cyclically. A person's' 'internal clock' contributes to genetic activations (or repression), hormonal shifts and physiological changes.

Molecular Biology

Molecular biology investigates interactions between various systems of a cell and the structure, function and regulation of proteins, nucleic acids, enzymatic activity and even phenotypical expressions. Understanding effects at the molecular level helps determine the best types of foods to eat, how nutrients act within the body, and the factors that may promote or hinder an individual's health. What is good to eat or drink for one person may not be the best for another.

Phenotypology

The phenotype describes the physical or physiological outcome of epigenetic changes. When a gene expresses a protein related to a specific environmental stimuli, it creates a change within the body, i.e. a change in the phenotype.

Biotypology

Biotypology is the study of systems biology, phenotypology and genetics and how a particular body develops as a whole. Differences in the shape and size of the body give information on the genes, and the balance/dominance of different hormones, through development. The biotype describes the pattern of phenotypic traits that are found within a body. From a systems biology perspective, every tissue in the body is part of a greater whole. Therefore, all tissues within the body will have synergistic physiology that supports the function of the other systems. Understanding the biotype gives Shae™ an understanding of the genetic and developmental aspects of the body, and gives predictability to how a given environmental influence will impact that particular body, both in a broader sense, and down to specific pathways and cellular mechanisms.

> “You are unique compared to everyone else and you are also unique to yourself at any other time of your life.”

Combining the Sciences

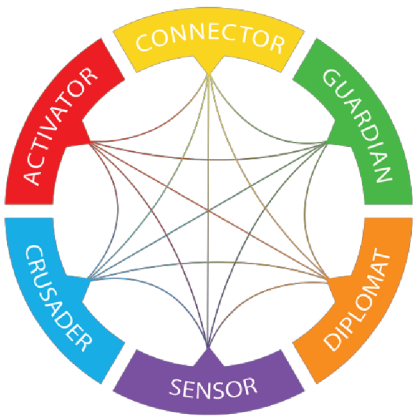
Shae™ identifies which parts of the user's environment and lifestyle, influence which parts of who they are. As the phenotype (HealthType) can be measured, it is also possible to ‘reverse engineer’, to quantify the epigenetic factors in a users environment such as climate, relationships, career, and lifestyle factors including foods, exercise and personality that affect who the user is over time.

Shae™ uses predictive phenomics to allow insight into users current and future health status, and offers very specific detail in the exact food for users to eat and avoid, exercise type and intensity, indoor and outdoor climates, social interactions, optimized timings, brain function and the natural talents that allow users to thrive.

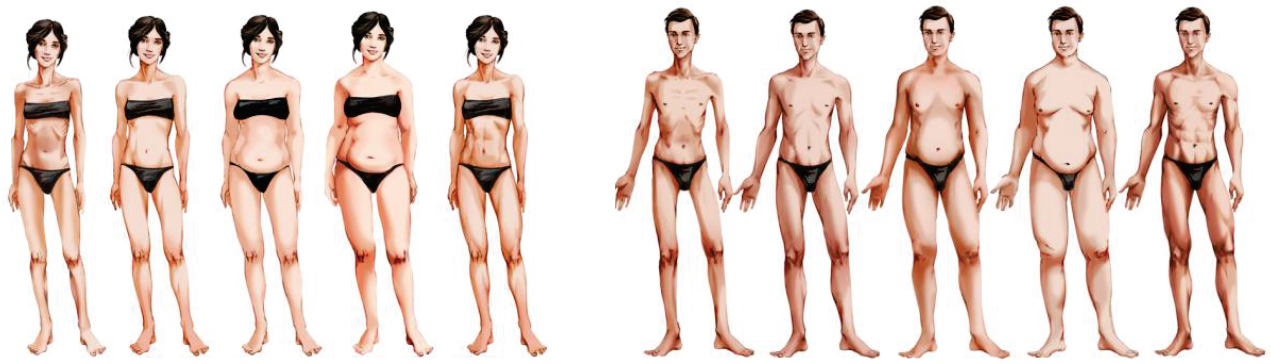
> “Every person is unique with their own health issues, specific genes, prefered lifestyle and environment.”

The HealthTypes

The following gives an overview of the practical application of HealthType characteristics in everyday life. When studying the HealthTypes and combinations, they can be viewed on a circle diagram for ease, as shown below. The ‘common’ name given in parentheses has been chosen for ease in recognition and correlation of the HealthType tendencies.



Ectomorph (Sensor)



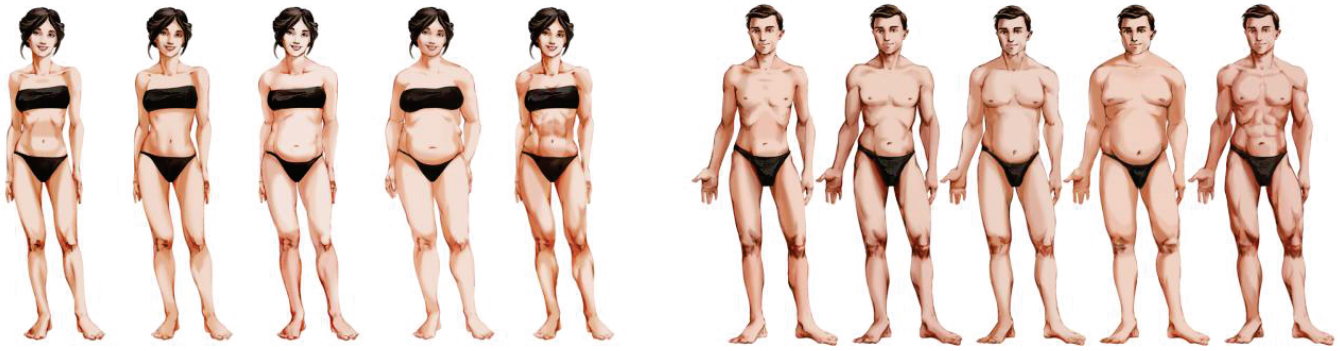
The ectomorph body is formed when the ectoderm is more dominant in development. The ectoderm forms the brain, nervous system and outer layers of our skin. As a result, the nervous system of the ectomorph (Sensor) tends to be more aware and even sensitive to the surroundings, with lots of energy placed in the brain for complex neural functions, creative thinking and an eye for detail.

Common to healthy Sensors is the ability to work quickly because the mind is able to navigate a considerable volume of information at a rapid pace. As a physically sensitive individual, certain senses may be more acute than others, such as a sensitivity to sound, light, touch or taste, or even to the people and environment (much like a sixth sense). Many Sensors find they are easily affected by certain foods, enjoy being independent, and may find they rejuvenate when they spend quiet time alone away from all the stimuli to which they're sensitive.

Ectomorph-Mesomorph (Crusader)

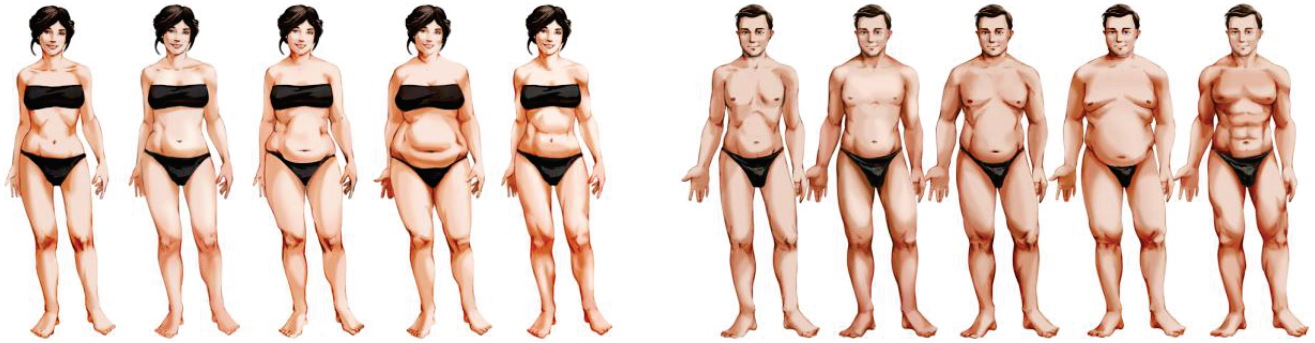
The Crusader is a mix of the ectomorph and the mesomorph so they tend to be medium height to tall and lean like the ectomorph, but able to get muscle tone and athletic bodies like the mesomorph. With a predominance of dopamine, the Crusader tends to be driven, motivated and very independent with excellent endurance. The Crusader doesn't need a lot of social interaction, but can also handle a lot of interaction if it is productive, especially because they generally need to express their opinions and ideas. They prefer to be in charge of their own situations and are skeptical to accept new ideas without absolute proof.

Mesomorph (Activator)



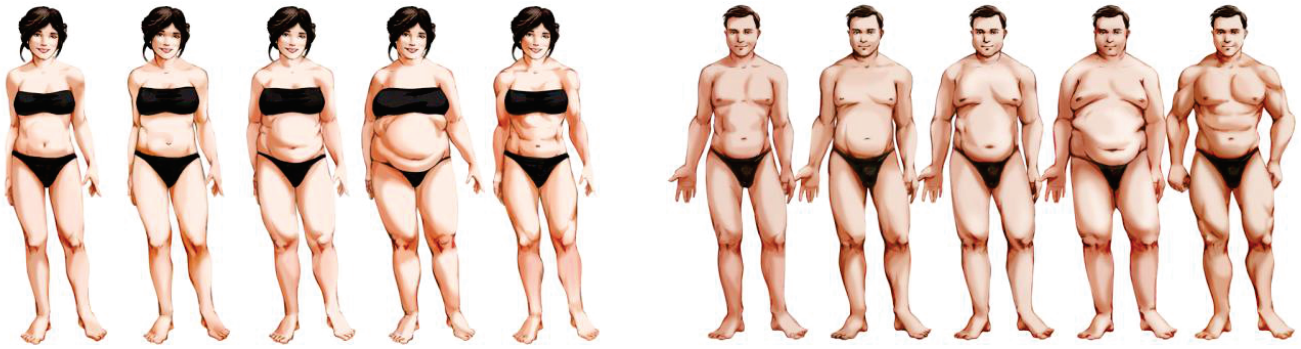
Activators are primarily mesomorphs, meaning that they have naturally athletic bodies that carry weight evenly throughout the body and are shorter in height. They can be agile with quick, short bursts of high energy, and then must rest. However, their heightened sympathetic nervous system activity can make it difficult for them to rest, relax and let the body and mind recuperate.

Mesomorph-Endomorph (Connector)



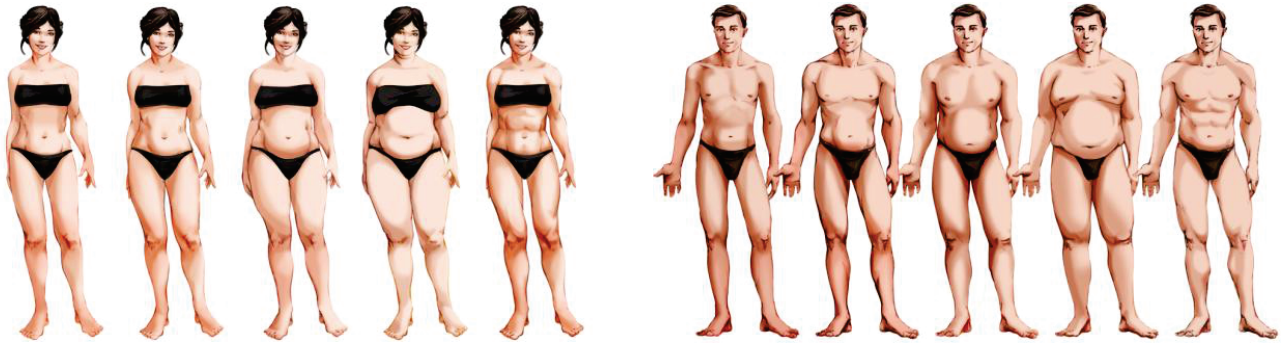
The Connector is a mix of the mesomorph and the endomorph, so they tend to have the shorter athletic bodies of the mesomorph, but are often more solid with fat deposits akin to the endomorph. They will need to work hard to obtain lean bodies, especially because their social natures often lead them to participate in unhealthy choices to be part of the group. Their higher oxytocin levels make them generally cheerful, with sunny dispositions that are well liked by others.

Endomorph (Guardian)



The endomorphs (Guardians) have strong, sturdy bodies that tend to retain energy stores. They are naturally enduring, resistant and resilient. They tend to roll with the punches, are stable, and generally like things to be predictable. With a tendency to have high levels of prolactin, they often engage in caregiving or protection, making sure their "clan" is well taken care of. They may even neglect exercise, choose food based on taste rather than nutritional value, and neglect personal needs while caring for others.

Endomorph-Ectomorph (Diplomat)



The Diplomat is a mix of the endomorph and ectomorph, and can have quite a variety of shapes based on where they sit on the wheel. If they have more endomorphy, they will tend to have thick, strong bodies that hold on to fat. If they have more ectomorphy they may have a tendency towards being lean and tall, but with a physical softness to them. They can be easy-going, consistent, ruminating thinkers, and prefer balance and structure.

How Shae™ Works

The Algorithm

Step 1: Using a Decisional Tree

The concept of IF-THEN-ELSE is used in computer programming and in the way people make decisions. An elaborate decisional tree combines research on what defines a constitution (physical traits like height, weight, chest circumference, etc). Thanks to the wealth of available research and data previously contributed by scientists worldwide, all of this information is compiled in a database and assessed; including what kind of health risks, tendencies, strength or skills are associated with the physical shape and form of the user.

Step 2. Layering the Data

With knowledge of a person's HealthType and correlated predispositions, additional layers of general data (from the user inputted data in the questionnaire) and symptomatology is added.

By adding information gathered on factors like obesity, age, gender, and so on, as well as symptoms mentioned in the questionnaire, Shae™ gains a three-dimensional avatar of the person.

Step 3. Gathering Recommendations

Similar to the above approaches for identifying health tendencies, information is gathered and compiled and extensively reviewed by a panel of experts.

Step 4. Putting It All Together

Efforts are made to convey the vast amount of information gathered on each Shae™ user in a manageable way, and that means providing text and written advice in a language and model that is easily comprehended by the user. This is where personalization of language and mode of delivery is important as it is often a deciding factor in compliance and behaviour change.

Why is this important?

When the state of the body is understood in reference to its blueprint, then combining that information enables the most effective pathway to resolving the issue for that specific individual. Only having genetic information without current health state without genetic blueprints means guesswork on behalf of the practitioner or individual.

See a fitness and nutrition example below:

Exercise

A female comes into the gym wanting to get stronger. You know from her genetics that she is going to respond well to powerlifting. You start her on a powerlifting protocol and she gets injured. The reason for the injury is that she is 70yrs old, has 2 weak hips that need replacements, and has a pre-existing shoulder impingement. The physical condition is the phenotype. While her body may be genetically designed for power training, without phenotype information, the treatment will not be individualised.

Nutrition

An individual has high blood pressure. As a result, he is given the DASH diet, known to help reduce blood pressure. He ends up losing significant amounts of weight and his risk factors for cardiovascular disease do not improve. In this case, the phenotype of high blood pressure has not been related to the makeup of this individual. This individual is a leaner body with specific sensitivities within the methylation pathways.

The best pathway for this genotype to manage blood pressure is through decreasing mental stress through meditation. This body may need more fatty acids, and more carbohydrate than found in the normal management of hypertension, and thus, the standard nutrition therapy will have a net neutral or even adverse effect. In this case, understanding the genotype as well as the phenotype is essential in ensuring the right treatment for the right condition.

Additional Case Study examples can be found here

The App

In the Shae™ App, the users data is collected through a health questionnaire in combination with measurements to provide a layer of information above and beyond the person's HealthType. Information is gathered about the person's health history and future trends, current symptoms and physical needs, which takes less than 30 minutes to complete; the result of this and the technology behind Shae™ is a completely unique profile for each individual user.

> "We are all unique: not one single person on this planet is the same or will need the same protocols."

Shae™ is a virtual health assistant, utilizing the the technology described above to process and display data to the user in a simple and easy to follow format. Shae™ monitors daily health habits, updates diet and lifestyle choices accordingly, and delivers real-time advice to help change behaviour and achieve health goals.

The Research

User data was tracked over the course of 4 years, in total 1690 people were followed over the period. The information tracked included the relevant changes reported in health status through the health questionnaire, and from surveys completed that appeared within the users profile.

Using this data, modelling was performed that calculated a cardiovascular disease (CVD) health and progression of disease (Framingham Risk Score), diabetes prevalence and progression, body composition markers, ratings of wellness, and change in signs and symptoms of disease.

From this data, there are a number of publishable articles that are being produced. Currently the data is going through the publication process and that is being completed by the University of Queensland, Australia.

These publications will cover:

- The impact of Shae™ and cardiovascular health
- The impact of Shae™ on diabetes risk and progression
- The impact of Shae™ on markers of body composition
- The impact of Shae™ on subjective ratings of wellness

The studies that are going through publication will speak to specific areas within the topics listed above. While the publications are in processing, white papers have been released that examines the impact of Shae™ on the above topics, these are listed below and a summary of their results is in the next section.

Cardiovascular Disease and Shae™
Diabetes and Shae™
Body Composition and Shae™
Ratings of Wellness and Shae™

The Results

Both long term and short term studies and research has been conducted to demonstrate the effectiveness of Shae™ on users. Below is a summary of some of the results found during the 4 year study, due to advice and recommendations encouraged by Shae™, for the more detailed analysis and research results please click here.

Diabetes and Shae™

- Users experienced significant improvements in all anthropometric measures computed. This included a significant decrease in overall BFI from 35.53 to 31.01 ($p<.0001$), in BMI from 26.86 to 25.38 kg/m2 ($p<0.0001$), and in waist-height ratio from 0.57 at baseline to 0.50 at follow-up ($p<0.1$)

- There was a significant drop ($p<.0001$) in the average AUSDRISK scores from 9.20 to 8.12 between baseline and follow-up showing a positive improvement on the risk of developing type 2 diabetes among the participants. On average, female participants experienced a significant drop in AUSDRISK scores from 8.95 at baseline to 7.87 at follow up, while male participants experienced a significant drop from 10.82 to 9.79.

- There were improvements in participants' survey responses on their conditions and lifestyle. These included a 72.6% decrease in participants with hypertension among those who declared being hypertensive at baseline, a 79.2% decrease in participants with dysglycemia that declared having glycemic imbalances at baseline, and a 86.1% decrease in participants with high cholesterol that declared having high cholesterol at baseline.

- Among 40 participants who declared they smoked at baseline, 19 had given up smoking at follow up, a 47.5% decrease among smokers. Finally, there was a 12.7% decrease in sedentary lifestyle among those who declared to be sedentary at baseline.

- Men seemed to start at a higher level of risk of developing type 2 diabetes but demonstrated a steady decrease in AUSDRISK scores, while women's AUSDRISK scores appeared to show a steeper yet fluctuating decrease.

- Shae™ provided significant improvements in the participating user group by reducing unwanted weight, reducing fat mass (especially visceral fat as evidenced by Wht), improving lifestyle choices and the overall risk of developing Type 2 diabetes.

- The percentage of users at high risk for Cardiovascular Disease immediately declined in the first 100 days, and the number of users at low risk for Cardiovascular Disease increased; and this positive trend continued through the whole study period; effectively demonstrating that Shae™ has a positive influence in effectively lowering users risk of Cardiovascular Disease, which is currently the world's biggest killer.

- Users with a diabetes diagnosis improved their health factors so significantly using Shae™ that their diagnosis changed and the total number of users with diabetes diagnoses declined continuously through the study. Diabetes is also one of the world's biggest killers.

- Of the body measurements tracked in this study, there was a very high level of correlation within change-from-baseline (CFB) measurements and untransformed measurements. The negative correlation between overall time and the body measurements shows that the longer someone participated in the program the more the body measurements decreased towards the desirable healthy ranges.

- This study confirms that Shae™ was effective in reducing WHtR, BMI and BFI for males and females across all age groups.

Ratings of Wellness and Shae™

- Shae™ was effective in increasing individual wellness scores. Of the 442 subjects in the study, 439 (99.3%) showed improvements in wellness scores.

- Those who started with low baseline wellness scores showed dramatic improvements, especially within the first 3 survey checkpoints, and maintained their more positive responses close to the upper-end of the 5-point scale (with average wellness scores of ~4) over time. Even those who started with an average of 3 out of 5 showed a subtle upward trend with incremental improvements towards scores of 5 and maintaining high wellness scores.

- Female subjects had significantly lower initial baseline wellness scores than males across all wellness categories except stress level. For most of the wellness categories, males and females showed about the same level of improvement in wellness scores indicating the program works well for both genders. However, females showed greater improvement than males in the energy levels, general mood, confidence and overall health categories. Given that males on average had higher baseline wellness scores than females, for many of the wellness categories they maintained higher wellness scores for the duration of the study, despite females improving more with respect to baseline scores in certain categories.

- Shae™ was equally effective across all ages in the study. There were almost no significant differences in improvement of wellness scores based on age or age group.

- Of the 10 wellness categories measured, all were very highly correlated to each other except for stress level which was uncorrelated. Shae™ was nearly equally effective in improving the 9 correlated wellness categories. However, it appears to have been most effective in improving sleep quality, energy levels, digestion, general mood, confidence and overall health.

Cardiovascular Disease and Shae™ (CVD)

- From the initial assessment through the end of follow-up, there were significant, beneficial changes in nearly every metric assessed. This included an absolute decrease in BFI from 35.6 to 31.0 ($p<.0001$), a 1.5 kg/m2 decrease in BMI ($p<.0001$), and a 6.4 cm decrease in waist circumference ($p<.0001$) resulting in a significant waist-height ratio decrease ($p<.0001$) from 0.53 at baseline to 0.49 at follow-up.

- There was a significant drop ($p<.0001$) in the Framingham 10-year CVD risk from 7.0% to 6.5% during follow up after adjusting for age and gender demonstrating a positive outcome on the risk of CVD by participating in the Shae™ program.

- Of the 134 women who were at intermediate or high risk of cardiovascular disease, as measured by the Framingham Risk Score (FRS) of 10 or above, a 24% reduction in risk was achieved and maintained long-term.

- CVD risk for women appeared to slowly and steadily decline over time, whereas there was a steeper initial decrease in CVD risk for men during months 0-4, a plateau during months 4-8, and another steady decrease in CVD risk from months 8-12 as found by a significant interaction ($p=0.0008$) between follow-up time and gender which resulted in differential rates of decrease in Framingham risk over time between women and men.

- Shae™ provided significant improvements in the participating user group by reducing unwanted weight, reducing fat mass (visceral fat as evidenced by WHtR), improving lifestyle factors associated with cardiometabolic health issues

Body Composition and Shae™

- Shae™ was effective in significantly decreasing individual body measurement indices. Of the 1334 subjects in the study, nearly all showed at least some improvement/reduction in their body measurement indices. For most subjects the effects are nearly immediate, with a significant proportion of the improvement realized within the first 100 days of participation in the program.

- Shae™ was effective in improving the studied anthropometric indices for both males and females. However, there were some slight differences between males and females. Female subjects comprised 88% of the sample studied, and they had more rapid reductions in baseline body measurement indices than males. This difference was most pronounced in WHtR and BFI.

- Within the first 3 months of participating in the program, the female subjects dropped an average of 2.8% total body fat, which doubled by 6 months to 6% loss of total body fat, and increased to 7.12% body fat loss by 9 months in the program.

- Shae™ was also effective across all ages in the study. There were however some differences observed between the age groups. Typically, younger individuals achieved more rapid decreases in the 3 body measurement indices than their older counterparts. Also, a higher percentage of the younger age groups achieved their healthy WHtR target of less than 0.49. However, having a lower percentage of their age group in the healthy WHtR range to begin with, the older age groups actually made larger proportional gains in the overall percentage of their age group attaining the healthy WHtR range.

References

References cited in this text are listed below, for a thorough list of Shae's references list please click here.

Atkinson, G., et al., Chronobiological Considerations for Exercise and Heart Disease. Sports Medicine, 2006. 36(6): p. 487-500.

Benjamin, J.S., Pilarowski, G.O., Carosso, G.A., Zhang, L., Huso, D.L., Goff, L.A., Vernon, H.J., Hansen, K.D., and Bjornsson, H.T. (2016). A ketogenic diet rescues hippocampal memory defects in a mouse model of Kabuki syndrome. PNAS, 114(1).

Bhaskaran, K., et al., Short term effects of temperature on risk of myocardial infarction in England and Wales: time series regression analysis of the Myocardial Ischaemia National Audit Project (MINAP) registry. BMJ, (2010). 341.

Bind, M.-A., et al., Effects of Temperature and Relative Humidity on DNA Methylation. Epidemiology (Cambridge, Mass.), (2014). 25(4): p. 561-569.

Bind, M.-A.C., et al., Distributional changes in gene-specific methylation associated with temperature. Environmental Research, (2016). 150: p. 38-46.

Bird, S.P. and K.M. Tarpenning, Influence of Circadian Time Structure on Acute Hormonal Responses to a Single Bout of Heavy-Resistance Exercise in Weight-Trained Men. Chronobiology International, 2004, Vol.21(1), p.131-146, 2004. 21(1): p. 131-146.

Björntorp, P. E. R. "Body fat distribution, insulin resistance, and metabolic diseases." Nutrition 13.9 (1997): 795-803.

Bonsch, D., et al., Daily variations of homocysteine concentrationmay influencemethylation of DNA in normal healthy individuals. Chronobiol. Int., 2007. 24(2): p. 315-326.

Brand, Judith S., et al. "Testosterone, sex hormone-binding globulin and the metabolic syndrome in men: an individual participant data meta-analysis of observational studies." PloS one9.7 (2014): e100409.

Brunham, L. R., & Hayden, M. R. (2015). Human genetics of HDL: Insight into particle metabolism and function. Progress in Lipid Research, 58, 14–25.

Cashman, M.W. and S.B. Sloan, Nutrition and nail disease. Clinics in Dermatology, (2010). 28(4): p. 420-425.

Comings, D. E., et al. "The dopamine D2 receptor (DRD2) as a major gene in obesity and height." Biochemical medicine and metabolic biology 50.2 (1993): 176-185.

Costa, M.J., et al., Circadian rhythm gene period 3 is an inhibitor of the adipocyte cell fate. The Journal of biological chemistry, 2011. 286(11): p. 9063.

Csathó, Árpád, et al. "Sex role identity related to the ratio of second to fourth digit length in women." Biological psychology 62.2 (2003): 147-156.

De Bacquer, D., et al., Rotating shift work and the metabolic syndrome: a prospective study. International Journal of Epidemiology, 2009. 38(3): p. 848-854.

Dinga R., Jina Y., Liua, X., Zhub, Z., Zhanga, Y., Wanga, T., Xu, Y. (2016). H3K9 acetylation change patterns in rats after exposure to traffic-related air pollution. Environmental Toxicology and Pharmacology, 42: 170-175.

Epel, Elissa S., et al. "Stress and body shape: stress-induced cortisol secretion is consistently greater among women with central fat." Psychosomatic medicine 62.5 (2000): 623-632.

Epel, Elissa E., et al. "Stress‐Induced Cortisol, Mood, and Fat Distribution in Men." Obesity 7.1 (1999): 9-15.

Foster, R., & Kreitzman, L. (2011). The Rhythms Of Life: The Biological Clocks That Control the Daily Lives of Every Living Thing

Frank, A.J.L.S., et al., Adverse metabolic and cardiovascular consequences of circadian misalignment. Proceedings of the National Academy of Sciences, 2009. 106(11): p. 4453.

Freedman, D.S. and A.A. Rimm, The relation of body fat distribution, as assessed by six girth measurements, to diabetes mellitus in women. American Journal of Public Health, (1989). 79(6): p. 715-720.

Furnham, A., Eysenck, S. B., & Saklofske, D. H. (2008). The Eysenck Personality Measures: Fifty Years of Scale Development. The SAGE Handbook of Personality Theory and Assessment: Volume 2 — Personality Measurement and Testing, 199-218. doi:10.4135/9781849200479

Gidday, J. M. (2015). Extending injury- and disease-resistant CNS phenotypes by repetitive epigenetic conditioning. Frontiers in Neurology, 6, 42.

Giegling, Ina, et al. "Do the estrogen receptors 1 gene variants influence the temperament and character inventory scores in suicidal attempters and healthy subjects?." American Journal of Medical Genetics Part B: Neuropsychiatric Genetics 150.3 (2009): 434-438.

Gregory, D.J. et al. (2017). Transgenerational transmission of asthma risk after exposure to environmental particles during pregnancy. American Journal of Physiology – Lung Cellular and Molecular Physiology, 313(2): L395-L405.

Isagawa, T., Nagae, G., Shiraki, N., Fujita, T., Sato, N., Ishikawa, S., … Aburatani, H. (2011). DNA Methylation Profiling of Embryonic Stem Cell Differentiation into the Three Germ Layers. PLoS ONE, 6(10), e26052.

Jablonski NG, Chaplin G. Human skin pigmentation as an adaptation to UV radiation. Proceedings of the National Academy of Sciences. (2010);107(Supplement 2):8962-8968.

Johns Hopkins Medicine. Low-Carb Diet Alleviates Inherited Form of Intellectual Disability in Mice. Johns Hopkins Medicine News and Publications. 19 Dec 2016. Web.

Koleva, M., A. Nacheva, and M. Boev, Somatotype and disease prevalence in adults." Reviews on environmental health. 17, (2002). 1: p. 65-84.

Li, Y., & Tollefsbol, T. O. (2010). Impact on DNA methylation in cancer prevention and therapy by bioactive dietary components. Current Medicinal Chemistry, 17(20), 2141–2151.

Magee, C. A. & Heaven, P. C. L. Big five personality factors, obesity and 2-year weight gain in Australian adults. Journal of Research in Personality, (2011). 45 (3), 332-335.

Myers, Regina L., et al. "Polymorphisms in the regulatory region of the human serotonin 5-HT 2A receptor gene (HTR2A) influence gene expression." Biological Psychiatry 61.2 (2007): 167-173.

Nardi, Bernardo, et al. "Genetic factors in inward vs outward personality organizations: focus on HTR2A polymorphisms." Quaderni Italiani di Psichiatria 30.2 (2011): 83-88.

Olweus, Dan, et al. "Testosterone, aggression, physical, and personality dimensions in normal adolescent males." Psychosomatic medicine 42.2 (1980): 253-269.

Oswald, Lynn M., et al. "Relationship between cortisol responses to stress and personality." Neuropsychopharmacology 31.7 (2006): 1583.

Painter R.C., Roseboom T.J., Bleker O.P. Prenatal exposure to the Dutch famine and disease in later life: an overview. Reproductive Toxicology 20, 345-52 (2005).

Pfeiffer, C.C. and E.H. Jenney, Fingernail White Spots: Possible Zinc Deficiency. JAMA, (1974). 228(2): p. 157-157.

Sales, A. P. A. M., Soares, N. T., Castelo, M. H. C. G., Ponte, C. M. M., Fernandes, V. O., Montenegro, A. P. D. R., & Montenegro, R. M. Thoracic circumference as a predictor of metabolic syndrome and changes in its components in non-obese adults. Diabetology & Metabolic Syndrome, 7(Suppl 1), (2015). A156.

Seidman, Stuart N., et al. "Testosterone level, androgen receptor polymorphism, and depressive symptoms in middle-aged men." Biological psychiatry 50.5 (2001): 371-376.

Sleiman, S. F., Henry, J., Al-Haddad, R., El Hayek, L., Abou Haidar, E., Stringer, T., … Chao, M. V. (2016). Exercise promotes the expression of brain derived neurotrophic factor (BDNF) through the action of the ketone body β-hydroxybutyrate. eLife, 5, e15092. http://doi.org/10.7554/eLife.15092
The American Physiological Society. Environmental Pollution Exposure during Pregnancy Increases Asthma Risk for Three Generations. The American Physiological Society Press Release. 17 May 2017. Web.

Terracciano, A., Sutin, A. R., McCrae, R. R., Deiana, B., Ferrucci, L., Schlessinger, D., … Costa, P. T. Facets of personality linked to underweight and overweight. Psychosomatic Medicine, (2009). 71(6), 682–689.