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AGEING, IT'S ALL IN YOUR DNA!

Sarah Carolides explains how genetic testing is revolutionising individualised treatment programmes for aesthetic patients

The arrival of genetic testing in aesthetic practice allows the practitioner to broaden their approach away from the conventional '*one wrinkle is the same as another*', and instead curate an individually tailored set of preventative and restorative medical and lifestyle measures and products for each client.

DNA testing is transforming medical practice. Genetic analyses can now be used to determine an individual's vulnerability to a range of degenerative diseases, the likely effectiveness of prescribed medications, the way that we metabolise different foods and even what kind of exercise we should be doing. This has now expanded into the aesthetics industry, with testing able to determine an individual's genetic;

- risk of UV damage
- production and metabolism of collagen and hyaluronic acid
- telomere ageing process
- need for antioxidants and whether these should be applied topically or taken internally

But perhaps more importantly, DNA analysis can also determine the risks of osteoporosis and other degenerative diseases, which directly affect how and where wrinkles will appear on the face.

Armed with this knowledge, the practitioner can prescribe individually targeted nutritional supplements and serums, along with advising on lifestyle changes that will directly reduce the risks of future ageing and skin damage. These can incorporate diet, exercise, supplementation and lifestyle changes. In this way the practitioner can market to a more diverse and younger client base, and it gives them greater client loyalty and repeat business as the client becomes reliant on the practitioner for much more than just the routine injectables.

Since the first individual DNA sequencing was completed in 2007, the number of companies offering DNA analyses has exploded. The capabilities of testing have improved enormously as demand has grown. The first thing to be aware of is the quality of the analysis itself.

Gene mapping, or gene sequencing?

Firstly, most DNA analysis companies offer gene mapping. This works by picking out the most important genes and variations but ignores the less common ones. One easy way to describe it is to imagine a map of the world, where only the most important landmarks are included, such as the Andes, Mount Everest, the Amazon and so on. The rest of the landscape has been omitted. As a result, these tests only have about a 66% accuracy overall.

In contrast, gene sequencing looks at the entire genome, and can provide over 99% accuracy. It is obviously a more expensive test, but when offered the choice, the client will always choose the more accurate version.

Secondly, the quality of the laboratory used for testing is important. Check the accreditation standards.

Thirdly, some of the cheaper testing companies subsidise their prices by selling on the information to research companies. If anonymity is important to your clients, it is worth knowing what happens to their genetic data.

Companies like Pure Genetic Lifestyle (PGL) are at the forefront of genetic analysis, providing the most comprehensive gene sequencing health and aesthetic DNA testing on

the market. With the aim of making genetics accessible, they are working on creating a platform to bring the most specialised laboratories and scientists together in a practical implementation suitable for health services. Their network of 100 specialised labs adhere to the strictest international standard, data is never sold on and complete anonymity is guaranteed to the client.

So, what can the practitioner expect from the DNA test?

Genetics of collagen production

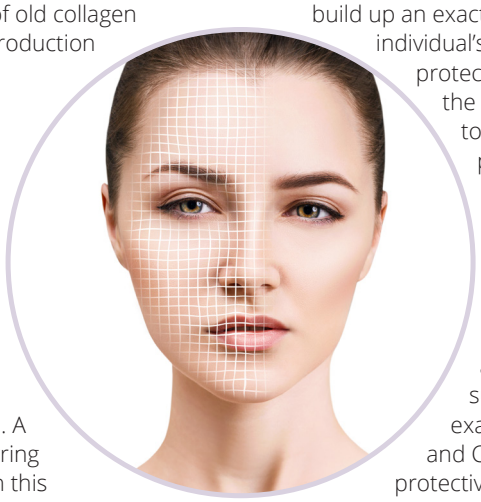
Collagen is produced when the enzyme prolidase metabolises proline to form collagen.[1] However, this pathway can be significantly inhibited by the presence of caffeine in the body.

The CYP1A2 gene codes for the enzyme that breaks down caffeine in the body.[2] One common genetic variation on the P450-1A2 cytochrome can result in significantly reduced enzyme function. If you possess this variation, caffeine is metabolised slowly and will not be removed from the cells before it begins to interfere with collagen production.

In this case, you would advise the client to avoid products containing caffeine, to cut down on their coffee intake, and also add some anti-oxidant products to help reduce the collagen breakdown and increase collagen density in the skin. For example, introducing hydrolysed collagen either topically or through supplements can positively affect the body's own production of collagen.[3] Similarly, vitamin C and folic acid both have recognised collagen production properties.[4]

Genetics of the MMP1 gene and collagen degradation

The rate of collagen breakdown is as important as the rate of its production, as the removal of old collagen stimulates the production of new collagen.



Collagen is broken down by the collagenases MMP1, MMP8 and MMP13. The gene that codes for the MMP1 enzyme is found on chromosome 11. A frequently occurring polymorphism in this particular gene can double the production of the destructive enzyme. Both heterozygous and homozygous carriers of this variation produce MMP1 much faster than normal and therefore break down their collagen much faster. MMP8 and MMP13 also break down collagen, but as yet there have been no polymorphisms discovered that affect their expression. Currently, detection of the MMP1 polymorphism allows a good assessment of the collagenase activity in the skin.

Certain anti-oxidants and nutrients, taken both externally and internally, can interfere with the MMP1 pathway and decrease collagen break down. One of these nutrients is lutein, which can directly inhibit the MMP1 gene expression and thus reduce the loss of collagen from the skin. Further research has indicated that Vitamin C, Vitamin E, Alpha Lipoic Acid and Phytosterol can all slow down the MMP1 enzyme activity.

Genetics of UV-protection and hyaluronic acid

The production of UV-protective pigments in the skin is coded for by several genes. The two most important ones are MC1R and STXBP5L, with genetic variations in these genes causing the differences in pigment production.[9] Almost everyone has some reduced protective capabilities due to inherited polymorphisms.

Analysis of these genes will help build up an exact picture of the individual's innate UV protection. This allows the practitioner to advise on personalised, genetically appropriate topical UV protective products as well as additional anti-oxidant supplements. For example, Vitamins E and C both have skin protective properties.

In addition, UV radiation on the skin leads to reduced expression of the hyaluronic acid-producing genes (HYAL2 and HYAL3) and simultaneously increases the activity of hyaluronic acid-degrading enzymes (hyaluronidase).[5] Harmful UV-B rays should be neutralised by the MC1R and STXBP5L genes, which is why polymorphisms in these genes also influence the hyaluronic acid balance in the skin. In cases where the skin-ageing UV-B rays are not sufficiently neutralised due to genetic variations in the genes, the skin will lose moisture and age more quickly.

The practitioner can advise clients with these DNA variations to purchase both supplements and skin products that will help replace any lost hyaluronic acid.[6]

UV rays also stimulate inflammation in the skin.[8] For most people this inflammation is not a problem, but some genetic variations can make the immune response much more aggressive, damaging the tissues and promoting ageing.

For clients with this result, you might want to prescribe some Omega 3 fish oils to help dampen down the inflammatory response, and perhaps some topical MSM (methylsulfonylmethane).

Genetics of anti-oxidant production

Similarly, there are several genes that code for the production of vital anti-oxidants. In particular, analysis will look at the production of Coenzyme Q10 (CoQ10), superoxide dismutase, glutathione S-transferases and glutathione peroxidase. The NAD(P)H dehydrogenase enzyme, coded for

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by the NQO1 gene, determines whether CoQ10 can be converted into its useful form, ubiquinol.

By looking at the genetic variants that code for anti-oxidant metabolism, we can tell the client exactly which anti-oxidants they need to supplement, and whether these should be applied topically or takin internally.[7]

Many of these anti-oxidants are important for other health issues throughout the body. Co-Q10 and selenium for instance are both important to produce the enzymes that bind free radicals in the skin and remove them, helping protect against premature ageing, but they are also hugely important for cardiovascular health and energy. Alpha-lipoic acid, Vitamin C, Vitamin E, zinc, manganese and selenium are all vitally important anti-oxidants for skin health, but they all also have crucial functions in the rest of the body.[10]

This brings me to one of the key benefits of DNA testing. You start to personalise your client's programme and link their skin health to their overall health.

For instance, knowing that a client has a high risk of osteoporosis and future bone degradation means that you can structure a longer-term programme by explaining what might happen to their face as the bone structure changes, and how you are going to help them maintain their looks.

Genetics of telomerase production

Genetic variations in the genes that code for telomerase are further examples of this. If the telomerase gene is functioning well, then the telomeres will stay long and keep the tissues young despite increasing age. Certain genetic variations can disrupt the function of the telomerase and promote degradation of the telomeres, leading to a faster ageing process and a higher biological age. If this is the case with your client, you can advise directly on dietary and lifestyle approaches that will help increase their telomerase activity again.

Conclusion

If you are already using a whole-face approach, then DNA testing is the natural next step. It not only provides huge potential for up-selling with tailored products and supplements, but also gives you the ability to build a more fulfilling and longer-term relationship, with customer trust and loyalty, because you're no longer just looking after superficial damage or problems, you are now involving them in a deeper conversation about their overall health.

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