The London Genetic Centre

New Preventative Genetic Screen at £1,000

Created jointly with our sequencing and analysing partner Veritas Intercontinental.

Whilst our Whole Genome Screening programme is very successful, we understand that it is expensive, and we have therefore come up with a simplified, less comprehensive version for those who feel that £4,995 price is out of their reach.

Lower cost genetic screening at £1,000 will make genetics available to more people than our ideal Whole Genome Screening (WGS) combined with a medical and tests. (See below for the differences.)
The need to expand genetic testing to more people is crucial.

Currently less than I in 10 people who have the BRCA variants with the ensuing high lifetime risks of breast and ovarian cancer know that they have it. They just suffer the consequences. Lynch syndrome dramatically increases the risk of bowel cancer and endometrial cancer in particular. Less than 1 in 10 people who have this condition are aware of it.
BRCA and Lynch syndrome variants are not uncommon, each occurring in 1 in 250 people. In the Ashkenazi population BRCA variants are present in 1 in 40 people.

We only test for genes which are called '**actionable'** whereby knowing you have that gene means you can reduce the risk.
For this reason, we are **not** doing dementia and Parkinson genes. It is not fortune-telling, but it is giving us the opportunity to know a few of our health vulnerabilities where, if there is a risk, we can lower them and improve our future.

The Preventative Screen is designed to include as many of the benefits gained from Whole Genome Screening as possible.
It includes:

1) Cancer genes: we are covering the same 83 genes as in the WGS, so nothing is missing

2) Cardiac Genes: we test for 77 cardiac genes.

3) 5 Extra Genes:

Haemochromatosis: an iron overload gene which increases the risk of liver cirrhosis and cancer where the simple removal of iron can be affected by drawing off blood
Factor V Leiden and the F2 prothrombin genes: two clot-risk genes which gives a 4-5-fold increased risk of deep vein thrombosis (DVT)
Familial hypercholesterolaemia genes cause severely elevated cholesterol levels and subsequent high levels of coronary artery disease and stroke
SerpinA1; a gene for alpha 1 antitrypsin, the deficiency of which may cause emphysema and liver cirrhosis

4) Polygenic Risk Scores for 12 conditions.

There are two main ways diseases are caused by our genes. Monogenes such as BRCA and Lynch syndrome for example, or by common variants so called single nucleotide polymorphisms (SNPs). Each of the SNPs, which are just the change of two letters in the genetic code in a particular position, may affect the risk of cancer or other conditions.
For prostate cancer there are currently 270 SNP positions we can check for, then add the sum of these to form a polygenic risk score (PRS). Patients with a high prostate polygenic risk score on the 99th centile will have an 11-fold risk of prostate cancer. So it is a way of finding those at greatest risk and then being able to do something preventative.

The Polygenic risk scores included are:

Cancer PRS

- Breast cancer
- Prostate cancer
- Colorectal cancer
- Ovarian cancer

Cardiovascular PRS

- Coronary artery disease
- LDL cholesterol
- Systolic blood pressure

Other conditions

- Osteoporosis
- Inflammatory bowel disease
- Premature ovarian failure
- Coeliac disease
- Diabetes

Cardiac Genetic Testing

The proof that cardiac genetic testing in the asymptomatic population is as helpful as the cancer gene testing is not yet clear. Our knowledge in the cardiac genetic setting currently lags behind that of the cancer field.
For example: cardiac genes for heart muscle disorders - cardiomyopathies - may be found in an asymptomatic person, but the gene may only penetrate and cause the condition in 10-20% of people. Consequently, other tests could be necessary after such a result.

However, the knowledge of having a cardiomyopathy can be lifesaving.
There are also the abnormal heart rhythm disorder cardiac genes which can cause sudden death, which is why we are checking for them. Although it may be worrying to find out you have such a gene, in the majority of cases the result enables preventative action to be taken. We therefore offer the choice as to whether to do cardiac genes or not. If going ahead, patients need to have watched our videos on this subject for them to have informed consent.

Whole Exome Screening
The genetic method we use for the Preventative Test is called 'Whole Exome' and is of the same accuracy level as 'Panel Tests.' It is extremely unlikely to miss a variant gene deletion as rarely occurs with WGS, which as a technique has a very small miss rate. We are therefore reducing the cost by not double-checking the results with a second method as we do in our current WGS London Genetic Centre screening, where additional Panel Tests are done as well.

Would we act on the result of a test that is not double-checked by a second method?

Yes, as Whole Exome Testing is very secure. Usually in genetic testing clinics we are just doing a single Panel Test. The situation where one might double-check a result is when it comes out of the blue without a corresponding family history, especially where the action to be taken is irreversible, such as surgery.

Main areas not covered in the Preventative Screen:

1. **Pharmacogenes** – genes that control how we metabolise drugs
2. **Carrier genes** – those recessive genes which are asymptomatic in those who carry them but can be passed down to their children, and if the other parent also has a variant in the same gene, then the risk to their children of having the condition is 1 in 4.

It should be noted that Genetic Testing for the older population can be helpful for their children and grandchildren.

What is different about the 90S Whole Genome Screening?
Our **Whole Genome Screening** is done as a part of an audit trial, as a **Next generation medical** including many other non-genetic tests such as a Cardiac Echo and ECG together with Ultrasound of abdomen and pelvis, general blood screen together with a detailed medical.

It costs **£4,995** which also includes a **multidisciplinary team meeting** (MDT) of the genetic consultants to go through the result. These are more complicated and require the genetic team to have paediatric genetic as well as cardiac genetic expertise in addition to the cancer gene specialisation. Also, pharmacogenetic knowledge is important.
The WGS is double-checked for 83 cancer and 77 cardiac genes with additional Panel Tests.
An MDT summary 3-page sheet is created for each patient, who also has a consultant geneticist appointment at the end.

In an ideal world our WGS medicals are obviously the best. But while our **Prevention Genetic Screen** comes in at second place it is an enormous leap up for your health protection.