

What are genes?

The human body is made up of billions of cells, all of which originated from the fertilised egg at conception. While the baby is developing in the uterus, groups of cells begin to change and specialise to become different tissues and organs. Even though the cells within the heart are very different from the cells with the kidneys or certain cells in the blood, they have one common link - they all contain Deoxyribo Nucleic Acid (DNA).

DNA carries all the information needed to make a human and differs from one person to the next. It is often referred to as the blue print of life. DNA is organised into 'building blocks' known as genes which, in turn, are packaged into microscopic structures called chromosomes. The DNA within cells is responsible for creating each different person. A person's DNA blueprint is a mixture of the DNA inherited from their mother and father, which is why people commonly resemble their parents. The re-mixing of genetic information with each new generation is vital for a healthy population, but can also create problems, if the chromosomes become altered or combined in a way that doesn't work properly. Genetic diseases can run in a family from one generation to the next.

Some genetic re-arrangements may not cause serious disease but can affect fertility. If a patient is having problems achieving a pregnancy or has suffered recurrent miscarriages then it may be useful to have their genes and chromosomes checked via a blood sample. MFS offers three types of genetic screening:

- Cystic Fibrosis (CF)
- chromosome analysis (karyotyping) (see MFS infosheet: Genetic Screening 2)
- Y chromosome deletion (see MFS infosheet: Genetic Screening 3)

Cystic Fibrosis (CF)

CF is one of the most common serious genetic diseases in Caucasians. Persistent coughing, wheezing and recurrent bouts of pneumonia are the common symptoms of this condition. This is caused by thick, sticky mucus which builds up in the lungs and leads to repeated infections. Treatments are constantly improving and help extend the length and quality of life of people with CF. However, the life

expectancy of a CF sufferer remains significantly reduced compared to that of the general population.

Causes of Cystic Fibrosis

Small regions of DNA within a chromosome are called genes - and an isolated number are associated with CF. Each person has two copies of these genes and CF occurs when both copies of the same gene are defective. If only one gene is changed, the person will not usually show any of the symptoms of CF, but will be a carrier of the faulty gene and may pass it on to their children. About one in 20 Northern European Caucasians in the UK is a CF carrier.

How is the test carried out?

A sample of blood is taken at MFS and analysed at a specialist laboratory, where molecular biology techniques are used to scan the genes involved in CF and compare them to a CF-free standard. Thirty three (of around 600) mutations are routinely looked for, which cover about 90% of all those mutations in the Caucasian population.

Who should be tested?

Some men are born without a vas deferens (see figure 1), the tube which carries sperm from the testes, and many of these men are CF carriers. Men who need a testicular biopsy to obtain sperm for use in treatment may be at an increased risk of being a CF carrier. (See MFS infosheet: Surgical Sperm Retrieval.)

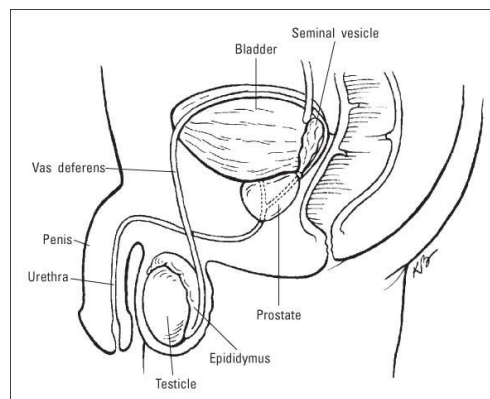


Figure 1: The vas deferens is missing in many male CF carriers (courtesy of 'Fertility & Infertility for Dummies', published by Wiley)

Anyone - male or female - who is aware of family members who have suffered from CF may consider having the test because they may carry one of the affected genes.

What does a positive test result mean?

If tests indicate that the patient is a CF carrier, their partner is also advised to be tested for CF. If the partner screens negative for the most common CF mutations, then half of all their children will be CF carriers, but not show signs of the condition (see figure 2).

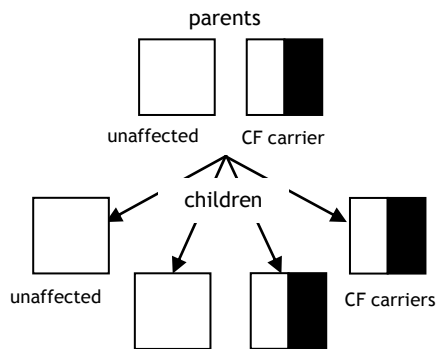


Figure 2: Chances of children being CF carriers if one parent is a CF carrier

If both partners carry the same altered gene - or perhaps one of the other affected genes - there is a risk that one in four of their children will have CF, one in two will be carriers of CF and one in four will be unaffected (see figure 3).

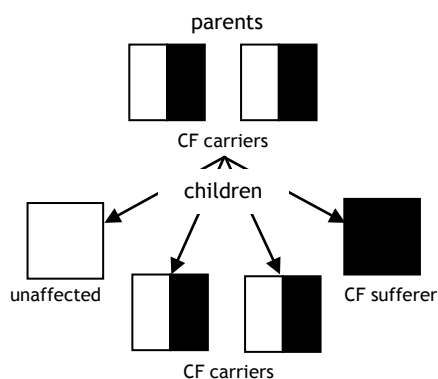


Figure 3: Chances of children having or carrying CF if both parents are CF carriers

Of the children who are carriers or full CF sufferers, sons will be at risk of being born with a defective or absent vas deferens (see figure 1). This will affect their fertility and they may need to seek help when they want to start a family.

Very rarely, CF can develop in a child when it seems as if only one parent has the affected gene. This may be explained by the presence of a rare mutation not detectable by the screening, or a totally new spontaneous mutation may occur in the fertilised egg.

What happens if the test is positive?

A positive test result can have consequences for anyone trying to have a baby and also for their everyday life. It may even affect their close relatives. A patient will have the chance to discuss the results and any possible future fertility

treatment with an MFS nurse, doctor or embryologist. It is important that the risks of continuing with treatment are explained and understood and any alternatives, if appropriate, can be discussed with an MFS specialist. MFS can also arrange for a patient to see a genetic counsellor, as appropriate.

What is included in the cost?

- genetic screening for CF

What is not included in the cost?

- screening for any other genetic conditions
- any other fertility investigations, treatments or preservation services for either partner

Costs

Please refer to the current List of Charges in either the Patient Finance Information leaflet or via midlandfertility.com/fees.

Further information

Please visit midlandfertility.com and search for 'Investigations' or read the following MFS infosheets:

- Genetic Screening 2: Karyotyping
- Genetic Screening 3: Y Deletions
- Counselling
- Reproductive Organs
- Surgical Sperm Retrieval
- ICSI

(downloadable from midlandfertility.com by searching for 'MFS Treatment Literature', or in hardcopy from MFS).