

# Preimplantation Genetic Diagnosis Cystic Fibrosis (1) Supplementary leaflet

This leaflet has been created as an additional source of information, to be read in conjunction with the **Preimplantation Genetic Diagnosis Booklet**. The details within the following pages are specific to you and the reason why you have asked about PGD treatment.

As before, there will be plenty of time to discuss further aspects of treatment during your consultation, but if anything is unclear in the leaflet, please let us know. Our contact details can be found on page 33 of the main booklet.

The **Preimplantation Genetic Diagnosis Booklet** explains what happens up to the stage where a cell is removed from each embryo. This leaflet explains the testing that is done to determine which embryos have the genes that cause cystic fibrosis (CF).

## Testing for cystic fibrosis

There are two steps to obtaining the genetic material (DNA) needed for the test.

1. The DNA is extracted from each single embryo cell and copied a million times (this is called whole genome amplification). This gives us a large sample of DNA to work on.
2. Then the crucial piece of DNA which contains the CF gene (called the CFTR gene) is rapidly copied many times again. This process is called PCR (polymerase chain reaction).

Now we have enough DNA to do the testing.

You may remember that CF is caused by changes in the CF gene (this gene is found on chromosome number 7 and is called CFTR). There are many different types of these gene changes and you will know which ones you carry. The most common gene change is called Delta F508 and many of you will carry this. We all have two copies of the CFTR gene because our genes come in pairs. A child affected with CF will have a gene change in both copies of their CFTR gene. Carriers will have one normal copy of the CFTR gene and one altered copy.

## Linkage analysis

Because Delta F508 is common and caused by a deletion in the gene (bit missing), it has been easy to look for this in the embryo cells. If either or both of you carry Delta F508, we will look for this gene change in the embryos and use another test called preimplantation genetic haplotyping (PGH) also known as *linkage analysis*.

As there are hundreds of other gene changes causing CF, it is not possible to look for rarer gene changes the embryo cells. Linkage analysis helps us get around this problem. If only one or neither of you carries Delta F508 we will use *linkage analysis* only.

Linkage analysis uses the principle of DNA fingerprinting and compares genetic markers in your DNA with genetic markers in the embryos' DNA. We can then tell the chromosome 7s apart and see the difference between those carrying the altered CF gene and those carrying the normal CF gene. To do this part of the test, we will need to look at blood samples from you.

Linkage analysis tells us two pieces of information:

1. The test tells us whether the embryos are affected or unaffected with CF.
2. That the cell being tested is definitely a cell from your embryo and not from another source.

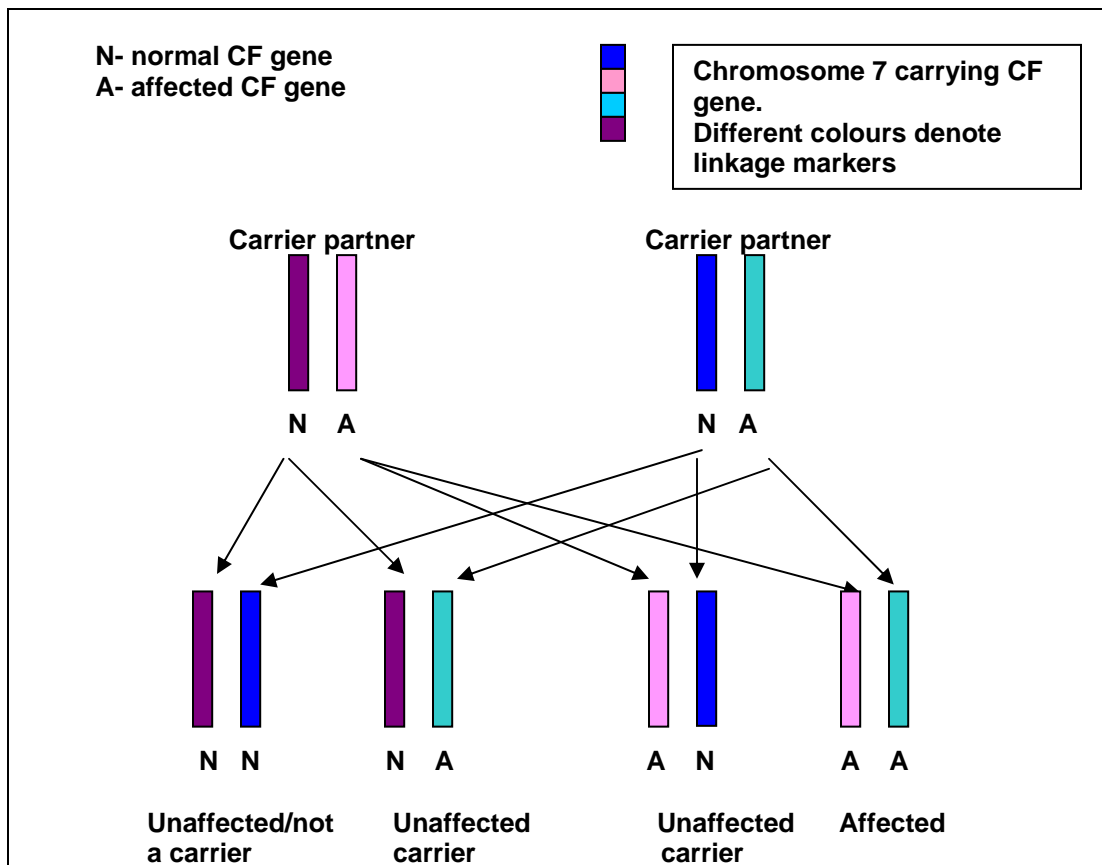
To be able to offer linkage analysis we will require **blood samples from the two of you and other family members who may be either affected or carriers of CF.**

### Outcome of testing

#### Results in your embryos

It is likely that the results we obtain will be a combination of the following (see diagram below):

**Diagram to show possible outcomes of PGD**



- An embryo has two copies of the normal CF markers and is **unaffected**.

- An embryo has one copy of the normal markers and one copy of the affected markers and is **a carrier**.
- An embryo has two copies of the affected markers and is **affected**.
- The test has failed to produce a result in the embryo. The only embryos that will be considered as suitable for use will be those that are **clearly unaffected or carriers**.

*It is not always possible to distinguish between those embryos that are unaffected carriers and those that are unaffected and not carriers. However as carriers have no associated health problems, we usually recommend these embryos for transfer. This will be discussed with you when you come to see us in the clinic.*

### Accuracy of the test

Whilst the greatest care is taken to ensure that the diagnosis is as accurate as possible, there is a chance that the result in the embryo analysed, could be incorrect. Fortunately the chances of this happening are relatively small. This is likely to be around 1% (1 chance in 100) per embryo.

The actual risk will be discussed with you before you undertake treatment.

### Confirmation of diagnosis

As PGD is not 100% reliable, we offer couples that become pregnant following treatment a prenatal test (test in pregnancy) to confirm the diagnosis. This may be a CVS (chorionic villus sampling) done at 11 weeks of pregnancy or an amniocentesis done at 16 weeks.

We appreciate that after going through a procedure such as PGD this can be a difficult decision to make. If you decide against confirmatory prenatal testing then we could arrange for a blood sample to be taken from the baby's umbilical cord at birth. The blood sample will be sent to our laboratory and confirmation of the PGD should be available within a week. Arrangements will be made to contact you with this result.

### Limitations of testing

Testing the embryos is limited to offering a test for CF. It is not possible to undertake any other testing on the single cells simultaneously, e.g. Down syndrome. The chances of any other problems affecting your embryos would be the same as for any other couple in the general population. The incidence of Down syndrome does increase with a woman's age and this may be something for which you may want to have a prenatal test, if you were to become pregnant.

There will plenty of time to discuss the issues above and those in the **Preimplantation Genetic Diagnosis Booklet** when you attend the clinic, but in the meantime, if you have other questions please ring us on the contact numbers given in the main leaflet.

## Other useful contacts

### **Cystic Fibrosis Trust**

11 London Road  
Bromley  
BR1 1BY

Tel: 0845 859 1000 CF Trust Helpline

Tel: 020 8464 7200 CF Trust

Fax: 020 83130472

E-mail: [enquiries@cftrust.org.uk](mailto:enquiries@cftrust.org.uk)

Website: <http://www.cftrust.org.uk>

## Glossary

*Amniocentesis: Test done during pregnancy. A fine needle removes fluid from the amniotic sac at about 16 weeks of pregnancy. This test is usually performed to check for abnormalities in the fetus.*

*Chorionic villus sampling (CVS): Test done during pregnancy. Fine needle removes some tissue from the placenta (afterbirth) at about 11 weeks of pregnancy. This test is usually performed to check for abnormalities in the fetus.*

*Factual information presented within this communication is based on accurate contemporaneous peer reviewed literature. Evidence of sources can be provided on request.*