2) If one parent has haemochromatosis and the other is a carrier (about 1 in 3,000 marriages) on average half of the children will be genetically susceptible to developing haemochromatosis. and the other half will be carriers.

3) If both parents suffer from haemochromatosis, (a rare event, occurring in about 1 in 10,000 marriages) all the children will inherit two defective genes and all will be genetically susceptible to developing haemochromatosis.

It should be emphasised that the proportions given in examples 1 and 2 are averages for the whole population. For instance, in any particular family where both parents are carriers, it would be possible for all children to be affected, all to be carriers, or all to be normal.

Who should be tested?

Relatives who are at risk should be tested. This is absolutely essential in the case of brothers and sisters (siblings) as they stand at least 1 in 4 chance of being affected. Early detection and treatment will prevent all the complications of the disease.

Since the carrier rate is 1 in 5, it is worth while screening the spouse of homozygotes.

N.B. Screening leads to early diagnosis and treatment, preventing complications developing from this frequent and potentially fatal genetic disorder.

For further information please write to or contact by telephone:

The Liver Centre
The Mater Misericordiae Hospital
55 Eccles Street
Dublin 7

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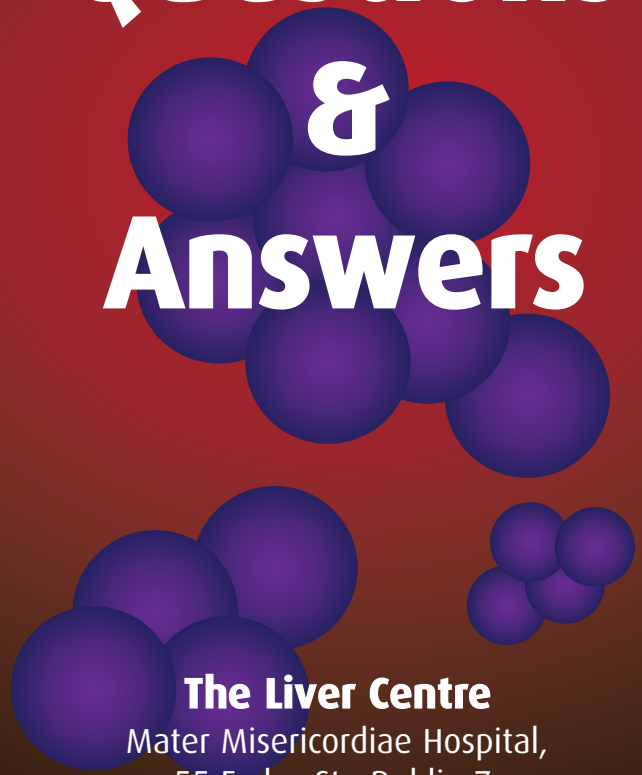
HAEMOCHROMATOSIS

Questions & Answers



The Liver Centre
Mater Misericordiae Hospital,
55 Eccles St., Dublin 7.

What is haemochromatosis?

Haemochromatosis is a genetic disorder where an excessive amount of iron is absorbed from the diet. This excess iron is then deposited in various organs, mainly the liver, but also the pancreas, heart and the joints.
Normally the liver stores iron for the essential purpose of providing new red blood cells with iron vital for health. When excess quantities of iron are stored in the liver it becomes enlarged and deposits of iron in the pancreas, heart, and joints cause serious damage to the tissue of these organs.

What are the symptoms?

Iron builds up slowly so the symptoms may not appear until the age of 30 to 40years. These symptoms include:

- Chronic fatigue
- Impotence
- Arthritis
- Diabetes
- Liver disorders
- Cardiomyopathy
- Skin pigmentation

Most of these symptoms can be found in other disorders but when arthritis affects the first two finger joints, it is highly suggestive of haemochromatosis. Chronic fatigue, weakness and lethargy may be ascribed to the after effects of a viral infection or to psychological causes, and abdominal pain to irritable bowel syndrome. Similarly, liver disorders may be put down to excessive alcohol intake, even in a moderate drinker. In all such cases haemochromatosis should be considered as a diagnosis.

Most individuals who have haemochromatosis will develop at least one or two of the above symptoms, although possibly in a very mild form. The need for treatment does not depend upon the presence of symptoms. Anybody with this diagnosis should be treated to remove iron overload.

Diagnosis and Treatment

What are the tests?

These consist of a simple blood test called a serum iron profile ideally performed after an overnight fast.

Transferrin Saturation:

This is an iron transport protein. It carries iron when taken from the gut to the bone marrow and the liver. A transferrin saturation above 50% for women and above 55% for men fasting is very suggestive of haemochromatosis.

Serum Ferritin:

This is an iron storage protein. An elevated result may be due to iron overload, but there are other causes of a high level. The result should be interpreted in combination with transferrin saturation.

Liver biopsy:

If the above blood tests suggest that the liver is likely to contain excess iron or other blood tests imply any degree of liver inflammation then a biopsy is performed. This test involves removing a small piece of liver tissue with a special biopsy needle which is then examined under microscope and the iron concentration is measured chemically.
The result enables doctors to assess the amount of iron overload and to see if any damage has occurred to the liver tissue. It can exclude any other cause of abnormal test results.

Genetic Tests:

There is now a simple genetic test that can identify the mutation in the gene responsible for causing the absorption too much iron. This involves a blood test or a simple finger prick test where a small drop of blood is applied to a card.
The great benefit of this test is that it allows for whole families to be screened and therefore early detection of the disease before symptoms and tissue damage have occurred.

Treatment

Treatment is most effective when begun early on in the disease as it can successfully prevent or stop organ damage. If damage has already occurred then treatment should halt any further damage and in most cases bring about an improvement.

The only method of removing excess iron from the body is by removal of blood. This is like giving a blood donation and is called venesection or phlebotomy therapy. Every pint of blood removed contains 250 mg of iron. The body then uses some of the excess stored tissue iron to make new blood cells which are removed in subsequent phlebotomy The length of treatment depends on the amount of excess iron in the body at the time of diagnosis, which is measured by the ferritin and transferrin saturation. Treatment may mean weekly phlebotomy for one to two years, or until the iron levels have been reduced to a safe level. During the treatment the serum ferritin levels are monitored, the results of this test gives a measure of the remaining iron stores. Once the initial treatment is completed and the iron levels are back to normal then they are monitored every 3 months. As they start to rise again phlebotomy is recommended.

Treatment for haemochromatosis is on going for life and may require blood to be removed once or twice yearly depending on how quickly the iron is reaccumulating. This is called maintenance therapy.
Venesection treatment will allow iron tissue to be mobilised and iron stores will return to normal. However it will not cure any clinical condition such as diabetes already present at the time treatment is started. This emphasises the importance of early diagnosis!

Diet!

The common view is that a low iron diet is of little benefit and is not advised since considerably more iron can be removed in a single venesection
The following is advised:

- Modest alcohol consumption.
- No iron medication or multivitamins containing iron.
- No bread or cereals with fortified iron.

How is haemochromatosis Inherited?

Inherited disorders are caused by defective genes in the cells which make up the body. Genes which are made up of DNA, contain the information the body needs to develop from the egg, and to maintain itself in good working order. Human beings have about 60,000 genes, and every cell in the body except the egg and sperm cell contain two copies of each. One of these copies is inherited from each parent.
The disease Haemochromatosis is a recessive disorder. This means that it only develops if both copies of the gene are abnormal. If only one copy is defective an individual will be perfectly well but will be a carrier, about 20% of the population are carriers, This means:-

1) If both parents are carriers (about 1 in 25 marriages), On average a quarter of the children will develop haemochromatosis, half will be carriers and a quarter will be normal.