PATIENTS MANUAL - HEREDITARY HEMOLYTIC ANEMIA II (G6PD DEFICIENCY AND SPHEROCYTOSIS) - REVISED EDITION 07/2009

HEREDITARY HEMOLYTIC ANEMIA II

(G6PD deficiency and spherocytosis)

Basic guidelines for patients and family

HEMORIO
BLOOD CENTER OF RIO DE JANEIRO

Introduction

The objective of this manual is to provide information about hereditary hemolytic anemia to patients and their relatives, as we know that medical information and its technical jargon can be difficult or incomprehensible to most people. Thus, we hope it can answer your questions.

Any comments are welcome, either about the clarity or omission of some information considered important they can be sent as suggestions to HEMORIO or by e-mail ouvidoria@hemorio.rj.gov.br.

What is hemolytic anemia?

Hereditary Hemolytic Anemia comprises a group of disorders in which red blood cells of affected individuals exhibit a phenomenon known as "hemolysis" which is his break prematurely, leading to anemia. His heritage is genetic, or inherited from parents, so they are called "heritable".

There are several different types of hereditary hemolytic anemia, which vary in severity, some causing many problems, and others almost none.

It is necessary to know the characteristics of red blood cells (RBCs) in order to better understand the hemolytic anemia.

Function: The red blood cell operates carrying oxygen to tissues, constituting thus the main fuel for organs.

Evolution: The development of blood cells is a process called Hematopoiesis. Red blood cells enter the bloodstream after having already gone through the process of growth that occurs in bone marrow. Bone marrow is a soft tissue, like a sponge and it is found in the cavities of many bones. Adult red blood cells must be in adequate number to develop their functions properly. The red cell membrane should be extremely tough yet highly flexible and deformable to withstand the aggressions in circulation and move through tiny capillaries and "pores" of the spleen.

When they lose their ability to function properly, they are destroyed by the spleen and replaced with more new ones that go through the same process, and so on.

In the case of hemolytic anemia, red blood cells are destroyed (hemolyzed), because structurally, have inadequate capacity to function.

In this booklet we will deal with three types of hereditary hemolytic anemia: spherocytosis, elliptocytosis and the G6PD deficiency.

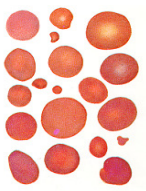
I - Spherocytosis

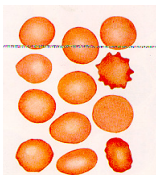
What is Spherocytosis?

It is a hereditary familiar disorder, caused by defects in the erythrocyte membrane. This occurs when one parent carries the gene and passes it to his son. Another possibility is when a genetic change occurs (mutation) that arises when the baby is being formed, causing a defect in the wall of red blood cells. In this case, neither parent is a carrier of the gene that transmitted the disease.

In Hereditary spherocytosis there is a change in the wall of the red blood cell. The result of this defect is that the globule acquires a spherical shape (spherocytic), different from that normally present (biconcave). These spherical cells are more fragile and not so deformable, suffering and being caught early destruction by the spleen, which leads to anemia. The spherocytosis is also called "Mycrospherocytosis" because the red cells in this disease are smaller than normal.

SPHEROCYTES REGULAR ERYTOCYTES





What are the symptoms of Spherocytosis?

The severity of symptoms varies considerably. Some patients may have no symptoms, until in some individuals anemia can be mild or severe.

Chronic destruction of blood cells can cause jaundice (yellow skin and eyes) and formation of gallstones.

How is it diagnosed?

The diagnosis is usually done in childhood and may have some milder cases diagnosed only in adulthood.

The diagnosis is made by performing a test called Osmotic Fragility Curve. In this test, the patient with spherocytosis is identified because their red blood cells are destroyed (hemolyzed) earlier than normal.

What is the treatment?

Folic acid supplementation can be indicated for patients with more severe hemolysis.

Correction of symptoms (anemia and jaundice) is obtained by surgery to remove the spleen (splenectomy). Splenectomy will not correct the defect presented by RBC, but will remove the spleen, where the spherocytes are preferentially destroyed, leading then to fix the symptoms. In mild cases, surgery is not necessary.

Before splenectomy, patients should receive the pneumococcal vaccine and anti-haemophilus because the spleen is responsible for defense against these germs.

II – Elliptocytosis or ovalocytosis

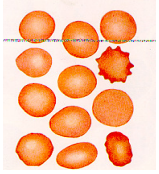
What is elliptocytosis or ovalocytosis?

Elliptocytosis or hereditary ovalocytosis is a rare variant of hereditary spherocytosis, mainly found in Southeast Asian populations.

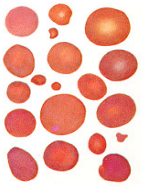
Genetic background is similar to that of the spherocytosis, may also be new cases even without the presence of disease in parents.

In most cases there is haemolysis (destruction of blood cells) that is well-compensated mild, with little or no anemia. However, in case there may be more severe anemia, enlarged spleen and gall stones.

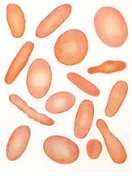
No need for splenectomy or folic acid supplementation in most cases.



REGULAR ERYTROCYTES



SPHEROCYTES



OVALOCYTES

III - G6PD DEFICIENCY

What is G6PD deficiency?

It is a hereditary condition that is inherited from one or both parents. It is found both in men and women, but generally affects men more severely.

People with G6PD deficiency, as the name implies, doesn't have enough of the enzyme glucose-6-phosphate dehydrogenase. It is necessary to know the characteristics of this enzyme in order to better understand the disease.

What is G6PD: G6PD or Glucose 6-Phosphate Dehydrogenase is one of many enzymes that help the chemical changes that turn sugar for energy.

Function of G6PD: G6PD protects red blood cells, making them resistant to certain types of aggression. Among those leading the assault is called oxidation.

G6PD protects red blood cells, making them resistant to certain types of aggression, especially oxidation.

Oxidation can damage vital structures in red blood cells, like hemoglobin, changing its liquid to solid form, creating obstacles in the circulation and oxygen transportation. The greatest consequence of oxidation is the fragmentation of red blood cells. When too many red blood cells are destroyed, the person develops anemia. Anemia is a consequence of destruction of many red blood cells.

What are the symptoms of G6PD deficiency?

Usually, the carrier of G6PD deficiency is asymptomatic until their red blood cells are exposed to certain triggers, which can be:

1 - SOME DRUGS: Some medicines promote the oxidation and can cause damage and anemia in people with G6PD deficiency. Many of these are rarely used. However, others are used very frequently. You'll find a complete list of these drugs at the end of this booklet.

People with G6PD deficiency can actually tolerate small concentrations of these substances, but if larger amounts are necessary to be used, a physician should be sought.

2 - CONTACT WITH OXIDIZING SUBSTANCES: Special attention should be given to moth balls (naphthalene). They can sometimes be eaten by children, since they seem sweet. Babies with G6PD deficiency may develop severe anemia when it happens.

Another group of substances that can lead to cell damage, although seemingly harmless, are the dyes used in some processed foods. Although most foods contain a bit of dye, you should avoid those that leave the mouth and tongue color, after taking it, as is the case of certain candies, juices, jellies and sorbets.

3 - INFECTIONS: Bacterial or viral infections are important causes of accelerated oxidative phenomenon. Not only their presence but also its treatment (such as sulfa antibiotics) may be precipitating factors of seizures in patients with G6PD deficiency.

How is the diagnosis of G6PD deficiency?

The diagnosis is suspected through the clinical presentation. In most cases it is undiagnosed until a child develops symptoms. The diagnosis is done through a blood test for screening and quantification of the enzyme.

What's the treatment?

There is no treatment yet for this inherited abnormality. Fortunately, the disease causes no harm to people, provided they are careful about exposure to the phenomena described above.

Patients with G6PD deficiency should keep their physicians informed of this fact so that they can avoid prescribing medications that cause the problem.

A very useful measure is to keep close to their documents and personal belongings, a card notice of this anomaly. This card is intended to inform in case of accident, that the bearer can not use certain medicines, besides the identification of the anomaly itself.

What are the drugs that should be avoided?

It is always useful to remember that self-medication is contraindicated for all individuals and may be especially harmful to people with G6PD deficiency. The medical consultation should not be replaced, especially when it is necessary to introduce the decision whether or not any medicine. The drugs to be avoided or used with caution are listed in Table 1.

Table 1: Agents capable of triggering Hemolysis in Erythrocytes with G6PD Deficiency

CATEGORY	CAN BE USED WITH CAUTION	SHOULD BE AVOIDED
ANALGESICS AND ANTIPYRETICS	Acetaminophen, acetofenatidin (phenacetin), aminosalicylic acid (ASA), aminopyrine, antipyrine, phenacetin, paracetamole.	**Acetanilide, metamizole, fluotane, aminosalicylic acid**
ANTIARRHYTHMICS	Procainamide	**Quinidine**
ANTHELMINTICS		**Piperazine**
ANTIHYPERTENSIVES		**Captopril, enalapril (maleate), hydralazine (hydrochloride)**
ANTIMALARIALS	Chloroquine, pyrimethamine, quinacrita, quinine	**Hydroxychloroquine, mefloquine, pamaquine, pentaquine, primaquine, quinocide**
ANTI-ANGINAL		**Isosorbide mononitrate, isosorbide dinitrate, nitroglycerin (trinitrine)**
ANTI-BACTERIAL	P-aminobenzoic acid, isoniazid, trimethoprim Streptomycin	**Nalidixic Acid,**
ANTIEPILEPTICS	Phenytoin	**chloramphenicol, ciprofloxacin,**
ANTIPARKINSONIAN	L-Dopa	**dapsone, Phenazopyridine,**
PROTOZOAN		**furaltodone, furmetonol,**

ANTISEPTIC		**nitrofurantoin, nitrofurazone, norfloxacin,**
ANTITOXIC		**ofloxacin, Co-trimoxazole**
ANTIFLAMATORY		**furmetonole, neoarsfenamin**
ANTIHISTAMINES	Astemizole, azatadin,	
CYTOSTATIC	bronfeniramine, cetirizine,	
CONTRASTS	chlorpheniramine, cyproheptadine,	**Furazolidone**
ESTROGEN	diphenhydramine, dexchlorpheniramine,	**Methylene Blue**
SULPHONATED	diphenhydramine, elastin, hydroxyzine,	**Dimercaprol (BAL)**
VITAMINS	loratadine, mequitazin, oxatomide,	**Probenicid**
FOOD AND HOUSEHOLD	**terfenadine**	

Collaborators

General Management
Clarisse Lobo

Coaching Staff
Interdisciplinary Group for Treatment of Patients with Hereditary hemolytic disease
Vera Marra

Publishing
Marcos Monteiro

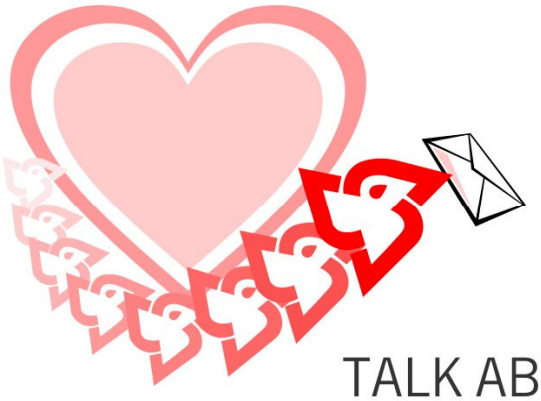
FURTHER INFORMATION AND HELP:

SOCIAL SERVICES OF HEMORIO

#8, Frei Caneca Street, room 801, Rio de Janeiro
RJ - ZIP CODE:20.211-030, room 811
Downtown - Phone: 2332-8611 ext 2253

"Here you will find people who care about you."

WHEREVER YOU
GO TAKE A
MESSAGE OF LOVE.



TALK ABOUT
BLOOD DONATION.

Address: Frei Caneca, 8 - Centro - RJ - Brazil - Zipe code: 20.211-030 - Phone: + 55 21 2332-8611
www.hemorio.rj.gov.br

SUS Ministério da Saúde Governo Federal | Governo do Rio de Janeiro Secretaria de Saúde | HEMORIO | Disque Sangue 0800 2820708

(Health System/Ministry of Health/Federal Goverment | Government of Rio de Janeiro/Department of Health | HEMORIO | Dial Blood)