



ON SOME PROBLEMS OF MEDICAL SERVICES OF PATIENTS WITH BETA – THALASSAEMIA

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ABSTRACT

Thalassaemia is a group of hereditary hemolytic anemia which occurs as a result of a reduced or complete lack of synthesis of one or more structurally normal polypeptide chains of hemoglobin molecule in human.

This creates a relative surplus of normal hemoglobin chains that precipitate and form inclusions in the erythrocytes. As a result of this the function of the erythrocytes membrane will violate and the survival of the erythrocyte will shrink. These processes determine morbid changes which are due to inefficient erythropoiesis, hemolysis and varying in severity anemia and iron overload.

While the problem of anemic syndrome was resolved after the introduction of the so called hypo transfusion regime iron overload is formed as the most significant complication of thalassaemia major.

Furthermore, the disease is accompanied from an early age to adulthood with different types and severity of psycho – emotional problems.

To achieve optimal therapeutic results, it is necessary to ensure sustained cooperation between the patient and a well trained team of doctors, nurses and psychologists.

Key words: Beta – Thalassaemia, transfusion, chelation, gene, patient, doctor, nurse, psychologist

Thalassaemia is a group of hereditary hemolytic anemia which occurs as a result of a reduced or complete lack of synthesis of one or more structurally normal polypeptide chains of hemoglobin molecule in human.

This creates a relative surplus of normal hemoglobin chains that precipitate and form inclusions in the erythrocytes. (Weatherall and Clegg, 2001). As a result of this the function of the erythrocytes membrane will violate and the survival of the erythrocyte will shrink. These processes determine morbid changes which are due to inefficient erythropoiesis, hemolysis and varying in severity anemia and iron overload.

At this time of life are synthesized seven types of polypeptide chains involved in development of hemoglobin molecules - α , β , $G\gamma$, $A\gamma$, δ , ϵ , ζ .

This theory gives the right to accept the existence of seven major Thalassaemia syndromes (Huisman T.H.J., et al 1998;

Weatherall and Clegg – 2001). The most common with the greatest medical – social importance are alpha- and beta thalassaemia.

In countries around the Mediterranean, including Bulgaria, has grown considerably beta thalassaemia (Spasov V. 1984; Petkov G. et al, 1990; Chakarova P. – 1991 et al.)

While the beta thalassaemia heterozygotes are in good health condition, the homozygotes have severe anemia and without regular hemo transfusion they are killed in the very first years of life or with transfusion therapy - later in life from the effects of the iron accumulation.

Iron loading of the diseased body of homozygous beta thalassaemia is the result of excessive absorption of iron in the gastrointestinal tract on the one hand, and iron, which is emitted during the blood transfusion, on the other side (Oliveri N. F. – 1999). Each gram of hemoglobin releases 3.41 mg. Fe. With each unit of erythrocyte concentrate the patient receives approximately 200 mg. iron.

On the following figures are presented schematic iron cycle track and its deposition (**fig.1**)

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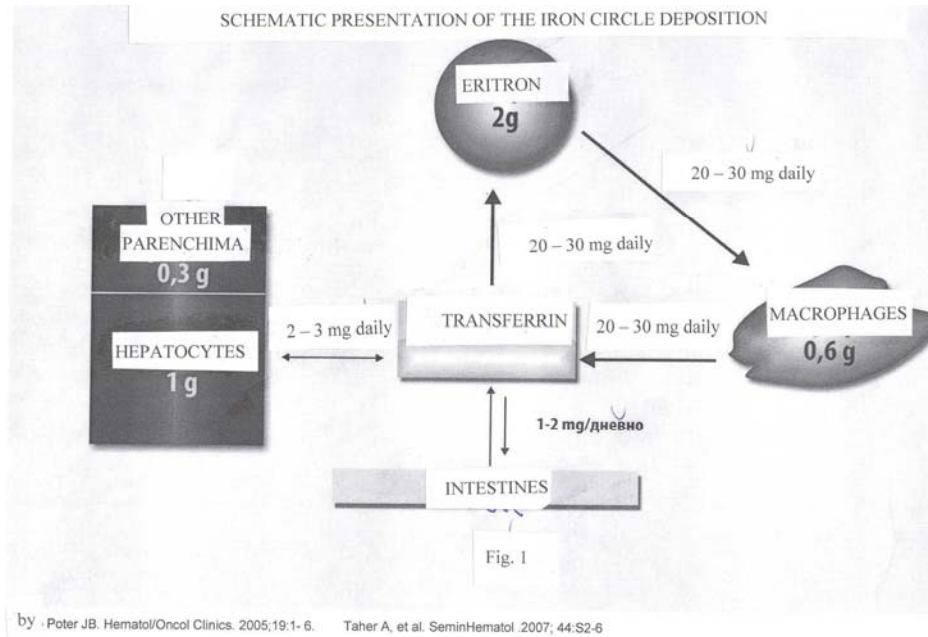


Fig. 1

And determined by the blood transfusion iron overload (**fig. 2**)

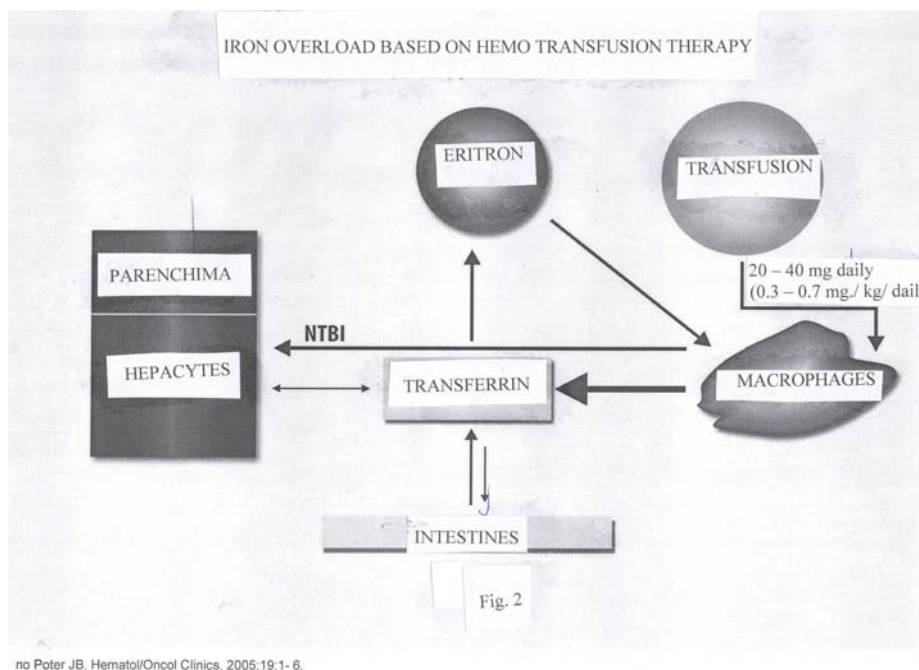


Fig. 2

The organs, affected by the iron overload are presented on **fig. 3**.

The four main target organs affected by the iron overload are: liver, heart, bones and endocrine glands. The development of cardiac damage that most often determines the early onset of a fatal outcome is crucial.

With the introduction of chelating treatment in

the late 60 s it is possible to prevent driven by the blood transfusions and increased intestinal absorption iron accumulation.

By conducting modern conventional therapy, which provides a hemoglobin level above 100 g / l and a ferritin of 1000 ng / ml survival of patients who started early adequate treatment, increased significantly. Показване на романизацията

ORGANS AND SYSTEMS IMPAIRED BY IRON OVERLOAD WITH
THALASSAEMIA MAJOR PATIENTS

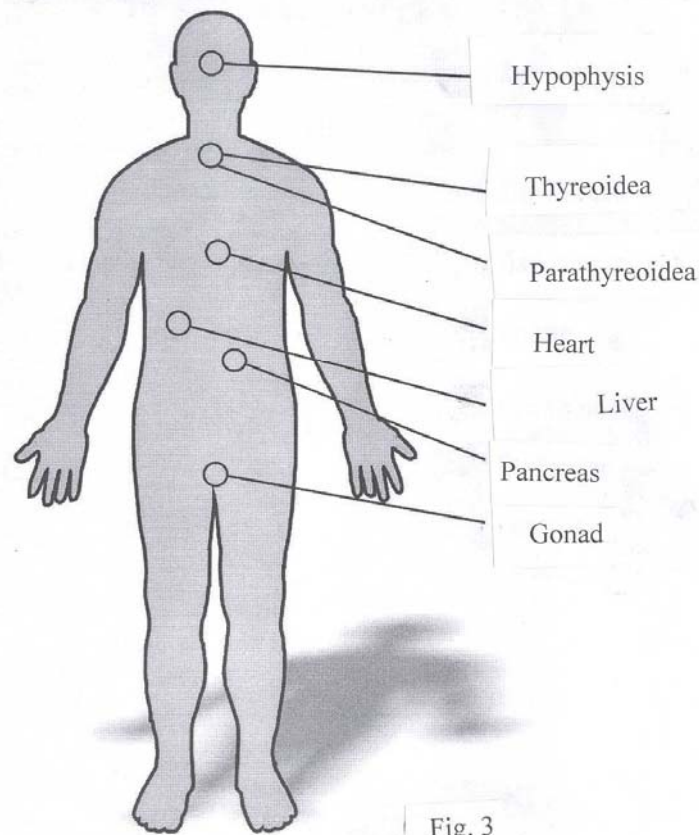


Fig. 3

Fig. 3

While the problem of anemic syndrome was resolved after the introduction of the so called hypo transfusion mode (Cappellini et al, 2000) the iron overload has emerged as the most significant complication of thalassaemia major. In practice the regular transfusion therapy transforms thalassaemia from anemic syndrome into a severe impairment of the body caused by the iron overload. This determines the leading role of iron-chelating therapy for patients with thalassaemia major. Its history dates from the late 60-ies of XX century with the introduction of the first chelated medicine for parenteral administration Desferrioxamine (deferroxamine, DFO; Desferal). In the course of approximately half a century, it remains standard for chelated iron. Treatment with Desferal is a solid investment for a better future. To achieve this goal, patients should be subjected to multiple (at

least 200 times a year) 8-12 hour night subcutaneous infusions administration of Desferal. They have to bear not only the painful nicks, but also the local reactions from desferal application. These negative impacts are often the cause of distortion of therapeutic rhythm with many negative consequences for the patients.

For a long time the only alternative to this treatment was the oral chelator Deferiprone (DFP, L1, CP20, Ferriprox), which in 1987 is licensed for a second-line therapy in patients in whom DFO therapy is contraindicated or inappropriate.

The next **Figures 4 and 5** show the chelating effect of the three chelators used currently in the clinic.

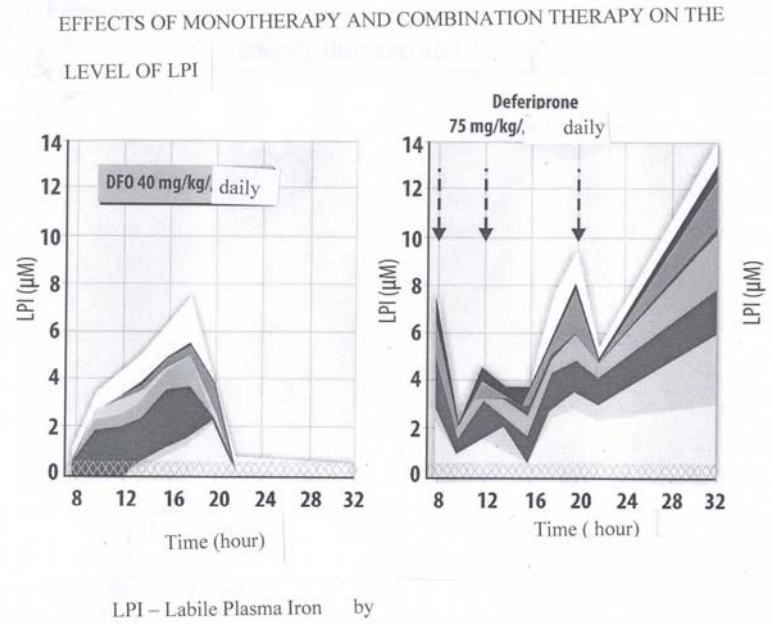


Fig.4

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Fig. 4. Effects of monotherapy and combination therapy on labile plasma iron /LPI /

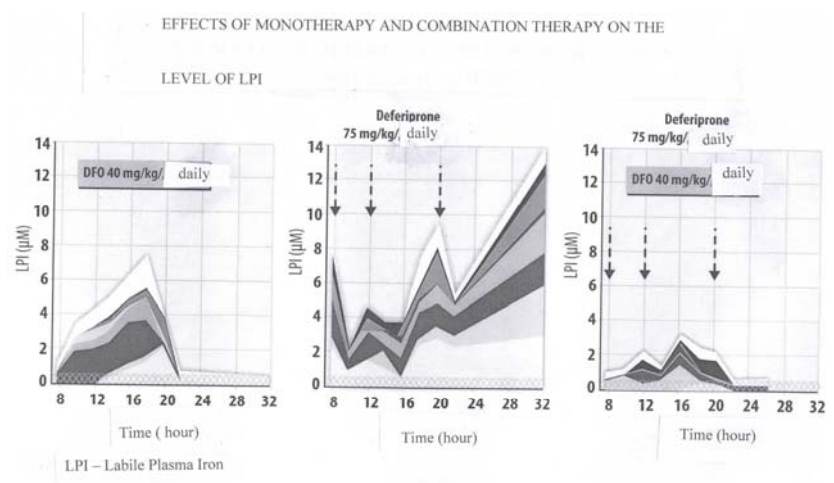


Fig.5

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Fig. 5. Effect of monotherapy and combination therapy chelating labile on labile plasma iron.

Deferasirox (DSX; ICL 670; Exjade) is a new drug for oral administration, registered for first and second-line iron-chelating therapy in patients with thalassemia major. It has been proved that it is well tolerated and have similar chelating activity of DFO.

There are other therapeutic alternatives. One of them is allogeneic bone marrow transplantation. It takes place in many centers.

In recent years is successfully used transplantation of stem cells taken from umbilical cord. One potential option emerges for the future by conducting gene therapy. On fig.6 is presented the effects of Atalaren'a RTS124 as a mean to treat patients with β -thalassemia caused by non sense - mutation. (In http://www.ptcbio.com3.1.1._genetic_disorders.aspx; and D. Petkov and others. 2009).

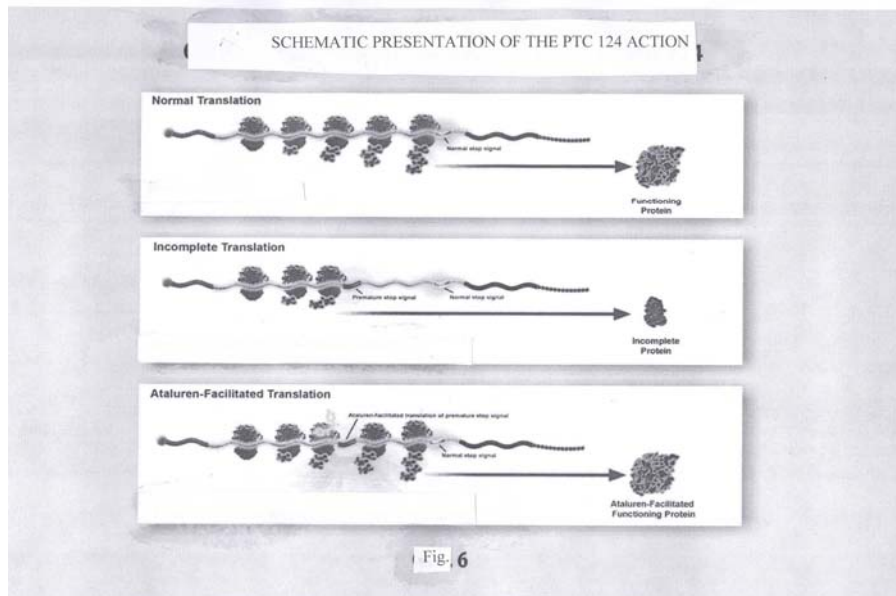


Fig. 6.

At this stage, modern conventional therapy gives choice for most patients with homozygous form of β -thalassaemia. Intended effect of therapy depends to a large extent on the quality of delivery. Who should implement this?

Service of thalassaemia patients should be entrusted to a team of highly qualified doctors and best nurses. The inclusion of a sister in this team should be a test for her high professional level. Nurses who will serve Thalassaemia patients need to have perfect manual technique. This is necessary for the protection of the venous pathways through which hemo transfusions are accomplished and helps spare the negative emotions and fear of repeated failures and nicks. Each operation must be preceded by adequate psychological preparation. Furthermore, the nurse with physician, has to plan the necessary research in a manner that will ensure minimum trauma to the sick child.

The activity of the doctor and nurse are essential in conducting hemo transfusion - preparation of the patient, of the blood to be transfused, dynamic monitoring of the key haemodynamic parameters and the timely identification of emerging infectious and non-infectious side effects, related to hemo transfusions. Nurses and doctors play an important role in the conduct of chelation therapy. Compliance with the pace of implementation of desferal, duration of infusion of chelation, place of its application, radiation monitoring of iron are crucial for the effect of chelating therapy. Without the active

and responsible attitude of the nurse in this process it is not possible to achieve optimum results. Of great Importance is her role in the timely establishment of adverse reactions associated with chelating treatment and prevention.

The nature of the disease requires periodically residence of Thalassaemia patients in the hospital. In these visits the nurse should not only be a mechanical contractor of another hemo transfusion or of the inclusion of a chelating agent. On the contrary, she must be in close contact with any child suffering from thalassaemia. Sick children are excited by a number of issues related to their disease - what has caused it, what will be the outcome of it, when they will recover, why should blood transfusions and chelating therapy be made and how long it will take? Are there other treatment options?

The problems increase with entry into puberty - the apparent decline of their peers and their ability to overcome this gap are problems incidental to their daily lives. The question of opportunities to start a family and generation is a constant dominant.

The nurse must be well prepared by the medical team to be able to meet these and similar questions raised by patients. She must have the patience and empathy to explain the current understanding of the problem "thalassaemia", while inspiring optimism of their patients. Time for this can always be found!

Valuable assistant to maintain a positive emotional tone in patients is psychologist in the clinic. Questions that the nurse can not answer by herself will naturally arise.. In such cases she have to look for the help of the doctor. He also must find time for this!

Thus, through appropriate impact and joint efforts of a doctor - a psychologist - a nurse – a patient the healing – healing process will be helped.

The structure of the multidisciplinary team is presented in **Fig. 7**.



Fig. 7

Each patient should be prepared, so that while growing up he / she is able to realize the words of the German philosopher Friedrich Christoph Yotingen and to adopt them as their hope.:

“Lord, give me patience to bear what I cannot change,
Give me the courage to change things I can change,
Give me the wisdom to distinguish the one from the other!”

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