



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



شبكة المعلومات الجامعية
@ ASUNET



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of
15-25- c and relative humidity 20-40%

بعض الوثائق الأصلية تالفة

بالرسالة صفحات لم ترد بالاصل

**SERUM TRANSFERRIN RECEPTOR AND ITS
RELATION TO SERUM FERRITIN IN THE
DIAGNOSIS OF IRON DEFICIENCY ANEMIAS**

Essay

B7037

*Submitted for the Partial Fulfillment of the
Master Degree of Clinical Pathology*

By

Abeer Okba Ahmed

M.B., B.Ch.

Under Supervision of

Prof. Dr. Taghreed Mohamed Gaafer

*Professor of Clinical Pathology
Faculty of Medicine
Cairo University*

Dr. Shereen Mahmoud Shawky

*Lecturer of Clinical Pathology
Faculty of Medicine
Cairo University*

Faculty of Medicine

Cairo University

2001

جامعة القاهرة / كلية الطب
القصر العيني

محضر

اجتماع لجنة الحكم على الرسالة المقدمة من
الطبيب / بلال عتيق ^{أ.م.د}
توطئة للحصول على درجة الماجستير / الدكتورة
في البيولوجيا الخلوية والكيمياء

تحت عنوان : باللغة الانجليزية Serum Transferrin receptor and its relation to serum ferritin in the diagnosis of iron deficiency anemias

: باللغة العربية علاقة الترانسفيرين وعلاقته بالفيريتين في تشخيص
أنيميا نقص الحديد

بناءً على موافقة الجامعة بتاريخ ١٥ / ١٠ / ٩٩ تم تشكيل لجنة الفحص والمناقشة للرسالة المذكورة أعلاه على النحو التالي :-

- (١) د. طارق دكتور / توفيق محمد جعفر ^{أ.م.د} كلفه السيد الأستاذ جابر عبد القادر من السيد الأستاذ د. طارق دكتور / توفيق محمد جعفر
 - (٢) د. طارق دكتور / توفيق محمد جعفر ^{أ.م.د} كلفه السيد الأستاذ جابر عبد القادر من السيد الأستاذ د. طارق دكتور / توفيق محمد جعفر
 - (٣) د. طارق دكتور / توفيق محمد جعفر ^{أ.م.د} كلفه السيد الأستاذ جابر عبد القادر من السيد الأستاذ د. طارق دكتور / توفيق محمد جعفر
- بعد فحص الرسالة بواسطة كل عضو منفردا وكتابة تقارير منفردة لكل منهم لأمثلة اللجنة بصفة رسمية يوم السلامة بتاريخ ١٦ / ١١ / ٩٠ بقسم التعليم الطبي م.م. طارق (١)
- بكلية الطب - جامعة القاهرة وذلك لمناقشة الطالب في جلسة علنية في موضوع الرسالة والمناقشة التي شروها إليها وكذلك الأسس العلمية التي قام عليها البحث .

أر اللجنة :

الموافق على رسالة الماجستير المقدمة من السيد الأستاذ جابر عبد القادر / بلال عتيق ^{أ.م.د}
والسماح له بدخول أصفاء الدور الثاني في مادة البيولوجيا
الخلوية والكيمياء

تبرعات أعضاء اللجنة :-

المفتون المستحسن

..... بلال عتيق ^{أ.م.د}

(مقام)

المفتون الداخلي

..... بلال عتيق ^{أ.م.د}

المفتون الخارجي

..... بلال عتيق ^{أ.م.د}

Abstract

Transferrin, transport iron into the cell. It is a single chain glycoprotein present in the plasma and extra-vascular space. The uptake of iron from transferrin requires its attachment to specific receptor sites on the cell surface. Transferrin and transferrin receptor genes present on chromosome No(3).

Iron deficiency anemia can be caused by dietary deviation of iron or by iron malabsorption, importantly it may be the first clinical sign of increased blood loss. Unexplained iron deficiency anemia warrant extensive investigation of gastrointestinal tract, since the probability of ulcers or malignant tumors as the cause of blood loss is relatively high , using tests distinguishing between iron deficiency anemia and anemia that accompanies infection, inflammation or malignancy is difficult, as the commonly used laboratory parameters do not necessarily distinguish between these common causes of anemia. Iron deficiency anemia is often associated with inflammatory disorders. The most conventional parameters of iron metabolism are therefore affected, making the evaluation of iron status difficult, serum transferrin receptor level are raised in iron deficiency but are not influenced by inflammatory changes.

The serum transferrin receptor level has been introduced as a promising new tool for the diagnosis of iron depletion as the serum iron, transferrin / total iron binding capacity, transferrin saturation and ferritin are considered influenced by acute phase response which complicates the clinical interpretation of the test result. Plasma transferrin receptor helps to predict anemia of chronic diseases .

Keywords :

- Iron metabolism
- Structure, site, gene regulator, regulatory function, laboratory assays of transferrin receptor and its aberrations in health and disease.
- The value of serum transferrin receptor level in diagnosis of iron deficiency anemia and anemia of chronic disorders.

THE UNIVERSITY OF CHICAGO

I have the honor to acknowledge the receipt of your letter of the 12th inst. in relation to the matter of the University of Chicago Press, and in reply to inform you that the same has been forwarded to the proper authorities for their consideration.

I am, Sir, very respectfully,
Yours truly,
The President of the University of Chicago

Very truly,
The President of the University of Chicago

TABLE OF CONTENT

* LIST OF FIGURES AND TABLES	L1
* LIST OF ABBREVIATION	L2
* INTRODUCTION	i
* AIM OF THE WORK.....	iii
*IRON METABOLISM.....	1
Distribution of body iron.....	1
Iron requirements.....	3
Iron absorption.....	4
Regulation of iron absorption.....	7
Internal iron exchange.....	10
Iron transport.....	11
Iron uptake.....	12
Iron in the erythroblast.....	16
Iron in other cells.....	17
Iron loss.....	19
Iron compartments.....	20
Structure of transferrin	25
*TRANSFERRIN RECEPTOR	28
Historical background.....	28
Transferrin receptor gene.....	29
Heterogeneity of transferrin receptor.....	31
Characterization and structure of TfR	32
Regulation of transferrin receptor expression	37
Tissue-specific regulation of transferrin receptor expression. ..	45
Function and cell biology of transferrin receptor.....	55
Clinical importance of cellular transferrin receptor	63
Serum transferrin receptor.....	70
Clinical importance of serum TfR.	71
Methods of assessment of TfR.....	74
*ROLE OF TfR IN DIAGNOSIS OF IRON DEFICENCY ANEMIA.....	84
Iron deficiency anemia.....	84
The anemia of chronic disorders.....	90
Role of serum TfR in the diagnosis iron deficiency anemia and distinguishing it from ACD.....	94

Serum TfR a specific marker of iron deficiency anemia in pregnancy.....	98
sTfR and its ratio to serum ferritin in the diagnosis of iron deficiency anemia.....	99
*SUMMARY & CONCLUSION	102
*REFERENCES	106
*ARABIC SUMMARY	A1

LIST OF FIGURES

	P
Figure 1:- Schematic view of iron metabolism	2
Figure 2:- Schematic representation of iron uptake form transferrin via receptor-mediated endocytosis in mammalian cells.	14
Figure 3:- Structure of transferrin molecule.	26
Figure 4:- Diagrammatic representation of human trasferrin receptor .	32
Figure 5:- Structure of consensus iron responsive element.	40
Figure 6:- The role of IRP-1 in the regulation of ferritin m-RNA translation and in the control of stability of m-RNA for TfRs(only three of five IREs are shown) .In contrast to IRP-1,regulation of IRP-2(not shown in figure) by iron is mediated by specific proteolysis	41
Figure 7:- Stages of the development of iron deficiency.	87

LIST OF TABLES

Table 1:- Iron metabolism can be viewed in the context of three pools: a large metabolic pool , and a very small transit pool.	2
Table 2:- Minimal daily iron requirements.	3
Table 3:- Assessment of iron status in iron deficiency.	87
Table 4:- Causes of iron deficiency.	88
Table 5:- condition associated with the anemia of chronic disorders.	90

LIST OF ABBREVIATIONS

ACD	:- Anemia of chronic diseases.
ALA	:- Amino levulinic acid.
Arg.	:- Arginine.
Asp.	:- Asparagine.
BSA	:- Bovine serum albumin.
COMBI	:- Patient who had both iron deficiency and chronic disease.
Cs Cl	:- Cesium chlorid.
CSF	:- Colony-stimulating factor.
CTR	:- Chicken transferrin receptor.
Cys.	:-Cysteine.
DCT ₁	: Divalent Cation Transporter. ₁ .
FEP	:- Free protoporphyrin in the erythrocytes.
FITC	:- Fluorescein-isothiocyanate.
ELISA	:- Enzyme linked immunosorbent assay.
FRP	:- Ferritin repressor protein.
FVA	:- Friend leukemia virus.
HH	:- Hereditary hemochromatosis.
His.	:- Histidine.
IDE	:- Iron deficiency erythropoiesis.
IDA	:-Iron deficiency anemia.
IEMA	:- Immunoenzymometric assay.
IFN- γ	:-Interferon gamma.
Ig	:- Immunoglobulin.
IgG	:- Immunoglobulin G.
LIP	: Labile iron pool.
IL-2	:- Interleukin-2.
IRE	:-Iron responsive elements.
IRE-BPs	:- Iron regulatory element binding proteins.