Impact of Iron Status on Phagocytic Lytic Index in Egyptian Pregnant Females

Thesis

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List of Abbreviations

Abb.	Full term
ABCB10	ATP-binding cassette, subfamily B, member10.
ALA	δ-aminolaevulinic acid.
ALAS2	δ-aminolaevulinic acid synthase 2.
ATP	Adenosine triphosphate.
BMP	Bone morphogenetic protein.
2, 3-BPG	2, 3-biphosphoglycerate mutase.
CBC	Complete blood count.
CO	Carbon monoxide.
DHR 123	Dihydrorhodamine 123.
DLC	Differential leucocytic count.
DMSO	Dimethyl sulfoxide.
DMT1	Divalent metal transporter 1.
2, 3 – DPG	2, 3 – diphosphoglycerate.
ESR	Erythrocyte sedimentation rate.
FCM	Flowcytometry.
Fe	Iron.
FITC	Fluorescein isothiocyanate.
FLVCR	Feline leukemia virus, subgroup C receptor.
fMLP	N-formyl-Met-Leu-Phe.
G-CSF	Granulocyte colony-stimulating factor.
GDF 15	Growth differentiation factor 15.
G-6-P	Glucose-6-Phosphate.
Hb	Hemoglobin.
Hct	Hematocrit.
HFE	Human hemochromatosis protein.
HIF	Hypoxia inducible factor.
HJV	Hemojuvelin.
HOX	Hemoxygenase.

Abb.	Full term
HMS	Hexose monophosphate shunt.
IL	Interleukin.
IREs	Iron-responsive elements.
IRP	Iron-regulatory protein.
K_2-EDTA	Ethylenediamine tetra-acetic acid, dipotassium salt.
MCH	Mean corpuscular hemoglobin.
MCHC	Mean corpuscular hemoglobin concentration.
MCV	Mean corpuscular volume.
Mdx	Median intensity.
MFI	Median peak fluorescence intensity.
Mfrn1	Mitoferrin 1.
MPO	Myeloperoxidase.
MPO abs.	Absolute myeloperoxidase.
NADP	Nicotinamide adenine dinucleotide phosphate.
NBT	Nitroblue tetrazolium.
NK	Natural killer cells.
O_2	Oxygen.
PB	Peripheral blood.
PBA	Phosphate buffered saline with azide.
PBS	Phosphate buffered saline.
PE	Phycoerythrin.
PLT	Platelets.
PMA	Phorbol 12-myristate 13-acetate.
PMN	Polymorphonuclear leukocytes.
PS	Post stimulation.
RBCs	Red blood cells.
RDW	Red cell distribution width.

List of Abbreviations (Cont...)

Abb.	Full term
RNI	Reactive nitrogen intermediates.
ROC	Receiver operating characteristic curve.
ROM	Reactive oxygen metabolites.
SLC11A2	Solute carrier family 11, member 2.
SOD	Superoxide dismutase.
sTfR	Soluble transferrin receptor.
TfR	Transferrin receptor.
TFRC	Transferrin receptor gene.
TIBC	Total iron binding capacity.
TLC	Total leucocytic count.
TWSG1	Twisted gastrulation protein homolog 1.

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Introduction

Experimental evidence in the last decades shows that iron is a fundamental element for normal development of the immune system. Its deficiency affects the capacity to have an adequate immune response. An increased susceptibility to infections has been observed in some patients with iron deficiency. Iron plays an essential role in immunosurveillance, because of its growth promoting and differentiation inducing properties for immune cells as well as its interference with cell-mediated immune effector pathways and cytokines activities ***(Weiss, 2002).***

Reported immune defects in iron deficiency include decreased cell-mediated immunity, mitogen responsiveness, natural-killer cell activity and lymphocyte bactericidal activity ***(Ekiz et al, 2005).***

Despite proven reversible functional immunological defects, a clinically important relationship between states of iron deficiency and susceptibility to infections remain controversial. Macrophage phagocytosis is generally unaffected by iron deficiency, but bactericidal activity of these macrophages is shown to be attenuated in some studies ***(Hallquist et al, 1992)***. Neutrophils have a reduced activity of the iron-containing enzyme, myeloperoxidase, which produces reactive oxygen intermediates

responsible for intracellular killing of pathogens ***(Ekiz et al, 2005).*** Iron is also required for monocyte / macrophage differentiation and macrophages require iron as a cofactor for the execution of important antimicrobial effector mechanisms, including the NADPH-dependent oxidative burst ***(Kramer et al, 2002; Collins, 2003).*** Humoral immunity appears to be less affected by iron deficiency than is cellular immunity. Little is known concerning the effects of clinical iron deficiency on cytokines, although it has been reported that the in vitro production of interleukin (IL)-2 by lymphocytes of iron-deficient children may be impaired ***(Jason et al, 2001).***

A high proportion of women in both industrialized and developing countries become anemic during pregnancy. Estimates from the world health organization report that from 35% to 75% (56% on average) of pregnant women in developing countries are anemic. However many of these women were already anemic at the time of conception, with an estimated prevalence of anemia of 43% in non-pregnant women in developing countries. There is a dearth of information on the rates and severity of infection of anemic pregnant women or iron-deficient anemic pregnant women. The major concern about the adverse effects of anemia on pregnant women is the belief that this population is at greater risk of perinatal mortality and morbidity ***(Allen, 2000).***

Because of doubts concerning the benefits of iron supplementation on pregnancy outcome, therefore we considered it beneficial to evaluate the iron status of pregnant females as well as their neutrophil count and phagocytic lytic function.