

**THE INTEGRITY OF GLUTATHIONE SYSTEM  
IN CHILDREN WITH CHRONIC RENAL FAILURE**

**THESIS**

Submitted for partial fulfilment of the  
**Master Degree in Pediatrics**

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بسم الله الرحمن الرحيم

« قالوا سبحانك لا علم لنا إلا ما علمتنا إنك أنت العليم الحكيم . »

صدق الله العظيم

(سورة البقرة ، الآية ٢٢)



***To ...***

***My Family***

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*Magda Moustafa*

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## LIST OF ABBREVIATIONS

|                               |                                                     |
|-------------------------------|-----------------------------------------------------|
| 2,3-DPG                       | 2,3-diphosphoglyceric acid.                         |
| Al                            | Aluminum                                            |
| ATP                           | Adenosine triphosphate                              |
| BFU-E                         | Burst forming unit-erythroid                        |
| BUN                           | Blood urea nitrogen                                 |
| CAPD                          | Continuous ambulatory peritoneal dialysis           |
| CFU-E                         | Colony forming unit-erythroid                       |
| CRF                           | Chronic renal failure                               |
| DNA                           | Deoxyribonucleic acid                               |
| Epo                           | Erythropoietin                                      |
| ESRD                          | End stage renal disease                             |
| F                             | Female                                              |
| GFR                           | Glomerular filtration rate                          |
| GSH                           | Reduced glutathione                                 |
| GSSG                          | Oxidized glutathione                                |
| H <sub>2</sub> O <sub>2</sub> | Hydrogen peroxides                                  |
| Hb                            | Hemoglobin                                          |
| HD                            | Hemodialysis                                        |
| LOOH                          | Hydroperoxides                                      |
| M                             | Male                                                |
| Mn                            | Manganese                                           |
| NADPH                         | Reduced nicotinamide adenine dinucleotide phosphate |
| Ni                            | Nickel                                              |
| OF                            | Osteitis fibrosa                                    |
| Plase A <sub>2</sub>          | Phospholipase A <sub>2</sub>                        |
| pLOOH                         | Phospholipid hydroperoxide                          |
| RBCs                          | Red blood corpuscles                                |
| RIA                           | Radioimmunoassay                                    |
| Se-GSH-PX                     | Selenium glutathione peroxidase                     |
| Si                            | Silicon                                             |
| SLE                           | Systemic lupus erythematosus                        |
| Zn                            | Zinc                                                |

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# ***Introduction***

## INTRODUCTION

Anemia occurs with relatively high incidence in patients affected by chronic renal failure (CRF) (*Erslew, 1970*).

It has been described as normocytic, normochromic anemia. Erythropoietin deficiency seems to be the main cause of anemia in these patients (*Giardini et al., 1984*). The red blood cells (RBCs) of uremic patients, although reduced in number, show a shortened life span (*Jacob et al., 1975*). The biochemical alterations involved in this event have yet to be completely clarified.

Different mechanisms have been implicated in aging and lysis of RBCs; lipid peroxidation of the RBC membrane induced by free radicals could be the most important (*Hirshman et al., 1981*). In vitro studies demonstrate that plasma from CRF patients contains various oxidants (*Costagliola et al., 1987*).

RBCs have several lines of defence against oxidative stresses. Reduced glutathione (GSH), together with its related enzymes, is one of the major scavengers of activated oxygen radicals in RBCs (*Aggarwal et al., 1984*).

Red cells release oxidized glutathione (GSSG) when exposed to oxidative stresses, most probably as a consequence of an increased intracellular content of GSSG due, in turn, to increase glutathione peroxidase activity (*Costagliola et al.*, 1986).

## ***Aim of the Work***

### **AIM OF THE WORK**

The aim of this study is to investigate the RBC and plasma levels of reduced and oxidized glutathione in patients with CRF in order to test indirectly the presence in plasma of oxidants which affect the integrity of the glutathione system and the possible role of hemodialysis (HD).