

# **CD<sub>14</sub> as a marker in septic shock**

Thesis

Submitted for partial fulfillment of M.S. Degree  
of clinical and chemical pathology

By

Amira Salama Mohammed, M.B., B.ch.

Under supervision of

**Ass. Prof. Dr. Magda Salah El-Din Gabr**

Assistant Professor of clinical and chemical pathology

616.07561 Ain-Shams University

A.S

**Dr. Manal Abd El-Aleem Abd El-Sattar**

Lecturer of clinical and chemical pathology

Ain-Shams University

**Dr. Omnia Abu El-Makarem Shaker**

Lecturer of clinical and chemical pathology

Ain-Shams University

Dr. Shaker

Dr. El-Sattar

Magda C.

**Faculty of Medicine  
Ain-Shams University**

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بسم الله الرحمن الرحيم

"رب اغفر لي  
وإسّر لي أمري،  
وادلّ لي حجة من لسانى،  
يفقهوا قولى"

صدق الله العظيم



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## **Abstract**

**Author:** Amira Salama Mohammed. M.B., B.ch.

**Title:** CD14 as a marker in septic shock.

**Place of research:** Faculty of Medicine, Ain- Shams University.

**Abstract:** To investigate the role of CD14 receptor in the pathogenesis of septicemia and septic shock, a study was done on 40 patients suffering from septicemia, 20 of them had gram-negative septicemia [Klebsiella 8(40%), Pseudomonas 8(40%) and E-coli 4(20%)] and 20 had gram-positive septicemia [Staph. aureus 10(50%), Coagulase- negative staph. 6(30%) and  $\alpha$ -hemolytic strept 4(20%)]. 11 of them developed septic shock. Whole blood was obtained from patients for blood culture by Oxoid signal system and upon isolation of organisms, another whole blood sample on EDTA was obtained from patients and compared with 20 normal controls and subjected to flow cytometric analysis of the intensity of CD14 expression on monocytes. Statistical analysis of the results showed that there is a significant down- modulation of CD14 receptor associated with septicemia and septic shock. This down-modulation expressed in gram- negative septicemia more than gram-positive septicemia with higher mortality, so that, CD14 receptor may be a significant marker in septicemia and septic shock.





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## **List of Abbreviations**

<b>LPS</b>	<b>Lipopolysaccharide.</b>
<b>LBP</b>	<b>Lipopolysaccharide Binding Protein.</b>
<b>GPI</b>	<b>Glycosyl Phosphatidyl Inositol.</b>
<b>SPS</b>	<b>Sodium Polyanethole Sulfonate.</b>
<b>BHI</b>	<b>Brain Heart Infusion broth.</b>
<b>mCD14</b>	<b>membrane CD14.</b>
<b>SCD14</b>	<b>Soluble CD14.</b>
<b>EDTA</b>	<b>Ethylene Diamine Tetra Acetic Acid.</b>
<b>KDa</b>	<b>Kilo Dalton.</b>



## **Introduction:**

Septic shock caused by a diverse group of bacterial pathogens is a serious human disease. Recognition of bacterial envelope constituents is one mechanism used by mammalian cells to initiate responses leading to bacterial killing or, unfortunately, responses that also cause fatal septic shock (*Pugin et al., 1994*).

Lipopolysaccharide, an essential outer membrane glycolipid of gram- negative bacteria is a potent inducer of inflammation and is involved in the pathogenesis of septic shock (*Rietschel and Brade, 1992*). Lipid A represents the biologically active principle and is structurally conserved among different types of lipopolysaccharides (*Rietschel et al., 1994*).

Lipopolysaccharide- activated mononuclear phagocytes release mediators such as, interleukin 1, interleukin 6 and tumour necrosis factor  $\alpha$  (*Loppnow et al., 1990*). This activation requires recognition of lipopolysaccharides at the cell surface and trans-membrane signalling. So far, several cellular proteins have been reported to bind lipopolysaccharides or Lipid A (*Halling et al., 1992*). However, only membrane- bound CD<sub>14</sub> has been shown to be involved in the initiation of secretory responses after recognition of lipopolysaccharides which are responsible for septic shock cascade (*Couturier et al., 1992*).

CD<sub>14</sub> is a glycoposphatidyl inositol- linked membrane protein expressed by macrophages. It plays a key role in initiating cell activation by a group of bacterial envelope components from gram- negative and gram- positive microorganisms and may be crucial in gram- negative septicemia. Thus its level may be of prognostic value in patients with gram- negative septic shock (*Landmann et al., 1995*).

**Aim of the work:**

The aim of this work is to study the role of CD<sub>14</sub> in septic shock and to compare the results according to the etiological agents isolated in blood culture whether gram- positive cocci or gram- negative bacilli.