

# **Endotoxemia in hemodialysis patients with chronic HCV infection**

**Thesis**

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Medicine*

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

# قالوا

لَسْبَحَانَكَ لَا عِلْمَ لَنَا  
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ  
الْعَلِيمُ الْعَظِيمُ

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## List of Abbreviations

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**[Ca<sup>2+</sup>]<sub>i</sub>:** cytosolic-free Ca<sup>2+</sup> co

**5'NCR:** 5' non-coding region

**AA:** arachidonic acid

**AAMI:** Association for Advancement of Medical Instrumentation

**AGEs:** advanced glycation end-products

**ALT:** alanine transaminase

**AMPs:** Antimicrobial peptides

**ANSI:** American National Standards Institute

**AVF:** arteriovenouse fistula

**BSP:** brain specific proteins

**CD14:** cluster of differentiation

**CDC's:** Centers for Disease Control and Prevention

**CKD** chronic kidney disease

**CPFA:** Coupled plasma filtration adsorption

**cPLA<sub>2</sub>** cytosolic phospholipase A<sub>2</sub>;

**CRP:** C reactive protein

**CRRT:** continuous renal replacement therapy

**CVD:** cardiovascular disease

**DNA:** Deoxyribonucleic acid

**E1 and E2:**envelope proteins E1 and E2

**EBPG:** European Best Practice guidelines

**EE:** Enterogenous endotoxemia

**EEG:** electroencephalographic

**EIA:** enzyme immunoassay

**ELISA:** Enzyme linked immunosorbent assay

**EPO:** Erythropoietin

**ESRD:** end-stage renal disease

**ESRF:** end-stage renal failure

**ET:** endotoxin

**EU:** Endotoxin unit

**FAO:** Food and Agriculture Organization

**GLP-2:** Glucagon-like peptide 2

**GPRs:** G protein coupled receptors

**HCC:** hepatocellular carcinoma

**HCO:** high cut-off

**HD:** hemodialysis

**HDF:** hemodiafiltration

**HMGB-1:** high-mobility group box 1 protein

**HsCRP:** High sensitivity C reactive protein

**IE:** intestinal endotoxin

**IFN $\gamma$ :** Interferon  $\gamma$

**IL-12:** Interleukin 12

**IL-18:** Interleukin 18

**IL-1 $\beta$ :** Interleukin 1  $\beta$

**IL-6:** Interleukin 6

**iNOS:** inducible nitric oxide synthase;

**INR:** international normalised ratio

**IVC:** Intravenous Catheter

**KDIGO:** Kidney disease improving global outcomes

**LBP:** lipopolysaccharide-binding protein

**LDL:** Low density lipoprotein

**LPS:** lipopolysaccharide

**LPS-LBP complex:** lipopolysaccharide-lipopolysaccharide-binding protein complex

**LV:** Left ventricle

**MAPK:** mitogen-activated protein kinase

**mCD14:** a membrane bound cluster of differentiation

**MCP-1:** monocyte chemoattractant protein-1

**MIA:** malnutrition, inflammation, and atherosclerosis syndrome.

**NANBH:** non-A, non-B hepatitis

**NAT:** nucleic acid amplification technology

**NF- $\kappa$ B:** Nuclear factor kappa B

**NLRs:** nucleotide-binding oligomerization domain receptors

**NO:** nitric oxide;

**NUF:** new single-use ultrafilter

**ODN:** oligodeoxynucleotides

**ONNO:** peroxyxynitrite;

**p7, NS2-5:** protein seven non- structural 2-5

**PCR:** polymerase chain reaction

**PEPA:** polyester-polymer alloy

**PMMA:** poly methyl methacrylate

**PMX:** Polymyxin

**PPAR  $\gamma$ :** peroxisomal proliferator activated receptor  $\gamma$

**RIBA:** recombinant immunoblotting assay.

**RNA:** Ribonucleic acid

**RO:** Reverse osmosis

**ROS:** reactive oxygen species

**RUF:** Reference ultrafilter



**sCD14:** soluble cluster of differentiation

**SCFAs:** short chain fatty acids

**SIRS:** Systemic Inflammatory Response Syndrome

**TLR:** Toll like receptors

**TNF-  $\alpha$ :** Tumor necrosis factor  $\alpha$

**WHO:** World Health Organization

**$\beta$ 2M:**  $\beta$ 2-microglobulin

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# *INTRODUCTION*

## **Introduction**

Bacterial endotoxin is a lipopolysaccharide (LPS) and the major glycolipid component of the outer membrane of gram-negative bacteria, which comprise 70% of the total bacteria in the healthy human gut. Exposure to endotoxin results in release of a wide variety of proinflammatory cytokines and binding via CD14 to systemic immune competent cells. *(Christopher W et al.,2010).*

LPS molecules can form aggregates which are too large to pass through dialysis membranes. It has been shown that components of lipopolysaccharide (lipid A) are able to pass through dialysis membranes, can elicit a pyrogenic response, and contribute to long-term morbidity and inflammation *(Raj et al., 2009).*

Endotoxin results in a broad range of negative cardiovascular effects including peripheral vasodilation and reduction in cardiac contractile performance. patients on long-term maintenance hemodialysis have evidence of mucosal ischemia and ultrafiltration causes a reduction in splanchnic blood volume despite preserved blood pressure. Mesenteric ischemia results in disrupted gut mucosal structure and function, with increased gut permeability .also Endotoxin contamination of dialysis water has