

# **The Value of Urinary Neutrophil Gelatinase-Associated Lipocalin in the Differential Diagnosis of Acute Kidney Injury in Liver Cirrhosis**

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا  
إلا ما علمتنا إنك أنت  
العليم العظيم

صدق الله العظيم

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**Key words:** Acute kidney injury, prerenal, FENa, Neutrophil gelatinase associated lipocalin, acute tubular necrosis, HRS, ascites, liver cirrhosis

## **Abstract:**

Introduction of acute kidney injury was mentioned. Types of AKI in liver cirrhosis was listed. Urinary NGAL and its measurement importance was discussed. Concerning diagnostic performance of uNGAL in differentiating the different types of AKI, uNGAL has good diagnostic performance in the differentiation, uNGAL levels were significantly different in each category of AKI: highest in iAKI, intermediate in HRS and low in prerenal disease. Furthermore, uNGAL levels in patients with prerenal azotemia were similar to those with normal kidney function.

Urinary NGAL has not only potentiality to detect AKI but also has the ability to differentiate cause of AKI as shown in the current study that revealed uNGAL > 30 ng/mg, 15-39 ng/mg, 39-143 ng/mg and >143 ng/mg had the highest characteristics as a diagnostic marker for detecting AKI, diagnosis of prerenal group, HRS and ATN patients respectively.



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*Candidate*



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## List of Abbreviations

Abbr.	Full-term
<b>AKI</b>	: Acute kidney injury
<b>AKIN</b>	: Acute kidney injury network
<b>ATN</b>	: Acute tubular necrosis
<b>CB1</b>	: Cannabinoid 1
<b>CKD</b>	: Chronic kidney disease
<b>CSPH</b>	: Clinically significant portal hypertension
<b>eNOS</b>	: Endothelial NO synthase
<b>ET-1</b>	: Endothelin-1
<b>FENa</b>	: Fractional excretion of sodium
<b>FGF</b>	: Fibroblast growth factor
<b>GFR</b>	: Glomerular filtration rate
<b>HRS</b>	: Hepatorenal syndrome
<b>HSCs</b>	: Hepatic stellate cells
<b>HVPG</b>	: Hepatic venous pressure gradient
<b>ICA</b>	: International club of ascites
<b>KDIGO</b>	: Kidney disease improving global outcome
<b>Lcn2</b>	: Lipocalin 2
<b>MAP</b>	: Mean arterial pressure
<b>MDRD</b>	: Modification of Diet in Renal Disease
<b>MELD</b>	: Model of end stage liver disease
<b>MMP-9</b>	: Matrix metalloproteinase-9

<b>NGAL</b>	: Neutrophil-gelatinase-associated lipocalin
<b>NO</b>	: Nitric oxide
<b>NSAIDs</b>	: Non-steroidal anti-inflammatory drugs
<b>PDGF</b>	: Platelet-derived growth factor
<b>PGE</b>	: Prostaglandin E
<b>RAAS</b>	: Renin-angiotensin-aldosterone system
<b>SARS</b>	: Severe acute respiratory syndrome
<b>SBP</b>	: Spontaneous bacterial peritonitis
<b>sCr</b>	: Serum creatinine
<b>SECs</b>	: Sinusoidal endothelial cells
<b>sGC</b>	: Soluble guanylyl cyclase
<b>TGF-<math>\beta</math>1</b>	: Transforming growth factor-beta 1
<b>VEGF</b>	: Vascular endothelial growth factor

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## Introduction

Physicians caring for patients with cirrhosis should recognize the acute or chronic character of renal disease; the causes of renal injury; the clinical conditions leading concomitantly to acute kidney injury (AKI) and liver dysfunction, and the prognostic factors associated with the progression of AKI. Hypovolemia (due to diuretics, hemorrhage, diarrhea), acute tubular necrosis, sepsis, nephrotoxic agents (such as non steroidal anti-inflammatory drugs, aminoglycosides radiological contrasts) and hepatorenal syndrome-type 1 are the most common causes of AKI in cirrhotic patients (*Hartleb and Gutkowski, 2012*).

Acute kidney injury (AKI) in patients with cirrhosis is common and deadly. Up to 20% of hospitalized patients with cirrhosis develop AKI and once AKI occurs, there is a reported fourfold increased risk of mortality (*Du Cheyronnet al., 2005*).

In cirrhosis, AKI types include prerenal azotemia, hepatorenal syndrome (HRS), and acute tubular necrosis (ATN) (*Garcia-Tsao et al., 2008*).

Unfortunately these forms of AKI are difficult to be distinguished clinically as serum creatinine (sCr), the clinical