Study Of Brain Natriuretic Peptide and Neutrophil Gelatinase-Associated Lipocalin In Patients With Risk Of Acute Kidney Injury In ICU

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List of Abbreviations

ADQI	Acute Dialysis Quality Initiative
AKI	Acute kidney injury
AKIN	Acute kidney Injury Network
ANP	Atrial Natriuretic Peptide
AP	Alkaline Phosphatase
ARF	Acute Renal Failure
ASN	American Society of Nephrology
BEST Kidney study	The Beginning and Ending Supportive Therapy for the Kidney investigators study
BNP	Brain Natriuretic Peptide
BUN	Blood Urea Nitrogen
c-GMP	cyclic Guanylate MonoPhosphate
CHF	Congestive Heart Failure
CNP	C- Natriuretic Peptide
CRRT	Continuous Renal Replacement Therapy
CRS	CardioRenal Syndrome
CycC	Cystatin C
DNP	D- Natriuretic Peptide
GFR	Glomerular Filtration Rate
α-GST	Alpha-Glutathione S-Transferase
eGFR	estimated Glomerular Filtration Rate
GGT	GammaGlutanyl Transpeptidase
π-GST	pi- Glutathione S-Transferase
HUS	Haemolytic Uremic Syndrome
ICU	Intensive Care Unit
IHD	Intermittent HemoDialysis
IL-18	Interleukin-18.
KIM-1	Kidney Injury Molecule-1
LCN2	Lipocalin-2
LDH	Lactate DeHydrogenase
L-FABP	Liver Fatty Acid Binding protein.
LVEDP	Left Ventricular End Diastolic Pressure
MMP-9,	Matrix MetalloProteinase
NAC	N-AcetaylCysteine

NAG	N-Acetyl-β-D-Glucosamini-dase
NEiPHROS-AKI	North East Italian Prospective Hospital Renal Outcome Survey on Acute Kidney Injury
NEP	Neutral EndoPeptidase
NGAL	Neutrophil Gelatinase-Associated Lipocalin
NHI	National Health Institute
NPR	Natriuretic Peptide Receptor
NT-proBNP	N-Terminal fragment Precursor Brain Natriuretic Peptide
PD	Peritoneal Dialysis
pNGAL	plasma Neutrophil Gelatinase-Associated Lipocalin
pro-BNP	Precursor Brain Natriuretic Peptide
RIFLE	Risk, Injury, Failure, Loss, End-stage kidney disease
ROC-AUC	Receiver Operating Characteristic Curve
RRT	Renal Replacement Therapy
sCr	serum Creatinine
SLED	Sustained Low Efficiency Dialysis
STEMI	ST segment Elevation Myocardial Infarction
uNGAL	urinary Neutrophil Gelatinase-Associated Lipocalin
VEGF	Vascular Endothelial Growth Factor

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Introduction

Acute kidney injury (AKI) represents a major clinical problem, with rising incidence and high mortality rate despite significant advances in medical care. It affects some 3-7% of patients admitted to the hospital and the overall incidence of AKI in ICU patients ranges from 20% to 50% with higher incidence in sepsis patients. AKI represents a significant risk factor for mortality and can be associated with mortality greater than 50%

(Case et al.,2013).

The potentially effective therapeutic interventions for AKI may currently fail because they are applied late in the course of injury after an obvious increase of serum creatinine (sCr) is observed ***(JO et al.,2007).*** Due to the delayed rise in sCr following injury, recent efforts have focused on identification of an early and reliable promising novel biomarker of kidney injury with potentially high sensitivity and specificity ***(Bouman et al., 2010).***

Plasma Brain Natriuretic Peptide (BNP) is a biomarker related to myocardial overload, and is elevated in some ICU patients. It is 32 amino acid polypeptide secreted by the ventricles of the heart in response to

excessive stretching of heart muscle cells (cardiomyocytes).There is a high prevalence of BNP in both cardiac and renal dysfunction in ICU patients ***(Ware and Matthay 2005).***

Recent studies have shown that critically ill patients with AKI on presentation or during ICU stay have higher levels of the cardiac biomarker BNP relative to patient without AKI patients. Elevated levels of plasma BNP may help to identify patients with elevated risk of AKI in the ICU setting ***(Massimo et al.,2011).***

Neutrophil gelatinase-associated lipocalin (NGAL) is a novel renal biomarker showing promising results in prediction of AKI in patients across different clinical settings ***(Nagi et al.,2011).***

NGAL measured at ICU admission predicts the development of severe AKI similarly to serum creatinine-derived estimated Glomerular Filtration Rate (eGFR). However, NGAL adds significant accuracy to this prediction in combination with eGFR alone or with other clinical parameters and has an interesting predictive value in patients with normal serum creatinine ***(de Geus et al.,2011).***

Aim of the study

To identify the frequency of elevated serum BNP and NGAL in patients with risk of AKI in the ICU setting and its relation to AKI development & patients outcome.