Circulating $CD4^{+}CD28^{null}$ T cells and its Association with Atherosclerotic Changes in Patients with End Stage Renal Disease

Thesis

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List of Abbreviations

Abbreviation		Full term
AAA	:	Abdominal Aortic Aneurysm
ACAT	:	Acyl-Coa: Cholesterol O-Acyltransferase
ACE	:	Angiotensin-Converting-Enzyme
ACE-Is	:	Angiotensin Converting Enzyme Inhibitors
ACS	:	Acute Coronary Syndrome
AIDS	:	Acquired Immune Deficiency Syndrome
AKI	:	Acute Kidney Injury
AMPK	:	Adenosine Monophosphate -Activated Protein Kinase
APCs	:	Antigen-Presenting Cells
APD	:	Automated Peritoneal Dialysis
API	:	Analytical Profile Index
APO	:	Apolipoprotein
ARBs	:	Angiotensin Receptor Blockers
ATP	:	Adenosine Triphosphate
AUC	:	Area Under The Curve
BCL-6	:	B-Cell Lymphoma 6 Protein
BUN	:	Blood Urea Nitrogen
CAC	:	Coronary Artery Calcium

CAD	:	Coronary Artery Disease
CAPD	:	Continuous Ambulatory Peritoneal Dialysis
CCR	:	C-C Motif Chemokine Receptor
CETP	:	Cholesteryl Ester Transfer Protein
CIMT	:	Carotid Intima Media Thickness
CKD	:	Chronic Kidney Disease
CK-MB	:	Creatine Kinase-Muscle/Brain
CMV	:	Cytomegalovirus
COX2	:	Cyclooxygenase-2
CRP	:	C-Reactive Protein
CRRT	:	Continuous Renal Replacement Therapy
CT	:	Computerized Tomography
CTLA-4	:	Cytotoxic T-Lymphocyte-Associated Protein4
CTLs	:	Cytotoxic T Cells
CV	:	Cardiovascular
CVD	:	Cardiovascular Diseases
CVVH	:	Continuous Veno-Venous Hemofiltration
CVVHD	:	Continuous Veno-Venous Hemodialysis
CVVHDF	:	Continous Venovenous Hemodiafiltration
CX3CR	:	C-X-C Chemokine Receptor

DC	:	Dendritic Cells
DGAT	:	Diacyl glycerol acyl transferase
DNA	:	Deoxyribo nucleic Acid
ECG	:	Electrocardiogram
eGFR	:	Estimated Glomerular Filtration Rate
ELISA	:	Enzyme-linked immunosorbent assay
ERK1/2	:	Extracellular Signal-Regulated Kinase 1/2
ESRD	:	End-Stage Renal Disease
FAs	:	Fatty Acids
Fas-FasL	:	First Apoptosis Signal - First Apoptosis Signal Ligand
FOXP3^{+}	:	Forkhead Box P3
GATA3	:	Gata-Binding Protein 3
HbA1c	:	Hemoglobin A1c
HD		Hemodialysis
HDL	:	High Density Lipoprotein
HIV	:	Human Immunodeficiency Virus
HMG-CoA	:	3-Hydroxy-3-Methyl-Glutaryl coenzyme A
ICAM-1	:	Intercellular Adhesion Molecule-1
IFN	:	Interferon

IL-2R	:	Interleukin-2 Receptor
ILs	:	Interleukins
iNOS	:	Inducible Nitric Oxide Synthase
IVUS	:	Intravascular Ultrasound
KDIGO	:	Kidney Disease: Improving Global Outcomes
KDOQI	:	Kidney Disease Outcomes Quality Initiative
KIR2DS2	:	Killer Cell Immunoglobulin Like Receptor, Two Ig Domains and Short Cytoplasmic Tail 2
Lck	:	Lymphocyte-Specific Protein Tyrosine Kinase
LDL	:	Low Density Lipoprotein
LFA-1	:	Leukocyte Function-Associated Antigen-1
LPL	:	Lipoprotein Lipase
MDRD	:	Modification Of Diet In Renal Disease
MHC	:	Major Histocompatibility Complex
MMPS	:	Matrix Metalloproteinases
MRA	:	Magnetic Resonance Angiography
MRI	:	Magnetic Resonance Imaging
MS	:	Multiple Sclerosis
MTHFR	:	Methylenetetrahydrofolate Reductase

MTTP	:	Microsomal Triglyceride Transfer Protein
NA	:	Not Applicable
NFAT	:	Nuclear Factor Of Activated TCells
NK	:	Natural Killer
NKG2D	:	Natural-Killer Group 2, Member D
NO	:	Nitric Oxide
NOS	:	Nitric Oxide Synthase
NSAIDs	:	Non Steroidal Anti- Inflammatory Drugs
PAD	:	Peripheral Arterial Disease
PBMCs	:	Blood mononuclear cells
PBS	:	Phosphate buffered saline
PCSK-9	:	Proprotein Convertase Subtilisin/Kexin Type-9
PD	:	Peritoneal Dialysis
PE	:	Phycoerythrin
PKC-8	:	Protein Kinase C-8
PLC-ɣ	:	Phospholipase C-Gamma
pmp	:	Patients Per Million
PPARα	:	Peroxisome Proliferator-Activated Receptor Alpha
PPARγ	:	Peroxisome Proliferator-Activated Receptor Gamma

PV-	:	Predictive Value Of Negative Test
PV+	:	Predictive Value Of Positive Test
RA	:	Rheumatoid Arthritis
RAAS	:	Renin-Angiotensin-Aldosterone System
ROC	:	Receiver-Operating Characteristic
RORγt	:	Related Orphan Receptor GammaT
RRT	:	Renal Replacement Therapy
SCUF	:	Slow Continuous Ultrafiltration
SD	:	Standard Deviation
SLEDD	:	Sustained Low Efficiency Daily Dialysis
SLEDD-F	:	Sustained Low Efficiency Daily Diafiltration
SMCs	:	Smooth Muscle Cells
sPLA$_2$	:	secreted PhosphoLipaseA2
TCR	:	T Cell Receptor
TFH	:	Transcriptional regulation of follicular T-helper cells
TG	:	Triglycerides
TGFbeta	:	Transforming Growth Factor Beta
Th	:	T helper
TIA	:	Transient Ischemic Attack
TLRs	:	Toll-Like Receptors

TNF-α	:	Tumor Necrosis Factor-Alpha
T_{reg}	:	T Regulatory
US	:	Ultrasound
VCAM-1	:	Vascular Cell Adhesion Molecule1
γδ T cells	:	Gamma Delta T Cells

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Introduction

Chronic kidney disease (CKD) is an increasing health problem, approximately 15% of the adults in industrialized countries suffer from CKD***(Chadban et al., 2003).***

Patients with ESRD (End Stage Renal Disease), including those on hemodialysis (HD) have increased mortality risk , especially from cardiovascular disease (CVD).This high CV risk is not only explained by conventional risk factors like hypertension, diabetes in addition to dyslipidemia***(Chiu and Mehrotra,2010).*** Carotid intima- media thickness(CIMT) is a simple ,easy beside a cost-effective method for assessing atherosclerosis in addition to cardiovascular risk in adults***(Casella et al.,2008).***

Inflammatory pathway activation mediates some of the associations between renal dysfunction in addition to CV risk. Inflammatory markers, as C-reactive protein (CRP), interleukin (IL)-6, fibrinogen together with soluble adhesion molecules and cytomegalovirus(CMV)infection may have a role in CV risk in the general population especially in ESRD patients***(Ridker et al,2000;Yilmaz et al, 2005; Rao et al,2006).***

Observations suggested a role for T cells in atherosclerosis predisposition and CVD. $CD4^+$ T helper cells can augment atherogenisis***(Gerli et al,2004).***