

口頭論文發表

時間：107 年 12 月 8 日(星期六) 09:30 ~ 10:30

地點：B1 會議廳(三)

【Basic-1】

主持人：呂至剛 張志宗

- 09:30—09:45
1. 微處理狼瘡性腎炎：微核糖核酸17-92調控濾泡輔助T細胞發育及調節性T細胞活性以減輕狼瘡腎炎
Micromanaging Lupus Nephritis: MiR17-92 Modulates T_{FH} Development and Regulatory T Cell Activity to Mitigate Lupus Nephritis
楊皇煜 吳昭儀 林展宇 顏宗海 張明揚 洪振傑 田亞中 楊智偉
¹林口長庚腎臟科 ²林口長庚兒童過敏氣喘風濕科
- 09:45—10:00
2. 急性腎損傷引起之長期粒線體失能容易因二次損傷而導致慢性腎病
Acute Kidney Injury Induced Long-Term Mitochondrial Dysfunction is Susceptible to Second Injury and Development of Chronic Kidney Disease Thereafter
許永和 ^{1,3} 柯理思 ² 陳正憲 ^{1,3} 陳佑璋 ^{1,2,3} 吳麥斯 ^{1,3}
¹臺北醫學大學 雙和醫院 內科部 腎臟內科
²臺北醫學大學 醫學院 臨床醫學研究所
³臺北醫學大學 醫學院 醫學系 腎臟內科學科
- 10:00—10:15
3. 鳶尾素/纖連蛋白 III 型結構域的蛋白質 5 與尿激酶型纖溶酶原激活劑對肥胖和 2 型糖尿病小鼠腎臟的關係
The relationship between irisin/FNDC5 and urokinase plasminogen activator on kidney of obese and type 2 diabetes mellitus mice
陳金順 ¹ 吳忠擇 ² 鄒居霖 ³ 張立乾 ⁴
三軍總醫院腎臟內科1、署立雙和醫院新陳代謝科2、腎臟內科3、國防醫學院藥學系4
- 10:15—10:30
4. 高濃度 C5a 對腎臟內皮細胞粒線體損傷的效應研究
The Effect of High Level C5a on Mitochondria Damage of Kidney Endothelial Cells
蔡宜蓉 ¹ 周佳宏 ² 曹永魁 ¹
¹台大兒童醫院小兒部 ²台大醫院婦產部

口頭論文發表

時間：107 年 12 月 8 日(星期六) 10:45 ~ 11:45

地點：B1 會議廳(三)

【Basic-2】

主持人：林水龍 張明揚

10:45—11:00

1. 交通空氣污染之懸浮微粒對腎臟細胞的影響及相關機制
Effects and Mechanisms of Traffic-Related Particulate Matter in Kidney Cells

許永和^{1,3} 邱惠雯² 林裕峯^{1,2} 吳麥斯^{1,3}

¹臺北醫學大學 雙和醫院 腎臟內科

²臺北醫學大學 醫學院 臨床醫學研究所

³臺北醫學大學 醫學院 醫學系 腎臟內科學科

11:00—11:15

2. 基因甲基化關閉腎前驅細胞的轉位子，維持進行腎元分化
DNMT1 in *Six2* Progenitor Cells is Essential for Transposable Element Silencing and Kidney Development

Szu-Yuan Li 黎思源^{1,2}, *Jihwan Park¹, Katalin Susztak¹

¹Renal-Electrolyte and Hypertension Division of Department of Medicine, and Department of Genetics, Perelman School of Medicine, University of Pennsylvania, Philadelphia

²Division of Nephrology, Department of Medicine, Taipei Veterans General Hospital and School of Medicine, National Yang-Ming University, Taipei, Taiwan

11:15—11:30

3. Empagliflozin 在大鼠嚴重心腎症候群模型中可以中斷心腎衰竭的進展並展現出除 SGLT2 / 1 抑制之外可能的有益作用

Empagliflozin Interrupts Progression of Chronic Kidney Disease and Heart Failure in a Model of Severe Cardiorenal Syndrome in Rat and Exhibits the Possible Beneficial Effects Beyond Inhibition of SGLT2/1

楊智超 吳建興 莊峰榮 陳靖博 李建德 廖上智

高雄長庚紀念醫院 內科部 腎臟科

11:30—11:45

4. 母親接受 nrf2 活化劑治療對暴露於產前類固醇和產後高脂飲食的雄性大鼠後代產生的腎臟程序化和高血壓具有長期保護作用

Maternal Nrf2 Activation Has Long-Term Renal Programming and Antihypertensive Effects in Male Rat Offspring Exposed to Prenatal Dexamethasone and Postnatal High-Fat Diet

王筑瑩, 盧佩真, 林育如, 田祐霖

口頭論文發表

時間：107 年 12 月 8 日(星期六) 09:30 ~ 10:30

地點：B1 會議廳(一)

【Clinical-1】

主持人：林志慶 王偉傑

- 09:30--09:42
1. 以全外顯子定序分析台灣兒童非典型尿毒溶血症候群
Whole-Exome Sequencing Detected Mutations in Pediatric Patients with Atypical Hemolytic Uremic Syndrome in Taiwan
曾敏華¹ 蔡政道² 蔡宜蓉³ 黃世明⁴ 范文郎⁵ 林石化⁶
林口長庚紀念醫院兒童腎臟科¹ 馬偕兒童醫院腎臟科²
台大兒童醫院腎臟科³ 國防醫學院生化所⁴
林口長庚紀念醫院基因體中心⁵ 三軍總醫院內科部腎臟科⁶
- 09:42—09:54
2. 急性腎損傷增加嚴重先天性心臟病之死亡風險 - 台灣 2000-2015 小於三歲病童傾向分數配對分析
Acute Kidney Injury Increases Mortality Risk of Severe Congenital Heart Diseases under Three Years Old - A 2000-2015 Nationwide Propensity Score Matching Analysis
蔡宜蓉¹ 何俊儀¹ 許力霏² 莊培宏² 劉濟郝³ 吳允升⁴ 陳進陽⁵
曹永魁¹ 台大急性腎損傷聯盟
¹台大兒童醫院小兒腎臟科²台北市衛生福利健康資料研究與教育協會³國軍高雄總醫院腎臟內科⁴臺大醫院內科部腎臟科⁵榮民總醫院內科部腎臟科
- 09:54—10:06
3. 分析台灣小於三歲兒童急性腎損傷從 2000-2012 的流行病學
The Epidemiology of Pediatric Acute Kidney Injury in Taiwan 2000-2012: Focus on Patients under Three Years Old
蔡宜蓉¹ 何俊儀¹ 許力霏² 莊培宏² 劉濟郝³ 吳允升⁴ 陳進陽⁵
曹永魁¹ 台大急性腎損傷聯盟
¹台大兒童醫院小兒腎臟科²台北市衛生福利健康資料研究與教育協會³國軍高雄總醫院腎臟內科⁴臺大醫院內科部腎臟科⁵榮民總醫院內科部腎臟科
- 10:06—10:18
4. 低 C3 濃度,以及高嗜中性與淋巴球比,以及高血小板與淋巴球比,都預測切片證實為原發性膜性腎絲球腎炎的不良長期腎臟存活率
Low Serum C3 Level, High Neutrophil-Lymphocyte-Ratio, and High Platelet-Lymphocyte-Ratio All Predicted Poor Long-Term Renal Survivals in Biopsy-Confirmed Idiopathic Membranous Nephropathy
蔡守倫¹ 蔡尚峰^{1,2,3} 吳明儒^{1,2} 陳呈旭^{1,2}
¹台中榮總內科部腎臟科²台中東海大學生命科學系
³台北陽明大學醫學院

10:18—10:30

5. 由組織及血清預測因子預測經由腎臟切片確診 IgA 腎病變的長期腎臟預後

Serologic and Histologic Predictors of Long Term Renal Outcome in Biopsy-Confirmed IgA Nephropathy

洪秉鴻¹ 蔡尚峰¹ 吳明儒² 陳呈旭³

¹台中榮總 ²台中榮總 ³台中榮總

口頭論文發表

時間：107 年 12 月 8 日(星期六) 10:45 ~ 11:45

地點：B1 會議廳(一)

【Clinical-2】

主持人：朱柏齡 洪振傑

- 10:45--10:57 1. 居家血液透析治療，臺灣先驅計畫，年度報告
Home hemodialysis, a pilot study in Taiwan, annual report
郭慧亮、盧雅惠、黃秋錦
中國醫藥大學附設醫院內科部腎臟醫學中心
- 10:57--11:09 2. 全國透析患者 2009-2016 年費用趨勢分析
National Trends in Medical Expenditures in the Taiwan Dialysis
Population from 2009 to 2016
林明彥¹ 邱怡文¹ 簡鳳萱¹ 謝慧敏² 王淑麗³ 李蕙蘭¹ 楊舒安¹
黃尚志^{*1}
¹高雄醫學大學附設中和紀念醫院 腎臟內科 ²高雄醫學大學 公共
衛生學系 ³高雄醫學大學附設中和紀念醫院 護理部
- 11:09--11:21 3. 長期性血液透析導管之照護成果:個案管理模式之運用
Achievement of Case Management Practice Model in Patients with
Cuffed Hemodialysis Catheters
蔡蕙鍾^{1,2} 洪麗香^{1,2} 王一^{1,2} 黃惠勇² 李建德²
雲林長庚紀念醫院 腎臟科¹ 高雄長庚紀念醫院 腎臟科²
- 11:21--11:33 4. 腎臟科醫師執行腹膜透析導管植入之成效
Percutaneous Peritoneal Dialysis Catheter Placement by A Nephrologist
林軒任 陳虹志 林崇智 周哲毅
亞洲大學附屬醫院腎臟科
- 11:33--11:45 5. 使用臨床因子的交互作用來預測透析病人輕微的認知障礙
Mutual Interaction of Clinical Factors for Prediction of Mild Cognitive
Impairment in Patients Receiving Dialysis
陳靖博¹ 張瓊之² 李隆志¹ 李文欽¹
高雄長庚紀念醫院 內科部 腎臟科¹ 神經內科² 長庚大學

口頭論文發表

時間：107 年 12 月 8 日(星期六) 09:30 ~ 10:30

地點：B1 會議廳(二)

【Clinical-3】

主持人：蘇裕謀 吳家兆

- 09:30—09:42 1. Association between Serum Aluminum Level and Uremic Pruritus in Hemodialysis Patients
於血液透析患者血中鋁濃度和尿毒搔癢症的關係
湛茗任¹ 許景瑋^{1,2} 翁正昊^{1,2} 林譚敦慈¹ 顏宗海^{1,2} 黃文宏^{1,2}
¹林口長庚醫學中心腎臟科系暨臨床毒物中心
²長庚大學醫學院
- 09:42—09:54 2. 血液透析的年輕成人有較高的罹癌風險:全國性的人口研究
Higher Risk of Malignant Neoplasms in Young Adults with End-Stage Renal Disease under Hemodialysis: A Nationwide Population-Based Study
柯佳君¹ 潘恆之^{1,2,3} 孫樵隱^{1,2,3} 吳逸文^{1,2,3} 蔡天翎² 孫啟欽^{2,3,4}
李進昌^{1,2,3}
¹基隆長庚醫院腎臟科 ²基隆長庚醫院社區醫學研究中心
³長庚大學醫學院 ⁴基隆長庚醫院眼科
- 09:54—10:06 3. 透析病患維生素 D 缺乏與心臟-胸廓比及長期預後的相關性研究
Vitamin D Deficiency, Cardiothoracic Ratio, and Long Term Mortality in Hemodialysis Patients
余運軒¹ 許恆榮^{1,2} 吳逸文^{1,2} 孫樵隱^{1,2} 陳俊宇^{1,2} 李進昌^{1,2}
陳永昌^{1,2}
基隆長庚醫院腎臟科¹ 長庚大學醫學院²
- 10:06—10:18 4. 血液透析患者自體顯性多囊腎病變與動靜脈血管通路功能失調之關聯性
The Association of Autosomal Dominant Polycystic Kidney Disease with the Malfunction of Arteriovenous Access in Hemodialysis Patients
李宗倫^{1,2} 林志慶^{1,2}
¹台北榮民總醫院內科部腎臟科 ²台灣台北陽明大學醫學系
- 10:18—10:30 5. 抗血小板藥物維持血液透析病人動靜脈瘻管通暢性
Antiplatelet Agents Maintain Arteriovenous Fistula and Graft Function in Patients Receiving Hemodialysis: A Nationwide Case-Control Study
許永和^{1,2} 宋立勤^{3,4} 嚴友君⁵ 林怡諄⁵ 吳麥斯^{1,2}
¹臺北醫學大學 雙和醫院 內科部 腎臟內科
²臺北醫學大學 醫學院 醫學系 腎臟內科學科
³臺北醫學大學 雙和醫院 內科部 心臟內科
⁴臺北醫學大學 醫學院 醫學系 心臟內科學科
⁵臺北醫學大學 管理學院 生物統計研究中心

口頭論文發表

時間：107 年 12 月 8 日(星期六) 10:45 ~ 12:00

地點：B1 會議廳(二)

【Clinical-4】

主持人：賴彬卿 李柏蒼

- 10:45—10:57
1. 探討低磷飲食對末期腎臟病 Fibroblast Growth Factor-23 的影響：一個隨機交叉試驗結果
Effect of Low-Phosphate Diet on Fibroblast Growth Factor-23 in Patients with End-Stage Renal Disease: A Randomized Cross-Over Trial
蔡萬全¹ 徐世平¹ 吳泓彥¹ 邱彥霖¹ 董奎廷¹ 楊如燁¹ 白玫芬¹
陳泓源¹ 劉麗娟² 蔡淑敏² 彭渝森¹
亞東紀念醫院腎臟內科¹ 亞東紀念醫院營養科²
- 10:57—11:09
2. 鹼性治療可能減緩慢性腎臟病患者缺血性心臟病的風險
Alkali Therapy May Lessen Risks of Ischemic Heart Disease in CKD Patients
鄒居霖¹ 曾敏峯² 許育瑞³ 方德昭⁴ 林裕峯¹ 吳麥斯¹
許永和^{1*}
¹雙和醫院腎臟科 ²國軍高雄總醫院左營分院 ³三軍總醫院腎臟科
⁴台北醫學大學附設醫院腎臟科
- 11:09—11:21
3. 糖尿病視網膜病變是慢性腎臟病惡化的危險因素：台灣一項多中心病例對照研究
Diabetic Retinopathy as A Risk Factor for Chronic Kidney Disease Progression: A Multicenter Case-Control Study in Taiwan
鄭彩梅¹ 吳美儀¹ 吳麥斯¹ 許永和¹ 盧國城² 林裕峰¹
¹腎臟內科衛生福利部雙和醫院-臺北醫學大學
²腎臟內科輔仁大學附設醫院
- 11:21—11:33
4. 不含干擾素之直接抗病毒藥物用在腎臟移植併有慢性 C 型肝炎患者的世代研究
Interferon-Free Direct Antiviral Agents in Kidney Transplant Recipients with Hepatitis C Infection: A Cohort Study
吳勝文 張滋榮 連榮達
中山醫大 醫學系 中山醫大附設醫院 腎臟科
- 11:33—11:45
5. 健康成人腎臟大小與身體指數及腎功能在超音波下的關聯性：臺灣兩家醫學中心的回溯性觀察性研究
The Nomogram of Kidney Size and Its Association with Body Indices and Renal Function by Ultrasonography Assessment: A Retrospective Observational Study in Taiwan
吳建興¹ 蘇炫安² 謝函穎³
¹腎臟內科 高雄長庚紀念醫院, ²醫學系 中山醫學大學,
³教學部 童綜合醫療社團法人童綜合醫院

11:45—11:57

6. 治療慢性 C 型肝炎病患時直接作用抗病毒組合 Daclatasvir 與 Asunaprevir 對腎絲球過濾率的長期影響：一個區域教學醫院的初報
The Long-Term Effect of Daclatasvir and Asunaprevir Direct-Acting Antiviral Regimen on the Glomerular Filtration Rate in Treating Patients with Chronic Hepatitis C: A Preliminary Report of a Regional Teaching Hospital

謝日耀^{1*} 蔡青陽² 吳怡雯³ 張百純³ 賴秀青³

¹ 阮綜合醫療社團法人阮綜合醫院 內科部腎臟科 ² 消化系內科 .

³ 腎臟科衛教室

一般論文壁報發表

地點：B1 樓壁報發表區

【Basic】

- B01 無機磷酸鹽透過抑制粒線體使腎小管細胞對缺血再灌注損傷更敏感
Inorganic Phosphate Makes Renal Tubular Cells more Sensitive to Ischemia-Reperfusion Injury through Inhibiting Mitochondrial Function
鄭仲益^{1,2} 陳彥成^{1,2} 劉崇德^{1,2} 蘇裕謀^{1,2} 陳作孝^{1,2} 陳正憲^{1,2}
¹臺北醫學大學萬芳醫院內科部腎臟內科 ²臺北醫學大學醫學院醫學系腎臟內科]
- B02 類昇糖激素胜肽受體可調節高糖環境中老鼠間質細胞的醣化終產物受器表現
Glucagon-Like Peptide-1 Receptor Regulates Receptor of Advanced Glycation End Products in High Glucose Treated Rat Mesangial Cells
張瑞廷¹ 梁耀仁² 呂至剛^{1,3}
¹新光吳火獅紀念醫院腎臟內科 ²輔仁大學生命科學系暨研究所 ³輔仁大學醫學系
- B03 液相色譜法-質譜聯用分析 IgA 腎炎病人的免疫球蛋白
Investigation of Immunoglobulins from Patients with IgA Nephropathy by Using Liquid Chromatography - Triple Quadrupole Tandem Mass Spectrometry
高治圻¹ 陳曉凡² 陳璵帆² 廖馨瑜² 蔡昀蓉³ 張偉嶠⁴ 吳麥斯⁵ 蔡伊琳^{6*}
¹北醫腎臟內科 ²北醫大保健營養學系 ³藥學系
⁴臨床藥物基因體學暨蛋白質體學碩士學位學程
⁵雙和醫院腎臟內科 ⁶北醫大醫學系生化學科
- B04 第二型血管生成素經由 microRNA-33-5p-SOCS5 路徑誘發糖尿病腎臟病變之腎膈細胞凋亡
Angpt2 Induces Mesangial Cell Apoptosis through microRNA-33-5p-SOCS5 Loop in Diabetic Nephropathy
蔡宜純^{1,2} 郭柏麟¹ 郭美娟² 許雅玲³
¹高雄醫學大學臨床醫學研究所 ²高雄醫學大學附設醫院腎臟內科
³高雄醫學大學醫學研究所
- B05 尿中白蛋白引發的腎絲球足細胞的 microparticles 可以調控腎絲球足細胞內質網壓力
Podocyte-Derived Microparticles after Albumin Overload Regulates Endoplasmic Reticulum Stress in Podocytes
陳建安¹ 張哲銘² 陳鴻鈞²
¹台南新樓醫院腎臟科 ²高雄醫學大學腎臟科
- B06 尿中白蛋白藉由內質網壓力來增加腎絲球足細胞的 integrin-β3 表現
Albumin Load Increases Integrin-β3 Expression of Podocytes through Endoplasmic Reticulum Stress
陳建安¹ 張哲銘² 陳鴻鈞² 楊堉麟³
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- B07 鉤端螺旋體菌感染的小鼠巨噬細胞及腎轉錄組譜:探討感染對慢性腎病的影響
Transcriptome Analysis of Murine Macrophages and Kidneys upon Leptospiral Infection:
Implications for Chronic Kidney Diseases
周莉芳 陳亭紋 楊皇煜 張明揚 徐慎行 蔡忠穎 葛依青 黃瓊增 田亞中 洪振傑
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- B08 維生素D3透過負向調控β-catenin訊號路徑
抑制硫酸吲哚酚所誘發HK-2人類腎小管細胞上皮細胞間質化
Calcitriol Attenuates Indoxyl Sulfate-Induced Epithelial-Mesenchymal Transition By
Down-Regulation of β-catenin signaling Pathway in HK-2 Human Proximal Tubular Cells
張立建^{1,2*} 郭嘉文¹ 廖昱凱¹ 蔡佳翰² 李健群^{2,3#}
¹國軍台中總醫院內科部腎臟內科 ²中山醫學大學營養學系
³中山醫學大學附設醫院營養科
- B09 海藻糖攝入對多囊腎自噬作用與囊泡發生之研究
Effect of Trehalose Ingestion on Autophagy Activity and Cystogenesis in Polycystic
Kidney Disease
周莉芳 鄭雅蓮 謝君儀 林展宇 楊皇煜 洪振傑 陳永昌 田亞中 楊智偉 張明揚*
長庚紀念醫院 腎臟科系 腎臟研究中心
- B10 活性氧物質在肥胖腎纖維化與代謝性內毒血症誘發的訊號路徑作為治療標靶
Therapeutic Targeting of ROS Triggered Signalling Pathways in Obese Kidney Fibrosis
with Metabolic Endotoxemia
張嘉峯^{1-3,*} 謝治宇¹⁻³
¹行天宮醫療志業醫療財團法人恩主公醫院腎內科
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³社團法人新北市愛腎研究與健康推廣協會
- B11 蛇床子素透過誘導 klotho 表現而削弱高度糖化終產物引發之腎小管細胞過度肥大
Osthole Attenuates Advanced Glycation End Products-Mediated Renal Tubular
Hypertrophy via Induction of Klotho Expression
陳銳溢¹ 甘偉志^{1,2} 林平正² 楊翼寧¹ 簡志強¹ 王憲奕¹ 吳佳純¹ 江銘彥¹
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- B12 MST3 (mammalian Ste20-like protein kinase 3), 在自發性高血壓鼠一個調控腎臟離子
平衡及高血壓的新基因
MST3 (mammalian Ste20-like protein kinase 3), A New Gene Involved in Ion
Homeostasis and Renal Regulation of Hypertension in Spontaneous Hypertensive Rats
甘偉志^{1,2} 陸德齡³ 陳奕廷³ 王俊翰⁴ 楊翼寧¹ 陳銳溢¹ 簡志強¹ 王憲奕¹
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- B13 MAGE-D2 透過伴隨蛋白依靠性內質網相關蛋白降解調節鈉氯離子通道
MAGE-D2 Regulated Na-Cl Cotransporter through Chaperon-dependent ERAD

楊松昇^{1*} 林石化²
三軍總醫院腎臟科

- B14 吉特曼疾病之尿液胞外泌體的蛋白質體研究
Proteomic Analysis of Urinary Exosomes in Patients with Gitelman Syndrome
宋志建^{1*} 陳敏修¹ 鄭智仁¹ 許育瑞¹ 楊松昇¹ 林石化^{1#}
¹三軍總醫院腎臟內科
- B15 製作與功能分析 KLHL3 基因中 klech 結構域突變所引起的第 II 型假性醛固酮小鼠模型
Generation and Analysis of a Mouse Model of Pseudohypoaldosteronism Type II Caused by KLHL3 Mutation in Kelch Domain
林建銘^{1,2} 楊松昇^{1,3} 林石化^{1,3*}
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國防醫學院三軍總醫院腎臟科³
- B16 在末期腎臟病患所發生老化相關免疫變化的惡化與發炎及心血管疾病相關：iESRD 研究的初步發現
Aggravated Aging-Related Immune Changes Are Associated with Inflammation and Cardiovascular Diseases in ESRD Patients: Baseline Findings from the iESRD Study
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⁴臺灣大學免疫學研究所
- B17 尿毒素硫酸吲哚酚對骨髓間質幹細胞於骨生成的影響
The Effect of Uremic Toxin Indoxyl Sulfate on Osteogenesis in Bone Marrow Mesenchymal Stem Cells
謝晉文^{1,2} 何美玲^{3,4} 陳崇桓³ 張瑞根³
屏東基督教醫院 腎臟科
- B18 瑞香草醌抑制腎臟癌細胞之細胞轉移透過 Src 及 Phosphatidylinositol 3-Kinase-Akt 訊息路徑
Antimetastatic Potentials of Thymoquinone on Renal Carcinoma Cells Targeting the Src and the Phosphatidylinositol 3-Kinase-Akt Pathway
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³中山醫學大學醫學系
- B19 腎臟幹細胞與去細胞腎臟骨架之工程再造腎臟
Bioengineering Kidney with Decellularized Kidney Scaffold and Renal Progenitor cells
李柏蒼 周康茹 方華章 陳建良 許智揚 張子爰 黃建維 陳信佑 歐世祥
高雄榮總腎臟科及陽明大學
- B20 薑辣素對人類腎癌細胞的細胞毒殺作用及其可能機轉的探討
Cytotoxicity Effect of 6-Gingerol and Its Possible Mechanism on Human Renal Cancer Cells
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¹衛生福利部桃園醫院 腎臟科 ²中原大學 生物醫學工程研究所

B21 活化轉錄因子3藉由 ChREBP-SCD1途徑增強脂肪分解和白脂褐變來抑制肥胖
ATF3 Inhibited Obesity by Enhancing Lipolysis and White Fat Reprogram Browning via
ChREBP-SCD1 Pathway

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B22 NLRP3 基因剔除可降低血管鈣化
NLRP3 Deficiency Attenuates Vascular Calcification

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【Clinical】

- C001 鉤端螺旋體造成急性腎衰竭的長期預後
Long-term Outcomes After Leptospirosis Induced Acute Kidney Injury
孫偉喬¹ 張智翔¹ 李承家¹ 張書緯^{2,3} 范佩君¹ 田亞中¹ 楊智偉¹
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³長庚紀念醫院兒童過敏氣喘風濕科
- C002 使用葉克膜患者接受連續性腎臟替代療法的預後分析
Outcome analysis in patients using extracorporeal membrane oxygenation and continuous renal replacement therapy
郭彥志、李承家、范佩君、張智翔
林口長庚醫院腎臟科
- C003 整合分析:尿中 Calprotectin 應用在鑑別診斷急性腎損傷病因
Meta-analysis: Urinary calprotectin for the distinction between prerenal and intrinsic acute kidney injury
陳佳晉¹，張智翔¹
¹林口長庚紀念醫院腎臟科
- C004 新生兒先天性心臟病術後發生急性腎損傷之危險因子及預後
Risk Factors and Prognosis of Acute Kidney Injury in Neonates Receiving Congenital Heart Surgery
莊國瑯¹ 何俊儀^{1,2} 蔡宜蓉¹ 吳恩婷³ 黃書健⁴ 陳益祥⁴
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³台大醫院小兒部小兒胸腔與加護醫學科
⁴台大醫院外科部心臟血管外科
- C005 連續性腎臟替代療法可提供加護病房中急性腎傷害需透析病患較佳之長期預後
CRRT Provides Better Overall Survival and Renal Survival for AKI-D Patients in ICU
陳佑璋^{1,2,3} 林明煌⁴ 吳麥斯^{1,2,3} 許永和^{1,2,3} 林裕峯^{1,2,3} 吳美儀^{1,2} 邱怡仁^{1,2,3}
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學科 ³臺北醫學大學 醫學院 臨床醫學研究所 ⁴國家衛生研究院 群體健康科學研究
所 ⁵國立陽明大學 臨床醫學研究所 ⁶中國醫藥大學 醫務管理系
- C006 國家腎臟切片登錄系統—追蹤報告
Distribution of glomerular disease in Taiwan- follow up report from National Renal Biopsy Registry-publication on behalf of Taiwan Society of Nephrology
邱顯富¹、吳明儒¹、陳呈旭¹、徐國雄^{1,2}、張志宗³(謹代表台灣腎臟切片登錄委員)
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- C007 第二型糖尿病視網膜病變病人合併免疫性腎絲球腎炎之預測因子
Predictors of Concomitant Immune-mediated Glomerulonephritis in Type 2 Diabetic Patients with Retinopathy
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⁴國立陽明大學臨床醫學研究所

- C008 次世代定序分析成人蛋白尿之基因突變
Analysis of Genetic Mutations of Adult Proteinuria by Next Generation Sequencing
余智娟 李安富 黃道揚
高雄醫學大學附設醫院 高雄醫學大學
- C009 台灣IgA腎病變: 18年回溯研究
IgA Nephropathy in Taiwan: a 18-year Retrospective Study
李安富¹ 林明彥¹ 吳佳純² 黃志強² 黃尚志¹ 陳鴻鈞¹ 黃道揚¹
¹高雄醫學大學附設醫院,高雄醫學大學 ²奇美醫學中心,台南,台灣
- C010 高齡老人早期慢性腎臟病照護現況與影響腎功能因素探討
The status of CKD care and factors related to kidney function in the elderly
陳慈徽¹ 王淑麗¹ 龔蘭芳¹ 蕭仕敏¹ 蕭佩妮¹ 邱怡文² 蔡宜純²
¹高雄醫學大學附設中和紀念醫院護理部 ²高雄醫學大學附設醫院腎臟內科
- C011 酮酸胺基酸補充對於末期慢性腎臟病患者腎功能之影響
Effect of Ketoanalogues on renal function in patients with advanced chronic kidney disease
顏子淇^{1,2} 楊苓美¹
¹安泰社團法人安泰醫院 ²輔英科技大學
- C012 慢性腎臟病病人感覺性聽力損傷的風險
Risk factors of sensorineural hearing loss in patients with chronic kidney disease: a nationwide, population-based cohort study
吳坤霖¹、詹正雄¹、施政坪²、簡戊鑑⁴、蕭博仁¹
¹國軍桃園總醫院內科部, ²三軍總醫院耳鼻喉科, ³三軍總醫院醫學研究部
- C013 高齡是慢性腎臟病人腎臟預後的正向影響因子
Old age is a positive modifier of renal outcome in patients with stages 3 to 5 chronic kidney disease
周鈺翔^{1,2}, 嚴崇仁^{2,3}, 賴台軒², 陳永銘^{2,3}
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- C014 第二型糖尿病併慢性腎臟病病人其尿液硬骨素的臨床關聯性
Clinical Associations of Urinary sclerostin in patients with type 2 diabetes and chronic kidney disease
吳青芳¹、劉宏祥²、蔡明憲³、張敏育¹、李宜哲⁴、洪士元¹
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- C015 應用健康管理平台結合穿戴式裝置強化慢性腎臟病患自我管理
Application of Health Management Platform with Wearable Devices to Strengthen Self-management of Chronic Kidney Disease Patients
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¹臺大醫院雲林分院內科部腎臟科, ²臺大醫學院, ³雲林科技大學工業工程與管理系, ⁴臺大醫院雲林分院營養部

- C016 閒暇時間體能活動對於慢性腎臟病人之死亡率,主要心血管事件及末期腎臟病之影響:
一縱向族群研究
Effect of leisure-time exercise on all-cause mortality, major cardiovascular events and end-stage renal disease in advanced chronic kidney disease patients: a longitudinal cohort study
郭周斌 唐德成 曾偉誠
台北榮民總醫院 腎臟科
- C017 一項隨機對照臨床試驗研究CH-025對慢性腎臟病人降尿毒素的功效
A Randomized, Comparative Study to Evaluate the Efficacy of CH025 for Elimination of Uremic Toxins in Patients with Chronic Kidney Disease
謝晉文^{1,2}梁世欣^{3,4}
屏東基督教醫院 腎臟內科
- C018 高濃度的空氣汙染會增加未透析末期腎病病人急性肺水腫的機率
High air pollution is at risk of developing acute pulmonary edema in patients with end-stage CKD without dialysis
林鍵銘¹, 吳家麟¹, 邱炳芳¹
¹彰化基督教醫院腎臟內科
- C019 探討對於心房顫動與慢性腎臟病患者使用抗凝血劑後發生中風的風險
Warfarin and aspirin for stroke in atrial fibrillation patients with chronic kidney disease
吳美儀¹ 王忠信² 陳姿婷¹ 許永和¹ 林裕峯¹ 吳麥斯¹
¹臺北醫學大學-北醫·雙和醫院-內科部-腎臟內科
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- C020 急性腦中風經溶血栓治療後的腎臟預後
Renal Outcomes after Intravenous Thrombolytic Therapy for Acute Ischemic Stroke
張凱傑, 邱炳芳, 張登翔, 蔡俊傑, 吳家麟
彰化基督教醫院內科部腎臟科
- C021 影響慢性腎臟病病人決策共享中選擇的因素
Factors influencing choice in patients with chronic kidney disease during shared decision making (SDM)
吳美瑩、劉建秀、李佳諺、廖瑛君、王春葉、吳建興、李建德
高雄長庚紀念醫院腎臟科
- C022 血清抵抗素與慢性腎臟衰竭患者中樞動脈硬度有關
Positive Correlation of Serum Resistin Level with Aortic Artery Stiffness in Patients with Chronic Kidney Disease
郭秋煌¹ 王智賢^{1,3} 林子立¹ 賴宇軒¹ 劉宏祥^{2*} 徐邦治^{1,3*}
¹花蓮佛教慈濟醫院腎臟科 ²新北市新仁醫院 ³花蓮慈濟大學醫學系
- C023 慢性腎臟病高危險群病患之疾病變化相關因素分析
Factor Analysis of Progression in the High-Risk Patients with Chronic Kidney Disease
王谷鐘¹ 陳德全² 吳孟學¹ 鄭晶丹¹ 廖上智¹
高雄市立鳳山醫院腎臟科¹ 財團法人高雄長庚紀念醫院內科部腎臟科²

- C024 熱傷害與慢性腎臟病風險系統性研究
Risk of CKD from Heat Injury: A National Longitudinal Cohort Study in Taiwan
曾敏峯^{1,2} 簡戊鑑³ 鍾其祥⁴ 朱柏齡²
¹國軍高雄總醫院左營分院內科部 ²三軍總醫院腎臟科
³三軍總醫院暨國防醫學院醫學研究室 ⁴國防醫學院公共衛生系
- C025 慢性腎臟病患者使用毛地黃與全死亡率及心血管事件之關聯
The Association of Digoxin Treatment with All-Cause Mortality and Cardiovascular Outcomes in Patients with Chronic Kidney Disease
楊禮嘉^{1,2} 許善閔² 吳秉勳^{2,5} 林明彥^{2,6} 黃騰慧² 林憶婷^{3,4,5} 郭弘典^{2,6} 邱怡文^{2,6}
黃尚志^{2,6} 蔡哲嘉^{2,6} 陳鴻鈞^{2,6}
¹高雄市立旗津醫院內科 ²高雄醫學大學附設醫院腎臟內科
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- C026 慢性腎疾病第三期病人之尿酸長期控制趨勢對腎臟以及病人預後之影響
Trajectory of Serum Uric Acid as a Predictor for Renal Outcome and Mortality in Stage-3 Chronic Kidney Disease Patients
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- C027 急性腎臟梗塞病人使用動脈內血栓溶解治療相關預後：世代分析研究
Outcomes Associated with Intra-arterial Thrombolytic Therapy in Patients with Acute Renal Infarction: A Retrospective Cohort Study
黃建維 陳信佑 歐世祥 張銘珊 許智揚 陳建良 李柏蒼 方華章 周康茹
高雄榮民總醫院內科部腎臟科
- C028 益生菌可以延緩腎功能惡化
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- C029 低蛋白飲食對末期腎臟病人的成效
Effect of Low Protein Diet in Patients with End Stage Renal Disease
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- C030 糖尿病是否對紅斑性尿毒症病人有慢性尿毒症發生之加重影響？
Does Diabetes Mellitus increase the Risk of End-Stage Renal Disease in Patients with Systemic Lupus Erythematosus?
黃志強 王憲奕 甘偉志 簡志強 吳佳純 江銘彥
奇美醫院 腎臟科
- C031 參加腎臟病論質計酬照護計畫有助於糖尿病腎病變患者預後之改善
Chronic Kidney Disease Pay-for-Performance Program Recruitment is Associated with Better Clinical Outcomes in Patients with Diabetic Kidney Disease
張莉茹¹ 顏正杰¹ 劉美吟² 江政倫¹ 劉育如¹ 徐約翰¹ 黃智源¹ 洪培豪¹
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- C032 慢性腎臟病合併心衰竭老人身體活動功能與預後之探討
Physical Functionality and Outcome in Older Patients with Heart Failure and Chronic Kidney Disease
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- C033 不同烹調方法的蛋品其磷含量之分析
Phosphorus content in flavored egg products
吳紅蓮¹ 王明誠² 劉宏祥³
國立成功大學醫學院附設醫院 ¹營養部 ²內科部腎臟科
新北市新仁醫院 ³內科部腎臟科
- C034 GATM 突變致自體顯性范可尼氏症候群合併腎衰竭
Recurrent GATM Mutations Causing Autosomal Dominant Renal Fanconi Syndrome with Progressive Renal Failure
顏銘佐^{1,2}，鄔哲源³，林石化^{2,4}
¹國泰綜合醫院腎臟科，²國防醫學院醫科所，³中央研究院生物醫學科學研究所，
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- C035 異位性促腎上腺皮質激素分泌症候群跟低血鉀：一個醫學中心的 11 年回溯性研究
Ectopic ACTH-Secreting Syndrome and Hypokalemia: a Retrospective Study Over 11 Years from A Single Center
廖宸逸^{1,2} 吳家兆² 楊松昇^{2*}
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- C036 血液透析病人高血鉀衛教介入與降鉀藥物使用之研究分析
An Integrative Approach of Hyperkalemia in Hemodialysis Patients
郭淑冠 朱盈潔 張明芳 郭韋宏 吳建興 李建德
高雄長庚紀念醫院 腎臟科
- C037 以行為修正模式提升血液透析病人瘻管加壓止血技能改善方案
To improve the fistula pressure hemostasis skills for hemodialysis patients with behavior modification mode
黃玉娟 莊靜宜 賴君嵐 林紘均 吳家燁 新欣診所
- C038 比較線上血液透析過濾與高通量血液透析治療對病人營養狀況和身體成分之影響
Impact of Online Hemodiafiltration on Nutritional Status and Body Composition compared to High-Flux hemodialysis
林曉慧² 陳煥升² 林居正² 陳昶旭^{1,2} 曾素珊² 郭和煙² 謝明星² 藍逸梅²
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- C039 根據血流狀況自創血管理學檢查系統來評估透析患者的血管通路
A Categorical flow-based Physical Examination System(Woodpecker Project) for Hemodialysis Vascular Access Sites -- Assessing the sixth vital sign of hemodialysis patients.
陳炯毓，簡克芬，吳怡雯，張百純，賴秀青，劉怡俊
阮綜合醫院

- C040 血管通路流速為基礎的定期追蹤降低血栓與導管置入事件並避免通路遺棄
Access blood flow-based surveillance reduces events of thrombosis and catheter insertion and avoids access abandonment
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³新光吳火獅醫院外科部心臟外科
- C041 血液透析病人便秘評估
Evaluation of Constipation in Hemodialysis Patients
邱梨淑¹ 黃瓊惠¹ 紀若喬¹ 張慧貞¹ 劉文治¹ 張佑剛² 林柏松^{1*}
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- C042 運用多媒體衛教資訊化改善血液透析室照護品質及提升衛教滿意度
Using multimedia education and information technology to improve the quality of hemodialysis room care and improve the satisfaction of health education
黃映琪 柯惠文 田志宏
秀傳醫療財團法人彰濱秀傳紀念醫院血液透析中心
- C043 接受血液透析的病人的身體組成與死亡率的關係
The association between body composition and dialysis mortality
黃于恬¹ 巫宏傑^{2*}
¹衛生福利部桃園醫院腎臟科 ²衛生福利部桃園醫院腎臟科
- C044 接受血液透析的老年男性病人血中睪固酮濃度與死亡率的關係
The association between serum testosterone and mortality among elderly men on hemodialysis
黃于恬¹ 巫宏傑^{2*}
¹衛生福利部桃園醫院腎臟科 ²衛生福利部桃園醫院腎臟科
- C045 降低血液透析治療中空氣進入血液迴路管發生率
Reduce the incidence of air entering the blood circuit tube during hemodialysis treatment
黃家琪¹、陳黎玉²、楊凱玲³、張穎方⁴、張琬菁⁵、洪雅惠⁶、廖秀玲⁷、黃蘭宜⁸、林靜玫⁹
中國醫藥大學附設醫院腎臟科血液透析室
- C046 糖尿病腎病變病人進入透析前後發生低血糖的趨勢及風險分析
Temporal Trends and Risk Factors of Hypoglycemia in Patients with Advanced Diabetic Kidney Diseases Transitioning to Dialysis
蕭景中¹ 陳冠興¹ 田亞中¹ 史麗珠^{2*}
¹長庚腎臟醫學研究中心 ²長庚大學公共衛生科
- C047 運用品質改善活動降低血液透析暫時性雙腔靜脈導管感染率
Reduced infectious rate in temporary hemodialysis catheter by healthy quality improvement program
江文秀¹、洪麗香¹、洪以貞¹、簡淑慧¹、蕭婉禎¹、劉之筠¹、俞靜儀¹、陳靖博²
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- C048 較高的透析血磷下降率可以預測透析病患的死亡
Higher Intradialysis Serum Phosphorus Reduction Ratio as a Predictor of Mortality in Patients on Chronic Hemodialysis
方昱偉¹, 呂至剛¹, 蔡明憲¹, 劉宏祥²
新光醫院腎臟科 新仁醫院腎臟科
- C049 106年中部醫院血液透析中心患者高血磷原因與團隊照護改善成效分析
Analysis the reasons of hyperphosphatemia and improvement of team work care at Medical Center hemodialysis patients in 2016
王馥祁¹ 吳鳳美² 邱炳芳^{3*}
¹彰化基督教醫院營養部 ²彰化基督教醫院血液透析中心 ³腎臟醫學會
- C050 鐵含量對多囊腎長期血液透析病患預後-台灣腎臟醫學會資料庫研究
Different Effects of Iron Indices on Mortality in Patients with Autosomal Dominant Polycystic Kidney Disease After Long-Term Hemodialysis: A TWRDS study
林彥仲¹、葉曙慶¹、許志成²、陳錫賢¹、吳麥斯³
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- C051 兒童重症族群使用連續性腎臟替代療法的預後因子探討
Prognostic Factors of Continuous Renal Replacement Therapy in Critical Children
丁肇壯^{1,2} 林建志³ 夏紹軒³ 江東和⁴ 陳世翔⁴ 曾敏華^{1*}
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- C052 老年透析病人低血鈉之相關因子分析
Body Composition and Biochemical Factors Associated with Hyponatremia in Elderly Hemodialysis Patients
梁鴻華 俞靜儀 李岳庭 吳建興 李建德 黃惠勇
高雄長庚紀念醫院 內科部 腎臟科
- C053 血中 Pentraxin-3 可預測透析血管通路不良事件
Circulating Pentraxin-3 Predicts Hemodialysis Vascular Access Failure
蔡亨政¹ 唐德成^{1,2} 楊智宇^{1,2}
¹臺北榮民總醫院腎臟科 ²國立陽明大學醫學院臨床醫學研究所
- C054 血液透析患者高的血清硬化素跟骨密度呈負相關
Serum Sclerostin Level is Negatively associated Bone Mineral Density in Hemodialysis Patients
林韋辰¹ 王智賢^{1,3} 林于立¹ 郭秋煌¹ 賴宇軒¹ 劉宏祥^{2*} 徐邦治^{1,3*}
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- C055 血管張力素II型受體拮抗劑與慢性血液透析患者的肌肉力量保持有關
Angiotensin II Receptor Blockade is associated with Preserved Muscle Strength in Chronic Hemodialysis Patients
林于立¹ 賴宇軒¹ 王智賢^{1,3} 郭秋煌¹ 劉宏祥^{2*} 徐邦治^{1,3*}
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- C056 維持性血液透析患者急診醫療利用之分析
Emergency Department Utilization among Patients receiving Maintenance Hemodialysis
林義智¹ 許華桂² 賴台軒^{3*} 姜文智³ 林水龍³ 陳永銘³ 陳楚杰^{2*} 朱宗信³
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- C057 中西整合治療模式減少透析病患住院醫療費用
Integrated Chinese and Modern Medicine Reduce the Cost of Hospitalization in Hemodialysis Patients
許雅賢 林軒名
台南市立安南醫院-委託中國醫藥大學興建經營
- C058 血液透析患者的巨細胞病毒專一T淋巴球多功能性存在鈍化現象
Lack of Polyfunctional Cytomegalovirus-specific T cells in Hemodialysis Patients
賴方筠¹ 周思瀛¹ 徐愷翔¹ 潘思宇¹ 彭渝森¹ 莊宜芳² 賈景山³ 邱彥霖¹
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國立台灣大學免疫學研究所³
- C059 探討血液透析病人動靜脈瘻管異常上針因素
Factors Associated with Re-Puncture of Arterio-Venous Fistula in Hemodialysis Patients
李凱妮¹ 陳建安¹ 林佳蓉¹ 蔡岳峰¹
¹台南新樓醫院血液透析室
- C060 透析病人的慢性病毒性肝炎相關研究
Chronic Hepatitis in ESRD Dialysis Patients
簡志強 黃志強 王憲奕 甘偉志 吳佳純 江銘彥
奇美醫院腎臟科
- C061 透析病人的憂鬱症相關研究
Depression in ESRD Dialysis Patients
簡志強 黃志強 王憲奕 甘偉志 吳佳純 江銘彥
奇美醫院腎臟科
- C062 腹主動脈鈣化能有效預測血液透析患者心血管疾病
Abdominal Aortic Calcification Score can Predict Future Coronary Artery Disease in Hemodialysis Patients: A 5-Year Prospective Cohort Study
曾盈瑜¹ 王韋婷² 奚婕寧² 林軒任³ 周哲毅³ 黃秋錦¹ 張志宗¹ 陳虹志^{3*}
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- C063 以訪談法研究台灣血液透析和腹膜透析病人的自付費用和生產力損失
Out-of-pocket Costs and Productivity Losses in Hemodialysis and Peritoneal Dialysis from a Patient Interview Survey in Taiwan
蘇裕謀¹ 湯澡薰² 陳錫賢³ 吳明儒⁴ 徐邦治⁵ 蔡哲嘉⁶ 郭繼正² 林士弼⁷ 陳作孝¹
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³台北醫學大學附設醫院腎臟科 ⁴台中榮民總醫院腎臟科
⁵花蓮慈濟醫院腎臟科 ⁶高雄醫學大學附設醫院腎臟科 ⁷高雄好生診所

- C064 血液透析前後心電心音參數的研究
Investigation of Acoustic Cardiography Parameters Before and After Hemodialysis
陳思嘉^{1,2} 黃俊祺^{1,2} 吳珮瑜^{1,2} 張哲銘² 陳鴻鈞²
高雄市立小港醫院內科¹ 高雄醫學大學附設醫院腎臟內科²
- C065 血液透析病患的足踝-臂血壓比值可為缺血性腦中風的一個預測因子
Ankle-Brachial Index is a Predictive Factor of Cerebral Infarction among Hemodialysis Patients
蔡岳峰¹ 陳建安¹ 陳滄山²
¹台南新樓醫院血液透析室 腎臟科 ²台南新樓醫院神經內科
- C066 血液透析患者血中骨質疏鬆標誌物與生化指數的相關性研究
Correlations between Osteoporosis Markers and Biochemical Parameters in Hemodialysis Patients
麥秀琴¹ 陳秋月¹ 陳瑞忻¹ 陳思嘉^{2,3} 黃俊祺^{2,3} 吳珮瑜^{2,3} 張哲銘³ 陳鴻鈞³
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高雄醫學大學附設醫院腎臟內科³
- C067 多囊腎病人接受腹膜透析的多年治療效果
Patients with polycystic kidney disease undergoing peritoneal dialysis: A longitudinal analysis
陳怡瑩、劉建秀、黃玉娟、鄭本忠、吳建興、李建德
高雄長庚紀念醫院 腎臟科
- C068 緊急啟動腹膜透析的安全性評估：林口長庚醫院的經驗
The safety of urgent-start peritoneal dialysis: a single center experience
林展宇,楊皇煜,洪振傑, 陳永昌,田亞中,楊智偉,張明揚*
長庚紀念醫院 腎臟科系 腎臟研究中心
- C069 Icodextrin 改善腹膜透析病人的新陳代謝及水份管理
Icodextrin improves metabolic and fluid management in peritoneal dialysis patients
高清添、高銘聰、賴建賓、陳虹如¹、楊雅蕙¹、高玉貞¹
澄清醫院中港分院 腎臟科、腹膜透析中心¹
- C070 使用預防性抗生素可以降低腹膜透析患者接受婦科侵入性檢查後發生腹膜炎的風險
Prophylactic antibiotic reduces the risk of peritonitis after invasive gynecologic procedures
范珮宜、湛茗任、張明揚、郭彥志
林口長庚醫院 腎臟科
- C071 比較有無肝硬化之腹膜透析病人併發症與臨床指標之差異
Comparisons between peritoneal dialysis patients with and without liver cirrhosis
趙美貞 邱鼎育 李昭娟 黃玉娟 鄭本忠 吳建興 李建德
高雄長庚紀念醫院內科部腎臟科
- C072 虛弱與需要協助與否對腹膜透析患者整體存活率的影響
The impact of frailty and assistance on overall survival of patients on peritoneal dialysis
陳昀通 董淳武 徐永建 林俊良
嘉義長庚醫院腎臟科

- C073 腹膜透析患者血清抑硬素濃度與中心動脈硬化正相關
Positive Correlates of Serum Sclerostin Level and Association with Central Arterial Stiffness in Patients with Peritoneal Dialysis
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- C074 改善措施介入降低腹膜透析病患高血磷比率之成效
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陳筠芳 吳家麟 吳鳳美 林秀姻 林妍涓 張宜驊 許春燕 蔡慧鳳
彰化基督教醫院 腹膜透析室 腎臟科¹
- C075 執行針對 Cr. ≥ 8 病患替代療法衛教及追蹤提升腹膜透析比率之成效
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林妍涓 吳家麟 吳鳳美 林秀姻 張宜驊 許春燕 蔡慧鳳 陳筠芳
彰化基督教醫院 腹膜透析室 腎臟科
- C076 建立腹直肌鞘隧道腹膜透析導管植入術與導管相關合併症成效觀察
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林秀姻 吳家麟 吳鳳美 林妍涓 張宜驊 許春燕 蔡慧鳳 陳筠芳
彰化基督教醫院 腹膜透析室 腎臟科
- C077 維生素 D 補充對腹膜透析患者血清 25-羥維生素 D 狀態之影響因素：兩年期前瞻性研究
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- C078 提升腹膜透析患者血磷控制之成效
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- C079 血清骨橋蛋白跟腹膜透析病患中樞動脈硬度有關
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裘亮德¹ 賴宇軒¹ 林子立¹ 郭秋煌¹ 王智賢^{1,3} 劉宏祥^{2,*} 徐邦治^{1,3,*}
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- C080 慢性腎臟病病患主動脈弓鈣化與心胸比對臨床預後的相關性
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吳珮瑜^{1,2} 陳思嘉^{1,2} 黃俊祺^{1,2} 張哲銘² 陳鴻鈞²
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- C081 腸鏡檢查前應用預防性抗生素對腹膜透析病人腹膜炎的影響
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劉琇夷 劉建秀 鄭本忠 吳建興 李建德
高雄長庚紀念醫院腎臟科
- C082 腹膜透析病人健康識能之分析研究
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白幸桂 俞靜儀 黃玉娟 劉建秀 鄭本忠 李建德
高雄長庚紀念醫院 內科部 腎臟科
- C083 腹膜透析病人之肋腹膜滲漏-回溯性分析研究
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白幸桂 劉建秀 鄭本忠 李建德
高雄長庚紀念醫院 內科部 腎臟科
- C084 用 ELISA 套件分析腹膜透析藥水中抑硬素濃度
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郭德輝^{1,2} 曾進忠¹ 吳安邦^{1,3} 林威宏^{1,4} 趙若雁^{1,3} 李佳駿¹ 劉宏祥^{5*} 王明誠^{1,3*}
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- C085 腎臟移植病患之移植年限與自我照顧行為與臨床檢驗數據之探討
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龔蘭芳¹ 王淑麗¹ 陳慈徽¹ 蕭仕敏¹ 蕭佩妮¹ 林麗玫² 郭弘典^{2,3} 邱怡文^{2,3}
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- C086 以機器學習建立移植腎衰竭預測模型
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羅盈智^{1,2} 吳明儒^{1,3} 陳呈旭^{1,4} 游棟閔¹ 莊雅雯¹ 黃士婷¹ 蔡尚峰¹
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- C087 高的血清骨橋蛋白跟腎臟移植病患第一次住院及死亡率有關
High Serum Osteopontin Level is associated with First Hospitalization and Mortality in Kidney Transplantation Patients
侯佳弦¹ 李崇仁² 何冠進³ 李明哲^{3,4} 徐邦治^{1,4,*}
¹花蓮佛教慈濟醫院腎臟科 ²花蓮慈濟科技大學護理系 ³花蓮佛教慈濟醫院外科
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- C088 多囊腎病患者腎移植預後分析：中部單一醫學中心研究
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陳呈旭¹ 游棟閔¹ 莊雅雯¹ 黃士婷¹ 蔡尚峰¹ 羅盈智¹ 翁碩駿¹ 鍾牧圻¹
黃俊德¹ 邱顯富¹ 徐佳鈿¹ 徐國雄² 連榮達³ 吳明儒¹
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- C089 腎臟移植病患慢性抗體性排斥之治療－醫學中心回溯性研究
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邱顯富¹ 文美卿² 吳明儒¹ 陳呈旭¹ 游棟閔¹ 莊雅雯¹ 黃士婷¹ 蔡尚峰¹ 羅盈智¹
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¹台中榮民總醫院腎臟科 ²台中榮民總醫院病理部 ³台中榮民總醫院泌尿外科
⁴林新醫院腎臟科
- C090 應用醫病共享決策於透析病患高血磷的控制－控制高血磷，我是否該自費購買降磷藥物？
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楊采環，潘宥騫，林于立，徐邦治
佛教慈濟醫療財團法人花蓮慈濟醫院腎臟內科
- C091 DPP-4 抑製劑與接受二線藥物之糖尿病患者的結腸直腸癌和肝癌風險之間的關聯性：巢式病例對照研究
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- C092 身體組成參數作為評估早期慢性腎臟病兒童心血管疾病的潛在危險因素
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盧佩真^{a*}，許茜甯^b，林宜君^a，羅賢鴻^a，田祐霖^a
^a高雄長庚紀念醫院兒科部 ^b高雄長庚醫院藥劑部
- C093 超音波導引下經皮腎臟生檢的併發症
Complications of Echo-guided Percutaneous Kidney Biopsies in an Area Hospital
賴建賓¹、高銘聰¹、高清添¹、黃文鈺²、龔麗文²、高玉貞²
澄清醫院中港分院腎臟科¹血液透析室²
- C094 末期腎病治療選擇，導入 SDM 輔助工具之經驗
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朱秀麗¹、林沛伶¹、黃智英¹、邱炳芳²、楊郁²、吳家麟²
¹彰化基督教醫院慢性腎臟病衛教中心 ²彰化基督教醫院腎臟內科
- C095 慢性腎臟病患骨鈣素，骨質疏鬆，腹主動脈血管鈣化的關聯性
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- C096 血管張力素轉化酶抑制劑 (ACEI) 或血管收縮素受體阻斷劑 (ARB) 單藥治療延緩台灣慢性腎病患者的腎功能惡化
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洪麗玉 許永和 鄒居霖 吳麥斯 邱怡仁 陳佑璋 林裕峰
腎臟內科衛生福利部雙和醫院-臺北醫學大學
- C097 降低門診血液透析病人醣化血色素控制不佳率
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高雄長庚紀念醫院 腎臟科
- C098 高敏感度心臟肌鈣蛋白 T 對於腎臟功能不全病人的急性心肌梗塞診斷價值
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許程凱¹ 陳永昌¹ 吳逸文¹
基隆長庚醫院內科部腎臟科¹
- C099 血液透析與腹膜透析病人腸道微生物相的差異
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國立成功大學醫學院附設醫院內科部腎臟科
- C100 多囊腎病基因突變的多樣性
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高雄醫學大學附設醫院 高雄醫學大學 高雄 台灣
- C101 燒炭自殺後蒼白球壞死的發生率及預測因子
Incidence Rates and Predictors of Globus Pallidus Necrosis after Charcoal Burning Suicide
古仲軒 黃文宏 許景璋 翁正昊 顏宗海
林口長庚紀念醫院 腎臟科及臨床毒物中心
- C102 利用急診 eGFR 作為肺炎住院死亡率之預測指標
eGFR in the Emergency Department as a Predictor of In-hospital Mortality in Pneumonia
劉崇德¹ 石智元² 徐士昌³ 陳俊佑⁴ 謝慧玲¹ 蘇裕謀¹ 陳作孝¹
萬芳醫院¹內科部腎臟科²內科部胸腔科³重症醫學部急診科⁴放射腫瘤部
- C103 兩側腎臟切除病患術後死亡率與醫師或醫院手術量關係
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許毓軫¹ 郭德輝^{2,3*} 張育誌² 孫健耀⁴ 劉冠宏² 李中一³ 王榮德^{1,3} 宋俊明²

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- C104 第二型糖尿病病患，低密度膽固醇變異性越大會增加心血管事件危險性
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陳瑞忻¹ 麥秀琴¹ 陳秋月¹ 陳思嘉^{2,3} 黃俊祺^{2,3} 吳珮瑜^{2,3} 張哲銘³ 陳鴻鈞³
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高雄醫學大學附設醫院腎臟內科³
- C105 探討糖尿病前期病人之血液糖化白蛋白、糖化血色素濃度與糖尿病視網膜病變的相關性
The Association between Glycated Albumin and Glycol Hemoglobin in Diabetes Retinopathy of Pre-Diabetes
陳秋月¹ 麥秀琴¹ 陳瑞忻¹ 陳思嘉^{2,3} 黃俊祺^{2,3} 吳珮瑜^{2,3} 張哲銘³ 陳鴻鈞³
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高雄醫學大學附設醫院腎臟內科³
- C106 腹膜透析病人 MRI 顯影劑使用後腎功能差異個案探討
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劉雅玲 劉建秀 鄭本忠 吳建興 李建德
高雄長庚紀念醫院腎臟科
- C107 末期腎病整合式醫病共享決策模式成效
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蘇筱雯 魏照軒
台南市立安南醫院-委託中國醫藥大學興建經營
- C108 高齡末期腎病進入腹膜透析治療之觀察性分析
The Elderly in Peritoneal Dialysis: An Observational Study
鄭錦如 張富玲 劉建秀 鄭本忠 吳建興 李建德
高雄長庚紀念醫院內科部腎臟科
- C109 運用醫病共享決策模式幫助病人做透析管路選擇
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張鳳纓¹ 江宜樺² 吳俊儀³ 吳淑娟⁴ 古佳衢⁵ 林淑照⁶ 蔡宗龍⁷
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^{5,7}衛生福利部朴子醫院醫療科
- C110 末期腎臟病前期患者之復原力及其相關因素探討
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汪碧雲¹ 吳宏蘭² 張世沛³ 劉紋妙⁴
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- C111 利用醫院電子病歷資料推估 CKD 高風險病人 CKD 疾病進程與轉換機率
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謝慧敏 簡麗珠 李蕙蘭 林明彥 邱怡文 黃尚志

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- C112 血液透析用水和透析液的內毒素檢測
Detection of Endotoxin in the Dialysate and the Water Used for Hemodialysis
王惠芳¹ 蔡佳璋² 賴台軒³
台大醫院護理部¹ 綜合診療部血液淨化科² 腎臟內科³
- C113 長期透析病人的感染性心內膜炎：臨床特點與預後分析
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陳佑丞 郭彥志 呂悅安 陳昭妤 顏介立 孫偉喬 洪振傑 田亞中 許翔皓
¹林口長庚紀念醫院 腎臟科系 腎臟研究中心
²長庚大學 醫學系
- C114 透析病患個人化死亡預測模型：貝氏漸進式分析
Individual Risk Prediction Model for Mortality in Patients with Chronic Hemodialysis: A
Bayesian Clinical Reasoning Approach
杜美蘭¹ 方昱偉¹ 劉宏祥² 蔡明憲¹
¹新光醫院腎臟科 ²新仁醫院腎臟科
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[Basic 1]

1

微處理狼瘡性腎炎：微核糖核酸17-92調控濾泡輔助T細胞發育及調節性T細胞活性以減輕狼瘡性腎炎

Micromanaging Lupus Nephritis: MiR17-92 Modulates T_{FH} Development and Regulatory T Cell Activity to Mitigate Lupus Nephritis

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Background: T follicular helper (T_{FH}) cell provide crucial growth signals to germinal center (GC) B cells supporting antibody production. Tight control of T_{FH} numbers maintains self-tolerance. Regulatory T (Treg) cells play a critical role in maintaining self-tolerance and controlling the magnitude of physiologic immune response. The Treg transcription factor forkhead box P3 (Foxp3) works in concert with other co-regulator molecules to determine suppressive phenotype of Treg. Compiling evidence show that aberrant T_{FH}, GC responses and deficiencies of Treg are associated with systemic lupus erythematosus and autoantibody production. We were interested in determining whether T_{FH} development and/or suppressive activity of Treg are modulated by microRNAs (miRNAs) so that we can modulate the miRNAs to improve lupus nephritis.

Methods: We generated T cell specific miR-17-92 knockout (miR-17-92^{-/-}) mice, followed by induction of pristane nephropathy on T cell specific miR-17-92 knockout (miR-17-92^{-/-}) mice and wild type littermates. By bioinformatics study, possible targets of mir-17-92, related to Treg function was evaluated. Luciferase reporter assay was utilized for verification. Forced expression and knockdown of miRNA was performed by lentivirus.

Results: Mir17-92 T cell specific deficiency mitigates pristane induced-lupus nephropathy in mice. The mice showed less T_{FH} cells, less GC B cells and lower autoantibody formation. Consistent with the reduction in autoantibody production, histological analysis revealed a lower mean renal histopathology score and less compliment deposition. We demonstrate that the miR17-92 cluster regulates T_{FH} development by targeting Akt pathway. Moreover, miR17-92 mitigate the suppression function of Tregs by targeting Foxp3 co-regulators. Ectopic expression of miR17-92 downmodulates the suppression functions of Tregs and provides Tregs with partial effector activity via de-repression of cytokine genes.

Conclusions: Our studies suggest that miR17-92 modulates lupus activity through critical regulation in T_{FH} and Treg, unveiling the future therapeutic potential of microRNA manipulation in lupus nephritis.

Key words: microRNA, T follicular helper, Regulatory T cell, Lupus Nephritis 關鍵字: 微核糖核酸 濾泡輔助性 T 細胞 調節性 T 細胞 狼瘡性腎炎

[Basic 1]

2

急性腎損傷引起之長期粒線體失能容易因二次損傷而導致慢性腎病 **Acute Kidney Injury Induced Long-Term Mitochondrial Dysfunction is Susceptible to Second Injury and Development of Chronic Kidney Disease Thereafter**

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Introduction: Development of chronic kidney disease (CKD) following acute kidney injury (AKI) is a complex process which remains poorly understood. Gentamicin is frequently used antibiotic and reported to responsible for significant numbers of AKI due to its nephrotoxicity. In the present study, we revealed the connection between gentamicin-induced AKI and CKD.

Methods: Rat renal tubular cells (NRK-52E) were treated with 3mM gentamicin for 24 hours and then subcultured in normal media to facilitate recovery. We compared mitochondrial function, mitophagy activity and fibrosis markers during recovery state. Gentamicin-treated mice were induced secondary injury by unilateral ischemia reperfusion (IR).

Results: We found that gentamicin-pretreated subculture cells showed lower oxygen consumption rate, indicating that mitochondrial basal function was depressed. Under electron microscopy we found that gentamicin induced mitochondrial fragmentation. Compared to the normal cells, the gentamicin-pretreated subculture cells expressed lower autophagic flux and ATP- β synthase, as well as higher fibrotic responses. The pressure (50 mmHg) induced apoptosis in the subculture cells but not in the normal cells. Rapamycin treatment reduced mitochondrial fragmentation, improved mitochondrial function and reduced fibrosis. In animal study, gentamicin pretreatment didn't obviously increase blood creatinine. However, ischemia-reperfusion (IR) strongly reduced renal function in gentamicin-pretreated mice, whereas IR-decreased renal function was fully restored in normal mice. Gentamicin-pretreated mice previous to IR have severe tubulointerstitial fibrosis compare to its counterpart.

Conclusions: Gentamicin induces a long-term mitochondrial dysfunction in renal tubular cells, which in turn makes the cells more sensitive to secondary injury. Our results suggest that AKI-related CKD may result from AKI-induced persistent mitochondrial dysfunction.

Key words: Acute kidney injury, Mitochondrial dysfunction, Second injury, Chronic kidney disease

[Basic 1]

3

鳶尾素/纖連蛋白 III 型結構域的蛋白質 5 與尿激酶型纖溶酶原激活劑對肥胖和 2 型糖尿病小鼠腎臟的關係

The relationship between irisin/FNDC5 and urokinase plasminogen activator on kidney of obese and type 2 diabetes mellitus mice

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Introduction: Urokinase-type plasminogen activator (uPA) is well known as a serine protease which converts to plasmin in the fibrinolytic process of thrombosis and extracellular matrix. In addition to triggering a fibrinolytic cascade, uPA is a pleiotropic functional protein linked to innate immune response in regulating immune cell migration and recruitment. Irisin, a novel myokine cleavage from fibronectin type III domain containing 5 (FNDC5) and released to circulation after an exercise, has broad implications for metabolism and energy homeostasis. A few studies have shown irisin is associated with chronic kidney disease. Available evidence about the association between uPA and irisin in the kidney is limited. The present study explores the relationship between uPA and irisin/FNDC5 in mouse models.

Methods: In the obese mouse model, wild type and uPA knockout (uPA^{-/-}) BALB/c and C57BL/6 mice were fed either a chow diet or a high-fat (40% fat) diet, and were euthanized 8 and 16 weeks later. In type 2 diabetes mellitus (DM) module model, wild type (WT) and uPA^{-/-} BALB/c and C57BL/6 mice were both fed a high-fat diet and treated with streptozotocin and nicotinamide for induction of type 2 diabetes. Diabetic mice were euthanized at 3 (D3) and 30 days (D30) later. Blood was collected and kidney was harvested before euthanization. The expression of FNDC5 on kidney was assessed by immunohistochemical stain. Serum irisin was measured.

Results: The FNDC5 expression on kidney, especially tubular region, increased in uPA^{-/-} mice of both strains. In WT and uPA^{-/-} mice, increase of FNDC5 expression was noted after high fat diet at 8 weeks, but declination following at 16 weeks. However, declination of FNDC5 expression on kidney in uPA^{-/-} mice fed a high fat diet at 16 weeks was significantly obvious as compared with those in WT mice. In diabetic mice, FNDC expression on kidney also decreased at D30 in both WT and uPA^{-/-} mice. Circulating irisin levels decreased with time in both WT and uPA^{-/-} mice fed a chow diet. However, irisin levels of uPA^{-/-} mice were higher than those of WT mice. Irisin decreased progressively after uPA^{-/-} mice were fed a high fat diet. In diabetic mice, irisin increased in WT mice on D3 and decrease by D30.

Conclusions: In conclusion, obese mice showed decreased circulating irisin and FNDC5 expression on kidney, especially in uPA deficiency. Moreover, hyperglycemia was correlated with a decrease in FNDC5 expression on kidney and irisin level in serum.

Key words: Irisin, fibronectin type III domain containing 5 (FNDC5), urokinase plasminogen activator, kidney, obese, type 2 diabetes. Diabetic mice,

關鍵字：鳶尾素，纖連蛋白 III 型結構域的蛋白質 5，尿激酶型纖溶酶原激活劑，肥胖，腎臟，第 2 型糖尿病小鼠

[Basic 1]

4

高濃度 C5a 對腎臟內皮細胞粒線體損傷的效應研究

The Effect of High Level C5a on Mitochondria Damage of Kidney Endothelial Cells

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Background

Serum C5a change is significantly increased in those with idiopathic nephrotic syndrome when relapse. In established animal model, proteinuria was noted in the mouse treated with C5a via permeability change in mouse kidney endothelial cells. The apoptosis of endothelial cells treated with high concentration C5a was observed. Mitochondria damage has known to be important in cell apoptosis, therefore, the association between high concentration of C5a induced kidney endothelial cells (KEC) apoptosis and the mitochondria damage was discussed.

Methods

Mouse KEC was isolated and treated with different concentrations of C5a. In the cell culture supernatant, the numbers of mitochondria change were checked by JC-1 and DNA qPCR. Mitochondria functions were analyzed via Seahorse Technology. And the role of oxidative stress in mitochondria damage were checked by the treatment of antioxidant, and the numbers and function of mitochondria change were analyzed. In the established animal model of C5a induced proteinuria, the role of oxidative stress in mitochondrial damage were checked in the treatment of high concentration of C5a as well.

Results

In mouse KEC with the treatment of difference concentration (0 ng/mL, 10 ng/mL, 25 ng/mL and 50 ng/mL), cell cycle phase were analyzed after 48 hours treatment. Cell apoptosis were observed in higher concentration of C5a with increase percentage of subG1 phase. KEC were treated with 50 ng/mL C5a for 48 hours stained with JC-1 dye, and C5a treated KEC reduced the intensity of mitochondria and the mitochondrial DNA copy number in qPCR as well ($p < 0.05$). In C5a treated mouse, the kidney tissue sections were stained with JC-1 and the intensity of mitochondria in glomerulus decreased. The mitochondria DNA copy number and ATP formation decreased in glomerulus isolated from kidneys in C5a induced proteinuria mouse compared to control ones ($p < 0.05$).

Conclusions

We would explore the possible involvement of mitochondria damage in high concentration of C5a induced KEC apoptosis which might be the possible mechanism in glomerular sclerosis, a potential process from minimal change to renal function impairment.

[Basic 2]

1

交通空氣污染之懸浮微粒對腎臟細胞的影響及相關機制

Effects and Mechanisms of Traffic-Related Particulate Matter in Kidney Cells

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Abstract

Traffic emission is responsible for most small-sized particulate matter (PM) air pollution in urban areas. Several recent studies have indicated that traffic-related PM may aggravate kidney disease. Furthermore, exposure to particulate air pollution may be related to the risk of chronic kidney disease (CKD). However, the underlying molecular mechanisms have not been adequately addressed. In the present study, we investigated the mechanisms of renal damage that might be associated with exposure to PM. In a whole-body exposure to traffic-related PM model, PM in urban ambient air can affect kidney function and induce autophagy, endoplasmic reticulum (ER) stress and apoptosis in kidney tissues. Exposure to traffic-related diesel exhaust particle (DEP) led to a reduction in cell viability in human kidney proximal tubular epithelial cells. Furthermore, DEP increased mitochondrial reactive oxygen species (ROS) and decreased the mitochondrial membrane potential. Eventually, DEP exposure induced caspase pathways and triggered apoptosis. Autophagy inhibition resulted in significantly increased cytotoxicity and apoptosis. These findings suggest that air pollution in urban areas may cause nephrotoxicity and autophagy as a protective role in PM-induced cytotoxicity.

Key words: Traffic-related particulate matter, Diesel exhaust particle, Chronic kidney disease

[Basic 2]

2

基因甲基化關閉腎前驅細胞的轉位子，維持進行腎元分化

DNMT1 in *Six2* Progenitor Cells is Essential for Transposable Element Silencing and Kidney Development

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Cytosine methylation (5mC) plays a key role in maintaining progenitor cell self-renewal and differentiation. Here, we analyzed the role of 5mC in kidney development by genome-wide methylation, expression profiling, and by systematic genetic targeting of DNA methyltransferases (*Dnmt*) and Ten-eleven translocation methylcytosine hydroxylases (*Tet*).

In mice, nephrons differentiate from *Six2*⁺ progenitor cells, therefore we created animals with genetic deletion of *Dnmt1*, *3a*, *3b*, *Tet1*, and *Tet2* in the *Six2*⁺ population (*Six2*^{Cre}/*Dnmt1*^{flox/flox}, *Six2*^{Cre}/*Dnmt3a*^{flox/flox}, *Six2*^{Cre}/*Dnmt3b*^{flox/flox}, *Six2*^{Cre}/*Tet2*^{flox/flox} and *Tet1*^{-/-}). Animals with conditional deletion of *Dnmt3a*, *3b*, *Tet1* and *Tet2* showed no significant structural or functional renal abnormalities. On the other hand, *Six2*^{Cre}/*Dnmt1*^{flox/flox} mice died within 24hrs of birth. *Dnmt1* knock-out animals had small kidneys and significantly reduced nephron number. Genome-wide methylation analysis indicated marked loss of methylation mostly on transposable elements. RNA sequencing detected endogenous retroviral (ERV) gene transcripts and early embryonic genes. Increase in levels of interferon (and RIG-I signaling) and apoptosis (*Trp53*) in response to ERV activity likely contributed to the phenotype development. Once epithelial differentiation was established, loss of *Dnmt1*, *3a*, *3b*, *Tet1* or *Tet2* in glomerular epithelial cells did not lead to functional or structural differences at baseline or following toxic glomerular injury.

Genome-wide cytosine methylation and gene expression profiling showed that DNMT1-mediated DNA methylation is essential for kidney development by preventing regression of progenitor cells into a primitive undifferentiated state and demethylation of transposable elements.

[Basic 2]

3

Empagliflozin 在大鼠嚴重心腎症候群模型中可以中斷心腎衰竭的進展並展現出除 SGLT2 / 1 抑制之外可能的有益作用

Empagliflozin Interrupts Progression of Chronic Kidney Disease and Heart Failure in a Model of Severe Cardiorenal Syndrome in Rat and Exhibits the Possible Beneficial Effects Beyond Inhibition of SGLT2/1

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Abstract

The co-existence of chronic kidney disease (CKD) and heart failure has an extremely bad prognosis. Empagliflozin (Empa) was shown to improve both cardiovascular and renal outcomes in patients with Type 2 diabetes and established cardiovascular risk. This study tested the hypothesis that early administration of Empa preserved both the heart and kidney function in a model of severe cardiorenal syndrome [(CRS) by 5/6 subtotal nephrectomy-induced CKD and doxorubicin (DOX) -induce dilated cardiomyopathy (DCM)] in rat. In vitro results showed that as compared with the protein expressions of cleaved-caspase3 and autophagy activity at 24h/48h in NRK-52P cells were significantly upregulated by p-Creso treatment that were significantly downregulated by Empa treatment, whereas the flow cytometric analysis showed the Vinexin-V (i.e., early/late apoptosis) of NRK-52P cells expressed an identical pattern of cleaved-caspase3 (all $p < 0.001$). Adult-male-SD rats ($n=18$) were equally categorized into the group 1 (sham-control), group 2 (CRS) and group 3 [CRS + Empa (20 mg/kg/day)]. By day-42 after CRS induction, the left-ventricular ejection fraction (LVEF) level exhibited an opposite pattern whereas the LV end-diastolic dimension and creatinine displayed a same pattern of apoptosis among the three groups (all $p < 0.0001$). The protein expressions of LV tissues in inflammatory (TNF- α /NF- κ B/IL-1 β /MMP-9), oxidative-stress (NOX-1/NOX-2/oxidized protein), apoptotic (mitochondrial-Bax/cleaved-caspase-3/cleaved-PARP), fibrotic (TGF- β /Smad3), DNA/mitochondrial-damaged (γ -H2AX/cytosolic-cytochrome-C) and heart failure (BNP) levels displayed an opposite pattern of LVEF among the three groups (all $p < 0.0001$). Additionally, the cellular expressions of DNA-damaged/heart-failure (γ -H2AX+/ XRCC1+CD90+ /BNP+) biomarkers and histopathological findings of fibrotic/condensed collagen-deposition areas and apoptotic nuclei showed an identical pattern, whereas connexin43 and small-vessel number exhibited an opposite pattern of inflammation among the three groups (all $p < 0.0001$). In conclusion, Empa protected the heart and kidney organs against CRS injury.

Key words: empagliflozin, cardiorenal syndrome, heart function, inflammation, oxidative stress.

[Basic 2]

4

母親接受 nrf2 活化劑治療對暴露於產前類固醇和產後高脂飲食的雄性大鼠後代產生的腎臟程序化和高血壓具有長期保護作用

Maternal Nrf2 Activation Has Long-Term Renal Programming and Antihypertensive Effects in Male Rat Offspring Exposed to Prenatal Dexamethasone and Postnatal High-Fat Diet

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Background: Hypertension can originate from early-life exposure to oxidative stress. Dimethyl fumarate (DMF) reportedly activates nuclear factor erythroid-derived 2-related factor 2 (Nrf2) and protects against oxidative stress damage. We utilized RNA next generation sequencing (NGS) to analyze whether Nrf2 knockdown altered renal transcriptome in the developing kidney and examine whether maternal DMF therapy protects adult offspring against hypertension induced by prenatal dexamethasone (DEX) and postnatal high-fat (HF) diet exposure.

Methods: We examined male Sprague-Dawley rat offspring at 4 months of age from five groups (n=11-13/group): control, DEX (0.1mg/kg i.p. from a gestational day 16 to 22), HF (D12331 diet from weaning to 4 months of age), DEX+HF, and DEX+HF+DMF (50mg/kg/day via gastric gavage for 3 weeks during pregnancy).

Results: Nrf2 knockdown altered 1313 renal transcripts in the developing kidney. Maternal DMF therapy prevented male offspring against hypertension induced by combined prenatal DEX administration and postnatal HF diet. The protective effects of maternal DMF include reduced oxidative stress, decreased plasma asymmetric dimethylarginine (ADMA) levels, downregulated several components of the renin-angiotensin system (i.e. *Ren*, *Agt*, *Ace*, and *Agtr1a*), and increased renal protein levels of SIRT1, phosphorylated mTOR, and PGC-1 α .

Conclusion: Maternal Nrf2 Activation by DMF protects male adult offspring against prenatal DEX and postnatal HF induced programmed hypertension. By providing new insight into programmed hypertension whose programming processes can be reversed by DMF, an Nrf2 activator, our results are of significance to the development of novel reprogramming interventions in the prevention of programmed hypertension in children exposed to prenatal glucocorticoid and excessive consumption of fat postnatally.

[Clinical 1]

1

以全外顯子定序分析台灣兒童非典型尿毒溶血症候群

Whole-Exome Sequencing Detected Mutations in Pediatric Patients with Atypical Hemolytic Uremic Syndrome in Taiwan

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Background: Although atypical hemolytic uremic syndrome (aHUS) is a genetic disorder, molecular defects are detected in only sixty percent of patients. We aim to dissect the genetic background and the clinical characteristics of pediatric patients with aHUS.

Methods: Patients with complement-dysregulation HUS treated at children's hospitals in Taiwan were investigated. Whole exome sequence was used to detect their genotype. Clinical characteristics and outcome were analyzed.

Results: Ten patients (6 male and 4 female) with mean age 5.2 ± 5.0 years were enrolled. The age at onset ranged from 2 days to 11 years. Eighteen different mutations (17 missense, 1 nonsense, and 11 novel) on 7 complement and 3 coagulation genes were detected in all of the patients the cohort. The majority of mutation was heterozygous and S1191L on *CFH* were the recurrent mutation. Half of patients had combined genetic mutations. Nine mutations were associated with genes known to be implicated in aHUS (*CFH*, *CFI*, *CD46*, *CFHR5*, and *DGKE*), while 4 and 5 mutations were detected on complement- (*C8B*, *C9*, and *MASPI*) and coagulation-associated (*VWF* and *CD36*) genes, respectively. *CD36* may be a candidate gene act as disease modifier for aHUS through the contribution of thrombosis by impairing the interaction with platelet and/or ADAMTS 13 shown in simulation model. There were no differences in clinical outcome between patients with and without combined genetic defects, and also no correlations between genotypes and phenotypes.

Conclusion: Genetic defects on both complement and coagulation pathways play pathogenic roles on aHUS. *CD36* may be a novel candidate gene act as disease modifier of aHUS.

Key words: Atypical hemolytic uremic syndrome, Whole exome Sequence, Complement regulatory protein, Coagulation

[Clinical 1]

2

急性腎損傷增加嚴重先天性心臟病之死亡風險 - 台灣 2000-2015 小於三歲病童傾向分數配對分析

Acute Kidney Injury Increases Mortality Risk of Severe Congenital Heart Diseases under Three Years Old - A 2000-2015 Nationwide Propensity Score Matching Analysis

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Background

The incidence of acute kidney injury (AKI) continues to increase in children with severe congenital heart diseases (CHD) and is associated with significant morbidity and mortality. In this study, we aimed to estimate the prognostic effects of AKI in severe CHD patients under three years old.

Methods

This is a nationwide retrospective cohort study, using data from the Health and Welfare Data Science Center (HWDC) of Ministry of Health and Welfare (MOHW), Taiwan. AKI was defined by ICD-9-CM code 584 or initiation of dialysis without a prior history of advanced chronic kidney disease (CKD). From January 2000 through December 2015, severe CHD patients who developed AKI under three years old were identified. We used propensity score matching to account for differences between severe CHD patients with and without AKI. Multivariable logistic regression was performed to determine the association between AKI and outcomes.

Results

We identified a total of 4273 severe CHD patients, and 543 of them ever developed AKI before the age of three. In addition to matching gender and residential area, 537 patients were 1:2 propensity-matched with those without AKI. The mortality rate was 29.61% in the AKI group, compared to 2.61% in the non-AKI group. For the development of CKD and ESRD after 180 days' follow-up, 3.17% and 2.79% were found in the AKI group, compared to 1.58% and none in non-AKI group. Multivariate logistic regression analysis showed that AKI, pulmonary edema and the use of vancomycin significantly increased mortality risk. The use of amphotericin-B significantly increased the risk of developing CKD 180 days after AKI episodes ($p < 0.05$).

Conclusions

In this propensity-matched analysis of severe CHD under three years old, AKI increases morbidity and mortality. It is important to identify those who are at an increased risk of AKI, with the foremost goal of prevention to help decrease morbidity and mortality in severe CHD patients.

[Clinical 1]

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分析台灣小於三歲兒童急性腎損傷從 2000-2012 的流行病學

The Epidemiology of Pediatric Acute Kidney Injury in Taiwan 2000-2012: Focus on Patients under Three Years Old

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Background

In pediatric acute kidney injury (AKI), risk factors and clinical course may vary in patients of different age. We aimed to understand the risk factors and outcomes of patients who develop AKI before three years old.

Methods

This is a nationwide retrospective cohort study, using data from the Health and Welfare Data Science Center (HWDC) of Ministry of Health and Welfare (MOHW), Taiwan. We included all individuals born from 2000 to 2012 and the last follow-up date is Dec 31, 2015. AKI was diagnosed using ICD-9-CM code (584) or initiation of dialysis without a history of advanced chronic kidney disease. Medications, intervention or major surgery before AKI were recorded for risk and prognostic factors analysis.

Results

We identified 1,916 first AKI episodes in patients younger than 3 years old (incidence rate = 21.1 per 100,000 person-years) and their underlying disease was severe congenital heart disease (CHD, 28.3 %), prematurity (18.3 %), sepsis (12.5 %) and simple CHD (10.7%). In severe CHD patients who developed AKI, 90.8 % received dialysis treatment and 98.9 % used antihypertension (anti-HTN) drugs during AKI episode (≤ 90 days). After AKI episode (>90 days), the usage of anti-HTN drugs decreased to 50%. The use of aminoglycoside and vancomycin were found in about 70% of severe CHD and simple CHD and 50% of prematurity and sepsis patients.

Conclusions

Severe CHD, prematurity and sepsis were major risk factors for pediatric AKI in patients younger than 3 years-old. During the AKI episode, 90% of patients needed anti-HTN drugs, and the usage of anti-HTN drugs decreased in the follow-up period. In risk factors analysis, increased proportion (60%) were noted in pediatric AKI patients under aminoglycosides and vancomycin usage. Since glomerular filtration rate (GFR) is still under maturation before 3 year-old children, blood pressure control and antibiotics usage should be closely monitored in the care of pediatric AKI patients.

[Clinical 1]

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低 C3 濃度,以及高嗜中性與淋巴球比,以及高血小板與淋巴球比,都預測切片證實為原發性膜性腎絲球腎炎的不良長期腎臟存活率

Low Serum C3 Level, High Neutrophil-Lymphocyte-Ratio, and High Platelet-Lymphocyte-Ratio All Predicted Poor Long-Term Renal Survivals in Biopsy-Confirmed Idiopathic Membranous Nephropathy

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Background

Idiopathic membranous nephropathy (iMN) is the major cause of end-stage renal disease (ESRD). Recent guidelines suggest limiting immunosuppressants only to high risk patients for ESRD. The present study is aimed at identifying new predictors for the renal outcome of iMN patients.

Materials and Methods

We conducted a retrospective cohort study covering a period from January 2003 to December 2013. We enrolled participants who had received their first renal biopsy at our medical center in Taiwan with the diagnosis of iMN. Clinical, pathological and laboratory data were collected from medical records. Analyses with Mann-Whitney U test was used for continuous variables and Chi-square test for categorical variables. The Kaplan-Meier curve was used for the analyses of patient survival and renal survival. Youden index was used for evaluating the performance of a dichotomous diagnostic test for renal and patient outcomes. Cox proportional hazard regression was used to determine factors affecting renal survival.

Results

A total of 99 patients with renal biopsy-confirmed idiopathic iMNs were enrolled. C3 level ≤ 114 mg/dl predicted patient outcome ($p < 0.001$) with good predictive power (AUC=0.736). The univariate analysis showed that risk factors for poor renal outcome were older age (HR=1.04, $p=0.002$), high BUN (HR=1.03, $p < 0.001$), poor baseline renal function (HR=1.30 and $p < 0.001$ for higher serum creatinine; HR=0.97 and $p < 0.001$ for higher eGFR; HR=1.06 and $p < 0.001$ for urine PCR), C3 ≤ 93.4 mg/dl (HR=2.15, $p=0.017$), NLR >3.34 (HR=3.30, $p < 0.001$) and PLR >14.48 (HR=2.54, $p=0.003$).

Conclusion

Stage of iMN did not fully account for the risk of ESRD. This is the first evidence that serum levels of C3 ≤ 93.4 mg/dl predicted poor renal outcomes with good predictive power. Easily obtained markers, NLR >3.34 and PLR >14.48 also predicted poor renal outcomes.

Keywords: idiopathic membranous nephropathy, patient outcome, renal outcome, C3 level, neutrophil-lymphocyte-ratio, platelet-lymphocyte-ratio

[Clinical 1]

5

由組織及血清預測因子預測經由腎臟切片確診 IgA 腎病變的長期腎臟預後 Serologic and Histologic Predictors of Long Term Renal Outcome in Biopsy-Confirmed IgA Nephropathy

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Background: The Hass classification of IgA nephropathy should be validated for Asian populations. More detailed and newer predictions regarding renal outcome of IgA nephropathy remains mandatory,

Materials and Methods: We conducted a retrospective cohort study between January 2003 and December 2013. Clinical, pathological and laboratory data were all collected via available medical records. A Mann–Whitney U test was used for continuous variables and the Chi-square test was implemented for categorical variables. A Kaplan-Meier curve was put in place in order to determine patient survival and renal survival. The Youden index and Cox proportional hazard regression were used to investigate the possible factors for renal survival and predictive power.

Results: All 272 renal biopsy-confirmed IgAN patients were enrolled for further studies. The univariate analysis showed that risk factors for poor renal outcome included stage 4-5 of Hass classification (HR=3.67, p<0.001), a poor baseline renal function (HR=1.02 and p<0.001 for higher BUN; HR=1.14 and p<0.001 for higher serum creatinine; HR=0.95, p<0.001 for higher eGFR), IgG ≤907 (HR=2.29, p=0.003), C3 ≤ 79.7 (HR=2.76, p=0.002), a higher C4 (HR=1.02, p=0.026), neutrophil-to-lymphocyte ratio > 2.75 (HR=2.92, p<0.001), and a platelet-to-lymphocyte ratio ≥ 16.06 (HR=2.02, p=0.012). A routine check often easily obtainable markers, neutrophil-to-lymphocyte ratio and platelet-to-lymphocyte ratio, in order to predict the renal outcome is recommended.

Conclusions: This is the first study to have demonstrated that Haas classification is also useful for establishing predictive values in Asian groups. A lower serum IgG (≤907 mg/dl) and serum C3 (≤79.7 mg/dl) were both risk factors for poor renal outcome. Additionally, this is the first study to reveal that serum C4 levels, an NLR >2.75, and a PLR>16.06 could suggest poor renal outcome.

Key words: IgA Nephropathy

[Clinical 2]

1

居家血液透析治療，臺灣先驅計畫，年度報告

Home hemodialysis, a pilot study in Taiwan, annual report

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中文摘要

由於許多文獻報導都認為居家血液透析是對病人最好的透析治療，本院持續推廣居家血液透析，目前累計 7 名受試者，線上有兩位正在接受訓練。居家血液透析在一些國家逐漸增加，像是紐西蘭，有 11% 的 ESRD 病人選擇居家血液透析治療，若扣除腎臟移植，居家血液透析占有所有透析病人的 18%。美國只有 1%，若扣除腎臟移植，居家血液透析占有所有透析病人的 2%。鄰近的香港有 2% 的 ESRD 病人選擇居家血液透析治療，若扣除腎臟移植，居家血液透析占有所有透析病人的 3%。居家血液透析的存活率約等於 marginal donor 的腎臟移植效果，以目前台灣腎臟捐贈比率偏低的情況，居家血液透析可以提供臺灣末期腎臟病人最高品質的透析治療，讓等待換腎的病人可以維持最佳的身體狀況。

以目前本院 7 名居家血液透析病患的資料看來，進入居家血液透析之後，血色素明顯增加 ($9.643 \pm 0.4937 \text{g/dl} \rightarrow 11.94 \pm 0.5928 \text{g/dl}$, $p=0.0115$)；血色素增加伴隨著 EPO 用量減少 ($21600 \pm 3709 \text{iu} \rightarrow 11200 \pm 5571 \text{iu}$, $p=0.1588$)；肌酐酸降低 ($14.03 \pm 1.250 \text{mg/dl} \rightarrow 8.907 \pm 0.6767 \text{mg/dl}$, $p=0.0036$)；血磷 $P < 5.5 \text{mg/dl}$ 的達標率增加 ($28.75\% \rightarrow 100\%$)；鈣磷乘積 $\text{Ca} \cdot \text{P} < 65$ 的達標率增加 ($42.86\% \rightarrow 100\%$)；白蛋白增加 ($3.757 \pm 0.1863 \text{g/dl} \rightarrow 4.386 \pm 0.1471 \text{g/dl}$, $p=0.0212$)。

居家血液透析治療的存活率尚無法分析，但以目前文獻看來，居家血液透析脫水速率比在院血液透析的脫水速率低 (HHD 6cc/kg/hr, in center HD 10cc/kg/hr)，可能就是居家血液透析造成比較少的心血管傷害，所以存活率較高。心臟超音波檢查發現左心室肥厚有些改善但不穩定。 $\beta 2$ 微球蛋白有明顯減少，可能長期透析之後會減少類澱粉沉積症。

關鍵詞：居家血液透析、 $\beta 2$ 微球蛋白、脫水速率

Keywords: Home hemodialysis, $\beta 2$ -microglobulin, ultrafiltration rate.

[Clinical 2]

2

全國透析患者 2009-2016 年費用趨勢分析

National Trends in Medical Expenditures in the Taiwan Dialysis Population from 2009 to 2016

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Background: The number of treated end-stage renal disease patients has been rapidly growing and increasing continuously, which is possibly driven by population aging and increase of the prevalence of type 2 diabetes mellitus. We studied the trends and contributing factors associated with financial burden in dialysis population.

Methods: We used National Health Insurance Database to conduct a trend analysis of medical expenditures in dialysis population from 2009 to 2016. Medical expenditures including costs of dialysis treatment, outpatient visit, emergency services, and inpatient admission, were calculated by month. We also stratified all expenditures by age, sex, status of dialysis (short-term or long-term), and diseases (hypertension, diabetes mellitus, myocardial infarction, stroke, and cancer) to clarify the associations of factors with increased medical expenditures.

Results: Total 261,023 dialysis patients were identified, and only 55.3% of them received long-term dialysis therapy. The number of short-term dialysis patients sharply increased by dozens of times in past decade. The overall outpatient costs (dialysis excluded) increased 1.48 times from 36.1 billion points in 2009 to 53.8 billion points in 2016. However, the outpatient costs for patients with short-term dialysis considerably increased by 2.85 times (from 7.0 billion points in 2009 to 20.1 billion points in 2016). The major contributing factors associated with increased medical expenditures were old age, death, hypertension, and diabetes mellitus.

Conclusions: The services and costs of patients on short-term dialysis increased dramatically when compared to those of long-term dialysis patients. To retard the financial burden, development of new strategy to avoid short-term dialysis is needed.

Key words: dialysis, medical expenditures, trend

關鍵字: 透析, 費用, 趨勢

[Clinical 2]

3

長期性血液透析導管之照護成果:個案管理模式之運用

Achievement of Case Management Practice Model in Patients with Cuffed Hemodialysis Catheters

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Background: 尿毒症患者使用長期性透析導管的愈來愈普遍，為了提昇病人安全及降低導管相關併發症，本單位成立長期性導管團隊並以個案管理師的方法(CMP, Case Management Practice) 推行更全面的照護。由導管個案管理師執行查檢作業，收集及即時處置長期性導管的臨床併發症，運用團隊力量激發具創意解決方案，以達到最佳的透析安全照護。

Methods: 長期性導管團隊成立於 2017 年 3 月，成員橫跨腎臟科醫師、心臟外科醫師、透析治療師、個案管理師及感染管制護理師，定期商討照護對策。透析治療師於每次透析時評估導管情形並給予護理；個案管理師則每兩週實地訪視病人，記錄導管周遭皮膚狀況、感染徵象、導管通暢情形和透析清除率。發生併發症時與團隊小組共同擬定適切之照護計劃，協調透析治療師執行，追蹤結果，定期會議中針對導管進行現況檢討與分析導管合併症，以作為改善對策。

Results: 一年期間共收案 94 人，平均年齡為 68.6 ± 13.6 歲，以女性居多(72.3%)。與成立前一年比較，皮膚併發症發生率由 0.57 人次/年降為 0.44 人次/年($p < 0.05$)；導管相關菌血症由 0.47 人次/年降為 0.09 人次/年，其中最終導管培養陽性住院由 0.05 人次/年降為 0.02 人次/年(兩者皆 $p < 0.05$)。導管通暢度: 血栓溶解劑 Urokinase 使用率由 0.65 人次/年降為 0.47 人次/年($p < 0.05$)；重新置放導管率由 0.19 人次/年增加為 0.32 人次/年($p > 0.05$)。以長期性導管作為過渡性血管通路的次族群分析中，導管留置的時間由 188 日降為 132 日。

Conclusion: 運用 CMP 模式管理長期性導管有助於減少相關皮膚併發症及導管相關菌血症住院，也減少導管留置的時間，此外亦提升病人生活品質。

Key words: 血液透析、長期性導管、個案管理模式

[Clinical 2]

4

腎臟科醫師執行腹膜透析導管植入之成效

Percutaneous Peritoneal Dialysis Catheter Placement by A Nephrologist

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Background

Initiation of dialysis with a functional dialysis access is associated with improving quality of life in chronic kidney disease patients who need dialysis. Dialysis access by a nephrologist may smooth the process of starting dialysis. The nephrologists of Asia University Hospital performed percutaneous PD catheter placement under local anesthesia since March 2017. We reviewed the outcomes and complications of PD catheter placement.

Methods

We placed PD catheter in 72 patients in Asia University Hospital from March 2017 to October 2018. We recorded the demographic characteristics, location of placement, break-in period, and complications of patients. Break-in period duration was defined the duration between PD catheter placement and initiation of regular exchanges. The complications included failed placement, peri-catheter early leakage (within two weeks), migration, and infection.

Results

Of 72 patients, we had success rate (95.8%) of PD catheter placement. PD catheter placements were performed in outpatients (43.0%), admitted patients (47.2%), patients in intensive critical unit (6.9%), and patients in the emergency room (2.7%). The break-in period were about 3 to 6 days. We had low rate of failed placement (4.1%), low rate of peri-catheter early leakage (2.7%), and low migration rate (5.5%). Patients had peritonitis episode every 47.5 months, tunnel infection episode every 190.0 months, and exit site infection episode every 190.0 months. No patient experienced significant bleeding or bowel perforation.

Conclusions

Percutaneous PD catheter by a nephrologist can be a safe and simple procedure in outpatients. Furthermore, the break in period is short in our experience and this may help to improve patients' uremic symptoms timely.

Key words: peritoneal dialysis catheter placement, nephrologist

[Clinical 2]

6

使用臨床因子的交互作用來預測透析病人輕微的認知障礙

Mutual Interaction of Clinical Factors for Prediction of Mild Cognitive Impairment in Patients Receiving Dialysis

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Background: To examine possible mutual interactions of various factors contributing to cognitive impairment in dialysis patients.

Methods: A total 48 patients receiving dialysis with subjective memory complaints in outpatient clinic were recruited from 2015 to 2017. Demographics, circulating uremic toxin concentrations (small water-soluble, protein-bound, medium-sized solutes), miRNA concentrations and nerve injury protein concentrations were collected and measured. Clinical dementia rating (CDR) scores was used to stratify the functional scores of the patients. Receiver operating characteristic(ROC) analysis was used to evaluate diagnostic test performance for predicting dichotomous results, cumulative ROC analysis to examine the interactions between clinical factors.

Results: On individual analysis, the area under curve(AUC) was more than 0.7 for hemoglobin and age. On cumulative ROC analysis, the major predictors of mild cognitive impairment were hemoglobin, age, sex, homocysteine, neuron-specific enolase and miR-486. The cumulative AUC on combining hemoglobin, age, and miR-486 was the highest (0.897, 95% confidence interval 0.806–0.988). Two dichotomized variables reached 81.82% sensitivity and 86.67% specificity, with the likelihood ratio for positive and negative results being 6.14 and 0.21, respectively.

Conclusion: Hemoglobin, age, and miR-486 are the major predictors for mild cognitive impairment in patients receiving dialysis.

[Clinical 3]

1

Association between Serum Aluminum Level and Uremic Pruritus in Hemodialysis Patients

於血液透析患者血中鋁濃度和尿毒搔癢症的關係

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Abstract

Uremic pruritus (UP) is a common symptom in patients undergoing hemodialysis (HD). The pathogenesis of UP is complex. Aluminum (Al) is a common metal and is toxic to patients undergoing HD. Al is also a known allergen in humans, which can induce immune reactions. However, the correlation between Al and UP remains unclear in dialysis patients.

A total of 866 patients on maintenance HD were enrolled for analysis. We demonstrated that HD patients with higher serum Al levels had higher prevalence of UP than those with lower serum Al levels. After adjusting for confounding variables, the serum Al level was significantly associated with UP. Overall, each 10-fold increase in serum Al level was associated with a 5.64-fold increase in the risk of UP development in these subjects. Notably, a serum Al level exceeding 1.25 ug/dL was a significant predictor (odds ratio = 3.53) of UP in this population. The results of this cross-sectional study suggest that serum Al level may be associated with the development of UP in patients on maintenance HD.

[Clinical 3]

2

血液透析的年輕成人有較高的罹癌風險:全國性的人口研究

Higher Risk of Malignant Neoplasms in Young Adults with End-Stage Renal Disease under Hemodialysis: A Nationwide Population-Based Study

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Background: Recent research has shown that patients with end-stage renal disease(ESRD) have a higher risk of malignancies. The purpose of this study was to search out the relationship between malignancy and long-term hemodialysis(HD) in ESRD with special emphasis on the age distribution.

Methods: A cohort search was conducted in the Taiwan's National Health Insurance Research Database. We enrolled 1 million randomly selected cases and followed them over 8 years (from 2005 to 2013). Of these patients, 3055 patients who developed ESRD and received regular hemodialysis were identified. For each hemodialysis patient, the age-, gender-, and diabetes-matched control group was selected from the database (n=12220). We further stratified the patients according to age. The endpoint of this study was the occurrence of malignancy.

Results: The incidence rate of malignancy was significantly higher in HD patients (6.8%) compared to controls (4.9%) ($p < 0.001$). The Competing risk Cox regression analysis indicated that age, hemodialysis, male gender, and diabetes were associated with an increased risk of malignancy. When further stratified according to age, the odds ratios of developing cancer were 5.788, 1.859, 1.945, and 1.510 among the hemodialysis group aged < 40 years, 40-49 years, 50-59 years, and 60-69 years, respectively.

Conclusion: The patients with end-stage renal disease who received hemodialysis had a significantly higher risk of malignancy, especially those with a relatively young age. Young HD patients may require more cancer screening strategies to improve their outcomes.

Key words: end-stage renal disease, hemodialysis, malignancy, young adults

[Clinical 3]

3

透析病患維生素 D 缺乏與心臟-胸廓比及長期預後的相關性研究

Vitamin D Deficiency, Cardiothoracic Ratio, and Long Term Mortality in Hemodialysis Patients

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Background: Hemodialysis patients are a special group of patients with higher mortality. Vitamin D deficiency is common in hemodialysis patients. Hemodialysis patients with vitamin D deficiency are associated with even higher mortality. Cardiothoracic ratios (CTR) on chest X-rays has been used as an index of cardiac hypertrophy and fluid overload. The association between vitamin D deficiency and the cardiothoracic ratio in hemodialysis is still unclear. The prognostic value of vitamin D deficiency in hemodialysis patients with different CTR is still unclear.

Method: This prospective study was performed in a dialysis center in Taiwan between August 2006 and July 2011. A total of 186 patients were included. This study analyzed the prognostic value of vitamin D deficiency on the survival of CKD patients on hemodialysis with different CTR. Patients with plasma 25 (OH) vitamin D were considered to be vitamin D deficiency patients.

Result: The prevalence of vitamin D deficiency was about 37%. Patients with vitamin D deficiency had significantly higher prevalence of DM (47.8% vs. 32.5%, $p = 0.044$) and stroke (17.9% vs. 6.0%, $p = 0.011$) than patients without vitamin D deficiency. Furthermore, the CTR was higher in patients with vitamin D deficiency than those without vitamin D deficiency (51.6 ± 7.3 vs. 48.7 ± 6.3 , $p = 0.009$). After multivariate logistic regression, we found CTR was the most powerful factor that was independently significantly associated with vitamin D deficiency [Odds ratio: 1.066, 95% confidence interval (CI): 1.010-1.126, $p = 0.021$]. Additionally, vitamin D deficiency was associated with all-cause mortality in higher CTR patients after adjustment by hierarchical regression models.

Conclusion: We showed for the first time that vitamin D deficiency was independently significantly associated with higher CTR. We additionally revealed that vitamin D deficiency was an independent predictor of all-cause mortality in hemodialysis patients with higher CTR. Further studies are needed to confirm our results.

關鍵字：維生素 D 缺乏，體液過量，心臟-胸廓比，血液透析，死亡率

Key words: Vitamin D deficiency, fluid overload, cardiothoracic ratio, hemodialysis, mortality

[Clinical 3]

4

血液透析患者自體顯性多囊腎病變與動靜脈血管通路功能失調之關聯性

The Association of Autosomal Dominant Polycystic Kidney Disease with the Malfunction of Arteriovenous Access in Hemodialysis Patients

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Background: Vascular diseases, including aneurysms of intracerebral arteries and abdominal aorta are commonly observed in patients with autosomal dominant polycystic kidney disease (ADPKD). We aimed to investigate the difference in the risk of malfunction of arteriovenous fistula or graft (AVF/AVG) between hemodialysis (HD) patients with and without ADPKD

Methods: We enrolled 354 HD patients with ADPKD and 28264 HD patients without ADPKD in this study. Only 1062 propensity score-matched HD patients without ADPKD were included for analysis. The outcomes include the rate of AVF/AVG malfunction which is defined as the need for the first interventional procedure of either angioplasty, thrombectomy or creation of another AVF/AVG for all HD patients within 3 months, 1, 5 and 10 years respectively.

Results: The malfunction rate (per 100 person-years) of AVF/AVG for ADPKD and non-ADPKD was (1) 20.1 and 30.38 [HR=0.68, P=0.144] within 90 days, (2) 34.85 and 30.38 [HR=1.08, P=0.517] in first year, (3) 23.56 and 20.46 [HR=1.12, P=0.154] within 5 years, (4) 17.82 and 12.59 [HR=1.36, P=0.004] between 1st and 10th years, and (5) 22.6 and 17.52 [HR=1.21, P=0.015] at all period respectively.

Discussions: A lower risk of malfunction of AVF/AVG may be associated with easier maturation in early phase but a higher risk of malfunction may be associated with complicated aneurysmal dilatation in later period.

Conclusions: In comparison with non-ADPKD patients, ADPKD patients had a lower risk of AVF/AVG malfunction in first 90 days but a higher risk after 1 year of AVF/AVG creation.

Keywords: ADPKD (autosomal dominant polycystic kidney disease), AVF/AVG (arteriovenous fistula/graft), PTA (percutaneous transluminal angioplasty)

關鍵字：自體顯性多囊腎病，動靜脈瘻管，經皮血管成形術

[Clinical 3]

5

抗血小板藥物維持血液透析病人動靜脈瘻管通暢性

Antiplatelet Agents Maintain Arteriovenous Fistula and Graft Function in Patients Receiving Hemodialysis: A Nationwide Case–Control Study

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Background: In this study, we evaluated the effects of various medications on the patency of vascular access (VA) for hemodialysis.

Methods: We analyzed data from the Longitudinal Health Insurance Database of Taiwan. We adopted a case–control study design within a cohort of patients who had received regular hemodialysis between 2002 and 2012; 34,354 patients with first VA failure were identified, and the duration from VA creation date to the first VA failure date was calculated. We then classified these patients into two groups, namely arteriovenous fistula (AVF, n = 25,933) and arteriovenous graft (AVG, n = 8,421). Each group was further divided into two subgroups, namely short-term (<1 year) and long-term (≥1 year) patency.

Results: The risk factors for early VA failure were age ≥65 years, diabetes mellitus, hyperlipidemia, cerebral vascular disease, congestive heart failure, peripheral artery disease, and sepsis. Male sex, hypertension, cancer, and peptic ulcer were associated with early AVF failure. Antiplatelet therapy increased the AVF and AVG patency times with adjusted odds ratios of 0.748 (95% confidence interval [CI]: 0.703–0.796, p < 0.0001) and 0.810 (95% CI: 0.728–0.901, p = 0.0001), respectively. A significant decrease in the VA failure risk was observed with an increase in the cumulative defined daily dose of antiplatelet agents.

Conclusions: This nationwide study demonstrated that some risk factors were associated with early VA failure and that the use of antiplatelet agents prevented the loss of VA patency in a dose–response manner. Thus, antiplatelet drugs should be routinely administered to high-risk patients receiving dialysis.

Key words: Antiplatelet agent, Hemodialysis, Arteriovenous fistula, Arteriovenous graft

[Clinical 4]

1

探討低磷飲食對末期腎臟病 Fibroblast Growth Factor-23 的影響：一個隨機交叉試驗結果

Effect of Low-Phosphate Diet on Fibroblast Growth Factor-23 in Patients with End-Stage Renal Disease: A Randomized Cross-Over Trial

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The beneficial effects of low-phosphate diet on fibroblast growth factor-23 (FGF23) level remain unknown in patients with end-stage renal disease. We conducted a randomized, cross-over trial at a hemodialysis unit of tertiary teaching hospital, in which we assigned 35 adults with end-stage renal disease undergoing thrice-weekly hemodialysis, and serum phosphate level greater than 5.5 mg/dL or between 3.5 and 5.5 mg/dL with regular phosphate binder use to receive a very low-phosphate diet with phosphate-to-protein ratio (PPR) of 8 mg/g, or a low-phosphate diet with PPR of 10 mg/g. The participants consumed each study diet for 2 days. Primary outcome measure was mean difference (MD) in change-from-baseline FGF-23 level between intervention groups. Secondary outcomes included changes in serum phosphate, and parathyroid hormone (PTH). We found that both low-phosphate diets significantly decreased FGF23, phosphate, and PTH level, compared with baseline. Compared with low-phosphate diet, very low-phosphate diet lowered serum phosphate level (MD, 0.6 mg/dL; 95% CI, 0.2 to 1.0; $P = 0.002$) but had no significant effect on FGF23, and PTH level. In conclusion, the 2-day low-phosphate diets decreased FGF23, phosphate and PTH level and very low-phosphate diet provided an additional phosphate-lowering effect.

關鍵字：交叉、透析、飲食介入、FGF23、磷-蛋白質比值

Key words: cross-over; dialysis; dietary intervention; FGF23; phosphate-to-protein ratio.

[Clinical 4]

2

鹼性治療可能減緩慢性腎臟病患者缺血性心臟病的風險

Alkali Therapy May Lessen Risks of Ischemic Heart Disease in CKD Patients

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Background: Metabolic acidosis is commonly implicated in ischemic heart disease (IHD) in patients with chronic kidney disease (CKD). Alkali therapy to correct metabolic acidosis (MA) in CKD patients appears to preserve kidney function and survival. However, the benefits of alkali therapy on IHD have been unclarified in CKD patients in the literature.

Methods: Using the National Health Insurance Research Database between 2000 and 2010, 162 CKD patients with sodium bicarbonate supplementation for MA were enrolled and propensity score-matched with 324 CKD patients without sodium bicarbonate supplementation according to age, sex, index date, diabetes, hypertension, hyperlipidemia, antihypertension drugs, antidiabetic drugs, statin, antiplatelet drug, erythropoietin-stimulating agents, and CKD stages. Main outcomes were IHD events and adverse effects of sodium bicarbonate.

Results: The risk of IHD events was significantly lower in CKD patients with bicarbonate supplementation than those without bicarbonate supplementation (adjusted hazard ratio = 0.666, 95% CI = 0.429–0.959, $P < .05$). As stratified to different stages of CKD patients, the lower risk of IHD was significantly associated with bicarbonate supplementation in patients with CKD stage 1-3. However, there were lower but insignificant in IHD events in CKD stage 4-5. The increased cumulative bicarbonate dosages appeared to be associated with the lower IHD events in CKD patients, maybe indicating a protective role of bicarbonate supplementation.

Conclusions: Bicarbonate supplementation might be associated with a lower IHD risk in patients at CKD stage 1-3 for MA. As regards CKD stage 4-5, the benefit of bicarbonate supplementation on IHD risk needs to be clarified in a large cohort study.

Key words: chronic kidney disease, ischemic heart disease, alkali therapy

關鍵字：慢性腎臟病、缺血性心臟病、鹼性治療

[Clinical 4]

3

糖尿病視網膜病變是慢性腎臟病惡化的危險因素：台灣一項多中心病例對照研究

Diabetic Retinopathy as A Risk Factor for Chronic Kidney Disease Progression: A Multicenter Case-Control Study in Taiwan

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Background: This study investigated the characteristics of patients with different chronic kidney disease (CKD) stages according to the occurrence of diabetic retinopathy and determined the influence of severity of retinopathy in renal function deterioration.

Methods: We conducted a multicenter, longitudinal cohort study based on the Epidemiology and Risk Factors Surveillance of CKD project (2008–2013) and National Health Insurance Research Database (NHIRD) (2001–2013). A total of 16206 patients with CKD aged 20–85 years from 14 hospitals were included in the study.

Results: CKD patients with DR had lower baseline estimated glomerular filtration rate (eGFR), poorer glycemic control, higher proteinuria, more anemia and lower albumin levels. Later CKD (Stage 3b-5) patients with DR had significantly higher CKD progression compared to those without DR. Proliferative DR had significantly higher CKD progression events compared to non-proliferative DR.

Conclusions: The presence and severity of DR is a risk factor for CKD progression among our Taiwanese CKD with diabetes. Prevention and early detection of DR are important and DR should be routinely screened as early as possible among diabetic CKD patients.

[Clinical 4]

4

不含干擾素之直接抗病毒藥物用在腎臟移植併有慢性 C 型肝炎患者的世代研究

Interferon-Free Direct Antiviral Agents in Kidney Transplant Recipients with Hepatitis C Infection: A Cohort Study

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Abstract:

Hepatitis C (HCV) infection has been associated with increased patient morbidity and decreased graft survival in kidney transplant recipients. Until now, there has been no efficient and safe therapy in treating chronic HCV infection after kidney transplantation. The aims of this lecture was to review observe the efficacy and safety of interferon-free regimens with new generation direct antiviral agents (DDAs) in treating chronic stable kidney transplant recipients with chronic HCV infection. We present Seventeen kidney transplant recipients with chronic HCV infection, whom was given DDAs in our hospital. Sofosbuvir plus Ribavirin (n= 7); Sofosbuvir plus Ledipasvir (n= 9); Sofosbuvir plus Ledipasvir plus Ribavirin (n= 1); and Daklinza plus Sunvepra (n= 1), for 12 (n= 16) or 24 (n= 1) weeks. All patients exhibited a rapid virologic response on therapy, and 3 patients (82.3%) had achieved a sustained virologic response at 12 weeks after the end of therapy. The anti-HCV regimen was well tolerated, but the tacrolimus level decreased significantly during treatment. The renal graft function stabilized in all patients. Our data show that new generation DAAs can be efficiently and safely eliminate HCV infection after kidney transplantation; however, tacrolimus dose adjustment is needed. Further studies with a large number of patients are needed in the future.

[Clinical 4]

5

健康成人腎臟大小與身體指數及腎功能在超音波下的關聯性：臺灣兩家醫學中心的回溯性觀察性研究

The Nomogram of Kidney Size and Its Association with Body Indices and Renal Function by Ultrasonography Assessment: A Retrospective Observational Study in Taiwan

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Background: Renal ultrasonography is an essential examination in clinical practice for differentiation between acute or chronic kidney disease, which enable physicians to preliminarily evaluate the health condition of kidneys and other structural abnormalities. However, unsuitable kidney nomograms published decades ago from different races still widely serve as references in many countries, and the establishment of renal nomogram of each population is of great importance. Also, the associations between healthy renal size and some parameters, including age, gender, body height, body weight, BMI, and renal function are inconsistent in the literature, which is of interest in the present study.

Method: A great number of cases (N=4,075) was included in the present study from the Kaohsiung and Linkou Chang-Gung Memorial Hospitals, with diseased cases affecting the normal renal morphology excluded.

Results: As a result, the mean right renal length is 10.66 ± 0.70 cm, left length 10.72 ± 0.73 cm, right width 4.78 ± 0.75 cm, left width 5.06 ± 0.64 cm, right cortical thickness 1.46 ± 0.32 cm, and left cortical thickness 1.49 ± 0.30 cm. Except for the relationship between left renal width and eGFR, renal length, width, and cortical thickness of both sides were all associated with age, body height, body weight, BMI, and eGFR, either quadratically or linearly in regression plots. Moreover, the left kidneys are larger than the rights, and male kidneys are larger than the females. In the ethnic comparison of renal length, significant differences were identified among populations.

Conclusion: a renal nomogram of Chinese population is proposed, and by a large sample size we reported the associations between renal size and body indices. The variation in renal size among populations is not ignorable, and the establishment of renal nomogram of every population is recommended.

Keywords: Ultrasonography, Kidney nomogram, Kidney size, Body Index, Renal function

[Clinical 4]

6

治療慢性C型肝炎病患時直接作用抗病毒組合Daclatasvir與Asunaprevir對腎絲球過濾率的長期影響：一個區域教學醫院的初報

The Long-Term Effect of Daclatasvir and Asunaprevir Direct-Acting Antiviral Regimen on the Glomerular Filtration Rate in Treating Patients with Chronic Hepatitis C: A Preliminary Report of a Regional Teaching Hospital

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Background: There's evidence that direct-acting antivirals (DAAs) alleviate or correct chronic hepatitis C infection (HCV)-related glomerular disease and abnormal blood status, such as mixed cryoglobulinemia, vasculitis, hypocomplementemia, and membranoproliferative glomerulonephritis. DAAs could also have renal toxicity. However, the net long-standing impacts remain unclear.

Methods: From Feb. to Jul. 2017, we identified patients with HCV genotype 1b infection completing the DAA regimen of daclatasvir and asunaprevir for 24 weeks. Outcomes comprised serum creatinine and estimated glomerular filtration rate (eGFR, using abbreviated MDRD formula) at baseline, at the end of treatment (24 wks), at attaining sustained viral response of 12 weeks' duration (SVR12), and at 6 months after SVR12 (6 Ms). Repeated measures ANOVA was applied.

Results: A total of 30 patients was enrolled, eGFR changed significantly. (86.26±18.44, 81.00±21.51 at 24 wks, 81.79±22.46 at SVR12, 87.21±24.79 c.c./min/1.73 m² at 6 Ms, $p=0.02$) As compared diabetes mellitus (DM) with non-DM, eGFR declined much more significantly and did not return to baseline at 6 months following SVR12. ($p<0.0001$)

Conclusions: Given the limitation of a small retrospective cohort nature, this study revealed the renal toxicity during DAA therapy with daclatasvir and asunaprevir regimen for HCV, especially for DM patients

Key words: Glomerular filtration rate, Direct-acting antivirals, Hepatitis C

關鍵字：腎絲球過濾率，直接作用抗病毒藥，C型肝炎

[Basic]

B01

無機磷酸鹽透過抑制粒線體使腎小管細胞對缺血再灌注損傷更敏感

Inorganic Phosphate Makes Renal Tubular Cells more Sensitive to Ischemia-Reperfusion Injury through Inhibiting Mitochondrial Function

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ABSTRACT

The incidence of chronic illness and disability increases with age, this growth in life expectancy creates new challenges in the healthcare system. Cellular senescence is known to play a major role in age-related diseases, has shown to relate to vascular calcification and renal fibrosis. High phosphate (Pi) diet causes hyperphosphatemia, vascular calcification and leads to renal fibrosis. We found that high phosphate induced the senescence of rat renal tubular cells revealed by X-gal staining. High phosphate also reduced the mitochondrial basal function, which decreased the ratio of NAD⁺ to NADH and the expression of ATP synthase beta. The decrease of the ratio of NAD⁺ to NADH inhibited NAD-dependent deacetylase sirtuin-1 (Sirt1) expression. Foscarnet, a phosphate channel blocker, recovered high phosphate-reduced mitochondrial basal function and Sirt1 expression. In animal study, high Pi diet didn't obviously increase blood creatinine and inorganic phosphate. However, ischemia-reperfusion (IR) strongly reduced renal function in mice fed high Pi, whereas IR-decreased renal function was fully restored in normal mice. High Pi-fed mice previous to IR have more severe tubulointerstitial fibrosis compare to its counterpart. In summary, inorganic phosphate reduces mitochondrial function in renal tubular cells, which in turn makes the cells more sensitive to IR injury.

Keywords: inorganic phosphate; ischemia-reperfusion injury; mitochondrial; renal tubular cell

類昇糖激素胜肽受體可調節高糖環境中老鼠間質細胞的醣化終產物受器表現 **Glucagon-Like Peptide-1 Receptor Regulates Receptor of Advanced Glycation End Products in High Glucose Treated Rat Mesangial Cells**

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Background: Hyperglycemia-induced advanced glycation end products (AGEs) and receptor for AGEs (RAGE) production play major roles in progression of diabetic nephropathy. In previous study, we knew both GLP-1 receptor and PPAR δ agonists have anti-inflammatory effect on AGE-treated rat mesangial cells.

Methods: In this study, GLP-1 expressions and GLP-1R expression response to PPAR δ (L-165,041) agonists were investigated. RAGE expressions in treating with PPAR δ agonists and siRNA of GLP-1R were also detected.

Results: The results showed GLP-1 mRNA and protein had insignificant increment treated with AGE or PPAR δ agonists. But GLP-1 receptor mRNA and protein showed significant increase with administration of PPAR δ agonists with presence of AGE. Elevations of RAGE mRNA and protein were attenuated by PPAR δ agonists but reversed significantly by giving siRNA of GLP-1R. AGE-induced cell death was reversed by PPAR δ agonists administration, but attenuated by siRNA of GLP-1R.

Conclusions: These results suggest that PPAR δ agonists could suppress AGE-induced RAGE mRNA and protein expressions with GLP-1 receptor co-existence, which enhanced by both PPAR δ agonists and AGE.

Key words: GLP-1 receptor, AGE, PPAR δ , renal mesangial cell

關鍵詞：類昇糖激素胜肽受體，糖化終產物， peroxisome增生活化接受器 δ ，腎臟間質細胞

液相色譜法-質譜聯用分析 IgA 腎炎病人的免疫球蛋白**Investigation of Immunoglobulins from Patients with IgA Nephropathy by Using Liquid Chromatography - Triple Quadrupole Tandem Mass Spectrometry**

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Background: Immunoglobulin A nephropathy (IgAN) is a glomerulonephritis characterized by IgA deposition in the glomerular mesangial cells. Until now, kidney biopsy is the only way to confirm the disease. It was found that abnormal glycosylation - galactose deficiency - occurred at IgA hinge region which caused IgA deposition and anti-IgA autoantibodies were also detected in patient plasma.

Methods: To investigate all the immunoglobulins from patient plasma, we used three platforms to detect IgG, IgA, and total Ig, respectively. The volume of plasma used for immunoglobulin purification was less than 10 µL. Bead volume, time of incubation, and temperature of incubation were optimized to achieve the best purification efficiency. After purification, the immunoglobulins were reduced, alkylated, and digested by trypsin. Samples were diluted with 0.1 % formic acid and introduced to liquid chromatography -triple quadrupole mass spectrometry. Multiple reaction monitoring was used to detect the tryptic peptides, and isotope labeled internal standard was added to investigate the potential of generating calibration curves.

Results: All the immunoglobulin isotypes and subclasses can be detected in one analysis. Glycopeptides of IgG and IgA Fc regions can also be detected by using multiple reaction monitoring mode. Relative quantification can be achieved by using the current method, and we are investigating the suitability of adding isotope labeled intact protein as internal standard.

Conclusions: The developed methods will be applied to clinical samples to investigate the antibody profile changes for IgAN patients after validation.

Key words: Immunoglobulin A nephropathy, Liquid Chromatography - Mass Spectrometry

關鍵字: 免疫球蛋白 A 型腎炎, 液相色譜法-質譜聯用

第二型血管生成素經由microRNA-33-5p-SOCS5路徑誘發糖尿病腎臟病變之腎膈細胞凋亡

Angpt2 Induces Mesangial Cell Apoptosis through microRNA-33-5p-SOCS5 Loop in Diabetic Nephropathy

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Background: Diabetic nephropathy (DN) is the leading cause of end stage renal disease, which causes an enormous burden on affected individuals and health-care systems. Mesangial cells (MCs) loss are correlated with worsening renal function in DN. Disturbance of angiotensin (Angpt)/Tie ligand-receptor system results in inflammation and abnormal angiogenesis. This association between elevated circulating Angpt2 and rapid decline in renal function has been in patients with DN. However, the pathogenic role of Angpt2 in the MCs remains unknown.

Methods: We conducted a cross-disciplinary study, including human, in vivo, and in vitro studies to examine the molecular mechanisms of Angpt2-driving MC apoptosis. Blood and urine Angpt2 levels were measured in 63 type 2 diabetes mellitus (DM) patients and 34 healthy volunteers. The role of Angpt2 was evaluated using mouse mesangial cells (MMC) model under normal glucose (NG) and high glucose (HG) conditions. C57BL/6 mice, non-diabetic db/m mice and diabetic db/db mice were used to validate the molecular mechanism of Angpt2 in vivo.

Results: Serum Angpt2 levels were elevated in type 2 DM patients and db/db mice, which correlated with urinary albumin/creatinine ratio. Angpt2 synergistically induced MMCs apoptosis under HG condition via intrinsic proapoptotic pathway. miR-33-5p was inhibited in MMCs treated with Angpt2 under HG condition, and miR-33-5p regulated Angpt2-inducing MMCs apoptosis treated with HG. Loss of miR-33-5p caused an increase in suppressor of cytokine signaling 5 (SOCS5), leading to the inhibition of Janus kinase1 and signal transducer and activator of transcription 3 signaling transduction. Dysregulation of SOCS5 was found in MCs in kidney sections of both db/db mice and type 2 DM patients. Furthermore, decreased levels of miR-33-5p were found in the urine of db/db mice and type 2 DM patients, and miR-33 levels negatively correlated with albuminuria.

Conclusions: Angpt2 induces MC apoptosis under HG condition via intrinsic proapoptotic pathway. Angpt2 leads to MC apoptosis through miR-33-5p/SOCS5 regulatory loop in DN. miR-33-5p is predictive of the severity of kidney injury in DN. These findings may provide future applications in predicting renal dysfunction and therapeutic potential of DN in clinical practice.

Keywords: angiotensin-2, miR-33, SOCS5, diabetic nephropathy, mesangial cell

關鍵字：第二型血管生成素，miR-33，SOCS5，糖尿病腎臟病變，腎膈細胞

尿中白蛋白引發的腎絲球足細胞的 microparticles 可以調控腎絲球足細胞內質網壓力

Podocyte-Derived Microparticles after Albumin Overload Regulates Endoplasmic Reticulum Stress in Podocytes

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Background: Microparticles (MPs) are small vesicles and derived from cell membranes. MPs have been found to be an important role in several diseases. We found that albumin overload induced endoplasmic reticulum (ER) stress through ROS pathway. We hypothesized that albumin overload regulated MPs release from podocytes through ER stress. Then, the albumin-induced podocyte-derived MPs (PMPs) could regulate ER stress on non-albumin treated podocytes.

Methods: Cells were exposed to medium alone or in high concentrations of delipidated, endotoxin-free human serum albumin (HSA, 10 mg/ml). Then podocyte-derived MPs were isolated and detected by centrifuged method and flow cytometry. The ER stress biomarker (GRP78) expression was analyzed by Western blotting.

Results: The number of PMPs was decreased after HSA treatment. The HSA+inhibitors of ROS or ER stress increased the number of PMPs compared with HSA only. The number of PMPs was decreased after the incubation of HSA-induced PMPs. The number of PMPs after the incubation of HSA+inhibitors of ROS or ER stress induced PMPs was increased compared with the incubation of HSA-induced PMPs. The number of PMPs was higher in podocytes with PMPs treatment than without PMPs treatment. The HSA-induced PMPs down-regulated the ER stress biomarker (GRP78) expression. However, the PMPs from the HSA+inhibitors of ROS or ER stress abrogated the effect of HSA-induced PMPs on ER stress expression

Conclusion: HSA decreased PMPs excretion through ROS and ER stress pathways. The HSA-induced PMPs also decreased PMPs excretion. The HSA-induced PMPs inhibited ER stress. Therefore, the HSA-induced PMPs can protect podocytes' own self.

Keywords: microparticles, podocytes, ER stress, ROS

尿中白蛋白藉由內質網壓力來增加腎絲球足細胞的 integrin-β3 表現 Albumin Load Increases Integrin-β3 Expression of Podocytes through Endoplasmic Reticulum Stress

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Background: Proteinuria is a major hallmark of glomerulonephritis. Activation of integrin- α v β 3 by urokinase receptor causes proteinuria and focal segmental glomerulosclerosis. Our studies find that albumin overload can induce endoplasmic reticulum (ER) stress and TGF- β 1 increases integrin- β 3 expression on podocytes. In this study, we examined whether albumin overload regulated integrin- β 3 expression through ROS-ER stress pathway.

Methods: Cells were exposed to medium alone or in high concentrations of delipidated, endotoxin-free human serum albumin (HSA, 10 mg/ml). Intracellular ROS generation was estimated with fluorescent indicator 20,70-dichlorofluorescein diacetate (DCF-DA). The expression of mRNA and protein was measured by real-time PCR and Western blotting.

Results: HSA increased intracellular ROS production after HSA incubation. The biomarkers of ER stress (GRP78 and CHOP) were increased after HSA treatment. The inhibitor of ROS production (NAC) attenuated the HSA-induced increase in the biomarkers of ER stress. The expression of integrin- β 3 mRNA was increased after HSA incubation. The inhibitor of ER stress (4-PBA) attenuated the HSA-induced increase in the expression of integrin- β 3 mRNA. The expression of integrin- β 3 protein was increased after HSA incubation. The inhibitor of ER stress (4-PBA) attenuated the HSA-induced increase in the expression of integrin- β 3 protein.

Conclusion: Albumin overload up-regulates the expression of integrin- β 3 mRNA and protein through ROS-ER stress pathway. The results demonstrate that proteinuria self causes progression of glomerulosclerosis through the increase in integrin- β 3 expression.

Keywords: podocyte, proteinuria, integrin- β 3, ER stress

鈎端螺旋體菌感染的小鼠巨噬細胞及腎轉錄組譜:探討感染對慢性腎病的影響
Transcriptome Analysis of Murine Macrophages and Kidneys upon Leptospiral Infection: Implications for Chronic Kidney Diseases

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Background.

Leptospirosis, an infectious disease caused by pathogenic *Leptospira* spp., is now facing the re-emergence and an increased incidence of public health problems in recent years. It leads to kidney damage that may progress to chronic kidney disease. However, how leptospiral infections-induced renal damage is unclear.

Methods. We apply microarray and RNA-seq technologies to investigate the first murine transcriptome-wide, leptospire-mediated changes in renal gene expression to identify biological pathways associated with kidney damage. We also used whole transcriptome analysis to determine the genome-wide gene expression analysis of bone marrow-derived macrophages infected with pathogenic or non-pathogenic *Leptospira* spp..

Results. Leptospiral genes were detected in renal transcriptomes of mice infected with *Leptospira interrogans* at day 28 post-infection, suggesting colonization of leptospire within the kidney with propensity of chronicity. Comparative differential gene expression and pathway analysis were investigated in renal transcriptomes of mice infected with pathogens and non-pathogens. Pathways analysis showed that Toll-like receptor signaling, complements activation, T-helper 1 type immune response and T cell mediated immunity were strongly associated with progressive tubulointerstitial damage caused by pathogenic leptospiral infection. Further studies were investigated the responses of bone marrow-derived macrophages infected with pathogenic or non-pathogenic *Leptospira* spp.. The differentially expressed genes were examined using KEGG pathway for the search of biological processes ($P < 1E-5$). A total of 66 and 195 functionally enriched KEGG pathways were identified in macrophages infected with pathogenic and non-pathogenic *Leptospira* spp., respectively.

Conclusions. It would provide valuable resources to explore functional studies of chronic renal damage caused by leptospiral infection.

Keywords: leptospirosis, macrophages, renal transcriptome, chronic kidney diseases.

維生素D3透過負向調控 β -catenin訊號路徑

抑制硫酸吲哚酚所誘發HK-2人類腎小管細胞上皮細胞間質化

Calcitriol Attenuates Indoxyl Sulfate-Induced Epithelial-Mesenchymal Transition By Down-Regulation of β -catenin signaling Pathway in HK-2 Human Proximal Tubular Cells

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In addition to the traditional role in maintenance of electrolyte balance and skeletal function, calcitriol exerts pleotropic role on kidney, heart, and immune system. Moreover, its anti-inflammatory, antiapoptotic, as well as antifibrotic effects have gained considerable attention. The aim of present study is to explore the effect of calcitriol on indoxyl sulfate mediated epithelial-mesenchymal transition in cultured HK-2 human renal tubular epithelial cells.

HK-2 cells were incubated with indoxyl sulfate for 24 hours in the presence of different concentrations of calcitriol, and cell viability was measured by MTT assay. The protein expression of α -smooth muscle actin (α -SMA), E-cadherin, fibronectin, β -catenin, PARP, and β -actin was determined by Western blotting.

Indoxyl sulfate treatment decreased cell viability in HK-2 cells; this was reversed by calcitriol pretreatment. Indoxyl sulfate treatment induced an increased protein expression of α -SMA, Fibronectin, N-cadherin, and a decreased protein expression of vitamin D receptor (VDR) and E-cadherin, which was reversed by calcitriol in a dose-dependent manner as well. Furthermore, calcitriol inhibited indoxyl sulfate-induced the nuclear accumulation of β -catenin by reduction of β -catenin phosphorylated at serine 552. Compared to non-targeting control siRNA group, transfect β -catenin siRNA group induced a decreased protein expression of α -SMA, Fibronectin, and an increased protein expression of E-cadherin.

In conclusion, we demonstrated calcitriol reversed indoxyl sulfate-induced epithelial-mesenchymal transition via down-regulation of β -catenin signaling pathway.

海藻糖攝入對多囊腎自噬作用與囊泡發生之研究**Effect of Trehalose Ingestion on Autophagy Activity and Cystogenesis in Polycystic Kidney Disease**

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Autophagy impairment has been linked to the pathogenesis of autosomal dominant polycystic kidney disease (ADPKD), suggesting a potential new target of treatment. Trehalose is a natural non-reducing disaccharide that has been shown to enhance autophagy activities. Therefore, we investigated whether trehalose treatment may reduce renal cyst formation in a *Pkd1*-hypomorphic mouse model. *Pkd1* miRNA transgenic mice were given 2% trehalose in drinking water from postnatal day 35 to day 91. The control groups received 2% sucrose or pure water. Trehalose did not reduce the relative kidney weights and plasma urea nitrogen or cystatin C levels in *Pkd1* miR TG mice. Histological analysis revealed no significant differences between trehalose, sucrose or water treated groups in renal cyst index, fibrosis score, and proliferative score. We found that *Pkd1* miR TG mice have a significantly lower renal mRNA expression of autophagy-related genes including *atg5*, *atg12*, *ULK1*, *beclin1*, and *p62* compared to wild-type control mice. The immunohistochemistry staining of kidney sections showed that the cystic lining cells have strong positive staining for p62 protein, indicating impaired autophagy degradation. However, trehalose treatment did not improve the reduced autophagy activities in the kidneys. Our data demonstrate that adding trehalose in the drinking water does not modulate the autophagy activities and renal cystogenesis in *Pkd1*-deficient mice. The results suggest that an oral supplement of trehalose may not affect the disease progression of ADPKD.

Keywords: autophagy, trehalose, polycystic kidney disease

活性氧物質在肥胖腎纖維化與代謝性內毒血症誘發的訊號路徑作為治療標靶
Therapeutic Targeting of ROS Triggered Signalling Pathways in Obese Kidney Fibrosis with Metabolic Endotoxemia

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Background: The focus of World Kidney Day 2017 is ‘kidney disease and obesity’. Obesity is intricately associated with metabolic endotoxemia (ME), reactive oxygen species (ROS), chronic inflammation, and obese kidney fibrosis (OKF). Nonetheless, pathomechanisms and therapeutic targets of OKF remain unelucidated.

Methods: To mimic obese human with ME, high-fat diet-fed (HF) mice were injected with lipopolysaccharide (LPS) as HL group of OKF-ME mouse model. Quantitative comparison of immunohistochemistry (IHC) stains and morphometric approach were analyzed for fibrosis, inflammation, and oxidative injury in the tubulointerstitium of HF, HL, and inhibitor-treated groups.

Results: HL group exhibited the most prominent OKF, lymphocyte infiltration and tubular epithelial vacuoles than basal and HF groups. Further, inhibitors of nonspecific ROS (N-acetyl-L-Cysteine, NAC), cytosolic phospholipases A2 (cPLA2), and cyclooxygenase-2 (COX-2) ameliorated the severity of OKF and lymphocyte infiltration. Notably, NAC-treated group ameliorated not only oxidative injury but also expressions of cPLA2 and COX-2, indicating that ROS acts as the upstream signal in the inflammatory cascade of OKF.

Conclusions: Nonspecific ROS acts as key messenger in signaling transduction of OKF, activating downstream cPLA2 and COX-2. Given NAC ameliorates OKF resulting from combined HF diet and LPS, nonspecific antioxidants could serve as potential therapeutic strategies of OKF with ME.

Key words: ROS, metabolic endotoxemia, obese kidney fibrosis

關鍵字：活性氧物質，代謝性內毒血症，肥胖腎纖維化

蛇床子素透過誘導 klotho 表現而削弱高度糖化終產物引發之腎小管細胞過度肥大

Osthole Attenuates Advanced Glycation End Products-Mediated Renal Tubular Hypertrophy via Induction of Klotho Expression

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Background: Osthole has been widely reported to have pharmacological activities such as anti-cancer, anti-inflammation and anti-hyperlipidemic effects. Klotho was identified as an anti-senescence protein in a variety of tissues. Loss of klotho has been associated with chronic kidney disease. However, potential roles and molecular events for osthole and klotho in diabetic nephropathy remain unclear. In the current study, we undertook to study the effect of osthole on klotho expression in advanced glycation end products (AGE)-cultured human renal proximal tubular cells, and to investigate the molecular mechanisms of osthole and exogenous klotho against AGE-induced renal tubular hypertrophy.

Methods: Cell viability was elucidated by MTT assay. Protein expression was measured by Western blotting. mRNA level was analyzed by real-time PCR. Cellular hypertrophy growth was evaluated by hypertrophy index. Relative cell size was detected by flow cytometry.

Results: We found that raising the ambient AGE concentration causes a dose-dependent decrease in klotho synthesis (Fig. 1). Osthole significantly increased AGE-inhibited klotho mRNA and protein expression (Fig. 2). Osthole and exogenous klotho treatments significantly attenuated AGE-induced Janus kinase 2 (JAK2)-signal transducers and activators of transcription 1 (STAT1) and STAT3 activation (Fig. 3). Moreover, protein levels of suppressor of cytokine signaling 1 (SOCS1) and SOCS3 were augmented by osthole and exogenous klotho (Fig. 4). The abilities of osthole and exogenous klotho to reverse AGE-induced cellular hypertrophy were verified by the observation that osthole and exogenous klotho inhibited cell size (Fig. 5).

Conclusion: We found that osthole attenuated AGE-induced renal tubular hypertrophy via induction of klotho expression and suppression of the JAK2-STAT1/STAT3 signaling. These results also showed that klotho might be used as a unique molecular target for the treatment of diabetic nephropathy.

Key word: advanced glycation end products; hypertrophy; Janus kinase; klotho; osthole; renal tubular cells; signal transducers and activators of transcription.

MST3 (mammalian Ste20-like protein kinase 3), 在自發性高血壓鼠一個調控腎臟離子平衡及高血壓的新基因**MST3 (mammalian Ste20-like protein kinase 3), A New Gene Involved in Ion Homeostasis and Renal Regulation of Hypertension in Spontaneous Hypertensive Rats**

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Background: Defective renal salt and water excretion, together with increased salt intake, frequently contributes to hypertension. Recent studies indicate that Ste20 family kinases, such as proline-alanine-rich Ste20-related kinase (SPAK) and oxidative stress-response protein 1 (OSR1), are regulators of cell volume, ion transport, and hypertension. The aim of this study was to investigate whether mammalian Ste20-like protein kinase 3 (MST3), which is also a stress-regulated kinase, is involved in the development of hypertension. MST3 expression was compared in Wistar-Kyoto (WKY) and spontaneously hypertensive rat (SHR) kidneys.

Material and Methods: The experiments were conducted on male SHR of the indicated ages. Aged-matched male Wistar-Kyoto rats (WKY) served as controls. To assess the effect of high-salt (HS) diet on renal MST3 expression, eight-week-old C57Bl/6 male mice were provided with access to food and water *ad libitum* and were fed either HS diet (8% NaCl chow and tap water to drink, referred to herein as HS) or standard diet (0.49% NaCl chow and tap water to drink, referred to herein as control) for 4 weeks.

Results: MST3 expression was markedly reduced in principal cells of the collecting ducts from the renal inner medulla of SHR (Fig.1). The downregulation of MST3 expression was observed before and after the onset of hypertension in SHR. (Fig.2) Mice fed HS diets exhibited a significant increase in MST3 protein level. (Fig.3)

Conclusion: This study reporting that MST3, a Ste20-like kinase, exerts a conserved regulatory role in sodium homeostasis after HS diet and in the development of hypertension.

Key words: Spontaneously hypertensive rat (SHR), MST3, Na channel, high salt diet

MAGE-D2 透過伴隨蛋白依靠性內質網相關蛋白降解調節鈉氯離子通道 MAGE-D2 Regulated Na-Cl Cotransporter through Chaperon-dependent ERAD

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Background: Mutation in MAGE-D2 gene, located in X-chromosome, was reported to associate with transient antenatal Battered's syndrome with severe polyhydramnios. Reduced Na-K-2Cl cotransporter 2 (NKCC2) and Na-Cl cotransporter (NCC) were observed in the renal tubules of affected male patients.

Method: To explore the role of mutant MAGE-D2 in the kidney, we created mutant Mage-d2 knock-in (KI) mice and checked the possible molecular mechanisms in vitro. **Results:** Three strains of disease-mutant Mage-d2 (c274dupA, Y346X and A495G) KI mice were generated and only female A495G/+ mice could be produced from chimera mouse. By sonography, some embryos with polyhydramnios were found in A495G/+ female mice at E15.5D. Compare with the WT embryos, more amniotic fluid amount in male A495G/+ embryos but no significant difference of amniotic fluid amount in female A495G/+ embryos was observed. The osmolarity of the amniotic fluid was no significant difference between female or male WT and A495G/+ embryos. When the different types of Mage-d2 cDNA [WT, c274dupA (truncated protein), Y346X (truncated protein) and A495G (missense full-length protein)] was transfected into the HEK293 cells, Y346X and A495G Mage-d2 showed interruption of the cell cycles in the G2/M phase and reduction of the abundance of NCC. Immunoprecipitation study revealed NCC could interact with WT and A495G Mage-D2 instead of truncated c274dupA and Y346X Mage-D2 proteins. Y346X and A495G Mage-d2 also reduce the expression of HSP40, HSP90 and CHIP.

Conclusion: These chaperon proteins were reported to form a complex and play a role in the ER-associated degradation (ERAD) of the NCC. These results suggested that Mage-D2 might affect the cell cycles of renal cells and the NCC expression through regulating ERAD chaperon proteins.

Key words: MAGE-D2, NCC, ERAD

關鍵字: MAGE-D2, 鈉氯離子通道, 內質網相關蛋白降解調

吉特曼疾病之尿液胞外泌體的蛋白質體研究**Proteomic Analysis of Urinary Exosomes in Patients with Gitelman Syndrome**

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Background: Gitelman syndrome (GS) are hereditary salt-losing tubulopathies resulting from defects of sodium-chloride cotransporter (NCC). Urinary exosome analysis of NCC by western blotting has been evaluated. However, the urine exosomal protein alterations in patients with GS remains unclear.

Purpose: Our purpose to examine urine exosomal protein alterations in patients with GS.

Methods: Urinary exosomes were further isolated by ultracentrifugation method. We applied isotopic demethylation labeling coupled with liquid chromatography-tandem mass spectrometry (LC-MS/MS) with CID to discover urinary exosomal target proteins in patients with GS (n=10) compared to health controls (n=10).

Results: We identified a total of 253 nonredundant proteins that were based on at least two distinct tryptic peptides. Of these, 241 proteins were quantified. Specifically, 90 proteins showed an altered pattern ($\text{Log}_2|\text{GS}/\text{Control}| \geq 1$) in patients with GS including 50 upregulated proteins and 40 down-regulated protein. Renin-angiotensin system was the shared KEGG pathway/biological process in the upregulated differentially genes that compatible with the clinical presentation in GS patients with salt-losing tubulopathy and volume depletion. NCC has been identified in urinary exosome from health control but not from patients with GS that was consistent with the finding of NCC mutation in GS. Of interest, there is no significant change in specific exosome markers in CD9, CD81, phosphoglycerate kinase 1 (PGK1), L-lactate dehydrogenase A chain (LDHA), and Alpha-enolase (ENOA) that could be used as an internal control.

Conclusion: The identified proteins constitute potential targets for understanding the signal pathway or pathogenesis in in patients with GS. Further target protein needs to be validated in the future.

Keywords: Gitelman syndrome (吉特曼疾病), proteomics (蛋白質體), urinary exosomes (尿液胞外泌體)

製作與功能分析 KLHL3 基因中 kelch 結構域突變所引起的第 II 型假性醛固酮小鼠模型

Generation and Analysis of a Mouse Model of Pseudohypoaldosteronism Type II Caused by KLHL3 Mutation in Kelch Domain

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Background

Mutations in Kelch-like 3 (KLHL3) are among the most common causative genes detected in patients with pseudohypoaldosteronism type II (PHAII). However, the molecular mechanisms by which kelch repeat domain of KLHL3 cause PHAII have not been fully investigated *in vivo*.

Methods

We generated and analyzed mutant Klhl3 knock-in (KI) mice carrying a nonsense W523X mutation in the kelch repeat domain (corresponding to human KLHL3 W470X mutation). The pathogenesis of PHAII regulated by KLHL3 kelch repeat domain were further evaluated by western blot, immunofluorescence, and co-immunoprecipitation (co-IP).

Results

Both heterozygous and homozygous Klhl3^{W523X/+} KI mice exhibited a significantly elevated systolic blood pressure ($p < 0.05$), secondary hyporeninemia ($p < 0.05$), a higher serum potassium level (K^+) ($p < 0.05$) with decreased fractional excretion of K^+ (FEK; $p < 0.05$) and a higher serum chloride level but lower bicarbonate level ($p < 0.05$). Their kidney tissues showed decreased levels of KLHL3 protein and Cullin3 protein along with an enhanced downstream WNK1/4-SPAK/OSR1-N(K)CC phosphorylation. *In vitro*, co-IP demonstrated human KLHL3 harboring the PHAII-causing W470X mutation resulted in a decreased total KLHL3 expression along with truncated KLHL3 protein, leading to impaired binding affinity of KLHL3 to WNK1/4.

Conclusions

Klhl3^{W523X/+} KI mice feature typical PHAII with a simultaneous increase of WNK1 and WNK4 through impaired binding of the KLHL3 kelch domain to WNKs. However, additional studies are needed to elucidate the *in vivo* effect of KLHL3 kelch domain mutation on Cullin3 expression.

在末期腎臟病患所發生老化相關免疫變化的惡化與發炎及心血管疾病相關：
iESRD研究的初步發現

Aggravated Aging-Related Immune Changes Are Associated with Inflammation and Cardiovascular Diseases in ESRD Patients: Baseline Findings from the iESRD Study

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Background: Patients with end-stage renal disease (ESRD) exhibit accelerated aging of the immune system and increased risk for cardiovascular diseases, but the overall contribution of "immune system aging", or "immunosenescence" to cardiovascular disease is not clear.

Methods: We performed a comprehensive lymphocyte and monocyte immunophenotyping in 412 ESRD patients on maintenance hemodialysis and age-matched 57 healthy individuals. Peripheral bloods were sampled before hemodialysis session and processed immediately for mononuclear cell isolation and staining. Using multicolor flow cytometry, lymphocytes were separated into subpopulations including naive T cells (CCR7+CD45RA+, T_{Naive}), central memory (CCR7+CD45RA-, T_{CM}), effector memory (CCR7-CD45RA-, T_{EM}), terminally differentiated (CCR7- CD45RA+, T_{EMRA}) and memory stem cells (naive cells with high CD28 and CD95, T_{SCM}). Monocytes were separated into classical (CD14++CD16-), intermediate (CD14++CD16+) and non-classical monocytes (CD14+CD16+).

Results: Compared to healthy individuals, ESRD patients showed decreased levels of naive CD4+ and CD8+ T cells, increased levels of terminally differentiated T_{EMRA} cells and intermediate monocytes (CD14++CD16+), and these changes not only significantly correlated with age but also enhanced by increasing dialysis vintage. Lymphocyte and monocyte aging also correlated with other established cardiovascular risk factors, including hemoglobin and high-sensitivity C-reactive protein. In multivariate-adjusted logistic regression models, a high terminally differentiated CD8+ T_{EMRA} cell level in combination with a high intermediate monocyte level was independently associated with the existence of coronary artery disease (OR=2.29, 95% CI=1.2~4.5, p=0.016) as well as cardiovascular diseases including stroke and peripheral arterial occlusive disease (OR=2.32, 95% CI=1.2~4.4, p=0.008).

Conclusion: Aging-related changes in the immune system are significantly aggravated in ESRD. Cardiovascular disease burden in the ESRD population might be enhanced by the presence of accelerated aging-related immune changes.

Keywords: immunosenescence, ESRD

關鍵字: 免疫老化、末期腎臟病

尿毒素硫酸吲哚酚對骨髓間質幹細胞於骨生成的影響**The Effect of Uremic Toxin Indoxyl Sulfate on Osteogenesis in Bone Marrow Mesenchymal Stem Cells**

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Background: Renal osteodystrophy is a serious health concern for patients with chronic kidney disease (CKD). In vivo studies have demonstrated that IS inhibits bone formation. However, few in vitro studies evaluated osteogenic differentiation using a non-cytotoxic concentrations of IS in bone marrow-derived mesenchymal stem cells (BMSCs).

Methods: D1 cells are mouse BMSCs and were used for this study. MTT assay and lactate dehydrogenase assay were used to search the non-cytotoxic concentrations of IS. The effect of IS on osteogenic differentiation of D1 cells was evaluated by osteogenic gene expression using quantitative real-time polymerase chain reaction and mineralization using alizarin red S staining.

Results: The results of IS affecting D1 cells viability showed that IS at concentrations of 100 to 400, 75 to 400, and 75 to 400 μM significantly decreased MTT activity ($P < 0.05$, $P < 0.01$, and $P < 0.05$, respectively), respectively. IS at concentrations of 25 and 50 μM , which did not affect the viability of D1 cells during proliferation, reduced osteogenic differentiation without influencing cell quantity at 7 and 10 d ($P < 0.01$) after osteogenic induction. In mechanistic studies, IS at concentrations of 50 to 200 μM ($P < 0.05$) downregulated *BMP-2* expression during the early stages of osteogenic differentiation, and IS at concentrations of 25 to 200 μM ($P < 0.01$) downregulated *ALP* and *OC* expression during the late stages of osteogenic differentiation.

Conclusions: In summary, IS of 25 to 50 μM reduced osteogenic differentiation of BMSCs without influencing cell viability. The effective concentrations of IS found in this study are at the average serum concentrations of IS in patients with CKD. From this finding, we suggest that IS is a crucial factor contributing to low bone turnover in patients with CKD.

瑞香草醌抑制腎臟癌細胞之細胞轉移透過 Src 及 Phosphatidylinositol 3-Kinase-Akt 訊息路徑

Antimetastatic Potentials of Thymoquinone on Renal Carcinoma Cells Targeting the Src and the Phosphatidylinositol 3-Kinase-Akt Pathway

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Abstract

Renal carcinoma cell metastasis is the most important cause of patient death and various therapeutic strategies have targeted on preventing the occurrence of metastasis. Thymoquinone (TQ), an active component of *Nigella sativa* or black cumin, has several proven biological activities including anti-inflammation and anti-tumor. However, the anti-metastasis effects of TQ on renal carcinoma cell remain unclear. Here, we provided molecular evidence associated with the anti-invasiveness effects of TQ by showing a marked inhibition on the invasion and migration of renal cancer 786-O SI3 cells. To further investigate the precise involvement of TQ in cancer metastasis, 786-O SI3 cells were treated with TQ at various concentrations and results from zymography and western blotting showed that a TQ treatment may reduce the expressions of matrix metalloproteinase-2 and urokinase plasminogen activator. TQ also exerted an inhibitory effect on the protein expression of p-Src, phosphatidylinositol 3-kinase and p-Akt. TQ effectively reduced the formation of lung metastases by tail vein injection mice model. In summary, these findings provide new insights into the molecular mechanisms involved in the anti-metastatic effect of TQ and are thus valuable in the treatment of metastatic renal carcinoma cell.

Keywords: thymoquinone, invasion, metastasis, matrix metalloproteinase-2, renal carcinoma cell

腎臟幹細胞與去細胞腎臟骨架之工程再造腎臟**Bioengineering Kidney with Decellularized Kidney Scaffold and Renal Progenitor cells**

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Approximately 7,000 individuals in Taiwan currently await for kidney transplantation. The creation of a transplantable graft to permanently replace kidney function would overcome the shortage of donor organ and the morbidity associated with immunosuppression. We decellularized rat kidneys by detergent perfusion, yielding acellular scaffolds with preserved vascular, ureter, cortical and medullary architecture. To create a functional organ, we seeded tubular epithelial cells and mouse kidney progenitor cells via ureter and seeded endothelial cells and mouse kidney progenitor cells via renal artery. The cells-seeded constructs were cultured in a home-made whole organ-bioreactor. After 3 months of organ culture, the seeded cells formed renal tubules, grew in the glomeruli and part of the mouse kidney progenitor cells also scattered in the interstitium. There was part of the renal scaffold that does not occupy with any cells. We tested the bioengineered kidney function with standardized perfusate in vitro. The bioengineered kidney could not only produce urine but also reabsorb albumin, glucose and calcium. However, the recipient rat died while receiving orthotopic kidney transplant with the bioengineered kidney. Future work will focus on how to enhance the growth of seeded cells and the practice of orthotopic kidney transplant to make a functional bioengineering kidney and perform a successful kidney transplant in rodent.

Keywords: 腎臟幹細胞、腎臟骨架、腎臟再造

Renal progenitor cell、Kidney scaffold、Renal bioengineering

薑辣素對人類腎癌細胞的細胞毒殺作用及其可能機轉的探討**Cytotoxicity Effect of 6-Gingerol and Its Possible Mechanism on Human Renal Cancer Cells**王偉傑^{1,2} 翁清松¹W-J. Wang^{1,2}, C-S. Weng¹¹衛生福利部桃園醫院 腎臟科 ²中原大學 生物醫學工程研究所

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6-Gingerol, a major pungent component of fresh ginger (*Zingiber officinale* Roscoe, Zingiberaceae). It is known to exhibit a variety of biological activities including anticancer, anti-inflammation, and anti-oxidation. 6-Gingerol has been found to possess anticancer activities via its effect on a variety of biological pathways involved in apoptosis, cell cycle regulation, cytotoxic activity, and inhibition of angiogenesis. However, the metabolic fate of 6-Gingerol and the contribution of its metabolites to the observed activities are still unclear. In the present study, we investigated the biotransformation of 6-gingerol in renal cell carcinoma cell line Caki-1 (metastatic renal cancer cell derived from skin). We also compared the 6-Gingerol cytotoxic effects in human non-small cell lung cancer cells NCI-H1299, and determined the IC₅₀ of the 6-Gingerol on proliferation of these two human cancer cells by MTT assay. To check the apoptotic pathways, we detected the BCL-2 (survival factor) and Bax (death factor) by western blotting. We assessed the 6-Gingerol cell killing status with Annexin V/PI apoptosis staining by flow cytometry and fluorescence microscopy. Our results show that 6-gingerol is more cytotoxic in NCI-H1299 human lung cancer cells (IC₅₀= 79.35 μM) than Caki-1 human renal cancer cells (IC₅₀= 313.62 μM). 6-Gingerol induces mitochondrial apoptosis through suppressing BCL-2 and up-regulating Bax proteins expression in Caki-1 after 48 hours. The percentage of necrotic, early and late apoptotic cells are most promising in 300 μM 6-Gingerol in Annexin V/PI apoptosis staining analysis in Caki-1. The above-mentioned mechanisms of ginger seem to be promising for cancer prevention. Thus, due to its efficacy and regulation of multiple targets, as well as its safety for human use, 6-gingerol has received considerable interest as a potential therapeutic agent for the prevention and/or treatment of cancer. However, further clinical studies are warranted to assess the efficacy and safety of ginger.

活化轉錄因子3藉由 ChREBP-SCD1途徑增強脂肪分解和白脂褐變來抑制肥胖 ATF3 Inhibited Obesity by Enhancing Lipolysis and White Fat Reprogram Browning via ChREBP–SCD1 Pathway

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Background: Obesity-induced metabolic syndrome is a worldwide disease and promoting lipolysis or browning of white adipose tissue may be a potential strategy for obesity therapy. ATF3 are found to has lower expression level in obese patients than normal groups.

Methods: High-fat diet given to mice with genetic deletion of ATF3 (ATF3^{-/-}) increased body weight, insulin resistance, and hepatic steatosis. Such metabolic dysregulation was abrogated by restoring ATF3 expression by use of an adeno-associated virus mediated vector in ATF3^{-/-} mice.

Results: Overexpression of ATF3 in 3T3-L1 adipocytes reduced the expression of adipogenic/lipogenic genes but increased lipolysis and adipocyte browning by suppressing the carbohydrate-responsive element-binding protein and stearoyl-CoA desaturase axis.

Conclusions: Our work identifies ATF3 as an important metabolic regulator and developing ATF3 inducer may be a promising therapeutic drug for treating obesity and related metabolic disorders.

Key words: ATF3, obesity, lipolysis, beige fat

關鍵字：ATF3，肥胖，脂肪分解，米色脂肪

NLRP3 基因剔除可降低血管鈣化**NLRP3 Deficiency Attenuates Vascular Calcification**

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Background: Vascular calcification in chronic kidney disease patient is attributed to osteogenic phenotypic change of vascular smooth muscle cells (VSMCs) and vascular inflammation. However, whether the activation of NOD-like receptor family pyrin domain-containing 3 (NLRP3) inflammasome contributes to this process is still unknown. We investigated whether NLRP3 deficiency would attenuate vascular calcification in this study.

Methods: Wild type and *Nlrp3*^{-/-} mice were subjected to vitamin D (cholecalciferol) overload to induce aortic calcification. VSMCs *in vitro* were treated with high concentration of inorganic phosphorus (high Pi) to induce osteogenic phenotypic change. Vascular calcification was visualized by von Kossa stain. The expression of osteogenic markers and the activities of NLRP3 inflammasome were analyzed using RT-PCR and immunoblotting.

Results: High levels of caspase-1 and IL-1 β were detected in the calcifying aorta derived from vitamin D overload mice and in the high-Pi-treated VSMCs, suggesting an activation of NLRP3 inflammasome during the calcification processes. NLRP3 deficiency did not diminish serum calcium and phosphate levels, whereas it attenuated aortic calcification in the vitamin-D-treated mice through down-regulating osteogenic gene expressions.

Conclusions: Activation of NLRP3 inflammasome contributes to osteogenic phenotypic change *in vitro* and vascular calcification *in vivo*. Whether such mechanisms are critical in vascular calcification of chronic kidney disease patients deserves further investigations.

[Clinical]

C001

鈎端螺旋體造成急性腎衰竭的長期預後

Long-term Outcomes After Leptospirosis Induced Acute Kidney Injury

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Background: Acute kidney injury (AKI) is a common complication of leptospirosis infection. The aim of this study was to elucidate the long-term outcomes of adult patients who survived after leptospirosis.

Materials and Methods: The study analyzed datasets from Taiwan's National Health Insurance Research Database. The data of 2145 patients who survived after leptospirosis between January 1, 2003, and December 31, 2013, were analyzed. Characteristics and outcomes were compared according to the AKI or not to evaluate the impact of AKI on long-term mortality and major adverse kidney events.

Results: Of the 2145 patients, 26.0% had AKI and 3.5% received renal replacement therapy(RRT). Compared between the non-AKI, AKI and AKI-RRT, those with RRT had highest rates of all-cause mortality (22% vs 12.6% vs. 7.0%) and, advanced chronic kidney disease (0% vs. 1.09% vs 6.49%) respectively, demonstrating a significant trend ($P < 0.001$).

Conclusion: Patients with AKI is associated with an increased risk of long-term mortality and major adverse kidney events in adult patients with leptospirosis.

Keywords: Leptospirosis, acute kidney injury

關鍵字：鈎端螺旋體感染，急性腎損傷

使用葉克膜患者接受連續性腎臟替代療法的預後分析**Outcome analysis in patients using extracorporeal membrane oxygenation and continuous renal replacement therapy**

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Background

No study has specifically investigated the outcome of patients receiving both continuous renal replacement therapy (CRRT) and extracorporeal membrane oxygenation (ECMO) support.

Materials and Methods

A retrospective population-based cohort study using Taiwan National Health Insurance Research Database data collected between January 1, 2007 and December 31, 2013. Patients who received ECMO and CRRT during the study period were included. We divided the patients into three groups based on the duration of CRRT received: ≤ 3 days, 4–6 days, and ≥ 7 days. The outcome were all-cause mortality, end stage renal disease, ventilator dependency, and readmission rate

Results

The CRRT ≤ 3 days group has highest in-hospital mortality and are more likely receive ECMO for cardiogenic causes, while those using CRRT ≥ 7 days had better in-hospital survival and more frequently receive ECMO for respiratory cause. The overall survival after discharge did differ significantly among the three CRRT groups. The patients who received CRRT ≥ 7 days had a higher risk of ESRD than did those who received CRRT ≤ 3 days (adjusted hazard ratio [aHR] 3.46, 95% confidence interval [CI] 1.47–8.14) and between 4 and 6 days (aHR 3.10, 95% CI 1.03–9.29). Those using CRRT ≥ 7 days also had more long-term ventilator dependency and re-admission.

Conclusions

Our study found similar long-term survival but increased long-term ESRD and ventilator dependency among the ECMO patients who underwent CRRT for 7 days or more.

整合分析:尿中 Calprotectin 應用在鑑別診斷急性腎損傷病因

Meta-analysis: Urinary calprotectin for the distinction between prerenal and intrinsic acute kidney injury

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Background: The etiology of acute kidney injury are most commonly classified to prerenal, intrinsic (intrarenal) or post renal kidney injury. To date, many studies revealed neutrophil gelatinase-associated lipocalin (NGAL) showed promised result in early diagnosis , making distinguish between prerenal and intrinsic kidney injury. Urinary calprotectin had been studied and showed similar characteristic to NGAL of making distinction between different acute kidney injury etiology. Therefore, we conducted a meta-analysis for accessing the diagnostic accuracy of urine calprotectin in making distinguish between pre-renal and intrinsic kidney injury.

Method: We performed a systematically review of published data in accordance with PRISMA guideline. A computerized search of electronic databases: Pubmed, Embase

Result: The online research yielded 6 article met criteria for inclusion in our study . The pooled sensitivity and specificity of urine calprotectin for distinguish between prerenal and intrinsic AKI were 0.90 (95% confidence interval (CI): 0.87–0.93) and 0.93 (95% CI: 0.88– 0.96), respectively. The pooled positive LR was 15.15 (95% CI: 4.45–51.55) and negative LR was 0.11 (95% CI: 0.06–0.20). The SROC with diagnostic accuracy :0.9667.

Conclusion: Our study demonstrated that urinary calprotectin had good diagnostic accuracy in distinction between prerenal and intrinsic kidney injury.

Key words: Calprotectin, AKI etiology

關鍵字:急性腎衰竭病因

新生兒先天性心臟病術後發生急性腎損傷之危險因子及預後

Risk Factors and Prognosis of Acute Kidney Injury in Neonates Receiving Congenital Heart Surgery

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Background: Acute kidney injury (AKI) is associated with increased morbidity and mortality in hospitalized adults and children. Post-cardiac surgery AKI is common, while few studies focused on neonatal population. We aim to identify the incidence and the risk factors of AKI in neonates after congenital heart surgery, as well as the impact on long-term outcome.

Methods: We enrolled 251 neonates retrospectively who received congenital heart surgery during year 2012-2016. AKI was defined based on the Neonatal AKI KDIGO classification. Statistical analyses were performed to detect factors and outcomes associated with postoperative AKI.

Results: AKI occurred in 108 neonates (43.0%) after surgery for congenital heart diseases. Longer cardiopulmonary bypass time and lower preoperative serum creatinine level were independent risk factors for developing AKI. There was also a trend of higher Risk Adjusted classification for Congenital Heart Surgery (RACHS-1) categorical score associating with AKI. In neonates receiving cardiac surgery, in-hospital and 2-year mortality rate were both significantly higher in those with AKI compared to those without AKI (21.3% vs 9.1% and 24.1% vs 9.1% respectively, both $p < 0.01$).

Conclusions: Postoperative AKI is common among neonates receiving congenital heart surgery, and it predicts poor clinical outcome independently. Identifying modifiable risk factors for neonatal AKI after cardiac surgery is crucial in future studies.

Key words: Neonatal AKI, congenital heart surgery

關鍵字: 新生兒急性腎損傷, 先天性心臟病手術

連續性腎臟替代療法可提供加護病房中急性腎傷害需透析病患較佳之長期預後 CRRT Provides Better Overall Survival and Renal Survival for AKI-D Patients in ICU

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Background: Previous systemic review and meta-analysis studies showed that CRRT may result into better renal outcome but no significant benefits on patient survival. Which kind of RRT serves best modality for AKI patients in ICU remained an unresolved issue.

Methods: We retrieved data from Taiwan National Health Insurance (NHI) Research Database. All the ICUs in Taiwan were included in NHI program. We used ICD-9 codes to determine comorbidities, diagnosis at admission and discharge. Specific codes in NHI program corresponding to different procedures were used to define initiation of acute RRTs and the RRT modalities. Analysis of variance (ANOVA) was used and $P < 0.05$ was defined as statistically significant.

Results: The total number of patients who received first-time RRT in ICU between 2000 and 2015 was 87,378 (IHD 74,192, IHD+CRRT 8,786 and CRRT 4,310). Adjusted hazard ratio (aHR) of mortality at 1-year were significantly higher in CRRT group and IHD+CRRT group, in comparison with IHD group. Outcomes of patients who survived for more than 30 days after ICU discharge were further analyzed. Adjusted hazard ratio of mortality at 1-year was lowest in CRRT group (aHR 0.87(0.80-0.95), IHD group as reference, $p = 0.0024$). Risk of long-term chronic dialysis were significantly lower in CRRT group and IHD+CRRT group (aHR IHD: reference, CRRT 0.37(0.32-0.44), $p < 0.0001$, IHD+CRRT 0.33(0.30-0.37), $p < 0.0001$).

Conclusion: At subgroup analysis of survivors, CRRT group had lower risk of mortality at 1-year follow-up. CRRT and IHD+CRRT groups had better renal outcome at 1-year follow-up. Given the lack of large-scale randomized controlled trials (RCT) comparing use of different RRT modalities in AKI patient in ICU, the present study provides real world evidence (RWE) of clinical benefits of CRRT for AKI patients with critical illness.

Key words: acute kidney injury; renal replacement therapy; intensive care unit; intermittent; hemodialysis; continuous veno-venous hemofiltration; continuous veno-venous hemodiafiltration; mortality; survival

關鍵字: 急性腎損傷、腎臟替代療法、加護病房、間歇性、血液透析、連續性全靜脈血液過濾術、連續性全靜脈血液過濾透析術、死亡率、存活率

國家腎臟切片登錄系統—追蹤報告

Distribution of glomerular disease in Taiwan- follow up report from National Renal Biopsy Registry-publication on behalf of Taiwan Society of Nephrology

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Introduction: Despite the development of biomarkers and noninvasive imaging tools, biopsy remains the only method for correctly diagnosing patients with unexplained hematuria, proteinuria and renal failure. Renal biopsy has been performed for several decades in Taiwan; however, a national data registry is still lacking until 2013.

Methods: The Renal Biopsy Registry Committee was established within the Taiwan Society of Nephrology in January 2013. A biopsy registry format, including basic demographic data, baseline clinical features, laboratory data, and clinical and pathological diagnosis was developed. Approval from the local institutional review board was obtained in each participating medical center.

Results: From January 2014 to September 2018, 2782 renal biopsies were identified from 25 medical centers. 52.8% cases were reported in men. After excluding renal transplantation, renal biopsies were commonly performed in patients with primary glomerulonephritis (51.6%), secondary glomerulonephritis (33.9%), followed by tubulointerstitial diseases (9.2%). Among primary glomerulonephritis, IgA nephropathy (30.3%), focal segmental glomerulosclerosis (20.9%), and membranous nephropathy (19.8%) were most frequently diagnosed. Diabetic nephropathy and lupus nephritis were the most common among secondary glomerulonephritis.

Conclusion: IgA nephropathy remained the most common primary glomerulonephritis in this follow-up report. This report from the renal biopsy registry provides valuable epidemiological and clinical data on renal diseases with a histological diagnosis in Taiwan.

第二型糖尿病視網膜病變病人合併免疫性腎絲球腎炎之預測因子

Predictors of Concomitant Immune-mediated Glomerulonephritis in Type 2 Diabetic Patients with Retinopathy

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Background: Diabetic nephropathy (DN) is the most prevalent cause of renal disease in type 2 diabetic patients and is usually diagnosed clinically. Renal biopsy is considered once a concomitant immune-mediated glomerulonephritis (IMGN) is suspected, but there is yet no consensus on the timing of renal biopsy. This study aim to identify markers which can help differentiate between DN and IMGN and guide the decision of renal biopsy.

Methods: We retrospectively reviewed patients with type 2 diabetes who received renal biopsy during 2008 to 2017 in Taipei Veterans General Hospital. Ophthalmologist consultation and outpatient records, diagnosis of renal biopsy, laboratory data and clinical characteristics were collected.

Results: This study enrolled 160 type 2 diabetic patients, among which 112 (70%) had diabetic retinopathy and 48 (30%) hadn't. Among those with retinopathy, 100 (89.29%) had pure DN, and 12 (10.71%) had IMGN superimposed on DN; in patients without retinopathy, 20 (41.67%) had pure DN, 26 (54.17%) had pure IMGN and 2 (4.17%) had IMGN superimposed on DN. Within patients who had retinopathy, those with IMGN superimposed on DN had more urine red blood cells (RBCs) upon urine analysis examination (24.2 vs 6.9/HPF, $P= 0.012$; ROC cut-off value: 5.5/HPF, AUC: 0.743) than pure DN patients, and there was no difference in proteinuria, HbA1c, and duration of diabetes between those two groups.

Conclusions: The sensitivity of retinopathy is high (89.29%) for detecting pure DN in diabetic patients, but the specificity is not (58.33%), meaning that diabetic retinopathy cannot exclude the possibility of coexistent IMGN and DN, in which condition renal biopsy is necessary. Hematuria can help differentiate between pure DN and DN superimposed on IMGN; when diabetic patients presenting with renal disease and retinopathy, renal biopsy is recommended to identify possible IMGN for those urine RBCs are more than 5.5/HPF.

Key words: Diabetic nephropathy, diabetic retinopathy, immune-mediated glomerulonephritis, hematuria

關鍵字：糖尿病腎病變，糖尿病視網膜病變，免疫性腎絲球腎炎，血尿

次世代定序分析成人蛋白尿之基因突變

Analysis of Genetic Mutations of Adult Proteinuria by Next Generation Sequencing

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Background: The disease-causing genes in adult proteinuria patients in Taiwan remains unknown. To study the diverse genetic mutations of proteinuria, we constructed a proteinuria gene panel to examine the disease-causing genes in a total 90 renal biopsy patients in Kaohsiung Medical University Hospital (KMUH).

Methods: We collected a total of 90 non-diabetic adult patients who clinically presented with nephrotic range proteinuria and received kidney biopsy in KMUH. No apparent familial kidney disease was found according to their medical history. The panel containing a total of 20 dominant genes, including ACTN4, ANLN, COL4A3, COL4A4, COL4A5, ARHGAP24, CD2AP, EMP2, GATA3, HNF1B, INF2, LMNA, LMX1B, MAFB, NPFS1, NPFS2, NXF5, PAX2, TRPC6, and WT1. Mitochondria mutation at position m.3243 was also included. Patient's DNA was extracted from blood sample followed by library construction and next generation sequencing via the Fluidigm Access Array and Miniseq. The bioinformatics analysis was performed with CLCbio Biomedical Workbench. The CADD and PolyPhen-2 score were used to predict the function of identified variants.

Results: A total of 11 non-synonymous variants were identified in 6 genes, including ANLN (1), COL4A5 (3), INF2 (3), HNF1B (2), PAX2 (1), and TRPC6 (1). The functional predictions showed 9 out of 11 maybe deleterious by either CADD or polyphen-2 score.

Discussions: Our result showed that genetic mutations may contribute a small but significant proportion in the adult sporadic proteinuria patients with no apparent familial kidney disease. Further functional studies should elucidate their role in the pathogenesis of proteinuria, and studies with a larger cohort should provide the prevalence of genetic mutations in the adult proteinuria population.

Keywords: Nephrotic syndrome, Proteinuria, Next generation sequencing

關鍵字：腎病症候群、蛋白尿、次世代定序

台灣IgA腎病變: 18年回溯研究

IgA Nephropathy in Taiwan: a 18-year Retrospective Study

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Background: The prognosis of patients with IgA nephropathy differences between ethnicity. In Japan, a high percentage of IgA nephropathy entered end stage renal failure. However, the progression of IgA nephropathy remains unclear in Taiwan. To study the disease prognosis, we retrospectively analyzed the renal function and proteinuria in IgA nephropathy biopsy patients performed from 2000 to 2018.

Methods: We collected patients who undergone kidney biopsy with the diagnosis of IgA nephropathy in KMUH from 2000 to 2018. A total of 207 patients were enrolled in our study. Lab data including creatinine, urine protein, urine creatinine, and urine microalbumin were collected and analyzed by Microsoft Excel 2016, SAS 9.4 for Windows.

Results: A totally 207 patients were received kidney biopsy, and patients with follow-up less than 1 year or eGFR less than 15 ml/min/1.73 m² at presentation were excluded. The remaining 148 patients' mean age at the time of diagnosis was 36.3 (±12.2) years. Baseline eGFR was 82.3(±29.3) ml/min/1.73 m² and the slope of eGFR decline was -0.23 (±1.2) ml/min/1.73 m²/year.

Discussions: Our study showed that the average progression IgA nephropathy was mild. Patients with marked proteinuria indicated faster deterioration of renal function. The slope of eGFR declining rate and degree of proteinuria can be a useful tool to predict the outcome of patient's renal function. Our Study provides an insight to the disease progression and gain a better understand of a general prognosis of IgA nephropathy in Taiwan.

Keywords: IgA nephropathy, Renal function, Proteinuria

關鍵字: IgA 腎病變、腎功能、蛋白尿

高齡老人早期慢性腎臟病照護現況與影響腎功能因素探討

The status of CKD care and factors related to kidney function in the elderly

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前言與目的：衛福部健康保險署於 2011 年起開始實施「全民健康保險初期慢性腎臟病醫療給付改善方案」，希望經由醫療團隊提供完整且正確之照護，監測腎功能，提供治療及衛教措施，以預防或延緩腎功能惡化。台灣自 107 年 3 月起 65 歲以上的老年人口占總人口 14.05%，正式邁入高齡社會，老年慢性腎臟病的盛行率本來就高於青壯年，隨著腎功能惡化加上年齡增長，相關併發症、身體失能及死亡率的風險也逐漸上升。故本研究目的在探討加入初期慢性腎臟病醫療給付改善方案之 65 歲以上高齡病人的腎臟病照護現況與分析影響腎功能之因素。

研究方法：本研究為一橫斷式研究調查，篩選自 106 年 1 月 1 日至 107 年 6 月 30 日各門診新加入初期慢性腎臟病醫療給付改善方案的個案共 2685 人，排除 65 歲以下，分析 65 歲以上者共 1548 人。分析資料包括基本資料、生化、尿液檢驗值、共病數及各科收案情形等。

研究結果：本研究共收集 65 歲以上個案 1548 位，其中男性有 720 位 (46.5%)，平均年齡為 75.1 ± 7.4 歲，平均 e-GFR 為 67.7 ± 20.8 ml/min/1.73m²，HbA1C 為 6.9 ± 1.3 ，平均 UACR 186.9 ± 992.3 mg/gm，平均 LDL 90.9 ± 30.7 mg/dl，平均共病數 2.3 ± 0.9 個；收案科別以內分泌科佔 44.3% 最多，心臟內外科佔 35%，腎臟科佔 13.3%。

結論與建議：本研究結果有助於醫療端了解高齡病患初期腎臟病照護現況及影響腎功能的因素。站在慢性病防治的觀點，若能早期篩檢出高風險族群，進而延緩或避免患者進入透析，必然可以減少健保局龐大的醫療支出。

關鍵字：高齡老人(elderly)，早期慢性腎臟病(early CKD)

酮酸胺基酸補充對於末期慢性腎臟病患者腎功能之影響

Effect of Ketoanalogues on renal function in patients with advanced chronic kidney disease

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Abstract :

This study evaluated the effectiveness of α - Ketoanalogues (KA) supplementation on the indicators of patients with chronic kidney disease.

Method :

A total of 51 patients with advanced chronic kidney disease, who started KA supplementation. These cases included chronic kidney disease with diet education (low- protein diet, LPD) from the nephrology department. The biochemistry form blood was analyzed.

Results :

Data analysis suggests that KA supplementation has kidney function in patients with advanced chronic kidney disease. KA has reduced BUN value and increased eGFR value without decreasing albumin value and Hemoglobin value.

Conclusions :

Among advanced chronic kidney disease patient that followed LPD, KA supplementation had protected kidney function. KA supplementation represents an additional therapeutic strategy to delaying the progression of chronic kidney disease.

Key words: advanced CKD 、 α - Ketoanalogues (α - KA) 、 low- protein diet

關鍵字 : 末期腎臟病、酮酸胺基酸、低蛋白飲食

慢性腎臟病病人感覺性聽力損傷的風險**Risk factors of sensorineural hearing loss in patients with chronic kidney disease: a nationwide, population-based cohort study**吳坤霖¹、詹正雄¹、施政坪²、簡戊鑑⁴、蕭博仁¹Kun-Lin Wu¹, Jenq-Shyong Chan¹, Cheng-Ping Shih², Wu-Chien Chien³, Po-Jen Hsiao¹¹國軍桃園總醫院內科部，²三軍總醫院耳鼻喉科，³三軍總醫院醫學研究部¹ Department of Internal Medicine, Taoyuan Armed Forces General Hospital² Department of Otolaryngology-Head and Neck Surgery, ³ Department of Medical Research, Tri-Service General Hospital, National Defense Medical Center

Problems associated with auditory system are common in patients with chronic kidney disease (CKD) and may negatively impact their quality of life. Here, we conducted a retrospective, population-based study to examine the risk of developing sensorineural hearing loss (SNHL) in patients with CKD. Population-based data from 2000–2010 from the Longitudinal Health Insurance Database of the Taiwan National Health Insurance Research Database was used in this study. The total population sample comprised 185,430 patients who were recently been diagnosed with CKD (CKD group) and 556,290 without CKD (control group) to determine SNHL risk factors. Cox proportional hazard regression analysis demonstrated the CKD group had a significantly increased risk of developing SNHL compared with the control group [adjusted hazard ratio (HR), 3.17; 95% confidence interval (CI), 2.781–3.605, $p < 0.001$]. In the CKD group, the risk of developing SNHL (adjusted HR, 5.465; 95% CI, 2.798–10.897) was higher among patients undergoing dialysis than among those not undergoing dialysis (adjusted HR, 1.298; 95% CI, 0.987–2.986). Furthermore, subgroup analysis revealed an increased risk of developing SNHL in patients with CKD and comorbidities such as heart failure (adjusted HR, 6.927; 95% CI, 3.770–12.729), liver cirrhosis (adjusted HR, 3.813; 95% CI, 2.240–6.491), diabetes mellitus (adjusted HR, 3.676; 95% CI, 2.845–4.479), hypertension (adjusted HR, 3.395; 95% CI, 2.731–4.221), and chronic obstructive pulmonary disease (adjusted HR, 3.227; 95% CI, 2.08–4.990). CKD was independently associated with the risk of developing SNHL. Additionally, dialysis for uremia might influence the risk of developing SNHL among patients with CKD. Cardiovascular, lung, liver, and metabolic comorbidities in patients with CKD contributed to inter-organ crosstalk and further aggravated the risk of developing SNHL. Performing auditory processing evaluations in patients with CKD is crucial for early identification and remediation of SNHL.

高齡是慢性腎臟病人腎臟預後的正向影響因子

Old age is a positive modifier of renal outcome in patients with stages 3 to 5 chronic kidney disease

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The incidence of end-stage renal disease (ESRD) is increasing in elderly patients with chronic kidney disease (CKD). This contradicts the general notion that elderly people are more likely to die than to ever reach ESRD. To elucidate this paradox, we followed longitudinally the outcome in a cohort of patients with stages 3-5 CKD by age category.

A total of 430 patients with a mean age of 65.6 years were enrolled and followed till death, ESRD, or end of 2015. Multivariable Cox regression was used to identify predictors of all-cause mortality. Competing risk-adjusted Cox regression was used to identify determinants of ESRD.

The median follow-up was 7.3 (interquartile range=8.8) years. On enrollment, patients aged 75 years or older accounted for 22% of the 205 cases of ESRD and 53% of the 136 events of death without ESRD. Cox regression showed old age and low mean arterial pressure were predictors of mortality before and after onset of ESRD. Competing risk analysis revealed patients aged 20-39 years and 40-64 years exhibited greater risks of ESRD, compared to those aged over 75 years. These effects of age on outcomes occurred independently of traditional risk factors such as low eGFR and high proteinuria.

Age over 75 years is associated with decreased risk for ESRD even after adjustment for competing mortality. Given the global trends in population aging, there is a need to develop age-specific strategies, on top of the existing stage-based measures, to optimize the management of CKD in the elderly.

關鍵字: 年齡、慢性腎臟病、末期腎臟病、死亡率、競爭風險存活分析

Keyword: Age, chronic kidney disease, end-stage renal disease, mortality, competing risk analysis

第二型糖尿病併慢性腎臟病病人其尿液硬骨素的臨床關聯性**Clinical Associations of Urinary sclerostin in patients with type 2 diabetes and chronic kidney disease**吳青芳¹、劉宏祥²、蔡明憲³、張敏育¹、李宜哲⁴、洪士元¹Ching-Fang Wu¹, Hung-Hsiang Liou², Ming-Hsien Tsai³, Min-Yu Chang¹, Yi-Che Lee⁴, Shih-Yuan Hung¹¹義大醫院內科部腎臟科/義守大學 ²新仁醫院內科部腎臟科 ³新光吳火獅紀念醫院內科部腎臟科 ⁴義大大昌醫院內科部腎臟科/義守大學¹Division of Nephrology, Department of Internal Medicine, E-DA Hospital/I-Shou University, Kaohsiung; ²Division of Nephrology, Department of Internal Medicine, Hsin-Jen Hospital, New Taipei City; ³Division of Nephrology, Department of Internal Medicine, Shin-Kong Wu Ho-Su Memorial Hospital, Taipei; ⁴Division of Nephrology, Department of Internal Medicine, E-DA Dachang Hospital/I-Shou University, Kaohsiung

Background: Sclerostin, mainly secreted by osteocytes, not only inhibits osteogenesis but also influences homeostasis of calcium and phosphate by inhibiting activation of vitamin D and inducing production of fibroblast growth factor 23 (FGF23). Clinically higher serum sclerostin level has been found in patients with diabetes or chronic kidney disease (CKD). In addition, renal elimination of sclerostin increased with declining renal function and proteinuria. The purpose of this study was to find out potential associations between urinary sclerostin, proteinuria, and renal excretion of calcium and phosphate in adult patients with type 2 diabetes and CKD.

Methods: Demographic data, serum and urine sclerostin, estimated glomerular filtration rate (eGFR), serum FGF23, 25-(OH) vitamin D, intact parathyroid hormone (iPTH), soluble alpha-Klotho as well as urine protein-creatinine ratio (UPCR), fractional excretion of calcium, phosphate, and magnesium (FeCa, FeP, FeMg) of patients were recorded at baseline (n=43) and six months later (n=33). The potential associations with urinary sclerostin, represented as urine sclerostin-creatinine ratio (USCR) and fractional excretion of sclerostin (FEsclerostin), were analyzed.

Results: Both Ln value of USCR and FEsclerostin was positively associated with FeP and FeMg. In addition, FEsclerostin was negatively associated with eGFR. After adjustment by age, sex, eGFR, and serum FGF23, both Ln value of USCR and FEsclerostin still positively correlated with UPCR. No significant association was found between urinary sclerostin and FeCa.

Conclusions: Increased urinary sclerostin was associated with higher proteinuria as well as increased FeP and FeMg. It indicates that sclerostin may have a local effect in regulating renal excretion of phosphate and magnesium in the kidney.

Keywords: sclerostin, type 2 diabetes mellitus, chronic kidney disease, fractional excretion of phosphate, fractional excretion of magnesium, proteinuria

關鍵字：硬骨素、第二型糖尿病、慢性腎臟病、磷排泄分率、鎂排泄分率、蛋白尿

應用健康管理平台結合穿戴式裝置強化慢性腎臟病患自我管理
**Application of Health Management Platform with Wearable Devices to
Strengthen Self-management of Chronic Kidney Disease Patients**

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Objectives: Chronic kidney disease (CKD) is a continually growing problem worldwide. If CKD patients kept healthy habits about diet and exercise and good adherence to medication, the progression of CKD will slow down. This study aimed to establish a self-management model in CKD patients.

Methods: This was a 90-day prospective experimental study. We enrolled 30 CKD stage 1-3 patients. The experimental group (n=15) received health management platform with wearable devices, whereas the control group (n= 15) did not. All participants recorded their diet diary by a smart phone application. In the experimental group, the exercise-related data were collected by wearable devices. All the information was uploaded to health management platform and we only provided suggestions about diet and exercise to the experimental group. We compared the scores of self-management questionnaire (4 subscales), body composition, and laboratory examinations before and after the intervention. We also interviewed the experimental group for the subjective feelings about the intervention.

Results: The ratio of diet diary upload was much higher in the experimental group (87.2% vs. 16.15%, $p < 0.05$). After the intervention, the scores of self-management questionnaire increased significantly in the experimental group (46.73 ± 5.42 vs. 51.93 ± 5.44 , $p=0.002$), but not in the control group (49.13 ± 7.21 vs. 47.87 ± 7.16 , $p=0.415$). The most improvement was in the subscales of compliance and self-care. Lesser body fat percentage gain was noted in the experimental group (0.59% vs. 1.13%). There were no differences in laboratory examinations between both groups at the end of study. Most patients gave positive feedback to the intervention.

Conclusions: The application of health management platform with wearable devices could strengthen self-management of CKD patients and promote healthy lifestyle behaviors. Our results will provide a self-management model in CKD patients.

Keywords: 慢性腎臟病, 自我管理, 健康管理平台, 穿戴式裝置。

Chronic kidney disease, self-management, health management platform, wearable device

閒暇時間體能活動對於慢性腎臟病人之死亡率，主要心血管事件及末期腎臟病之影響：一縱向族群研究

Effect of leisure-time exercise on all-cause mortality, major cardiovascular events and end-stage renal disease in advanced chronic kidney disease patients: a longitudinal cohort study

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Background: Chronic kidney disease (CKD) is a worldwide prevalent disease with multiple worse outcomes. Although leisure-time exercise has proven health benefit in the general population, its role on reducing the risks of major cardiorenal outcomes in advanced CKD patients is not yet confirmed. We aimed to investigate the prognostic role of exercise on death, end-stage renal disease (ESRD) and major adverse cardiovascular events (MACE, acute myocardial infarction or ischemic stroke) in advanced CKD patients.

Methods: A longitudinal cohort of 4508 CKD patients aged ≥ 20 years old from 2004 to 2017, with estimated glomerular filtration rate (eGFR) less than 45 ml/min, were enrolled. Intensity of leisure-time exercise was calculated as the metabolic equivalent of task (MET) values. Patients were then classified as no-exercise (0 MET-hr/week), moderate exercise (< 7.5 MET-hr/week) or vigorous exercise (≥ 7.5 MET-hr/week) groups. Study outcomes were ESRD, MACE and death. Cox proportional hazard models was used to analyze the effect of exercise intensity on the risks of outcomes, after adjusting for baseline characteristics and comorbidities.

Results: Over 11,731 patient-years of follow-up, there were 1060 patients developing ESRD, 259 patients having MACEs and 498 deaths. Kaplan-Meier survival curves revealed that vigorous exercise groups had the lowest study outcome rate, followed by moderate-exercise and no-exercise groups ($p < 0.0001$). Compared to patients without exercise, multivariable Cox regression showed moderate-exercise group had an attenuated risk for all-cause mortality, ESRD and MACEs (hazard ratio [HR]: 0.86; 95% confidence interval [CI]: 0.76–0.99). Notably, vigorous exercise group had a further decreased risk (HR: 0.65; CI: 0.58–0.73). The effect of exercise was consistent in subgroup analyses.

Conclusions: Greater exercise intensity was associated with reduced risks of mortality, ESRD and MACE among advanced CKD patients in a dose-response manner. Exercise program provides a possible opportunity to improve outcome of CKD patients.

Key words: Chronic kidney disease, Death, Leisure-time exercise, Major adverse cardiovascular events

一項隨機對照臨床試驗研究CH-025對慢性腎臟病人降尿毒素的功效
A Randomized, Comparative Study to Evaluate the Efficacy of CH025 for Elimination of Uremic Toxins in Patients with Chronic Kidney Disease

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Background: The burden of chronic kidney disease (CKD) is growing worldwide. Uremic toxins, which cannot be normally secreted into urine by failure kidneys, further damage kidney. However, there are only few strategies to eliminate uremic toxins effectively. CH025 is an enteric-coated capsule containing activated charcoal disintegrating in large intestines. The objective of present study is to evaluate whether CH025 reduce serum level of uremic toxins in patients with CKD.

Methods: CKD patients aged between 20 to 80 years were participated, and were excluded if they had liver cirrhosis, ileus, malignancy, major cardiovascular disease or renal function deterioration within 3 months prior to study. Finally, thirty one patients were enrolled, and they were randomly assigned to control, low dose (CH025 300mg thrice daily), and high dose (CH025 600mg thrice daily) group. Serum level of uremic toxin kynurenic acid (KYNA), hippuric acid (HA), p-Cresyl sulfate (PCS), and indoxyl sulfate (IS) were examined at baseline, 3th and 6th month during trial.

Results: Demographic and clinical characteristics were comparative between 3 groups of study patients. Results of mixed ANOVA showed that all of the uremic toxins significantly declined at 6th month during trial; however, the between-group effects of CH025 on uremic toxins were not significant. Post hoc analyses showed that, in contrary to control group, serum levels of HA of high dose group ($p=0.037$, Friedman test), IS of both low dose ($p=0.032$, repeated measures ANOVA or RM-ANOVA) and high dose group ($p=0.012$, Friedman test), and PCS of high dose group ($p=0.013$, RM-ANOVA) were significantly declined at 6th month during trial.

Conclusions: Six-month usage of CH025 combining conventional medical treatment reduced serum levels of HA, IS, and PCS in patients with CKD. Large scale research is warrant to confirm the beneficial effect of CH025 on uremic toxins and renal function in this patient population.

高濃度的空氣汙染會增加未透析末期腎病病人急性肺水腫的機率

High air pollution is at risk of developing acute pulmonary edema in patients with end-stage CKD without dialysis

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Background: High air pollution was associated with lung disease in many studies. We tried to evaluate, in patients with end-stage CKD without dialysis, the relationship of high air pollution and acute pulmonary edema in different season.

Methods: In this case-crossover study. We collected 317 patients living in central Taiwan with CKD stage 5 without dialysis who developing acute pulmonary edema and need hemodialysis. Pearson's correlation test was used to examine the relationship of acute lung edema cases with air pollution levels (PM2.5 level).

Results: The average air pollution level within the 7-day period correlated with acute lung edema incidence in the fall [adjusted odds ratio (OR) 3.23, P=0.047] and winter (adjusted OR 1.99, P<0.001). In winter, even a 3-day exposure to PM2.5 was associated with increased risk (adjusted OR 1.55, P<0.001).

Conclusions: High air pollution level was associated with an increased risk of acute lung edema. We should educate those patient with high risk to avoid further complication.

Key words: CKD, air pollution

探討對於心房顫動與慢性腎臟病患者使用抗凝血劑後發生中風的風險

Warfarin and aspirin for stroke in atrial fibrillation patients with chronic kidney disease

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Background: Both atrial fibrillation (Af) and chronic kidney disease (CKD) are at higher risk for stroke or systemic thromboembolism. Patients with Af should be treated with anti-platelet or anti-thrombotic therapy to reduce the risk of stroke. However, the role of anti-plate or anti-thrombotic therapy to reduce risk of stroke is still controversial in patients with Af and CKD. Therefore, the aim of this study is to investigate relationship between warfarin or aspirin and stroke in patients with Af and CKD.

Methods: The data in this study were obtained from the Health Insurance Database in Taiwan. We included Af patients with previous CKD between January 1, 2005 and December 31, 2010 in this study. We used the Cox proportional hazards model to estimate the risk of stroke after treating with warfarin or aspirin in patients with Af and CKD.

Results: We included 613, 2693, and 6135 patients with Af and CKD for warfarin group, aspirin group, and non-user group, respectively. The incidence rate of stroke were different among the control (840 cases per 10000 person-year), aspirin (627 cases per 10000 person-year) and warfarin (420 cases per 10000 person-year) in a follow-up period for about 9 years. As compared with non-user group, patients treated with warfarin or aspirin had lower risk of stroke. For ischemic stroke, the hazard ratios were 0.61 (95% confidence interval (CI): 0.49-0.76) and 0.84 (95% CI: 0.75-0.93) after adjusting age, sex, diabetes mellitus, coronary artery disease, cancer, hypertension, hyperlipidemia, systemic lupus erythematosus, CHA₂DS₂-VASc score, and the severity of CKD for warfarin group and aspirin group, respectively. For hemorrhagic stroke, the adjusted hazard ratios were 0.85 (95% CI: 0.52-1.38) and 0.71 (95% CI: 0.53-0.95) for warfarin group and aspirin group, respectively.

Conclusions: Among patients with Af and CKD, we observed that both warfarin or aspirin treatment may reduce the risk of ischemic stroke. As compared with non-user group, patients treated with aspirin had lower risk of hemorrhagic stroke.

Key words: atrial fibrillation, chronic kidney disease, stroke, warfarin, aspirin

急性腦中風經溶血栓治療後的腎臟預後

Renal Outcomes after Intravenous Thrombolytic Therapy for Acute Ischemic Stroke

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Background and Purpose

The administration of recombinant tissue plasminogen activator (rt-PA) is the most prevalent treatment for acute ischemic within golden time. However, the effects of rt-PA on the kidney function in these patients remain unknown. This study aims to determine long-term renal outcomes in patients with acute ischemic stroke receiving systemic rt-PA.

Methods

We enrolled patients who were hospitalized with acute ischemic stroke via emergency service from January 2001 to January 2017. We applied 1:2 propensity score matching to eliminate various confounding variables. Additionally, the Cox proportional hazards regression to competing risks was performed to assess the correlation between rt-PA and renal outcomes, and the subgroup analysis was performed to determine the impact of underlying diseases. We defined surrogate renal outcomes as declining of eGFR >30%, >50%, and chronic kidney disease (CKD) with eGFR <60 mL/min. Then, we compared the 1-year eGFR with paired *t*-test in patients treated with or without rt-PA. Furthermore, we also investigated whether the incidence of intracranial hemorrhage from systemic rt-PA increased in CKD patients.

Results

Of 1739 patients hospitalized with acute ischemic stroke, 343 patients received rt-PA within golden time. After 1:2 propensity score matching, baseline characteristics of patients were grouped as treated with rt-PA ($n=235$) or not ($n=394$). rt-PA-treated patients exhibited slower renal progression, including the risk of eGFR declining >30% (hazard ratio [HR], 0.72; $P=0.03$), risk of declining eGFR >50% (HR, 0.63; $P=0.046$), and risk of CKD (HR, 0.61; $P=0.005$). After 1-year cohort, the rt-PA group exhibited an improved renal outcome by the paired *t*-test (propensity match: Δ eGFR = 9.1 (95% CI: 6.3, 11.8), $P < 0.001$ in rt-PA group; Δ eGFR = -1.1 (95% CI: -2.9, 0.7), $P = 0.23$ in non-rt-PA group). In patients with eGFR <45 mL/min ($n=34$), no episode of intracerebral hemorrhage (ICH) was reported.

Conclusions

Patients receiving rt-PA for acute ischemic stroke exhibit favorable renal outcomes, and no increased incidence of ICH occurs in rt-PA patients with advanced CKD.

Key words: acute ischemic stroke, thrombolytic therapy, renal outcomes, chronic kidney disease, recombinant tissue plasminogen activator

影響慢性腎臟病病人決策共享中選擇的因素

Factors influencing choice in patients with chronic kidney disease during shared decision making (SDM)

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【目的】因醫病關係日益複雜，醫療團隊與病人間的溝通就需更加緊密與透明化。當慢性腎臟病的病人在面臨腎臟替代療法(Renal replacement treatment, RRT)如血液透析(Hemodialysis, HD)、腹膜透析(Peritoneal dialysis, PD)、腎臟移植(Kidney transplant, KT)或是安寧緩和(Hospice)的選擇時，希望能藉由『醫病共享決策Shared decision making; SDM』的方法來幫助病人能在充分了解的狀況下，作出最適當的決策。

【方法】慢性腎臟病第五期病人(CKD stage 5; GFR < 15mL/min/1.73m²)，經由腎臟科醫師診斷並轉介紹人員執行SDM。腎臟病衛教師負責門診病人介紹、住院病人則由透析治療師負責，先陪同病人觀看RRT影片再與會談了解病人意向及協助填寫「醫病共享決策輔助評估表」並回報給醫師。所有收案資料以SPSS.20進行統計分析。

【結果】2017年1月至2018年4月共收案115名病人，男性59人(51.3%)；平均年齡60.7±15.2歲；男性59.9±16.07；女性61.5±14.38；病人來源：門診67人(58.3%)；有接受末期腎臟病前期照護84人(73%)；糖尿病患者47人(40.8%)。經SDM後，病人對於RRT選擇為HD 52人(45.2%)、PD 41人(35.7%)、KT 7人(6.1%)、Hospice 9人(7.8%)、未能做決定者6人(5.2%)。追蹤至2018年4月，已進入透析有80人分別為HD53人(66.2%)、PD27人(33.8%)、未有腎臟移植及安寧緩和、尚未進入RRT35人(30.4%)。進一步分析探討病人來源、性別、年齡、糖尿病、是否接受末期腎臟病前期照護等，在SDM後病人對RRT的選擇是否有影響，發現病人來源、性別、糖尿病及是否接受末期腎臟病前期照護等無明顯差異(p>0.05)。但由各變相的比例上發現病人在決定透析模式時，門診病人選擇血液透析多於腹膜透析(46.3% vs 31.3%)，住院病人則相近(43.8% vs 41.7%)；性別方面：男性選擇血液透析較多(58.8% vs 28.8%)，女性則大致相同(39.3% vs 42.9%)；糖尿病的病人兩種治療無明顯差別(40.4% vs 40.4%)，非糖尿病的病人選擇血液透析較多(48.5% vs 32.4%)；病人是否接受末期腎臟照護都以血液透析居多；年齡≤55歲選擇腹膜透析較多(28.6% vs 46.4%)，大於55歲病人則以血液透析為主(50.6% vs 32.2%)，以年齡區分兩組有統計學上的差異 (p<0.001)。自我照護能力及生活品質是病人在SDM中選擇RRT最重要的考量。

【結論】本研究發現仍有許多因素會影響病人最後的選擇，希望藉由溝通模式的改變，能提升病人自我健康效能進而促進正向的醫病關係，減少潛在醫療糾紛。也希望能再累積更多的經驗，應用在臨床實務面上，產生正面的效應達到醫病雙贏的成效。

關鍵字：慢性腎臟病(CKD)、醫病共享決策(SDM)、腎臟病替代療法 (RRT)

血清抵抗素與慢性腎臟衰竭患者中樞動脈硬度有關

Positive Correlation of Serum Resistin Level with Aortic Artery Stiffness in Patients with Chronic Kidney Disease

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Background: Resistin has a pathogenic role in the development and progression of atherosclerosis. Chronic kidney disease (CKD) is associated with a significantly higher cardiovascular morbidity and mortality and in most cases; the underlying cause of the cardiovascular event is atherosclerosis. The aim of this study was to evaluate the relationship between serum resistin levels and carotid-femoral pulse wave velocity (cfPWV) values in patients with CKD.

Methods: Fasting blood samples and baseline characteristics were obtained from 240 patients with CKD (stage 3-5). Serum resistin concentrations were determined by available enzyme immunoassay kit. cfPWV value was measured using the SphygmoCor system. Patients with cfPWV value > 10 m/s were defined as the high aortic arterial stiffness group.

Results: Among 240 CKD patients, 88 patients (36.7%) were in the high aortic stiffness group. When compared to those in control group, the high aortic arterial stiffness group had high prevalence of diabetes mellitus (P = 0.018), older age (P < 0.001), higher body weight (P = 0.001), body mass index (P = 0.002), body fat mass (P = 0.002), systolic blood pressure (P < 0.001), diastolic blood pressure (P = 0.004), fasting glucose (P = 0.009), and higher serum resistin level (P < 0.001). Multivariate logistic regression analysis of the factors significantly associated with aortic arterial stiffness revealed that resistin levels (odds ratio (OR): 1.090, 95% confidence interval (CI): 1.032–1.152, P = 0.002), diabetes mellitus (OR: 2.373, 95% CI: 1.161–4.852, P = 0.018), age (OR: 1.063, 95% CI: 1.031–1.095, P < 0.001), and body weight (OR: 1.057, 95% CI: 1.009–1.107, P = 0.019) were the independent predictors of aortic arterial stiffness in CKD patients. Multivariate forward stepwise linear regression analysis also showed that logarithmically transformed resistin level (log-resistin, $\beta = 0.146$, P = 0.010) was an independent predictor of cfPWV values in CKD patients.

Conclusion: High serum resistin level is a predictor for aortic arterial stiffness in patients with CKD. Serum resistin level is positively associated with cfPWV values in CKD patients.

Key words: resistin, carotid-femoral pulse wave velocity, aortic arterial stiffness, chronic kidney disease

關鍵字：抵抗素，頸動脈到股動脈波行傳導速率，中樞動脈硬度，慢性腎臟衰竭

慢性腎臟病高危險群病患之疾病變化相關因素分析

Factor Analysis of Progression in the High-Risk Patients with Chronic Kidney Disease

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Background:

本研究針對慢性腎臟病(Chronic kidney disease, CKD)高危險群病人的疾病發生率、盛行率及疾病嚴重度進退階變化，並探究影響CKD分期之相關因素，以作為在CKD防治擬訂策略與計畫之參考。

Methods:

本研究之收案意選取103至105年間在南部某地區醫院有尿液及血液肌酸酐檢驗2次以上之高危險群病人為研究對象共366人，男性佔47.0%，女性佔53.0%，平均年齡為64.2±12.0歲。以結構式問卷調查研究樣本，個人屬性、過去治療病史及自我照顧的健康行為影響病人之相關因素分析，以SPSS 20軟體進行單變項分析及卡方檢定單因子變異數分析。

Results:

經分析發現慢性腎臟病發生率為在103~104年為50.0%、104~105年42.9%、103~105年間為46.9%。慢性腎臟病盛行率在103年為66.8%、104年為68.1%、105年為51.5%；區分各年各期時：慢性腎臟病第1、2期由103年的43.8%下降到105年為28.2%，第3-5期由103年的22.9%上升到105年為23.3%。疾病變化顯示轉好的期數增加，轉壞的期數減少，與發生率、盛行率下降的結果吻合。單變項分析顯示年齡愈大愈易罹患第3期以上慢性腎臟病；男性罹患慢性腎臟病較女性為多，且嚴重度也較高；有糖尿病人罹病率較無病史者為4.01倍；高血脂、按時使用降血糖或降血脂藥的，影響慢性腎臟病發生與分期有顯著差異。以多項式邏輯斯複迴歸分析發現：年齡、性別及糖尿病史是影響罹患慢性腎臟病的最主要原因。

Conclusion:

經由地區性流行病學調查及探討其相關影響因子，研擬適切預防保健措施及生活型態的改變、良好的血壓、血糖及血脂肪控制、降低尿蛋白、避免腎毒性藥物、早期轉介腎臟科醫師等，有計劃的施予個別護理指導，能使病患認識疾病的知識顯著增加，有效防治CKD的惡化及早施以個案健康管理，既可降低民眾罹患慢性腎臟病，亦可延緩演變成末期腎衰竭。

關鍵字：慢性腎臟病、糖尿病、盛行率、發生率。

熱傷害與慢性腎臟病風險系統性研究

Risk of CKD from Heat Injury: A National Longitudinal Cohort Study in Taiwan

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Background: Global climate change has led to significant rise of temperature over the last century and has been associated with significant increases in the severity and frequency of heat injury (HI). The consequences of HI included dehydration and rhabdomyolysis, leading to acute kidney injury which is now recognized as a possible risk factor for chronic kidney disease (CKD). Here we present a national longitudinal cohort study on the effect of HI on the risk of CKD.

Methods: We used Taiwan National Health Insurance Research Database (NHIRD) to collect nationwide longitudinal population-based retrospective cohort study. We selected adult patients who had been newly diagnosed with HI and were followed up between 2000 and 2013. We excluded patients who had been diagnosed with CKD or genital-urinary system related disease before the date of the new HI diagnosis. The control cohort consisted of individuals who had no HI history. The patients and the control cohort were selected by 1: 4 matching according to the following baseline variables: sex, age, index year, and comorbidities. The outcome measure was diagnosis of CKD.

Results: In total, 815 patients diagnosed with HI were identified. Compared to patients without HI, they had no significant cumulative risk of developing CKD in the first 3 years of follow-up. However, started from the 4th year of follow-up, patient with HI were independently associated with CKD (log rank test, $P < 0.001$). CKD was independently associated with HI following cox multivariate regression analysis and patients with an HI episode had a higher incidence of CKD compared to those without any HI episode (857.08/10⁵ person-years vs. 399.87/10⁵ person-years, adjusted hazard ratio 4.346, 95% CI: 3.206 – 5.892, $p < 0.001$).

Conclusion: HI related CKD may represent one of the first epidemics due to global warming. When compared to those without HI, patients with HI have an increased risk of CKD.

Keywords: heat injury; chronic kidney disease

關鍵字：熱傷害；慢性腎臟病

慢性腎臟病患者使用毛地黃與全死亡率及心血管事件之關聯

The Association of Digoxin Treatment with All-Cause Mortality and Cardiovascular Outcomes in Patients with Chronic Kidney Disease

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Background:

Digoxin is commonly used for heart failure and atrial fibrillation but has been reported associated with increased mortality recently. Despite recommendation of digoxin in clinical practice guidelines, there exist limited data on its safety in patients with chronic kidney disease (CKD). We studied the impact of digoxin on mortality, cardiovascular events, and renal outcomes in a nationwide CKD cohort.

Methods:

Using data from the multidisciplinary team care pay for performance (P4P) program, a part of National Health Insurance Research Database, we identified CKD patients between 2007 and 2011. We used multivariate Cox proportional hazards to evaluate the association between digoxin use and risks of death, cardiovascular and renal outcomes, controlling for clinical characteristics, medications, and comorbidities. Patients were followed to death, end-stage renal disease, or the end of 2012. Residual confounding was assessed by sensitivity analysis.

Results:

Cumulative mortality rates were higher in digoxin-treated CKD patients than in untreated patients (Incident rate ratio: 2.25, 95% confident interval [CI]: 1.81 - 2.80). Digoxin use was independently associated with higher mortality after adjusting for covariates (adjusted hazard ratio [aHR]: 1.63, 95% CI: 1.23 - 2.17) and propensity matching (aHR: 1.58, 95% CI: 1.09 - 2.28). However, the risk of acute coronary syndrome (aHR: 1.18, 95% CI: 0.75 - 1.86), ischemic stroke (aHR: 1.42, 95% CI: 0.85 - 2.37), and rapid estimated glomerular filtration rate (eGFR) decline (aHR: 1.00, 95% CI: 0.78 - 1.27) was not significantly different between these two groups after adjusting for comorbidities, medications, and competing risk of mortality.

Conclusion:

Digoxin was associated with increased risk of all-cause mortality but not of major cardiovascular events or renal function decline in CKD patients.

Keywords: digoxin, chronic kidney disease, cardiovascular disease, mortality, Taiwan National Health Insurance Research Database

關鍵字: 毛地黃, 慢性腎臟病, 心血管疾病, 死亡率, 台灣健保資料庫

慢性腎疾病第三期病人之尿酸長期控制趨勢對腎臟以及病人預後之影響
Trajectory of Serum Uric Acid as a Predictor for Renal Outcome and Mortality in Stage-3 Chronic Kidney Disease Patients

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Introduction: Uric acid (UA) is associated with renal and patient survival but the association is causal in nature remains unclear. Also, no finding is yet available regarding longitudinal UA control (trajectory).

Methods: We enrolled 808 subjects diagnosed with stage 3 CKD from 2007 to 2017. We plotted based on follow-ups the mean UA over a period of 6 months with a minimum of three samples of UA was required. From the sampled points, we generated for each patient an interpolated line by joining mean values of the UA levels over time. And from the lines from all patients, we classified them into three groups of trajectories (low, medium and high UA) through group-based trajectory modeling, and then further separated into either a treatment or no-treatment subgroups. Using the univariate competing-risks regression, we calculated the competing risk analysis with subdistribution hazard ratio of possible confounders..

Results: All of the 6 trajectories appeared as gradually falling functions with time without any of the curves crossed over one another. For all-cause mortality risk, none of the variables was statistically significant. Patients with DM were statistically more likely to undergo dialysis. There was also a trend that the on-treatment trajectories, compared to their no-treatment trajectories, had lower risks for dialysis.

Conclusions: Initial treatment of UA is utterly important. Xanthine oxidase inhibitors may lead to renal protection without effects on patient death, independent from the UA-lowering effects. This is the first study on the long-term effects of UA trajectory on patient survivals and renal outcomes.

關鍵字：軌跡，尿酸，腎功能，死亡率，慢性腎臟病

Key words: trajectory, uric acid, renal survival, mortality, chronic kidney disease

急性腎臟梗塞病人使用動脈內血栓溶解治療相關預後：世代分析研究

Outcomes Associated with Intra-arterial Thrombolytic Therapy in Patients with Acute Renal Infarction: A Retrospective Cohort Study

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Background: Acute renal infarction (ARI) is a potential severe thromboembolic disease resulting from an abrupt disruption of renal blood flow causing ischemic damage of renal parenchyma. The impact of intra-arterial thrombolytic therapy on persevering renal function in this population is uncertain.

Methods: A retrospective cohort study of 64 patients diagnosed with ARI at emergency department was conducted between October 1991 and May 2016. The association between intra-arterial thrombolytic therapy, acute kidney injury and long-term renal outcome was evaluated. Demographic data and comorbidities were collected for analysis.

Results: Thirteen (20.3%) patients with ARI received intra-arterial thrombolytic therapy. The mean time to treatment following presentation was 2.4 ± 1.9 days. ARI patients receiving intra-arterial thrombolytic therapy had higher body mass index, higher systolic blood pressure, higher proportion of anticoagulant therapy and antiplatelet therapy compared to those without intra-arterial thrombolytic therapy. Among ARI patients receiving intra-arterial thrombolytic therapy, two patients developed upper gastrointestinal bleeding and none had intra-abdominal infection or pulmonary edema. The incidence of acute kidney injury during the initial admission and hospital days did not differ between the two groups (23.1% and 19.6%, $P = 0.72$; 9.6 ± 7.2 days and 10.1 ± 10.3 days, $P = 0.87$). Long term renal outcome was evaluated in 43 patients with post-discharge measurement of eGFR levels. There was no significant association between intra-arterial thrombolytic therapy and long-term renal outcome in ARI patients including the monthly change in the eGFR (-0.43 ± 0.88 ml/min/1.73m² and -1.63 ± 5.92 ml/min/1.73m², $P = 0.53$), the incidence of eGFR reduction of more than 50% (0 and 18.2%) and end-stage renal disease (0 and 6.1%).

Conclusion: Use of intra-arterial thrombolytic therapy in patients with ARI may not preserve renal function which warrants further evaluation with larger sample sizes.

Key words: Acute renal infarction, thrombolytic therapy, renal function

關鍵字: 急性腎臟梗塞, 血栓溶解治療, 腎功能

益生菌可以延緩腎功能惡化

Probiotics Could Retard the Decline of GFR in Patients with Chronic Kidney Disease王怡寬^{1,2} 楊雅斐¹ 丁昇文¹ 黃彥宇³ 賴佳妘¹ 黃秋錦¹ 林鴻志³I-Kuan Wang^{1,2}; Ya-Fei Yang¹; I-Wen Ting¹; Yen-Yu Huang³; Chia-Wen Lai¹; Chiu-Ching Huang¹; Hung-Chih Lin³¹中國附醫腎臟科 ²中國醫藥大學醫學院 ³中國附醫小兒科¹Division of Nephrology, China Medical University Hospital, Taichung, Taiwan²Department of Internal Medicine, China Medical University College of Medicine, Taichung, Taiwan³Department of Pediatrics, China Medical University and Hospital, Taichung, Taiwan

Background: Chronic kidney disease (CKD) is a global health issue that has a substantial impact on affected individuals. The natural intestinal microbiota is altered in CKD patients as an increase in aerobic bacteria such as *E. coli* and a decrease in anaerobic bacteria such as *Bifidobacterium*. Probiotics containing *Bifidobacterium* species and *Lactobacilli* species could benefit the host by inhibiting the growth or epithelial invasion of pathogenic bacteria, enhancing the intestinal barrier function, and regulating the immune system. The aim of the present study is to evaluate whether probiotics could retard the decline of renal function.

Methods: Two capsule of probiotics containing 2.5×10^9 colony-forming units (CFU) *Lactobacillus acidophilus* TYCA-06, *Bifidobacterium longum* BLI-02, and *Bifidobacterium bifidum* VDD-088 (Glacbiotech Co.,Ltd., Tainan, Taiwan) after breakfast and before bedtime daily were given to stage 3-5 patients for 6 months. The estimated Glomerular filtration rate (eGFR) was measured before and after intervention. Since distribution of data might not all normal shape, we expressed data as median and 25th and 75th percentile for continuous variables. The Wilcoxon signed-rank test was used to compare the decline of eGFR before and after probiotics intervention. In addition, cytokine change, stool microbiota, and questionnaire for abdominal symptoms were measured. A p value less than 0.05 is regarded as statistically significant.

Results: 28 patients completed 3 month study and 25 patients completed 6 month study. 15 patients were in the stage 3, 6 patients were in the stage 4, 7 patients were in the stage 5 at the baseline. The etiology of CKD included chronic glomerulonephritis (14), diabetes nephropathy (7), gout (5), autosomal dominant polycystic kidney disease (1) and urolithiasis (1). The eGFR decline rate was significantly retarded after 6 month probiotics intervention from -0.54 (-0.91, -0.36) to 0.00 (-0.17, 0.36) ml/min/month (p = 0.004). In addition, the serum levels of TNF- α [from 14.98 (7.07, 23.44) to 5.70 (4.55, 8.87) pg/mL], IL6 [from 3.41 (2.64, 4.51) to 1.78 (1.05, 2.50) pg/mL], IL18 [from 415.37 (255.53, 541.31) to 64.16 (21.98, 92.29) pg/mL], endotoxin [from 0.74 (0.55, 1.25) to 0.50 (0.06, 0.77) EU/mL] were significantly decreased after 6-month probiotics treatment. The abdominal symptoms of borborygmus and flatulence significantly improved. The proportion of *Bifidobacterium longum* and *Bifidobacterium breve* in stool microbiota increased significantly.

Conclusions: Our preliminary results show probiotics treatment could retard the decline of eGFR in CKD patients, reduce the serum levels of pro-inflammatory cytokine, and endotoxin, increase the proportion of *Bifidobacterium*, and improve the symptoms of borborygmus and flatulence.

Key words: Chronic kidney disease, probiotics, renal function

關鍵字: 慢性腎病, 益生菌, 腎功能

低蛋白飲食對末期腎臟病人的成效

Effect of Low Protein Diet in Patients with End Stage Renal Disease

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背景：飲食控制對末期腎臟病病人來說是非常重要的，尤其是蛋白質攝取量（一般攝取量為 0.6-0.8g/Kg/day；及低蛋白攝取量為 0.3-0.4g/Kg/day）；研究指出低蛋白飲食除了可控制尿毒症症狀外亦可延緩腎絲球過濾率下降速度進而延緩進入透析治療過程。本研究目的為探討末期腎臟病病人經由醫療團隊的評估與衛教指導後，其檢驗數值的變化。

方法：取自 2017 年 1 月至 2017 年 12 月的南部某醫院腎臟病第 3b、4 和 5 期之門診新病人；於腎臟科衛教室，給予面對面及個別性的末期腎臟病飲食衛教（包含低蛋白飲食衛教）後，追蹤 18 個月，收集檢驗報告，以描述性統計與推論性統計（pair-t test、ANOVA）進行分析。

結果：共收案 147 位病人，CKD stage 3b 有 79 位、CKD stage 4 有 40 位、CKD stage 5 有 28 位；87 位（59%）男性，平均年齡 72.9 ± 11.8 歲；24 位為糖尿病腎病變、12 位為高血壓腎病變；平均腎絲球過濾率（estimated glomerular filtration rate, eGFR）為 28.7 ± 12.1 ml/min/1.73m²，身體質量指數（body mass index, BMI）為 25.7 ± 4.8 kg/m²，白蛋白（albumin）為 3.9 ± 0.5 g/l；觀察期間，有 4 位病人進入血液透析治療、1 位死亡和 2 位失聯。在 140 位病人中，以 BMI 分別於每 3、6、9、12 個月（平均數 12.5 ± 13.1 , 19.2 ± 12.1 , 24.3 ± 7.1 , 23.5 ± 8.2 ；95%CI: 10.4-24.9）達顯著性差異；並依年齡排序區分為四等份，以第 I 組與第 IV 組之 BMI（ 27.3 ± 6.5 ； 24.2 ± 4.6 , $p = .005$ ）、鈣（ 8.7 ± 0.7 ； 9.1 ± 0.6 , $p < .05$ ）及尿蛋白（ 2649.6 ； 858.4 , $p = .005$ ）均達顯著性差異；而 eGFR（ 25.6 ± 14.1 ； 30.9 ± 10.5 ）與 albumin（ 3.7 ± 0.6 ； 3.9 ± 0.4 ）卻未達顯著性差異（ $p > .05$ ）。

結論：隨著年齡增加，末期腎臟病病人並不會因為低蛋白飲食限制而導致營養流失或腎功能變差。因此，針對末期腎臟病病人應給予個別性的飲食衛教並增加病人對護理指導的遵從性，如此才能幫助病人有效延緩疾病進展。

Key words: low protein diet, end stage renal disease patients, Compliance

關鍵字：低蛋白飲食、末期腎臟病病人、遵從性

糖尿病是否對紅斑性尿毒症病人有慢性尿毒症發生之加重影響?

Does Diabetes Mellitus increase the Risk of End-Stage Renal Disease in Patients with Systemic Lupus Erythematosus?

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Background: Systemic lupus erythematosus (SLE) patients are associated with insulin resistance and are at higher risks to develop diabetes mellitus (DM). SLE and DM would lead to renal failure respectively. However, it is unknown whether DM increases the risk of end-stage renal disease (ESRD) in SLE patients. This study aimed to evaluate the potential synergistic effect of DM on SLE patients for development of ESRD.

Methods: We conducted this study by using National Health Insurance Research Database of Taiwan. We recruited SLE patients with newly-diagnosed DM as the study cohort (DM group, n = 1317). A comparison cohort at a 1:1 ratio of SLE patients without DM matched by age, sex, age at the diagnosis of SLE, duration between diagnosis of SLE and DM, and various comorbidities through propensity score matching were recruited (non-DM group, n=1317).

Results: After follow-up period of 5.01 ± 3.13 years, the cumulative incidence rate of developing ESRD was significantly higher in the DM group than in the non-DM group ($P < 0.0001$). The incidence rate ratio (IRR) for ESRD was higher in DM group (IRR: 2.71; 95% CI: 1.70 - 4.32) than in non-DM group. After control of confounding factors, DM was not an independent risk factor of ESRD (adjusted HR: 1.64; 95% CI: 0.97 - 2.76). After starting dialysis, DM patients had a similar mortality rate to those without DM ($P=0.197$).

Conclusion: Compared to DM per se, its related co-morbidities have more important impact on SLE patients to develop ESRD.

Key Words: systemic lupus erythematosus (SLE), diabetes mellitus (DM), end-stage renal disease (ESRD), insulin resistance

參加腎臟病論質計酬照護計畫有助於糖尿病腎病變患者預後之改善
Chronic Kidney Disease Pay-for-Performance Program Recruitment is Associated with Better Clinical Outcomes in Patients with Diabetic Kidney Disease

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Background

Patients with diabetic kidney disease (DKD) and glomerulus filtration rate (GFR) < 45 ml/min/1.73m² are indicated for recruitment of diabetes (DM) and chronic kidney disease (CKD) pay-for-performance program (P4PP). Divergent outcomes of those patients are observed under different degrees of enrollment.

Materials and Methods

We conducted a retrospective cohort study from 2013 to 2016. Patients in the case group were defined as receiving both CKD P4PP and DM P4PP, whereas those in the control group were defined as receiving DM P4PP only. We measured decline rate of GFR and glycated hemoglobin (HbA1c) of both groups. Cases were further stratified analyzed by age, sex, initial GFR in the CKD P4PP and follow-up period.

Results

Patients in the case group featured a significant better decrease rate of HbA1c, whereas a significant higher decrease rate of GFR than those in the control group. In the case group, decrease rate of GFR after CKD P4PP recruitment was significantly lower than that before recruitment. As to subgroup analyses in the case group, nearly all covariates exhibited lower GFR decrease rate after CKD P4PP enrollment, whereas there was no similar trend in consideration of HbA1c decrease rate.

Conclusions

Although DKD patients with GFR less than 45 ml/min/1.73m² and CKD P4PP participation had higher renal function progression, the trend would slow down following CKD P4PP recruitment.

關鍵字：糖尿病腎病變, 論質計酬照護計畫

Keywords: Diabetic kidney disease; Pay-for-performance program

慢性腎臟病合併心衰竭老人身體活動功能與預後之探討

Physical Functionality and Outcome in Older Patients with Heart Failure and Chronic Kidney Disease

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Background: Clinical heart failure and geriatric phenotypes were attributable to health depreciation and decreased cardioprotection during ageing. In older patients with CKD, heart failure and corresponding survey of physical function has not been elucidated.

Methods: A retrospective and comparative longitudinal study with comprehensive geriatric assessment (CGA) (Mini-nutritional assessment-short form, MNA-SF; Timed Up and Go test, TUG; Handgrip strength, HGS; 6-meter walking test, 6MW) was conducted in evaluating the severity of heart function and mortality between heart failure (HF) and non-HF older patients. 811 older patients under geriatric service were enrolled since Jan 2009 to May 2018. The HF and CKD were diagnosed according to ICD9 code, clinical data and 2D heart ECHO, and the index date was registered at the time of CGA nearby 2D heart ECHO.

Results: TUG test was closely associated with severity of HF in older patients with CKD, especially in men (P=0.002 in non-HF & HF; P=0.004 in non-HF, HFpEF & HFrEF). TUG value (<12, 12-16, 16-23, ≥23 sec) in men was significantly associated with better or poor LVEF between non-HF and HF patients. HGS, 6MW and MNA-SF were mildly associated with disease severity in HF. In all older patients, HF with reduced EF (crude HR 1.99, 95% C.I. 1.05-3.78), poor hand grip strength (adjusted HR 3.52, 95% C.I. 1.09-11.37) & one abnormal physical function (adjusted HR 3.22, 95% C.I. 1.13-9.20) were associated with all-cause mortality. In Kaplan-Meier survival analysis, older patients with poor TUG, poor HGS, and one abnormal physical function had poor survival rate. Those patients with HF concomitant poor HGS had poorest survival.

Conclusions: Comprehensive Geriatric Assessment (CGA) in older patients with HF and CKD is very important in the baseline and follow-up period. An integrated kidney disease care program could consider regular evaluation in physical function in older adults with CKD.

Keywords: all-cause mortality, heart failure, older adults, physical function, comprehensive geriatric assessment.

不同烹調方法的蛋品其磷含量之分析

Phosphorus content in flavored egg products

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Background: Eggs are a great source of high-quality protein, but various ways to cook eggs, it may increase the phosphorus content of egg products. it is imperative to compare the phosphorus burden in egg white and egg yolk, especially in the flavored products available on the market.

Methods: A variety of egg products (spiced corned egg、tea biled eggs、boiled eggs、pan-fried egg) will be purchased at retail stores (7-Eleven, FamilyMart), and analysis phosphorus each product (whole egg, egg white, and egg yolk) were measured using the Association of Analytical Communities (AOAC) official method 985.01. Phosphorus was measured using AOAC official method 984.27.

Results: Among these egg products, phosphorus content of whole egg and egg yolk are higher in iron egg(283.5 mg/100g and 701 mg/100g) and soy-stewed egg 1 (300.0mg/100g and 777.4 mg/g). Both tea-boiled eggs 1 (whole egg 232.1 and egg yolk 626.9 mg/g), and hard-boiled egg (whole egg 228.5 and egg yolk 649.9 mg/g). However, the phosphorus content in egg white is markedly elevated in all the eggs with flavoring, compared to that in the egg without. The phosphorus-to-protein ratio (PPR) is nearly 6 and 5 times higher in iron egg (6.09 mg/g) and soy-stewed egg 1 (4.82 mg/g) than that in hard-boiled egg (1.02 mg/g). With the longer re-cooked time, the phosphorus content of egg white-to yolk ratio is also higher in iron egg and soy-stewed egg 1.

Conclusions: The exposure to sauce application for seasoning and the extension of re-cooked duration may increase the phosphorus in flavored eggs. Accordingly, we urge dialysis patients who need restriction of phosphorus intake to choose the egg that is not or not heavily flavored.

Key words: Dialysis patients, egg, phosphate

關鍵字:透析病人、蛋、磷

GATM 突變致自體顯性范可尼氏症候群合併腎衰竭 Recurrent GATM Mutations Causing Autosomal Dominant Renal Fanconi Syndrome with Progressive Renal Failure

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Background

Fanconi renotubular syndrome (FRTS), inherited renal Fanconi syndrome without extrarenal manifestations, have been reported to be caused by genetic defects in uncertain loci of chromosome 15 (type I), *SLC34A1* (type II) and *EHHADH* (type III). Type I, characterized by autosomal dominant inheritance with late onset FRTS and progressive renal failure, was just reported to be caused by mutant *GATM* which encodes arginine-glycine aminotransferase (AGAT), an enzyme catalyzing rate-limiting step of creatine biosynthesis.

Methods

A Chinese family with typical autosomal dominant FRTS and progressive renal failure was enrolled. The affected father (age 60 and serum creatinine 6.1 mg/dl with eGFR 12 ml/min) and daughter (age 31, and serum creatinine 1.3 mg/dl, eGFR 50 ml/min) exhibited severe hypophosphatemia and hyperchloremic metabolic acidosis with distinctively osteomalacia as well as hypokalemia despite potassium, alkali, and vitamin D therapy. Sanger's sequencing demonstrated no pathogenic mutations in *SLC34A1* and *EHHADH*. Whole exome sequencing was performed in this family.

Results

Whole exome sequencing discovered a possible culprit missense mutation (p.Thr336Ile) in *GATM*, which mutation was identical to recent report, supporting the pathogenic role of *GATM* mutation in this unique type of FRTS. Localization of T336I mutation on 4th β -sheet was suggested to transform 4th β -sheet into a novel additional interaction surface, resulting in formation of linear AGAT multimer rather than physiological homodimer by interaction between 2nd β -sheet. Because biallelic mutations in *GATM* causes cerebral creatine deficiency syndrome (CCDS) with neurological symptoms but not FRTS, the role of diminished total AGAT activity in pathogenesis of FRTS is unlikely.

Conclusion

Uniallelic GATM mutation clustering to a specific region may play a role in pathogenesis of autosomal dominant FRTS. Generation of *GATM* T336I knock-in mice is warranted to elucidate the mechanism of FRTS and assess the therapeutic role of creatine administration.

異位性促腎上腺皮質激素分泌症候群跟低血鉀：一個醫學中心的 11 年回溯性研究

Ectopic ACTH-Secreting Syndrome and Hypokalemia: a Retrospective Study Over 11 Years from A Single Center

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Background: Ectopic adrenocorticotrophic hormone (ACTH)-secreting syndrome (EAS) is a rare cause of ACTH-dependent endogenous hypercortisolism. The objective of this study was to analyze clinical, biochemical, and tumor location; management strategies; and outcomes of EAS patients.

Methods: We screened the records (2006-2017) of cases diagnosed with Cushing syndrome managed at a tertiary care center according to the ICD9 codes.

Results: Of the 95 patients, 6 were diagnosed with EAS, 6 were diagnosed with Cushing disease, 13 were diagnosed with adrenal adenoma and with the rest of 76 were iatrogenic Cushing syndrome. In the EAS group, the mean 8:00 AM serum cortisol was 55.80 ug/dL (4.8-19.5 ug/dL), and the mean basal plasma ACTH was 162.9 pg/mL (0.1-46.0 pg/mL). Notably, ACTH levels below 100 pg/mL were found in 2 patients. The mean potassium level was 2.5mmol/L. Computed tomography (CT) localized the lesion in 6/6 patients. Cure rate was borderline (50%).

Conclusion: In EAS cases, ACTH-secreting tumors originating in the chest cavity were the leading cause and may be underestimated because of the atypical presentation in some cases. Hypokalemia with metabolic alkalosis may be an early clue. We therefore suggested careful evaluation of patients with neuroendocrine tumors to avoid missing co-existing EAS.

Key words: ectopic ACTH , hypokalemia

關鍵字: 異位性促腎上腺皮質激素分泌症候群, 低血鉀

血液透析病人高血鉀衛教介入與降鉀藥物使用之研究分析

An Integrative Approach of Hyperkalemia in Hemodialysis Patients

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目的(Objective)

高血鉀是末期腎臟衰竭最危險的併發症，嚴重時會心律不整、心跳停止，甚至死亡。有效監控血液透析病人血鉀值在正常範圍，是治療的重要目標，在臨床照護方面，醫護人員應指導透析病人正確藥物服用及透過完善的飲食衛教以降低高血鉀發生。

方法(Methods)

常規透析病人經醫師評估後，予開立降鉀藥物(Kalimate)醫囑，再合併透析治療師及營養師跨領域合作進行完善的飲食衛教，以降低及預防病人高血鉀發生。蒐集自 2016 年 11 月至 2017 年 11 月期間接受降鉀藥物服用之病人，包含年齡、性別、透析年資、透析次數、透析時間、高血鉀發生率、高血鉀發生原因、高血鉀症狀、醫囑開立頻率、藥物遵從性、病人攝取高鉀食物、便秘情形、抽菸、醫護人員飲食衛教、營養師衛教等相關資料進行統計分析。

結果(Results)

收案人數 228 人，其中 4.4% 有抽煙史；男性佔 47.4%，平均年齡 63.3 ± 8.2 歲；透析年資平均 7.7 ± 5.2 年；透析時間： $>4hr$ 0.45%、 $4hr$ 72.8%、 $3.5hr$ 21.5%、 $3hr$ 4.8%、 $2.5hr$ 0.45%。

分析降鉀藥物服用前、後，結果顯示：高血鉀發生率分佈：血鉀值 $>6.5mEq/L$ 由 9.2% (21 人) 降至 5.3% (12 人)；血鉀值 $6.0-6.4mEq/L$ 由 20.6% (47 人) 降至 8.3% (19 人)；血鉀值 $5.5-5.9mEq/L$ 由 27.2% (62 人) 降至 9.7% (22 人)；血鉀值 $4.5-5.9mEq/L$ 者由 36.4% (83 人) 提升至 56.6% (129 人)；血鉀值 $<4.4mEq/L$ 者由 6.6% (15 人) 提升至 20.1% (46 人)；高血鉀發生原因：飲食 64.1%、藥物 22.2%、透析不足 13.7%；醫囑開立頻率：前 6 個月 60.5% (138 人)、後 6 個月 39.5% (90 人)；藥物遵從率由 54.9% 提升至 99.2%；有關飲食部分：攝取高鉀食物比率由 76.1% 減少至 18.2%、醫護人員飲食衛教由 62.3% 提升至 99.4%、營養師衛教由 50.4% 提升至 95%；便秘情形 25.4% (40 人)。

結論(Conclusion)

由此研究分析，建立及加強病人正確的藥物遵從性，並配合跨領域團隊的飲食衛教確實能有效降低及預防高血鉀症的發生，進而減少醫囑開立、降低醫療資源的支出；且有效配合降鉀藥物讓病人在飲食攝取與血鉀值之間取得平衡，以提升透析病人生活品質。

關鍵詞(keywords)

降鉀藥物、血液透析、血鉀值、藥物遵從性、飲食衛教

以行為修正模式提升血液透析病人瘻管加壓止血技能改善方案

To improve the fistula pressure hemostasis skills for hemodialysis patients with behavior modification mode

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背景

透析病人血管通路功能不良是常見及高危險的合併症。現況分析得知病人透析後瘻管止血方式、使用纏繞手臂之加壓帶，止血後常覆以加壓帶返家，長期易致瘻管傷害；故運用行為修正模式提升血液透析病人瘻管加壓止血的技能，確保止血時間正常。臨床發現因病人知能缺失，醫護人員未給予指導及評估病人止血方法，以致影響病人的瘻管功能及使用壽命，故推動改善措施，確保提供病人最佳照護。

方法

2018年1月統計單位的血液透析病人有39人，使用透析導管者7人，自體瘻管及人工血管者32人，其中年齡大於65歲者12人，有照護者協助10人，以臨床觀察法監測病人透析後以手加壓止血的遵從率僅46.8%。分析發現病人的瘻管止血未以手加壓止血的原因，依序為：90%病人認為使用纏繞手臂之加壓帶止血方便好用，其次為病人不瞭解清纏繞手臂過度加壓，使血流受阻，致血管傷害；病人表示手部沒力氣，擔心自己以手加壓，易發生血液滲漏；醫護人員未給予教導止血技巧；病人多為高齡老人，需要協助者等因素。經文獻查證及資料收集，擬定措施為1.醫護團隊經由行為修正模式建構瘻管以手加壓的照護模式，依病人行為改變階段，應用不同方法策略，評估病人以手加壓止血知能。2.製作輔助工具、海報、圖表教材，提供意識到瘻管保護很重要或願意採取以手加壓止血的病人，進行個別指導及床邊示教演練、逐步改變病人行為。3.舉辦團衛活動，以同儕分享瘻管以手加壓止血技巧，增強病人改變行為。4.提供家屬，照護者個別指導，協助正確執行手部加壓止血技能；經由教導與學習，深化病人及照護者的健康識能。

結果

2018年9月30日止，統計病人及照護者共同參與治療的過程，提升病人的知能：1.病人個別接受瘻管以手加壓止血教育及示教演練達成率100%。2.單位舉辦二場的經驗分享團體衛教，提供病人、照護者止血技能演練及經驗交流。3.病人瘻管加壓止血遵從性由46.8%提升為77.1%；經強化病人學習的動機，逐漸改變行為並維持健康行為，達到自我健康管理的目的。

結論

本活動運用行為修正模式，強化透析病人的健康意識，改變其行為，使病人可做最適合自身狀況的照護舉措，進而鼓勵病人，家屬及照護者參與有利於病人健康的措施，正確執行瘻管以手加壓止血技能，提升自我照護能力及對醫療順從性，確保透析治療的安全。

比較線上血液透析過濾與高通量血液透析治療對病人營養狀況和身體成分之影響

Impact of Online Hemodiafiltration on Nutritional Status and Body Composition compared to High-Flux hemodialysis

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Background: Online-hemodiafiltration (OL-HDF) combines convective and diffusive solute removal in a single therapy and is the preferred dialysis modality in many countries. Currently, there are scarce and controversial evidence of the effect of OL-HDF on nutritional status. Moreover, recently only one study evaluates the short term effect of OL-HDF on body composition. The aim of the study was to compare these correlates with high-flux hemodialysis (HFHD) patients.

Methods: This was a retrospective cohort study comparing nutritional status and body composition between HFHD and OL-HDF patients treated in NephroCare centers in Taiwan. Stable cases on thrice-weekly dialysis, with at least 3 months therapy were selected. To adjust for confounding factors, we carried out a propensity score matching analysis. Two matched groups (101 pairs, n=202 patients) were generated and their baseline characteristics (Males 71.3%, median age 60.25±2.94 years, vintage 9.98±6.19 years) were balanced. During the 3-year clinical follow-up data was analyzed.

Results: Overall, there was no significant difference in nutritional markers and body composition between OL-HDF and HFHD. A higher benefit of OL-HDF for some subgroups was revealed. For example, in patients over 65 years old age, regardless of the vintage, Lean tissue Index (LTI) was significantly higher in patients with non-DM treated by OL-HDF than HFHD. Serum albumin level was also significantly higher in patients with DM, vintage year less than 5, and over-65 age group of men treated by OL-HDF. In female over-65 age, LTI was significantly higher in patients with non-DM, and vintage year less than 5 when treated with OL-HDF.

Conclusions: This preliminary study supports the generalizability of previous findings regarding the nutritional safety of OL-HDF. Sub-group analysis showed that some patient groups appear to benefit more from this mode of treatment. Compared with HF-HD, long-term OL-HDF appear to be preserved muscle mass and prevent protein-energy wasting in these HD patients.

Key words : Online-hemodiafiltration (OL-HDF), high-flux hemodialysis (HFHD), nutritional status, Lean tissue Index (LTI)

關鍵字：線上血液透析過濾，高通量血液透析，營養狀況，瘦肉組織指數

根據血流狀況自創血管理學檢查系統來評估透析患者的血管通路

A Categorical flow-based Physical Examination System(Woodpecker Project) for Hemodialysis Vascular Access Sites -- Assessing the sixth vital sign of hemodialysis patients.

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The dialysis fistula is the lifeblood of hemodialysis patients and is as important as the heart rate and blood pressure for the patients. Obstruction is the most serious complication of fistula and the treatment for blocked fistula is exactly a nightmare for patients and therapists of fistula. Besides consuming much time and causing intense pains to the patients, the process of removing blood clots can significantly increase the cost of medical treatment due to the use of thrombolytic drugs and relevant apparatus and instruments. Therefore, we need a way to screen out fistulas that may have a high risk of obstruction.

The most important factor affecting fistula obstruction is velocity of blood flow. We have developed a set of blood flow velocity scoring system based on physical examination result, which classifies the blood flow velocity in a fistula into nine grades in accordance with the ratio between thrill and pulsation and whether there is any sound during the period of relaxation. The obstruction degrees include the following levels based on the scores: green light - the fistula is in a good condition and needs a routine follow-up in 3 months; yellow light - the fistula needs special attentions and a follow-up in 1 month and monitoring points for the fistula should be provided to the patient and red light - immediate referral for treatment is required. The system can be used for discovering any potential fistula problem, deciding in interventional treatment as soon as possible and preventing fistula obstruction without early warning.

Three nurses who are familiar with the scoring method of the Yuan's General Hospital Vascular Access Team score the hemodialysis patients in our hospital regularly so as to find the patients who may face the high risk of fistula obstruction. The role of the nurses is just like a woodpecker searching pests in a trunk; so the project is named as Woodpecker Project and the nurses are called as Access Pecker.

Result :

The average incidence of fistula obstruction of our hospital in 2016 was 7.4‰. Since the Woodpecker Project was implemented, two patients have accepted a temporary dialysis catheter due to malfunction of dialysis fistula from August to November in 2017; thus the proportion has reduced from 0.56 (per 100 patients every month) to 0.26 (per 100 patients every month) and the incidence has decreased from 7.4‰ to 2.7‰. This project is significant as it demonstrates the importance of fistula function in hemodialysis patients. Medical staff should take the function of fistula as the sixth vital sign that should not be neglected and list it along with the other five vital signs of hemodialysis patients. This form needs to be promoted and attached to the record of vital signs of the hemodialysis patients.

血管通路流速為基礎的定期追蹤降低血栓與導管置入事件並避免通路遺棄
Access blood flow-based surveillance reduces events of thrombosis and catheter insertion and avoids access abandonment

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Objective: Vascular access (VA) function and patency are crucial for the optimal management of hemodialysis (HD) patients. The leading cause of vascular patency for an arteriovenous access is venous stenosis as a result of intimal hyperplasia. This morphologic change leads to hemodynamic change of VA including low vascular access flow (Qa), which can influence adequacy of dialysis. Early detection and intervention of venous stenosis can restore Qa, reduce progression of stenotic lesion and thrombosis, and avoid new access creation. However, no open data was available in Asia; therefore, we execute flow-based vascular surveillance to provide the information.

Methods: We conduct an observational cohort study using Transonic dilution method to measure Qa every three months of adult patients who underwent chronic HD treatment at the HD unit of Shin Kong Wu Ho-Su Memorial Hospital between January, 2017 and December, 2017 but new dialysis patients, those transfer to outside dialysis clinics or center, those with modality change and those who died during this period were excluded. We calculated and compared rate of thrombosis, rate of perm-cath insertion, rate of newly created arteriovenous fistula (AVF) and arteriovenous graft (AVG) between patients with AVF and those with AVG.

Results: We recruited 433 adult chronic HD patients. The proportion of VA is 78.98% (n=342) in AVF, 12.7% (n=55) in AVG, and 8.31% in perm-cath. The thrombosis rate (event/patient-year) of AVF and AVG is 0.0117 (n=4) and 0.309 (n=17). The rate of perm-cath insertion (event/patient-year) of AVF and AVG is 0.0083(n=3) and 0.054 (n=3). None of newly created AVF was found in both AVF and AVG groups. None of newly created AVG was found in AVF group and only 1 patient in AVG group received newly created AVG. Rate of thrombosis and perm-cath are significantly higher in AVF than in AVG. (p<0.001 and p=0.014, respectively)

Conclusions: Access blood flow-based surveillance reduces events of thrombosis and catheter insertion, especially in those of AVF and avoids access abandonment

血液透析病人便秘評估

Evaluation of Constipation in Hemodialysis Patients

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Abstract

Background: Constipation is a common medical condition associated with increased healthcare costs and impaired quality of life. Many hemodialysis(HD) patients suffer from constipation. The frequency of constipation has seldom been rigorously evaluated in HD patients, however. We conducted a survey self-perception on constipation in HD patients and compared the findings with those in hemodialysis patients through a simple questionnaire.

Method: A total of 434 individuals participated in the study. Simplified questions from the Rome IV criteria for functional constipation, and scored their stool form using the Bristol Stool Form Scale.

Results: The prevalence of constipation were using Rome IV criteria 13.8 %; patient perception 9.2 % and the BSFS 13.8%. The questionnaire sum score correlate well with the Rome IV criteria and BSFS and display an excellent AUC values of 0.85.

Conclusion: Prevalence differed according to the tool used. Relying on patients' self-perception may be unreliable. Patient assessment of constipation using the simplified questionnaire correlates well with established tools. Further research is needed to assess its usability and practicality in clinical practice.

Key words: Constipation, Hemodialysis

關鍵字：便秘，血液透析

運用多媒體衛教資訊化改善血液透析室照護品質及提升衛教滿意度 Using multimedia education and information technology to improve the quality of hemodialysis room care and improve the satisfaction of health education

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研究背景及目的

病人進入長期透析後，皆會出現透析相關併發症，其最根本的預防方法是飲食控制及自我照顧能力，所以在臨床上護理衛教佔極重要的地位。2017年11-12月根據單位每月品質報表發現，單位白蛋白 $<3.5\text{gm/dl}$ ，佔20%，血色素 $<8\text{g/dl}$ ，佔11%， $\text{P}>6\text{mg/dl}$ ，佔26%，皆超出單位品質監測之閾值，同月利用李克特五分量表調查家屬或病人對目前衛教單張使用滿意度，結果為2.5分，偏低；根據上訴結果，經現況分析後發現問題(一)衛教內容沒有一致的標準；(二)目前使用的衛教單張適用性不高、衛教方式不符合病人需求；(三)缺乏衛教輔助工具；(四)病人認知不足-錯誤的飲食習慣及服藥方式。

研究方法

經文獻查證後進行實施策略(一)製作單位衛教單張標準作業書(二)1.推廣多媒體衛教資訊化，內容包含中、台、英語等影音動畫，提高病人及照顧者學習動機及照顧能力；2.於單位交誼廳設置電子看板，輪流播放飲食日曆、圖片並使用紅(禁忌)、黃(偏高)、綠燈(可食)觀念，加強病人及照顧者飲食概念；3.每月定期更新衛教內容(三)1.製作透析人生懶人包 QR code，方便連結網頁並發放每位病友；2.於腎友透析期間，在電視牆強制播放網路連結使用說明；3.每日營養師會在線上回覆問題並與腎友互動；4.對於年老，需人照顧或不會使用 QR code 者，發放衛教光碟，教導照顧者或家屬播放給病人或照顧者觀看，護理人員每周電訪(四)1.每季舉辦腎友會，進行有獎徵答及英雄榜排名，加強腎友對食物認知、服藥方式；2.雙月安排營養師幫腎友上課及教腎友如何烹煮正確食物及烹調方式 3.單月安排護理人員進行團體衛教-透析病人飲食衛教，於2018年1月1日開始進行實施策略。

研究結果

2018年6月調查病人及家屬對目前多媒體衛教資訊化滿意度上升至4.7分，白蛋白 $<3.5\text{gm/dl}$ 佔10%，血色素 $<8\text{g/dl}$ 佔8%， $\text{P}>6\text{mg/dl}$ 佔20%，成效顯著。

研究結論

剛開始推行時對透析病人年齡大於65歲者，對資訊化的使用較排斥，在鼓勵後效果不佳，與單位同仁討論後，增設衛教光碟給照顧者或請家人幫忙播放已提升病人自我照顧能力，目前推行成效顯著，期望可推廣至其他透析中心。

關鍵字 衛教資訊化、血液透析室、照護品質、滿意度

接受血液透析的病人的身體組成與死亡率的關係**The association between body composition and dialysis mortality**黃于恬¹ 巫宏傑^{2*}Yu-Tien Huang¹, Hung-Chieh Wu^{*2}¹衛生福利部桃園醫院腎臟科 ²衛生福利部桃園醫院腎臟科¹ Division of Nephrology, Department of Internal Medicine, Taoyuan General Hospital, Ministry of Healthy and Welfare, Taoyuan, Taiwan² Division of Nephrology, Department of Internal Medicine, Taoyuan General Hospital, Ministry of Healthy and Welfare, Taoyuan, Taiwan

Background: This study examines the association between body composition and dialysis mortality.

Methods: From a total of 176 age-matched patients, the incidence rate of death for different groups were 3.7, 7.8, 10.3 and 16.5 per 1000 person-months. After adjusting for continuous variables, SMMI were independently associated with mortality. The difference between group A and D was more significant in women than those in men after multivariate adjustment (AHRs: 7.465 vs. 1.682) (P = 0.035 and 0.553). The discriminative power of SMMI to predict 5-year mortality were 0.700 for men and 0.750 for women, with the best cut-off value were 11.1 Kg/m² and 8.4 Kg/m²

Conclusions: Low muscle mass was associated with dialysis mortality. Obesity with low muscle mass was a predictor for dialysis death in women.

Key words: Mortality, Dialysis, Body composition parameters, Obesity, Low muscle mass

關鍵字：死亡率，透析治療，身體組成參數，肥胖，低肌肉質量

接受血液透析的老年男性病人血中睪固酮濃度與死亡率的關係**The association between serum testosterone and mortality among elderly men on hemodialysis**黃于恬¹ 巫宏傑^{2*}Yu-Tien Huang¹, Hung-Chieh Wu^{*2}¹衛生福利部桃園醫院腎臟科 ²衛生福利部桃園醫院腎臟科¹ Division of Nephrology, Department of Internal Medicine, Taoyuan General Hospital, Ministry of Healthy and Welfare, Taoyuan, Taiwan² Division of Nephrology, Department of Internal Medicine, Taoyuan General Hospital, Ministry of Healthy and Welfare, Taoyuan, Taiwan

Background: This study examines the associations between total testosterone levels and dialysis mortality.

Methods: Elderly men who initiate hemodialysis in Taoyuan General Hospital from January 2012 to June 2017 were enrolled. We reviewed clinical characteristics, biochemical data from start of dialysis and followed over a 5-year period after dialysis. Body composition parameters were assessed 3 to 6 months after dialysis. Skeletal muscle mass index (SMMI) was defined by skeletal muscle mass divided by squared height. We defined those with lowest tertile of testosterone values as low testosterone group. Adjusted hazard ratios (aHRs) and 95% confidence interval (95%CI) for mortality and cumulative survival curves were evaluated by Cox hazards model and Kaplan Meier method. The discriminative power of SMMI and testosterone levels were calculated according the area under the curve and the receiver operating characteristic curve (AUROC).

Results: From a total of 137 elderly hemodialysis patients, the range of lowest, middle, and highest tertile of testosterone values were < 6.25 nmol/L, 6.25 to 10.5 nmol/L and >10.5 nmol/L. After multivariate adjustment other than SMMI, total testosterone levels at baseline was a significant predictor for mortality (aHR(95%CI): 0.79(0.70—0.91). The unadjusted and adjusted c-statistics of SMMI vs. testosterone values to predict overall were 0.770(0.688—0.852) vs. 0.779(0.691—0.866) and 0.855(0.812—0.886) vs. 0.812(0.744—0.856) (Ps < 0.05); whereas the capacity of c-statistics were similar ($\chi^2 = 0.143$ and 2.709, Ps > 0.05)

Conclusions: Total testosterone value was a predictor for mortality. It was non inferior to SMMI in predicting dialysis mortality

Key words: Mortality, Dialysis, Body composition, Testosterone, Low muscle mass

關鍵字：死亡率，透析治療，身體組成，睪固酮，低肌肉質量

降低血液透析治療中空氣進入血液迴路管發生率

Reduce the incidence of air entering the blood circuit tube during hemodialysis treatment

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壹、計畫背景

血液透析治療中發生空氣進入迴路管事件是危及病人安全的重要原因之一。空氣進入血液迴路管容易導致人工腎臟及管路內血液凝固無法流通，嚴重者甚至無法將血液趕回病人體內，造成病人血液的流失，甚至會有貧血的症狀產生，必要時需進行輸血治療等後續處置，藉由降低治療中空氣進入血液迴路管發生率，分析原因，檢討因應措施，提供安全的透析治療。

貳、執行方式

空氣進入血液迴路管為本院血液透析中心護理照護品質監測項目之一，為確保病人治療過程安全，發生率閾值設定為 0%。統計 104 年 1 月-105 年 2 月治療中空氣進入血液迴路管事件，共計七個月異常發生率超過閾值。資料收集期間利用各項查檢表現進行場實地觀察：收集資料，找出導致空氣進入血液迴路管的真正原因，並藉由原因分析，擬定改善對策分別為：如何正確計算滴數、如何定時查看、教導正確操作 IV SET 導氣孔、正確銜接血液迴路管技術操作，教導同仁執行，並於改善對策實施後進行成效分析。

參、成果評估

血液透析治療中空氣進入迴路管異常發生率改善前為 0.019%，105 年 7 月始實施對策改善後 0.009%，達成率：181.2%。改善措施介入實施一年後，統計治療中空氣進入血液迴路管月平均發生率 0.008%。結果顯示，提昇血液透析護理人員給藥認知及正確銜接血液迴路管技術操作對降低治療中空氣進入迴路管發生率有顯著的成效。

肆、檢討與結論

血液透析治療中空氣進入血液迴路管經分析主要發生原因為人員操作錯誤造成，各項改善對策必須由「人」做起，持續在職教育訓練及落實標準作業流程執行，養成同仁良好的工作習慣，持續教育訓練、落實標準化，優化、內化、日常化，持續監測才能確保病人治療安全，提升護理照護品質。

糖尿病腎病變病人進入透析前後發生低血糖的趨勢及風險分析

Temporal Trends and Risk Factors of Hypoglycemia in Patients with Advanced Diabetic Kidney Diseases Transitioning to Dialysis

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Background: Rigorous glucose control is a key goal for the prevention of end stage renal disease in patients with diabetic kidney disease (DKD). However, both loss of kidney function and dialysis interfere with glucose homeostasis, which often leads to hypoglycemia. We aimed to investigate the temporal trends of hypoglycemia in advanced DKD patients transitioning to dialysis and ascertained the risk factors associated with hypoglycemia.

Methods: Using the Taiwan National Health Insurance Research Database, 46 779 advanced DKD patients transitioning to dialysis (PD: 4216, HD: 42563) between 1997 and 2011 were enrolled. We calculated the rates of hypoglycemia from 5 years before dialysis until 10 years after the process.

Results: A gradual increase occurred in the hypoglycemic rate as time advanced before dialysis initiation. The hypoglycemic rate (11.05%) peaked during the 1-year period before initial dialysis. One year following the start of dialysis, the hypoglycemic rate remained high (5.88%) but rapidly declined when compared with the predialysis periods. The hypoglycemic rates in the HD cohort were not significantly different from that in the PD cohort, except during the first year of dialysis. Multivariate analysis revealed that old age (>65 years), stroke, coronary artery disease, congestive heart failure, and use of antidiabetic agents, especially insulin and sulfonylurea, were associated with hypoglycemia.

Conclusions: Although hyperglycemia is the prime focus of attention during the management of diabetic patients, physicians must divert their attention to hypoglycemia, which might prove to be a cause for concern in advanced DKD patients, especially during the transition period.

Keywords: Hypoglycemia, diabetic kidney disease, dialysis

關鍵字：低血糖，糖尿病腎病變，透析

運用品質改善活動降低血液透析暫時性雙腔靜脈導管感染率**Reduced infectious rate in temporary hemodialysis catheter by healthy quality improvement program**

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Background: 暫時性雙腔靜脈導管主要作用:(1)提供急性腎衰竭病人，需進行緊急血液透析治療。(2)慢性腎衰竭病人，尚未建立永久性動靜脈血管通路。(3)已建立等待血管成熟病人，做為進行血液透析治療時的血管通路，一般置於右頸靜脈或雙側股靜脈。如暫時性雙腔靜脈導管發生感染，可能威脅病人生命安全，需即時拔除導管。本專案運用品質改善活動，探討降低暫時性雙腔導管感染率的可能性。

Methods: 研究觀察期從2017年9月至2018年9月。採品質改善活動，以現物、現況及現證原則，針對要因進行分析，探討其與醫師植管、治療照護技術及無菌技術等相關性。依要因研擬對策，包含:(1)落實侵入處置確認作業自主檢查評核。(2)修訂導管照護技術規範。(3)落實執行導管照護技術評核。(4)無菌觀念之海報製作及宣導。(5)侵入性處置部位之皮膚消毒由10% povidone-iodine alcohol solution更改為chlorhexidine gluconate, 2% CHG。(6)更換導管出口消毒由10% povidone-iodine alcohol solution及75% Alcohol，更改為75% Alcohol，其導管凹槽部分，使用酒精棉片消毒。(7)加強衛教病人，雙腔導管自我照護管理。(8)班與班-透析機及病床採低濃度漂白水擦拭。

Results: 改善前-2017年9月至2018年3月，使用暫時性雙腔靜脈導管共628人，感染人數共18人(感染率2.86%)，經由團隊運用改善方案後，改善中-2018年4月使用暫時性雙腔靜脈導管共88人，感染人數共1人，感染率降為1.13%(1人/88人)，改善後-2018年5月~9月，使用暫時性雙腔靜脈導管總人數為388人，感染人數共0人，感染率為0%。改善執行成果:(1)環境清潔(透析機及病床)執行率100%。(2)侵入處置確認作業自主檢查評核率100%。有效降低雙腔靜脈導管感染率。

Conclusion: 本研究顯示:(1)確實提供標準照護技術規範。(2)不定期評核操作技術。(3)持續加強宣導洗手五時機。(4)宣導及執行無菌技術操作。(5)有效及落實感染監控。(6)環境之改善-透析機及病床，採低濃度漂白水擦拭，可以有效改善暫時性雙腔靜脈導管感染率，讓病人安全完成血液透析治療。

關鍵字：血液透析、暫時性雙腔靜脈導管、感染率

較高的透析血磷下降率可以預測透析病患的死亡

Higher Intradialysis Serum Phosphorus Reduction Ratio as a Predictor of Mortality in Patients on Chronic Hemodialysis

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Background: Rapid shifting between extracellular and intracellular phosphorus can occur during dialysis sessions, through which will cause an aberrant intracellular signaling in chronic hemodialysis (CHD) patients. However, the impact of these intradialysis fluctuations of phosphorus on clinical outcomes has not been examined. Therefore, we aimed to investigate the relationship between intradialysis serum phosphorus reduction ratio (IDSPRR) and mortality in CHD patients.

Methods: This is a retrospective, observational cohort study to assess the prediction power of IDSPRR (>0.63 vs. ≤0.63) on mortality in a total of 805 CHD patients. All these fatal events were analyzed using the Cox proportional hazards regression model.

Results: After multivariable analysis, baseline IDSPRR which higher than 0.63 was significantly predictive of all-cause mortality (hazard ratio [HR]: 1.58; 95% confidence interval [CI]: 1.10–2.26), but not for cardiovascular (CV) mortality (HR: 1.41; 95% CI: 0.91–2.18). However, when time-varied IDSPRRs were applied, a value greater than 0.63 was not only significantly predictive of all-cause (HR: 1.74, 95% CI: 1.16–2.63) but also CV (HR: 2.04, 95% CI: 1.23–3.40) mortality.

Conclusions: Therefore, high IDSPRR (> 0.63) is independently associated with increased all-cause and CV mortality, which finding may implicate a negative impact of rapid intracellular phosphorus-shifting on CHD patients.

Keywords: hemodialysis, phosphorus, intradialysis serum phosphorus reduction ratio, all-cause mortality, cardiovascular mortality.

血液透析，透析中血磷下降率，全因死亡，心因性死亡

106年中部醫院血液透析中心患者高血磷原因與團隊照護改善成效分析 Analysis the reasons of hyperphosphatemia and improvement of team work care at Medical Center hemodialysis patients in 2016

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Background: 高血磷是洗腎患者最常見現象之一，高血磷容易有皮膚搔癢、骨質疏鬆、骨頭病變甚至增加死亡風險等病發症，分析本醫學中心血液透析中心每月血液透析患者106年1~12月血磷>6mg/dl平均約26%，已超出血液透析訪視作業評量標準要求血磷值 ≥ 6.0 mg/dl佔20%以下。本文分析106年中部醫學中心高血磷原因與團隊照護改善成效。

Methods: 收集106.1.1~12.31每月血磷>6mg/dl洗腎患者，經由營養師飲食衛教與醫療團隊照護，分析高血磷與團隊照護改善成效。

Results: 106.1.1~12.31 每月血液透析患者平均約 238 人，每月血磷>6mg/dl 總人數平均 63 人，每月血磷>6mg/dl 平均約 26.47%；106.1.1~12.31 血磷>6mg/dl 總人數共 181 人，共 743 總人次；分析 181 人中，一年中出現 1 次血磷>6mg/dl 有 38 人(20.99%)最多數；出現 11 次有 1 人(0.55%)最少數，而一年出現 12 次有 6 人(3.31%)；以人次來說，出現 6 次，有 17 人共 102 人次(14.26%)最多次；出現 11 次，有 1 人共 11 人次(14.26%)最少次；經由營養師飲食衛教與醫療團隊照護，每月血磷值與上個月比較，血磷值改善者有 540 人次(72.68%)，變差者有 184 人次(24.76%)，維持不變者有 19 人次(2.56%)，結果有明顯改善。743 總人次中分析高血磷原因，以飲食遵從性不佳出現有 609 次(51.13%)最多數，其次為服藥遵從性不佳出現有 318 次(26.15%)，次之為患者對高磷的食物不詳，出現有 98 次(8.2%)。分析每月血磷>6mg/dl 之 12 人中全部三餐都是外食為主，經常攝取攝取醃漬油炸加工食物，不僅飲食遵從性不佳，甚至改變飲食習慣意願低落，可見飲食習慣與行為改變對血磷值影響佔有重要角色。個別性給予高血磷改善方案，依比例為 1.告知正確飲食控制的重要性 15.38%；2.告知按時服藥之重要性 13.46%；3.每次透析時追蹤服藥配合度及正確性 11.14% 等等。

Conclusions: 飲食與服用藥物的遵從性不佳與血磷值高低息息相關，血液透析患者都應該養成良好的飲食與服用藥物的遵從性，配合個別性改善方案，期望達成每月血磷>6mg/dl佔20%以下。

Key words: Hyperphosphatemia、team work care

關鍵字：高血磷、團隊照護

鐵含量對多囊腎長期血液透析病患預後-台灣腎臟醫學會資料庫研究
Different Effects of Iron Indices on Mortality in Patients with Autosomal Dominant Polycystic Kidney Disease After Long-Term Hemodialysis: A TWRDS study

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Background and aims:

Iron supplement is essential in cooperation with erythropoietin stimulating agent to maintain hemoglobin levels in dialysis patients. However, patients with polycystic kidney disease (PKD) have a higher endogenous erythropoietin level. Therefore, the recommended iron indices in PKD patients may be different.

Methods: This is a cohort study from a nationwide population-based database, Taiwan Renal Registry Data System (TWRDS), in which a total 84,219 patients underwent hemodialysis with valid baseline iron profiles were enrolled in this study. Baseline and time-averaged cox regression analysis method was designed to evaluate mortality risk stratified by their underlying disease inherited polycystic kidney disease (PKD) or not. Primary outcome was 3-year all-cause mortality. Our predictors were iron stores including serum ferritin level (ng/mL) and transferrin saturation (TSAT, %).

Results:

A total 1346 PKD patients and the other 82873 non-PKD patients were surveyed. Mean age were 56.2±13.2 and 61.7±13.5 years respectively, and duration of follow-up were 2.62±0.89 and 2.28±1.04 years. In the fully adjusted model, mortality risk of ferritin >800 ng/mL (Hazard ratio (HR) = 1.51; 95% CI = 1.39-1.63) or transferrin saturation (TSAT) >50% (HR = 1.42; 95% CI = 1.26-1.60) were significant higher among non-PKD patients compared to those in normal range of iron indices. In addition, a U-shape curve between mortality and Ferritin/TSAT levels was observed in non-PKD patients. However, these phenomenon was not detected in PKD patients.

Conclusions:

Iron stores among PKD and non-PKD patients acts differently on mortality. The guideline for iron supplement or recommended serum ferritin level or TSAT should be considered individually especially on PKD patients.

Keywords: Ferritin; Hemodialysis; Iron profiles; Polycystic kidney disease; Transferrin saturation

兒童重症族群使用連續性腎臟替代療法的預後因子探討 Prognostic Factors of Continuous Renal Replacement Therapy in Critical Children

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Background:

Continuous renal replacement therapy (CRRT) had become the preferred device for hemodynamically unstable adults and pediatric patients. However, the study focused on the impact of CRRT on clinical outcomes in critical pediatric remains limited.

Materials and Methods:

Pediatric patients underwent CRRT between 2011 and 2018 were retrospectively enrolled. Patient with non-renal indications of CRRT, including inborn error of metabolism, hepatic failure, drug overdose, were excluded. The demographic and clinical characteristics, laboratory data, dose, duration, and efficacy of CRRT dosing, and outcomes were analyzed.

Results:

Seventy-five patients with male predominance (M:F=39:36) were enrolled. The mean age was 8.8 ± 7.15 years old, of which, the youngest patient was 3 days old. Indications for CRRT were acute kidney injury with complicated acid-base imbalance, electrolytes imbalance, and/or fluid overload. The mean duration and replacement dosing of CVVH were 9.96 ± 12.5 days and 39.89 ± 10.99 ml/kg/hr, respectively. The overall survival rate and renal survival rate were 46.67% and 71.42%, respectively. High PRISM IV score, status post bone marrow transplantation, and respiratory failure were significantly correlated with 90-day mortality. Logistic regression analysis demonstrated that patients who had received bone marrow transplantation independently associated with higher mortality. Among survivors, 10 of 35 had advanced chronic renal disease. Hypofibrinogenemia prior to CRRT had a favorable renal outcome. No benefit evidence of high replacement rate was found in this study.

Conclusion:

Patients who had received bone marrow transplantation was an independent risk factor of mortality in pediatric CRRT patients. Hypofibrinogenemia was a favorable factor of renal outcome among survivals.

老年透析病人低血鈉之相關因子分析

Body Composition and Biochemical Factors Associated with Hyponatremia in Elderly Hemodialysis Patients

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Background: Elderly patients who needed to receive hemodialysis is increasing around the world. Hyponatremia is commonly encountered in elderly population and also in patients receiving hemodialysis. It has been reported that hyponatremia is closely linked to mortality in uremic patients. The aim of this study was to investigate the body composition of these patients and identify the associated factors of hyponatremia in elderly patients on hemodialysis.

Methods: Seventy-seven uremia patient with age >65 years old were enrolled in this study. The clinical data were recorded and pre-dialysis laboratory data were collected and averaged for 12 months prior to the study. Measurement of body composition was performed 30 minutes before mid-week hemodialysis session. The patients were then divided into three groups according to the frequency of hyponatremia.

Results: The mean age of the subjects was 73.3 ± 6.6 years and 38% were male. Mean sodium level was 132.4 ± 3.6 . Based on the frequency of hyponatremia, 15.6% patients had persistently normal serum sodium levels, 46.7% had fluctuated sodium levels and 37.6% had chronic hyponatremia. Patients with chronic hyponatremia had significant higher prevalence of hypertension but lower total body water, uric acid, calcium, and hemoglobin. In multivariate study, serum sodium level was positively correlated with extracellular water, albumin but inversely associated with hypertension.

Conclusions: Hyponatremia or fluctuation of sodium levels was very common in old aged hemodialysis patients. Elderly patients with chronic hyponatremia had higher prevalence of hypertension but was more anemic and with lower total body water. Poor nutrition status and extracellular water overload may predict the development of hyponatremia.

Key words: hyponatremia, body composition monitor, hemodialysis, old age

血中 Pentraxin-3 可預測透析血管通路不良事件

Circulating Pentraxin-3 Predicts Hemodialysis Vascular Access Failure

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Background: Vascular access failure is associated with increased morbidity and mortality in hemodialysis (HD) patients. Therefore, we aimed to identify novel biomarkers for other vascular disease as an early predictor for stenosis or thrombosis of arteriovenous fistula (AVF). Pentraxin-3 (PTX-3) had shown to be related to atherosclerosis and peripheral artery disease in hemodialysis patients. Higher level of neutrophil gelatinase-associated lipocalin (NGAL) and Chitinase-3-like protein 1 (CHI3L1) were both related to higher risks of cardiovascular events and subclinical atherosclerosis in the patients whose estimated glomerular filtration rate (eGFR) more than 30 ml/min per 1.73 m². We hypothesized that these 3 biomarkers may also be early predictors for vascular access failure and all-cause mortality in the hemodialysis population.

Methods: This prospective observational study enrolled total 184 HD patients from 2016 to 2018. We investigated the correlations between these biomarkers and future clinical outcomes. Plasma level of PTX-3, NGAL and CHI3L1 were measured by ELISA assays. Clinical outcomes, including percutaneous transluminal angiography, thrombectomy, revision, creation or bypass of AVF and death were reviewed.

Results: Among 184 patients, mean age was 66.4±15.4 years old and 44% of those were male. The rate of underlying diseases including Type 2 diabetes mellitus (DM), hypertension (HTN), hyperlipidemia, coronary artery disease (CAD), congestive heart failure (CHF) and peripheral arterial occlusion disease (PAOD) were respectively 49%, 85%, 21%, 32%, 22% and 5%. During a 2-year follow-up period, 79 patients (42.9%) experienced thrombotic vascular events and 27 deaths (14.7%) occurred. Higher plasma level of PTX-3 was found in patients with thrombotic vascular events compared with those without events (hazard ratio [HR], 1.096; 95% confidence interval [CI], 1.001–1.200; *p*=0.049). Plasma level of CHI3L1 was higher in the group of patient dead in 2 years, compared with those survived (HR, 1.008; 95% CI, 1.002–1.015; *p*=0.016).

Conclusions: In HD patient, plasma PTX-3 was associated with higher risks of hemodialysis vascular access failure. In additionally, CHI3L1 was associated with higher risks of mortality in HD patients, whereas NGAL level had not shown to related to thrombotic vascular events or all-cause mortality.

Key words: Hemodialysis, Vascular access failure, Mortality, PTX-3, CHI3L1

關鍵字: 血液透析、血管通路功能喪失、死亡率

血液透析患者高的血清硬化素跟骨密度呈負相關

Serum Sclerostin Level is Negatively associated Bone Mineral Density in Hemodialysis Patients

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Background: Sclerostin inhibition of Wnt/ β catenin signaling pathway leads to decreased bone formation due to impaired osteoblastogenesis and decreased osteoblast survival. As a Wnt signaling pathway inhibitor, it is interesting to investigate whether sclerostin or dickkopf-1 (DKK1) level is correlated with bone mineral density (BMD) in hemodialysis (HD) patients.

Methods: Blood samples were obtained from 75 HD patients. BMD was measured by dual energy X-ray absorptiometry of the lumbar vertebrae (L2–L4). Serum sclerostin and DKK1 concentrations were determined using a commercially available enzyme-linked immunosorbent assays.

Results: Ten (13.3%) HD patients had osteoporosis, 20 patients (26.7%) had osteopenia, and 45 patients had normal BMD. Advanced age ($P = 0.008$), decreased height ($P < 0.001$), body weight ($P < 0.001$), body mass index (BMI, $P = 0.0012$), waist circumference ($P = 0.001$), was associated, while increase alkaline phosphatase (ALP, $P = 0.019$), urea reduction rate (URR, $P = 0.006$), fractional clearance index for urea (Kt/V, $P = 0.008$), sclerostin level ($P < 0.001$), and female HD patients ($P = 0.001$) was associated with lower lumbar T-scores. Multivariate forward stepwise linear regression analysis with adjustment for the significant variables indicated that low serum level of sclerostin ($\beta = -0.546$, adjusted R^2 change = 0.454; $P < 0.001$), female HD patients ($\beta = -0.288$, adjusted R^2 change = 0.072; $P = 0.0018$), and advanced age ($\beta = -0.216$, adjusted R^2 change = 0.041; $P = 0.007$) were significantly and independently associated with lumbar BMD among the HD patients.

Conclusion: In this study, advanced age or female gender is associated with poor BMD, while serum sclerostin level, but not DKK1, is negatively associated with BMD in HD patients.

Key words: bone mineral density, sclerostin, hemodialysis

關鍵字：骨密度，硬化素，血液透析

血管張力素II型受體拮抗劑與慢性血液透析患者的肌肉力量保持有關 Angiotensin II Receptor Blockade is associated with Preserved Muscle Strength in Chronic Hemodialysis Patients

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Background: Sarcopenia, defined as low muscle mass and strength, is highly prevalent in patients undergoing chronic hemodialysis (HD). Angiotensin II overexpression had been recognized to impair skeletal muscle strength. Accordingly, angiotensin II receptor blockers (ARBs) potentially possess a muscle protective effect. This cross-sectional study aimed to identify the factors associated with low muscle strength and to explore the relationship between ARB use and muscle strength in chronic HD patients.

Patients and Methods: A total of 120 chronic HD patients, aged 63.3 ± 13.2 years, were included in this study. Basic characteristics, handgrip strength (HGS), body composition, and nutritional status were assessed, and blood samples for biochemical tests were obtained. We divided these participants into normal- and low HGS groups according to the consensus of the European Working Group on Sarcopenia in Older People (EWGSOP).

Results: We observed that 78 (65.0%) patients had low HGS. In our cohort, we found that height ($r = 0.653$; $P < 0.001$), weight ($r = 0.496$; $P < 0.001$), body mass index ($r = 0.215$; $P = 0.020$), skeletal muscle index ($r = 0.562$; $P < 0.001$), albumin ($r = 0.197$; $P = 0.032$), and serum creatinine ($r = 0.544$; $P < 0.001$) were positively and age ($r = -0.506$; $P < 0.001$), subjective global assessment (SGA) score ($r = -0.392$; $P < 0.001$) and fractional clearance index for urea (Kt/V) ($r = -0.404$; $P < 0.001$) were negatively correlated with HGS. According to our analysis, age (Odds ratio, OR = 1.11, 95% confidence interval, 95% CI = 1.05-1.17, $P < 0.001$), HD duration (OR = 1.01, 95% CI = 1.00-1.02, $P = 0.010$), diabetes (OR = 13.33, 95% CI = 3.45-51.53, $P < 0.001$), Kt/V (OR = 1.61, 95% CI = 1.06-2.46, $P = 0.027$), and SGA score (OR = 1.19, 95% CI = 1.03-1.38, $P = 0.017$) were regarded as independent predictors of low HGS. In contrast, ARB use (OR = 0.25, 95% CI = 0.07-0.93, $P = 0.039$) was independently associated with preserved HGS in chronic HD patients, after adjustment for multiple confounding factors.

Conclusion: Our study is the first report in chronic HD patients to indicate a potentially protective effect of ARB on muscle strength. However, further longitudinal follow-up and intervention studies are needed to confirm this finding.

Key words: muscle strength, angiotensin II receptor blockers, hemodialysis

關鍵字：肌肉力量，血管張力素 II 型受體拮抗劑，血液透析

維持性血液透析患者急診醫療利用之分析**Emergency Department Utilization among Patients receiving Maintenance Hemodialysis**

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Background:

End-stage renal disease (ESRD) is a growing global health concern with increased disease burden and high medical costs. Utilization of the emergency department (ED) among dialyzed patients and the associated risk factors remain unknown.

Methods:

This longitudinal cohort study was sampled from National Health Insurance Database in Taiwan. Patients aged 19 to 90 years old with maintenance hemodialysis between January 1 to December 31, 2010 were recruited. We matched non-dialysis individuals by age, sex and Charlson Comorbidity Index (CCI) as control group from the same data source. The utilization of emergency department among enrolled individuals were identified in 2012. We used generalized estimating equations with multiple variables adjustment to explore risk factors associated with resuscitation in emergency department visits among all suffered patients.

Results:

One group of 2,985 individuals who received maintenance hemodialysis, and another group of 2985 patients that did not receive hemodialysis, between January 1, 2012, and December 31, 2012, were included in this study. There were 4,822 ED visits in the hemodialysis group, and 1,755 ED visits in the non-dialysis group. Analysis of multivariable generalized estimating equations identified the risk associated with resuscitation during ED visits to be greater in individuals who were receiving maintenance hemodialysis, aged 55 to 69 years or older than 70 years, hospitalized in the past year, and assigned first and second degree of triage.

Conclusions:

Patients receiving maintenance hemodialysis had higher ED utilization and a significantly higher risk of resuscitation during ED visits than those without hemodialysis.

Keywords: hemodialysis; emergency department utilization

關鍵字：血液透析；急診醫療使用

中西整合治療模式減少透析病患住院醫療費用

Integrated Chinese and Modern Medicine Reduce the Cost of Hospitalization in Hemodialysis Patients

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Background: 接受血液透析的末期腎病患者常罹患多種合併症，故需要頻繁的就醫，這不僅增加病人負擔，也增加醫療費用的支出。過去的研究報告雖然顯示血液透析病患的中醫治療可以治療多種症狀（如癢疹、腸胃道症狀），然而缺少中西整合治療之成效與醫療費用的探討。因此本研究希望了解接受中西整合治療的血液透析病人與醫療費用的相關性。

Method: 本研究為回溯性研究，納入 2014 年 1 月至 2018 年 6 月臺南市立安南醫院接受中西整合治療的血液透析患者，但須排除在透析初期（剛接受透析治療半年內）就接受中西整合治療者，或接受整合治療後三個月內死亡或轉院之病患。比較中西整合治療病患在接受治療前三個月與接受治療後三個月的住院率、住院費用以及門急診費用的差異。其中門診費用需排除血液透析固定申報之費用。數據分析使用 STATA 軟體，採 Pair-T test 與 T-test 統計方法。

Result: 2014 年 1 月至 2018 年 6 月臺南市立安南醫院有 201 位門診血液透析病患，其中有 83 位曾接受過中西整合治療，經排除透析初期就開始治療和接受治療三個月內死亡或轉院之病患後，總計 36 位病患進入研究。男性與女性各為 18 位，年齡為 62.25 ± 12.16 歲，在三個月的期間接受中醫治療次數為 9.47 ± 9.69 次 治療前後之平均住院次數分別為 $0.33 \pm .75$ 次及 0.25 ± 0.64 次($p=0.06$)，住院費用分別為 23683.64 ± 50656.91 元與 23683.64 ± 50656.91 元($p=0.005$)，門急診費用為 15549.22 ± 15106.88 元與 20243.31 ± 16766.34 元($p=0.08$)，總費用為 39232.86 ± 8681.073 元與 29391.39 ± 5646.817 元($p=0.10$)。根據性別來分析，男性與女性患者可住院費用改變分別為用 -2938 ± 10664.65 元與 -26133.11 ± 37154.94 元，總住院費用改變為 4653.611 ± 20711.4 元與 -24336.56 ± 42326.03 元($p=0.013$)。因此治療前相比，在治療後可降低住院費用，有統計學上的差異($p=0.005$)，然而在總費用部分沒有統計學上意義。但女性病患不僅在住院費用降低，總費用也降低。

Conclusion: 本研究顯示於血液透析室中導入中西整合治療，與住院費用降低有關，尤其是女性病患，與總費用降低有呈現相關性。因此可以提供具備中醫服務之醫院，採用此項整合服務模式。然而對於病患之生活品質或其他疾病之益處，仍須更多大型且前瞻性研究提供證據支持。

Keywords: Integrated Chinese Traditional therapy, hemodialysis, medical expenses

關鍵字：中西整合治療、血液透析、醫療費用

血液透析患者的巨細胞病毒專一 T 淋巴球多功能性存在鈍化現象

Lack of Polyfunctional Cytomegalovirus-specific T cells in Hemodialysis Patients

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Background: Polyfunctional T cells are critical for maintaining protection against pathogens. Patients with end-stage renal disease (ESRD) are at increased risks for infectious complications and their T cell immunity against viruses may be impaired. The current study intends to investigate the effects of renal disease on T cell immunity by analyzing T cell differentiation and polyfunctionality response against cytomegalovirus (CMV), an ubiquitous pathogen.

Method: 21 healthy individuals and 47 patients with ESRD on maintenance hemodialysis (HD) were enrolled in this study. All the donors were seropositive for CMV. Two CMV peptide pools (IE1 and pp65) were used to stimulate PBMCs and four effector functions were measured by multicolor flow cytometry (IL-2, TNF α , IFN γ and CD107a) to identify polyfunctional T cells (cells capable of four functions).

Result: The age of these two groups were similar (mean, 60 years old). We found that, in patients with renal disease, especially the HD patients, there is a decrease in CD4⁺ and CD8⁺ TN cells and an increase in CD4⁺ and CD8⁺ TEM or TEMRA cells. In addition, polyfunctional cell were dramatically reduced in the HD population. Among healthy individuals and HD patients, CD4⁺ CMV-IE1-reactive polyfunctional cell frequencies were 2.0% and 0%, respectively (p=0.002). The CD8⁺ CMV-pp65-reactive polyfunctional cell frequencies were 12.4% and 0.8% in the three groups (p<0.001). Expression levels of PD-1 and CTLA-4 of CMV-specific polyfunctional T cells were higher in HD patients than healthy donors.

Conclusion: HD patients are characterized by the loss of polyfunctional, CMV-specific T cells and increased PD-1 expression. Whether impaired CMV-specific polyfunctionality contributes to increased CMV disease after renal transplantation requires further study.

探討血液透析病人動靜脈瘻管異常上針因素

Factors Associated with Re-Puncture of Arterio-Venous Fistula in Hemodialysis Patients

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背景: 末期腎臟疾病病人以血液透析為腎臟替代療法。血液透析的永久血管通路，以自體動靜脈瘻管 (Native A-V fistula) 和人工動靜脈瘻管 (A-V graft) 為主。血液透析過程，如出現血管通路上針失敗除造成瘻管的損傷亦造成病人及其家屬焦慮與不安，也增加護理人員工作負荷及挫折感且影響透析品質及病人對醫護照護滿意度。

方法: 依據血液透析病人動靜脈瘻管異常上針原則，異常上針定義為於每次血液透析未能安全及正確執行穿刺動靜脈瘻管各一針。依此原則，探討影響13個月(106年7月至107年7月)，以upair-t test和ANOVA followed by bonferroni post hoc test來做分析。接受血液透析病人異常上針因素，含接受重新上針病人數、重新上針血管類別、重新上針部位及其原因、及護理人員年資。

結果: 研究結果呈現，血管類別之重新上針率Native AV fistula 高於 AV graft ($p < 0.001$)。重新上針部位V side 高於A side ($p < 0.001$)。影響重新上針因素，以血管rupture及blood clot是造成重新上針主要原因，其次為病人high pressure和low blood flow。以護理人員年資低於5年導致重新上針比率最高。

結論: 年資較淺的護理人員瘻管穿刺，血管評估能力不適當及經驗不足，持續的在職教育和臨床主管及資深護理人員現場臨床指導資淺的同仁評估瘻管走向、血管彈性和下針角度技巧，是必要的。安全和正確的上針技術能減少因為血管重打造成對病人瘻管的傷害，提供病人更優質的透析照護品質。

關鍵詞: 血液透析、動靜脈瘻管、重新上針。

key word: Hemodialysis, arterio-venous fistula, re-puncture。

透析病人的慢性病毒性肝炎相關研究

Chronic Hepatitis in ESRD Dialysis Patients

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Background: Chronic virus hepatitis is endemic in patients with end-stage renal disease (ESRD) on dialysis in Taiwan. Limited data are available to compare long-term mortality between HBV-only, HCV-only and HBV + HCV in ESRD dialysis patients. This longitudinal national cohort study is aim to analyze the outcomes of ESRD dialysis patients in different chronic virus hepatitis group.

Methods: A total of 2237 ESRD patients with chronic virus hepatitis who started dialysis between 2000 and 2006. Follow-up was from dialysis initiation to death, dialysis cessation, or 31 December 2008. Cox proportional hazards models were used to identify mortality risk factor.

Results: The HBV-only group had 1037 patients, the HCV-only group had 1064, and the HBV+HCV group had 136. The 1-, 5-, and 7-year cumulative survival rates were: HBV-only group: 94.8%, 62.1% and 54%; HCV-only group: 90.6%, 52.5% and 71.9%; and HBV+HCV group: 91.7%, 55.1% and 44.4%. Multivariate analysis showed no significant differences in the mortality rate between groups. The mortality rate of patients with liver cirrhosis (LC) was double that of patients without LC (HR: 2.07, 95% CI: 1.77-2.41).

Conclusions: Comorbid LC was the most important independent predictor of mortality no matter any different chronic virus type in ESRD dialysis patients. More attention should be paid to prevent progression to LC in ESRD dialysis patients with chronic virus hepatitis.

透析病人的憂鬱症相關研究

Depression in ESRD Dialysis Patients

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Background: While depression has been associated with adverse outcomes in patients with end-stage renal disease (ESRD), studies investigating the association between depression and outcomes are scarce. This longitudinal study tapped Taiwan National Health Insurance Research Database to follow the occurrence of psychotic episodes, suicide attempts, and mortality after initiation of dialysis in patients with depression.

Methods: A total of 67,993 incident ESRD dialysis patients were enrolled. They were stratified into mild depression, major depression and no depression. Major outcomes were mortality, psychotic episodes, and suicide attempts after start of dialysis. They were followed-up from the first dialysis until death, the end of dialysis, or December 31, 2008, the end of the follow-up period. Cox proportional hazards models were used.

Results: 1036 of these patients were diagnosed as being depressed in pre-ESRD stage and received medical assistance. Of these patients, 585 had mild depression and 451 had major depression. Patients without depression had 1-, 3-, and 7-year cumulative survival rates of 93%, 77%, and 45%, respectively; those with mild depression 89%, 68%, and 42%, respectively; and those with major depression 88%, 56%, and 36%, respectively (log-rank test: $P < 0.001$). Mild depression was associated with a 26% higher death risk (HR: 1.26, 95% CI: 1.11-1.42); major depression with a 51% higher death risk (HR: 1.51, 95% CI: 1.31-1.73). In addition, patients with mild depression had 2.79 times the risk of psychotic episodes (HR: 2.79, 95% CI: 2.22-3.49) and 6.13 times the risk of suicide attempt (HR: 6.13, 95% CI: 3.24-11.61). Patients with major depression had 5.66 times the risk of psychotic episodes (HR: 5.66, 95% CI: 4.66-6.88) and 3.31 times the risk of suicide attempt (HR: 3.31, 95% CI: 1.23-8.95).

Conclusions: Depression was strongly associated with mortality, psychotic episodes, and suicide attempts in ESRD dialysis patients.

腹主動脈鈣化能有效預測血液透析患者心血管疾病

Abdominal Aortic Calcification Score can Predict Future Coronary Artery Disease in Hemodialysis Patients: A 5-Year Prospective Cohort Study

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Background

Abdominal aortic calcification (AAC) has been known to be associated with cardiovascular mortality in hemodialysis. However, the association between AAC and future coronary artery disease (CAD) occurrence is not clear. We aimed to clarify the association of AAC severity and the occurrence of future CAD events in hemodialysis patients.

Methods

Hemodialysis patients were recruited in this prospective cohort study. AAC severity was quantified by AAC score, which was measured by lateral lumbar radiography. We used receiver operation curve (ROC) analysis to find the cutoff AAC value for CAD prediction. CAD-free survival was analyzed by Kaplan-Meier study.

Results

There were 303 patients recruited for study with a median (interquartile range) follow-up of 95 (65-146) months. The AAC score in patients with occurrence of new CAD [9 (3-15.25), n=114] was higher than in patients without new CAD occurrence [5 (1-9) n=189], $p<0.001$. Multivariate hazard ratio of AAC score for CAD was 1.039 ($p=0.016$). ROC study showed that an AAC score of 5.5 had a sensitivity of 0.658 and a specificity of 0.587 in the prediction of new CAD occurrence. Patients with AAC score above 5.5 had significantly higher cumulative incidence of CAD than patients with AAC score below 5.5. Age, diabetes, prior history of CAD, and longer dialysis vintage were major factors associated with higher AAC score.

Conclusions

AAC score can predict the occurrence of future CAD events in HD patients. The best cut-off value of AAC score is 5.5. AAC score greater than 5.5 is a reliable abdominal aortic calcification marker, and can predict future CAD in ESRD patients. Major contributive factors for higher AAC score were age, presence of diabetes, prior history of CAD, and longer dialysis vintage.

Keywords: Abdominal aortic calcification, coronary artery disease, hemodialysis

關鍵字：腹主動脈鈣化，冠狀動脈疾患，血液透析

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以訪談法研究台灣血液透析和腹膜透析病人的自付費用和生產力損失
Out-of-pocket Costs and Productivity Losses in Hemodialysis and Peritoneal Dialysis from a Patient Interview Survey in Taiwan

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ABSTRACT

Objectives: The total medical (economic) costs of haemodialysis (HD) and peritoneal dialysis (PD), including direct medical costs, out-of-pocket (OOP) costs, and productivity losses, have become an important issue. This study aims to compare the direct non-medical costs and indirect medical costs of both modalities in Taiwan.

Design and Setting: This multicentre study included cross-sectional interviews of patients over 20 years old and articulate, who had been continuously receiving long-term HD or PD for more than three months between April 2015 and March 2016. Mann-Whitney U test, Wilcoxon rank sum test, and 1,000 bootstrap procedures with replacement were used for analysis.

Outcome measures: Differences in OOP costs and productivity losses.

Results: There were 308 HD and 246 PD patients available for analysis. HD patients had significantly higher monthly OOP costs than PD patients after bootstrap procedures (NTD 5,912 vs. NTD 5,225, $p < 0.001$; NTD, New Taiwan Dollars; 1 US Dollar = 30 NTD). Compared with PD patients, HD patients had higher monthly productivity losses after bootstrap procedures (NTD 14,150 vs. NTD 11,611, $p < 0.001$), resulting from more time spent seeking outpatient care (HD, 70.4 hours vs. PD, 4.4 hours, $p < 0.001$) and time spent by family caregivers for outpatient care (HD, 66.1 hours vs. PD, 6.1 hours, $p < 0.001$). The total costs per patient-month of HD and PD modalities, including OOP costs and productivity losses were NTD 20,062 and NTD 16,836, respectively.

Conclusions: The HD modality has higher OOP costs and productivity losses than the PD modality in Taiwan.

Keywords: cost, haemodialysis; out-of-pocket cost; peritoneal dialysis; productivity loss

血液透析前後心電心音參數的研究

Investigation of Acoustic Cardiography Parameters Before and After Hemodialysis

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Background: End-stage renal disease (ESRD) is a major healthcare problem worldwide, and cardiovascular (CV) disease is a major cause of mortality in this population. Acoustic cardiography is a new technique which synchronizes cardiac auscultation with electric information to detect and characterize heart sound. Acoustic cardiography is an useful tool to identify heart failure earlier. The aim of this study is to investigate parameters of acoustic cardiography in the hemodialysis (HD) population.

Materials and Methods: This study enrolled 162 maintenance HD patients between October 2016 and April 2018. Demographic, medical, and laboratory data were collected. Acoustic cardiography was performed before and after HD to assess the parameters including S3, S4, SDI, EMAT and LVST.

Results: The mean age was 60.4 ± 10.9 years, and 86 (53.1%) patients were men. The dialysis vintage was 8.2 (25th–75th percentile range, 3.9–13.8) years. The mean albumin was 3.9 ± 0.3 g/dL, the mean PEP/ET was 0.3 ± 0.1 and the mean ankle-brachial index (ABI) was 0.95 ± 0.20 . Before hemodialysis the mean S3 was 2.8 ± 1.3 , the mean S4 was 4.9 ± 2.0 , the mean SDI was 3.7 ± 1.6 , the mean EMAT was 90.9 ± 15.7 ms and the mean LVST was 331.8 ± 37.5 ms. Multivariate linear regression analysis showed the EMAT/LVST before hemodialysis was negatively associated with serum albumin level ($\beta = -0.076$; 95% confidence interval (CI) = $-0.129, -0.024$; $p = 0.004$) and ABI ($\beta = -0.115$; 95% CI = $-0.204, -0.026$; $p = 0.003$). The EMAT/LVST before hemodialysis was positively associated with PEP/ET ($\beta = 0.278$; 95% CI = $0.100 - 0.456$; $p = 0.001$).

Conclusions: The EMAT/LVST before hemodialysis may be positively associated with PEP/ET in ESRD patients and EMAT/LVST and PEP/ET were related to left ventricle function. Besides, lower albumin and ABI level may increase the EMAT/LVST.

Key words: Acoustic Cardiography Parameters, ESRD, Before and After Hemodialysis

血液透析病患的足踝-臂血壓比值可為缺血性腦中風的一個預測因子
Ankle-Brachial Index is a Predictive Factor of Cerebral Infarction among Hemodialysis Patients

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Background: Cardiovascular disease is the major complication in patients with end-stage renal disease (ESRD). Peripheral arterial disease (PAD) is one of the important manifestations of systemic atherosclerosis and is related to poorer quality of life among patients with ESRD. PAD is usually evaluated and defined by an ankle-brachial index (ABI) < 0.9. In the study, we examines whether ABI is a predictive factor for ischemic stroke (IS) among hemodialysis patients in a 7-year follow-up.

Methods: 84 patients were enrolled. Data collection included chart reviews and assessments of laboratory records. ABI was assessed in January 2009. PAD is defined when ABI is < 0.9.

Results: Mean age of study patients was 60 ± 12 years. The female/male ratio was 50/34. Mean values for ABI were 0.98 ± 0.21 at study entrance. 23 patients were PAD. 28 patients were IS in the 7-year follow-up period. In univariate COX regression analysis, age (HR:1.065, 95% CI:1.030-1.102, $p < 0.001$), 7-year averaged serum phosphate levels (HR:0.473, 95% CI:0.306-0.730, $p = 0.001$) and ABI (HR:0.035, 95% CI:0.009-0.145, $p < 0.001$) were risk factors for IS. In multivariate COX regression analysis for significant variables in univariate analysis, ABI (HR:0.058, 95% CI:0.012-0.279, $p < 0.001$) and 7-year averaged serum phosphate levels (HR:0.625, 95% CI:0.404-0.968, $p = 0.035$) remained the risk factors for IS. The risk of IS in patients with PAD increased 3.783-fold more than patients without PAD (HR:3.783, 95% CI:1.731-8.269, $p = 0.001$).

Conclusion: The study shows that patients with low ABI values are at high risk of developing IS. Patients with PAD have about 3.8-fold risk of IS compared with patients without PAD in the 7-year follow-up.

Keywords: Peripheral arterial disease; ankle-brachial index; ischemic stroke

血液透析患者血中骨質疏鬆標誌物與生化指數的相關性研究

Correlations between Osteoporosis Markers and Biochemical Parameters in Hemodialysis Patients

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背景：慢性腎臟病與礦物質代謝異常有著密切相關，現有研究顯示末期腎臟病患骨質密度較低，然而探討血液透析患者血中骨質疏鬆標誌物與生化指數間的相關性研究則較為闕如。

方法：本研究利用血液透析前的血液檢查探索病患血液中骨質疏鬆標誌物與生化指數間的相關性，期能協助評估骨質的病變。本研究的對象為 181 名血液透析患者，包括男性 99 位及女性 82 位。利用自動化儀器進行血液中骨質疏鬆標誌物及生化參數的檢測，並利用多變項線性回歸分析骨質疏鬆標誌物與參數間的相關性。

結果：研究結果顯示女性患者血色素數值顯著低於男性患者($p < 0.001$)。第一型前膠原蛋白氮端前勝鏈(PINP)與年齡及白蛋白皆呈負相關($p < 0.05$)，而與總鈣則呈正相關($p < 0.001$)。

β 型的天門冬胺酸與鈣磷沉積物呈現負相關($p < 0.001$)。骨質特異性鹼性磷酸酶與性別及白蛋白皆呈負相關($p < 0.05$)，而與總鈣呈正相關($p < 0.05$)。Dickkopf (DKK1)相關蛋白與白蛋白呈正相關($p < 0.001$)。硬皮蛋白(SOST)與總鈣及 25-羥基維他命 D 呈負相關($p < 0.05$)。

結論：總括而言，本研究的骨質疏鬆標誌物 DKK1 及 SOST 皆高於正常參考值，SOST 為骨質分解的指數，顯示因骨質大量分解增加骨鬆的可能性大幅提高。DKK1 為天然的生長因子拮抗劑，血中數值升高不僅與骨頭病變有關，也可能是退化性關節炎的重要因子。此外，此二項與白蛋白及 25-羥基維他命 D 之間皆呈現負相關，因此增加血中白蛋白與 25-羥基維他命 D 應有助益。

關鍵詞：慢性腎臟病、血液透析、骨質疏鬆、生化指數、標誌物

多囊腎病人接受腹膜透析的多年治療效果

Patients with polycystic kidney disease undergoing peritoneal dialysis:

A longitudinal analysis

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背景:多囊性腎臟病(Polycystic Kidney disease, 簡稱多囊腎 PKD)是一種常見的遺傳的囊性腎臟病，由於腎囊腫的逐漸發育，減少腹腔內的空間增加腹腔壓力影響透析效果，所以臨床上末期腎病選擇透析治療模式中不常見 PKD 病人選擇腹膜透析 (PD) 治療。本研究分析探討 PKD 病人進入長期腹膜透析治療後之影響。

方法:收集本院在 1990 年至 2018 年開始接受腹膜透析治療併有多囊腎的患者，以回溯法分析 PKD 病人進入腹膜透析治療後，透析前三年的殘餘腎功能(24 小時尿量)及腹膜平衡試驗(peritoneal equilibration test, PET)、足量透析、每週尿毒氮廓清率 (Total Kt/V per weekly)、肌酸酐之週清除率 (Total Ccr per weekly 是否改變及相關治療成效。

結果:在 1990 年至 2018 年，合併有多囊性腎臟病的腹膜透析患者共有 18 人，男女比 9 人：9 人、平均年齡為 56.4 ± 6.3 歲、平均治療時間 3.4 ± 2.8 年(最長為 10.6 年、最短 0.6 年)、透析年資大於 5 年者佔 5 人(27.8%)、腹膜透析治療模式 CAPD 與 APD 比 14 人(77.8%):4 人(22.2%)、透析治療後首次腹膜平衡試驗結果以 Low average 居多(佔 55.5%)、腹膜 Dialysate Kt/V:1.46 per weekly、尿液 Urine Kt/V: $0.6 \pm 0.4 \text{ cc/min/1.73}^{\text{m}^2}$ 、Total Kt/V per weekly: 2.0 ± 0.4 、Total Ccr per weekly: $62.1 \pm 15 \text{ L/wk/1.73}^{\text{m}^2}$ 、殘餘腎功能(24 小時尿量): $0.9 \text{ L} \pm 0.7 \text{ L}$ 、Albumin: $3.6 \text{ g/dl} \pm 0.3$ 。分析 16 位腹膜透析病人植管後前三年數據變化結果，如下：PET 依序變化為：Low average 56.2%、45.9%、52.6%、腹膜 Dialysate Kt/V:1.38 per weekly/1.64 per weekly/→1.69 per weekly、尿液 Urine Kt/V 變化： $0.51 \text{ cc/min/1.73}^{\text{m}^2} \pm 0.01 / 0.41 \text{ cc/min/1.73}^{\text{m}^2} \pm 0.06 / 0.17 \text{ cc/min/1.73}^{\text{m}^2} \pm 0.01$ ，其中 3 人進入腹膜透析治療時已無尿液、Total Kt/V per weekly 變化： $1.9 \pm 0.02 / 1.9 \pm 0.06 / 1.8 \pm 0.02$ 、Total Ccr per weekly 變化： $56.7 \text{ L/wk/1.73}^{\text{m}^2} \pm 2.2 / 52.9 \text{ L/wk/1.73}^{\text{m}^2} \pm 2.3 / 44.01 \text{ L/wk/1.73}^{\text{m}^2} \pm 1.2$ 、殘餘腎功能變化(24 小時尿量): $8 \text{ L} \pm 0.4 / 0.6 \text{ L} \pm 0.0 / 0.5 \text{ L} \pm 0.1$ 、Albumin 變化： $3.8 \text{ g/dl} \pm 0.2 / 3.7 \text{ g/dl} \pm 0.3 / 3.9 \text{ g/dl} \pm 0.3$ 。比較其他非 PKD 分析總退出腹膜透析治療及合併 PKD(996 人 vs. 9 人)，退出治療分析因腹膜炎 (19.9% vs. 44.5%)、透析不足(2.2% vs. 11%)、脫水衰竭(4.5% vs. 22.2%)、腹壁滲漏(0.6% vs. 11.1%)其他因素(72.8% vs. 11.2%)。

結論:腹膜透析併有多囊腎的患者，男女比例相同，平均治療透析時間 3.4 年，PD 對 Inadequacy 且營養狀態不受影響，腹膜透析對多囊腎的患者是一種適當的腎臟替代療法。

關鍵字:多囊性腎臟病、腹膜透析、足量透析

緊急啟動腹膜透析的安全性評估：林口長庚醫院的經驗**The safety of urgent-start peritoneal dialysis: a single center experience**

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Background: Significant interest in the practice of urgent-start peritoneal dialysis (PD) is increasing internationally, with several observational studies supporting the safety, efficacy, and feasibility of this approach. Before September 2017, our incident PD patients typically admitted to the hospital and started PD therapy 10 days after catheter insertion if possible. All PD catheters were placed by surgeons, using the laparoscopic method. To decrease the length of hospitalization and avoidance of temporary hemodialysis initiated with a hemodialysis catheter, we modified our urgent start PD protocol and the patients started PD therapy with a shorter break-in period (usually 5 days after catheter insertion) since September 2017. We describe our experience of developing an urgent-start PD program in a single center.

Methods: This is an observational cohort study included all patients who initiated PD in our unit from September 2017 to August 2018. All patients receive intermittent, low-volume PD exchanges started with 500 mL dwell volumes and 100 mL increase per day. Dwell times were 2 hours in the beginning and increased gradually. The primary outcomes were early complications within 4 weeks following PD commencement.

Results: A total of 76 incident patients were enrolled. Seventy (92%) patients started PD within 14 days after catheter insertion. Forty-six (60%) patients commenced PD within 5 days after catheter insertion. The rate of peri-catheter leak was 10.5 % (8/76) and all peri-catheter leaks occurred in patients commencing PD within 7 days after catheter placement. However, all peri-catheter leaks were resolved after suspending PD for a few days without surgical intervention. No patient discontinued PD within four weeks. There was no significant difference of the rates of leakage, peritonitis, technique failure, or mortality between the urgent-start group compared to the historical control group.

Conclusions: Urgent-start PD has acceptably low early complication rates. Urgent-start PD is a safe and practicable approach. The effects of long-term technique survival and possible economic advantages need further study. Close collaboration with the surgical team is important to minimize the occurrence of possible complications.

Icodextrin 改善腹膜透析病人的新陳代謝及水份管理**Icodextrin improves metabolic and fluid management in peritoneal dialysis patients**

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Background

Many studies have suggested clinical benefits of Icodextrin in peritoneal dialysis (PD) patients regarding fluid management, glycemic control and metabolic improvement. However, we do not know how the clinical influences of Icodextrin in our patients.

Objective

To analyze the effects of Icodextrin on metabolic and fluid control in PD patients.

Material and method

We performed a retrospective analysis of all incident and prevalent PD patients (N = 51) receiving PD from January 2013 to Aug 2018. All patients' demography, comorbidities, the laboratory data and outcome were obtained from the medical records. Among these 27 patients who had prescribed Icodextrin for more than 1 year, and remaining 24 patients used glucose base solution. Patients were administered an overnight or daytime dwell of 1.5 or 2.0L of 7.5% Icodextrin-containing solution. At baseline and 3, 6, 9 and 12 months after the start of Icodextrin, non-fasting blood was drawn at the clinic for measurement of plasma glucose, glycated hemoglobin (HbA1C), serum total cholesterol and triglycerides level as well as routine CT ratio, body weight, ultrafiltration and blood pressure. (Table 1)

Result

During Icodextrin treatment, HbA1C level was decreased, but no significant change from 7.2% to 6.84% (P=0.174). Obviously decreasing in blood sugar was observed, from 181.07 mg/dl to 146.22 mg/dl (P=0.042) (Figure1). Total cholesterol was lower significantly, from 191.74 mg/dl to 167.07 mg/dl (P<0.033). Triglycerides value was decreased from 164.67 mg/dl to 136.22 mg/dl (P=0.234) but the value was not meaningful. (Figure2). Ultrafiltration (UF) was higher (1.14 L/day, p < 0.002) than the baseline. CT ratio and blood pressure were reduced but without significance. (Figure3)

Conclusion

In our findings, Icodextrin represents a significant advantage in the management of PD. Improvement in metabolic control and optimization of fluid management. In addition, the possible benefit of cardiovascular outcome in diabetic patient needs further studies.

使用預防性抗生素可以降低腹膜透析患者接受婦科侵入性檢查後發生腹膜炎的風險

Prophylactic antibiotic reduces the risk of peritonitis after invasive gynecologic procedures

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Background

Peritonitis is an important complications after invasive procedures in PD patients. Previous studies of peritonitis after gastrointestinal endoscopy showed a reduced risk of peritonitis with prophylactic antibiotics, however, little is known about invasive gynecologic exam, such as hysteroscopy. This study focuses on the clinical presentation, outcome and effect of prophylactic antibiotics.

Methods

A retrospective study during 2005 to 2015 in a tertiary medical center. We identified patients who received peritoneal dialysis and invasive gynecologic procedures. We collected the demographic and clinical information from the electronic health information system. Any use of prophylactic antibiotic and the outcome of peritonitis were recorded.

Results

Total 26 gynecologic procedures were performed in 18 PD patients, and among them, 7 episodes of peritonitis occurred after invasive gynecologic procedures in 6 patients. The pathogens were diverse (group B Streptococcus, group D streptococcus, E. coli, and Enterococcus). All 7 episodes of peritonitis were successfully treated with intraperitoneal antibiotics without recurrence, technique failure or mortality. The odds ratio of peritonitis in non-prophylactic group is 24.1 compared with those received prophylaxis.

Conclusion

The use of prophylactic antibiotic reduce the risk of peritonitis after invasive gynecologic procedures.

Keyword: prophylactic antibiotics, peritoneal dialysis, gynecologic procedures, hysteroscopy, peritonitis

關鍵字: 預防性抗生素、腹膜透析、婦科檢查、子宮鏡、腹膜炎

比較有無肝硬化之腹膜透析病人併發症與臨床指標之差異**Comparisons between peritoneal dialysis patients with and without liver cirrhosis**

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Background:

肝硬化 (liver cirrhosis) 常見合併症為腹水、自發性細菌性腹膜炎、急性肝腦病變、疝氣等。肝硬化症唯一治癒的方法是肝臟移植，但肝臟來源的取得極為缺乏與困難，故臨床多以症狀治療為主要治療方針；若需外科手術切除肝臟病灶，外科醫師常會希望腹膜透析 (PD) 病人轉血液透析 (HD)，以利病況後續追蹤治療或預防術後腹部疝氣發生，但有些透析病人仍希望繼續留在腹膜透析治療。

Methods:

本研究探討腹膜透析病人合併肝硬化症與臨床指標之相關性及比較肝臟手術後留在PD與轉HD後之癒後。收集2001年至2018年9月30日止共1312人，收集已確診之肝硬化的病人23人，截至收案日止現存已確診之肝硬化的PD病人為9人 (39.1%)，退出PD轉HD治療14人 (60.9%)，退出原因包括醫療照護需求3人 (21.4%)、外科醫師意願4人 (28.6%)、個人意願2人 (14.3%)、疾病因素2人 (14.3%)、死亡3人 (21.4%)。對照PD治療時年紀、併發症、總治療天數、血液檢驗、腹膜炎次數及發生率、轉HD治療後之臨床指標。分析兩者間臨床指標的相關性。

Results:

確診合併肝硬化的PD病人共23人，平均年齡為 55 ± 11.3 歲，男女比16:7，平均治療年份 4.75 ± 3.8 年。分析已轉HD滿一年及繼續留存PD病人的血液檢驗及合併症，已轉HD病人有較低的Creatinine (8.62 vs. 13.49, $P=0.029$)，但兩者的Hemoglobin (11 vs. 11.5, $P=0.77$)、Albumin (3.69 vs. 3.3, $P=0.09$)、Calcium (9.3 vs. 9.6, $P=0.64$)、Phosphorus (6.9 vs. 3.85, $P=0.053$)、GPT (23 vs. 27, $P=0.58$)，並無顯著差異。兩組病人肝臟手術後皆無疝氣發生。針對轉HD病人，分析在PD治療時與轉HD治療後，病人的生化檢驗前後比較，兩者之間無顯著性之差異。分析有無肝硬化腹膜透析病人之腹膜炎發生率，有肝硬化症病人腹膜炎發生率為1.58次/100病人月，無肝硬化症病人為2.32次/100病人月，合併肝硬化症病人有較低的治療期間平均發生腹膜炎次數 (1.51次 vs. 1.23次, $P=0.029$)，兩組病人同樣以革蘭氏陽性為主要發生菌種 (71.4% vs. 55.5%)。

Conclusions:

合併肝硬化症之腹膜透析病人，肝臟手術後繼續PD與轉HD治療之生化檢驗前後無明顯差異性，均無腹部疝氣發生；合併肝硬化症病人有較低治療期間平均發生腹膜炎次數。

Key words : Peritoneal Dialysis、Liver Cirrhosis、Peritonitis

關鍵字：腹膜透析、肝硬化症、腹膜炎

虛弱與需要協助與否對腹膜透析患者整體存活率的影響**The impact of frailty and assistance on overall survival of patients on peritoneal dialysis**

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Background: Peritoneal dialysis (PD) exchanges require aseptic techniques. Patients with frailty are often difficult to perform these procedures precisely and may need assistance. However, there are limited researches studying the clinical relevance of frailty and assistance in patients on PD. Therefore, the aim of this study is to investigate the impact of frailty and assistance on survival results among PD patients.

Methods: In this retrospective study, all-cause mortality was recorded in a cohort of 269 PD patients at Chiayi Chang Gung Memorial Hospital followed from September 1995 to January 2018. Karnofsky Performance Status (KPS) was used for assessing the status of frailty at enrollment. We defined baseline KPS score ≥ 70 as high KPS and KPS score < 70 as low KPS. Patients who executed all exchange procedures by themselves or needed assistance from others (family or caregivers) were further analyzed.

Results: The average age and hemoglobin were lower, but average BUN was higher in the high KPS group. Patients with high KPS had better overall survival than those with low KPS (unadjusted OR, 5.012, 95% CI: 2.666-9.423; age- and sex-adjusted OR, 3.314, 95% CI: 1.576-6.967). Patients were further divided into 4 groups: (1) high KPS without assistance (n=178); (2) low KPS patients without assistance (n=29); (3) high KPS with assistance (n=12); (4) low KPS with assistance (n=50). Kaplan-Meier survival analysis demonstrated the best overall survival in patients of high KPS without assistance. Notably, we found no statistical difference in all-cause mortality between patients with high KPS with assistance and those with low KPS (adjusted OR, 0.821, 95% CI: 0.232-2.898).

Conclusions: Overall, patients with high KPS had better survival. However, patients with high KPS but relying on the assistance of others had poorer survival outcomes which were similar as those lacking self-care abilities.

腹膜透析患者血清抑硬素濃度與中心動脈硬化正相關

Positive Correlates of Serum Sclerostin Level and Association with Central Arterial Stiffness in Patients with Peritoneal Dialysis

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Background: Wnt/ β -catenin signaling pathway is involved in the development of vascular calcification and atherosclerosis. The aim of this study was to evaluate the relationship between serum Wnt pathway inhibitors (sclerostin and dickkopf-1) on central arterial stiffness by measuring of carotid-femoral pulse wave velocity (cfPWV) values in patients with peritoneal dialysis (PD).

Methods: Fasting blood samples were obtained from 72 PD participates in the study. Carotid-femoral pulse wave velocity was measured by a validated tonometry system. cfPWV values of > 10 m/s were used to define the high central arterial stiffness group, while values ≤ 10 m/s were regarded as the control group, according to the ESH-ESC 2013 guidelines. Serum sclerostin and dickkopf-1 levels were measured using a commercial enzyme-linked immunosorbent assay kit.

Results: Twenty-one patients (29.2%) had high central arterial stiffness and were of older age ($p = 0.007$) and had longer PD vintage ($p = 0.031$), higher diastolic blood pressure ($p = 0.034$), fasting glucose ($p = 0.011$), C-reactive protein ($p = 0.015$) and sclerostin levels ($p < 0.001$) compared to subjects with control group. Multivariate logistic regression analysis of the factors significantly associated with central arterial stiffness revealed that sclerostin (odds ratio: 1.083, 95% confidence interval: 1.007–1.164, $p = 0.031$) was the independent predictor of central arterial stiffness in PD patients. Multivariate forward stepwise linear regression analysis also showed that sclerostin level ($\beta = 0.463$, $p < 0.001$) was positively associated with cfPWV values in PD patients.

Conclusions: In this study, serum sclerostin level, but not DKK1, was proved to be involved in the pathogenetic process of central arterial stiffness in PD patients.

Key words: Central arterial stiffness, Dickkopf-1, Peritoneal dialysis, Sclerostin

改善措施介入降低腹膜透析病患高血磷比率之成效

Effects of interventions on Reduce Hyperphosphatemia Rate in Peritoneal dialysis Patients

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背景：

腎病年報指出腹膜透析患者血磷在標準值內的比率從 2006 年 61.2% 增加至 2009 年 65.6%，至 2014 年下降為 57.6%。大於 5.5 mg/dL 以上的比率從 2006 年 38.3% 增加至 2014 年 41.8%。本院腹膜透析室每月常規門診透析人數約 183 人，台灣腎臟醫學會建議透析院所品質/透析評量標準醫療照顧品質：病人血磷平均值須小於 5.5mg/dl，故本單位以此基準，設定血磷值大於 5.5mg/dl 的比率需小於 30% 為監測指標，發現 2018 年第一季大於 5.5mg/dl 之平均比率異常為 35%，因而引發此動機，目的期望降低腹膜透析病人血磷大於 5.5mg/dl 之比率，減少合併症血管鈣化的發生，同時提升透析生活品質的滿意度。

方法：

分析本院腹膜透析病患高血磷原因為：1.高磷飲食遵從性差、2.不知高磷食物種類、3.服藥遵從性差、4.要提升營養兒攝取過多蛋白質，導致磷增加、5.副甲狀腺素偏高。依上述原因自 2018 年 4 月至 2018 年 6 月開始擬定並實施改善策略，改善措施包含：1.設定「每月一問」，於患者每月回診時做口頭詢問衛教並加強含磷食物圖片解說；2. 設計相關考題於患者每月回診時做測試 3.照會營養師，每月做個別衛教及定期舉辦團體衛教，加強飲食指導。

結果：

經措施介入後，血磷大於 5.5mg/dl 的比率由改善前 2018 年第一季平均值 35% 降至改善後 2018 年第二季 29%，顯示此措施之有效性。

結論：

藉由相關措施持續提供適當的照護，並持續監測血磷大於 5.5mg/dl 比率變化，分析原因並提供相關照護措施，維持良好的血磷控制進而提升透析生活品質。

關鍵字：腹膜透析、高血磷、Peritoneal dialysis、hyperphosphatemia

執行針對 Cr.≥8 病患替代療法衛教及追蹤提升腹膜透析比率之成效 The effect of renal replacement therapy education for Cr.≥8 patient to increasing PD penetration rate

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背景:

根據健保署近 5 年最新數據顯示,每年洗腎人口不斷向上攀升,到了 2016 年年底達到 7 萬 7030 人,每年洗腎健保費用更是從 2012 年 375 億元年年上升到 2016 年的 425 億元,佔健保比例 7%。其中血液透析病人每月平均健保支出為 42708 點,在腹膜透析則為 32104 點,因此,健保局提撥透析品質保留款,醫策會更將腹膜透析人數的成長納入醫院評鑑項目之一,目的是希望醫院以推廣腹膜透析為主軸。

2018 年本院慢性腎臟病門診衛教中心統計發現,每年進入透析治療人數中,接受腹膜透析比率 2016 年為 18.7%,2017 年為 18.3%,慢性腎臟病病患選擇腹膜透析比例較為下降,經腎臟科團隊會議討論結果未選擇腹膜透析原因為:1.多次換液麻煩不方便 2.擔心自己換液發生問題 3.害怕會感染 4.支持系統不佳 5.居家透析壓力大 6.中斷回診...等。本海報呈現本院腹膜透析中心針對 Cr.≥8mg/dl 病患執行替代療法衛教及追蹤之改善對策以期提升腹膜透析比率。

方法:

針對 Stage V 慢性腎臟疾病合併血清肌酸肝 Cr.≥8.0mg/dL 之病患,本院慢性腎病照護系統有提示功能,符合以上條件之慢性腎臟病之病患介入腹膜透析治療之衛教並轉介腹膜透析護理師共同照護。除轉介腹膜透析護理師外另有腹膜透析腎友義工治療經驗分享。提供病患個別性衛教及相關醫療諮詢,增加腹膜透析治療過程認知,降低治療所帶來的壓力與焦慮,期望透過改善對策的執行幫助病患選擇有利自己透析模式,進而提升腹膜透析比率。(圖一)

結果:

至 2018 年 9 月本院腹膜透析中心新病患共 40 位,相較 2016 年之 35 人、2017 年之 34 人有明顯增加。另外,PD 占比方面,也從 2016 年之 18.7%、2017 年之 18.3%,2018 年增加 24.8%。(表一)

結論:

病患在透析前能獲得充分完整的替代療法之衛教,可增加其對疾病的認知及了解如何自我照顧,做好心理準備,降低透析治療所帶來的壓力與焦慮。本院針對 Stage V 慢性腎臟病及 Cr.≥8.0mg/dL 之病患,除提供腹膜透析治療之衛教手冊或單張,以及錄影帶的觀看外,經相關腹膜透析實物的接觸及腎友現身說法持續追蹤衛教,使病患對腹膜透析較有深入的了解並對治療較不感到害怕,能夠適時地進入腹膜透析治療,達到保留殘餘腎功能之目的,讓透析生活與品質都有所提升,進而也提升了醫院腹膜透析比率成效。

建立腹直肌鞘隧道腹膜透析導管植入術與導管相關合併症成效觀察 The Effect of Rectus Sheath Tunneling Method for Inserting a Peritoneal Dialysis Catheter

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Purpose:

Rectus sheath tunneling, also described as extraperitoneal or preperitoneal tunneling, has been a way to maintain a pelvic orientation and prevent catheter migration. Laparoscopy has been applied by many adult and pediatric surgeons for insertion of PD catheters as well as for salvage of malfunctioning catheters. The primary causes of catheter dysfunction are compartmentalization from adhesions, catheter tip migration into the upper abdomen and omental wrapping or entrapment. We evaluate outcomes of patients underwent laparoscopic PD implantation with a new preperitoneal tunneling method for inserting a peritoneal dialysis catheter, there by lessening surgical complications.

Methods:

This technique was used in 156 cases from October 2013 to December 2017 and followed up until June 2018 total 54 months.(Table1) The procedure was performed laparoscopic under general anesthesia(156 cases) by one surgeon. All the catheters were double-cuff catheter. Patients were in the range of 10 – 92 years old with the average of 51.5 years. There were no perioperative complications in any of the patients. Flow of the fluid was also satisfactory in all patients after operation.

Results:

From October 2013 to December 2017, 156 PD catheters were inserted for patients (87men and 69 women) using new preperitoneal tunneling method. There was 43 patients (25 men and 18 women) had 54 episodes catheter related dysfunction. There was catheter migration(16 episodes),omental wrap(5 episodes),hernia(20 episodes) ,leak(4 episodes)Bleeding(3 episodes) and exit site leak(6 episodes). Patients were in the range of 10 – 92 years old with the average of 51.5 years(Table2).

Catheter migration was observed , the average time after the operation was 12 monthly .14 patients continue their peritoneal dialysis only 1 patient refer to HD and 1 patient was expired. Follow-up lasted for 54 months and all the patients were monitored until June 2018.

Conclusion

In our observed preperitoneal tunneling method for inserting a peritoneal dialysis catheter is effective in decrease catheter migration and there is also very low probability of omental wrapping, fluid leakage. We need subsequently observed to define the effect of minimize catheter dysfunction.

維生素 D 補充對腹膜透析患者血清 25-羥維生素 D 狀態之影響因素：兩年期前瞻性研究

Factors Influencing Vitamin D Supplementation on Serum 25-Hydroxyvitamin D Status in Chronic Peritoneal Dialysis: A Two-Years Prospective Study

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背景: 血清 25-羥維生素 D [25 (OH) D] 之缺乏和不足常見於慢性腎臟病 (chronic kidney disease, CKD) 病人，回顧文獻已發現維生素 D 對骨骼、心血管、發炎和免疫功能的具有臨床助益作用。對於腹膜透析病人而言，在遵循慢性腎臟病礦物質與骨骼代謝疾病 (CKD-mineral bone disease, CKD-MBD) 照護指引下補充維生素 D 後展現之臨床表徵之相關性，尤其是影響血中濃度之相關因素，目前尚缺乏長期及大型之臨床探討。本次研究將針對腹膜透析病人維生素 D 之補充對於血清 25-羥維生素 D 缺乏之改善與否，以及相關臨床指標之相關性作進一步探討。

方法: 收錄本院 114 位接受腹膜透析病人作為為期兩年之前瞻性研究。每位病人於常規回診後針對血清 25-羥維生素 D 缺乏之病人給予補充維生素活性 D3 (Calcitriol)，並遵循 CKD-MBD 照護指引調節且維持血鈣及血磷至適當濃度。追蹤兩年後依據病人血清 25-羥維生素 D 濃度之變化進行相關臨床數據及表徵之分析研究，包括偵測 hs-CRP、血清白蛋白、副甲狀腺素、鈣、磷、鹼性磷酸酶及骨特异性鹼性磷酸酶 (BSAP)、血色素及透析清除率等常規腹膜透析偵測指標。

結果: 在 114 位常規腹膜透析治療病人，有 102 位病人屬於血清 25-羥維生素 D 缺乏症 (小於 30 ng/mL)。觀察兩年後病人之血清維生素 D 顯著的下降 ($p=0.006$)，血鈣的增加 ($p<0.001$) 及副甲狀腺素下降 ($p=0.001$) 則呈現顯著意義。此外在性別上之差異以女性呈現血清 25-羥維生素 D 下降 ($p=0.003$)，在男性並沒有發現顯著差異。此外，本次研究亦發現血清白蛋白與維生素 D 呈現正相關 ($r = 0.294, p = 0.004$) 而 hs-CRP 對於維生素 D 之變化呈現負相關 ($r = -0.204, p = 0.042$) 之臨床意義。

結論: 維生素 D 缺乏症之女性腹膜透析病人即使補充活性維生素 D3，仍呈現持續性的降低。因此，對於維生素 D 缺乏症之透析病人，除應加以積極治療外更應著重營養提升及監測並改善炎症狀態。

關鍵字: 腹膜透析，25 (OH) 維生素 D，活性維生素 D3

提升腹膜透析患者血磷控制之成效

Enhance the Effectiveness of Blood Phosphorus Control in Peritoneal Dialysis Patients

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背景

根據統計，長期透析患者有 40% 因血管鈣化造成心臟血管疾病導致死亡，高血磷症即主要致病機轉，若血磷值持續高於 6.5mg/dl 以上，死亡率會比血磷值正常患者高 18-39%。本單位 2018 年 6 月血清磷 > 6.0mg/dl 高達 54.1%，故降低高血磷發生率減少合併症發生，是我們須繼續努力的目標。

目的

高血磷會引發嚴重的合併症，增加患者死亡率，故期望腹膜透析患者血清磷 > 6.0mg/dl 發生率由 54.1% 下降至 35%。

原因

血清磷 > 6.0mg/dl 高達 54.1% 的原因：

1. 缺乏對含磷高食物種類的認識
2. 未能按時服用降血磷藥物
3. 衛教時間不夠

改善措施

針對原因分析，擬定改善措施：

1. 利用衛教單張加深患者對高磷食物的認知。
2. 善用通訊軟體讓患者將三餐飲食內容並將降磷藥放於旁拍照送出給護理師。
3. 護理師及營養師於每月回診後，各電訪一次患者或家屬。

結論

經改善措施後，發現本單位的血清磷 > 6.0mg/dl，由 2018 年 6 月的 54.1% 降至 2018 年 9 月的 36.1%，顯示此專案在對策實施後有顯著成效。

血清骨橋蛋白跟腹膜透析病患中樞動脈硬度有關**Serum Osteopontin Level is Positively associated with Central Arterial Stiffness in Patients with Peritoneal Dialysis**

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Background: Osteopontin (OPN) is generally regarded as a proinflammatory and proatherogenic molecule and is associated with atherosclerosis. The aim of this study was to evaluate the relationship between serum OPN on central arterial stiffness by measuring of carotid-femoral pulse wave velocity (cfPWV) values in patients with peritoneal dialysis (PD).

Methods: Fasting blood samples were obtained from 70 PD participants in the study. Carotid-femoral pulse wave velocity was measured by a validated tonometry system. cfPWV values of > 10 m/s were used to define the high central arterial stiffness group, while values ≤ 10 m/s were regarded as the control group, according to the ESH-ESC 2013 guidelines. Serum OPN levels were measured using a commercial enzyme-linked immunosorbent assay kit.

Results: Twenty-two patients (31.4%) had high central arterial stiffness and were of older age ($P = 0.001$) and had longer PD vintage ($P = 0.024$), higher C-reactive protein ($P = 0.005$) and OPN levels ($p < 0.001$) compared to subjects with control group. Multivariate logistic regression analysis of the factors significantly associated with central arterial stiffness revealed that OPN (odds ratio: 1.044, 95% confidence interval: 1.020–1.069, $P < 0.001$) and PD vintage (odds ratio: 1.027, 95% confidence interval: 1.007–1.047, $P = 0.009$) were the independent predictors of central arterial stiffness in PD patients. Multivariate forward stepwise linear regression analysis also showed that OPN level ($\beta = 0.477$, adjusted R^2 change = 0.269, $P = 0.001$) was positively associated with cfPWV values in PD patients.

Conclusion: In this study, serum OPN level was proved to be involved in the pathogenetic process of central arterial stiffness in PD patients.

Key words: osteopontin, central arterial stiffness, peritoneal dialysis, carotid-femoral pulse wave velocity

關鍵字：骨橋蛋白，中樞動脈硬度，腹膜透析，頸動脈到股動脈波行傳導速率

慢性腎臟病病患主動脈弓鈣化與心胸比對臨床預後的相關性

Association of Aortic Arch Calcification and Cardio-Thoracic Ratio with Renal and Cardiovascular Outcomes in Chronic Kidney Disease

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Background. Vascular calcification and cardiomegaly are highly prevalent in chronic kidney disease (CKD) patients, however the association of the combination of aortic arch calcification (AoAC) and cardio-thoracic ratio (CTR) with clinical outcomes in patients with CKD is not well investigated. In this study, we investigated whether the combination of AoAC and CTR is independently associated with estimated glomerular filtration rate (eGFR) slope, overall and cardiovascular mortality in CKD stage 3-5 patients.

Methods. We retrospectively determined AoAC and CTR by chest X-ray in 568 CKD patients who underwent regular follow-up at outpatient department. Multiple stepwise logistic regression analysis was used to identify the factors associated with eGFR slope < -3 ml/min/1.73m²/year, and linear regression analysis for eGFR slope. Associations between the study groups and overall and cardiovascular mortality were assessed using multivariate forward Cox proportional hazard analysis.

Results. We stratified the patients into four groups according to a median AoAC score of $>$ or ≤ 4 and CTR $>$ or $\leq 50\%$. Those with an AoAC > 4 and CTR $> 50\%$ (vs. AoAC score ≤ 4 and CTR $\leq 50\%$) were associated with eGFR slope < -3 ml/min/1.73m²/year (OR, 5.549, 95% CI, 2.866 to 10.747; $p < 0.001$), and cardiovascular (HR, 3.254; 95% CI, 1.066 to 9.927; $p = 0.038$) mortality in multivariable analysis, but not with overall mortality ($p = 0.090$). Besides, AoAC (unstandardized coefficient $\beta = -1.053$; 95% CI, -1.367, -0.738; $p < 0.001$) and CTR (unstandardized coefficient $\beta = -0.060$; 95% CI, -0.110, -0.010; $p = 0.019$) were independently associated with eGFR slope.

Conclusion. The combination of increased AoAC and cardiomegaly was associated with rapid renal progression and increased cardiovascular mortality in patients with CKD stage 3-5 patients. Therefore, we suggest that evaluating AoAC and CTR on plain chest radiography may be a simple and inexpensive method for detecting clinical outcomes in CKD patients.

Key words: aortic arch calcification, cardio-thoracic ratio, eGFR slope, overall and cardiovascular mortality, chronic kidney disease

腸鏡檢查前應用預防性抗生素對腹膜透析病人腹膜炎的影響

Effects of Prophylactic Antibiotics before Colonoscopy in Peritoneal Dialysis-Related Peritonitis

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背景：腹膜透析（PD）是腎臟替代療法的治療方式，特色為居家透析治療。腹膜透析感染性併發症主要是腹膜炎，且是中止透析治療(drop-out)最主要的原因。ISPD guideline 對於腹膜炎預防和治療推薦指引中建議執行腸鏡檢查及泌尿生殖系統侵入性檢查前預防性應用抗生素，不僅可以降低腹膜透析腹膜炎發生風險、更能減少病人住院率及死亡率與醫療成本。

方法：回溯分析本單位 2013-2017 年腹膜透析感染性合併症中因侵入性檢查(執行腸鏡檢查)因素導致感染腹膜炎發生次數共計 7 次，其中 2017 年因執行腸鏡檢查導致腹膜炎案數為 4 次佔 57%。本醫療團隊於 2018 年啟動介入措施制定標準化作業如下：(1) 製作腹膜透析病人侵入性檢查預防性抗生素使用提醒單 (2) 制定腹膜透析病人病況回報主治醫師立即通報流程 (3) 衛教海報。並於病人端加強預防觀念教育指導，提醒病人在接受侵入性檢查前應先告知主責透析治療師；醫療端於病人接受侵入性檢查先回報主治醫師，經醫師評估依醫囑於檢查前投與預防性抗生素使用。

結果：經由介入措施執行後，分析比較 2017 年及 2018 年腹膜炎發生總數由 43 次降為 19 次，且 2018 年 1-9 月病人在執行腸鏡檢查總數 28 次其中無使用預防性抗生素者佔 14.3% (4 人) 皆未發生因執行侵入性檢查引發腹膜炎之案例。

結論：預防腸鏡檢查導致發生腹膜炎，最佳方法是加強病人及家屬預防感染之教育訓練、確定於執行鏡檢前需先告知主責透析治療師、並依醫囑執行預防措施；此外持續監測腹膜透析感染相關要因、降低腹膜透析腹膜炎發生感染風險是改善醫療品質重要步驟，亦是決定腹膜透析成功的重要因素。

Key words：peritoneal dialysis、complication、peritonitis

腹膜透析病人健康識能之分析研究

Assessment of Health Literacy in Peritoneal Dialysis Patients

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背景:近年來健康識能對醫療照護的影響和花費日益受到重視，並有研究指出健康識能程度與病人對慢性病知識、態度、自我效能與醫療決策有關，進而影響病人用藥情形、醫療利用率及自我管理行為。腹膜透析為長期居家自我照護的治療模式，本研究目的為探討腹膜透析病人健康識能的程度與透析治療的關係。

方法:本研究採橫斷面，立意取樣問卷調查。工具為「中文健康識能評估表」，此量表是依據美國醫學研究院的健康識能為概念定義，符合國內實際的健康照護需求情境設計的題組。施測方式由收案的常規腹膜透析病人自行閱讀內容填答完成，採單選方式，共有50題，最高分數為50分，最低為0分。收案期由2018年3月至5月共收案171位。透過SPSS軟體分析問卷得分、病人特質及透析治療之間的相關性。

結果:收案病人平均年齡為 50.0 ± 11.9 歲，男性與女性各占47.4及52.6%，教育程度高中與大專(含)以上各占45.0及38.0%，婚姻狀況已婚居多占57.9%，透析年資 4.9 ± 3.6 年，全自動腹膜透析(APD)及連續性可活動式腹膜透析(CAPD)各占52.0及48.0%，健康識能平均分數 44.6 ± 5.8 分，較2012年全國性成年民眾抽樣調查分數 39.6 ± 14.6 分高。以APD和CAPD透析方式分析發現，病人平均年齡分別為 48.2 ± 12.6 及 52.1 ± 10.9 歲($p = 0.034$)，教育程度大專(含)以上各占45.0及30.0%，已婚各居58.0及57.0%，透析年資為 4.8 ± 3.8 及 5.0 ± 3.5 年，健康識能平均分數為 45.6 ± 5.1 及 43.6 ± 6.5 分($p = 0.026$)。又以問卷得分中位46分分組分成 ≥ 46 及 < 46 分兩組，發現 ≥ 46 分組別的病人年齡較輕(47.8 ± 1.2 vs 53.9 ± 1.2 ， $p < 0.001$)，使用APD較CAPD多(60.2% vs 39.8%， $p = 0.005$)。

結論:年齡較輕和健康識能有顯著正相關。此外使用APD的病人健康識能分數較高，意味自我照顧能力較高者和健康識能有著關連性。

Key words: Peritoneal Dialysis、Health Literacy

關鍵詞: 腹膜透析、健康識能

腹膜透析病人之肋腹膜滲漏-回溯性分析研究**Pleuroperitoneal Leak in Peritoneal Dialysis Patients- Retrospective Analysis**

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背景:肋腹膜滲漏是一種少見且公認的腹膜透析非感染性合併症。25%病人通常無症狀，一旦發生則以漸進性呼吸困難或端坐呼吸的急症表現，易被誤診為鬱血性心衰竭；且經常需暫停腹膜透析甚而永久性轉為血液透析，此合併症對腹膜透析病人生活品質及退出治療影響極大。

方法:本研究對象為本院腹膜透析病人，採病歷回溯研究，蒐集1988年至2017年止，共1325位病人，其中經胸部X光可見肋膜積水並藉由肋膜穿刺抽取液或核子醫學Tc-99m攝影檢查確診肋腹膜滲漏共23例。收集整理包括病人的基本資料、原發疾病、介入腹膜透析治療後發生肋腹膜滲漏起始日、部位、處置及預後等資料做分析比較。

結果:本研究中共發現23位病人發生肋腹膜滲漏，發生部位皆在右側，男性3人(13%)，女性20人(87%)，平均年齡 47.9 ± 14.6 歲；原發疾病為腎實質腎炎65.2%，糖尿病26.1%，高血壓及全身性紅斑狼瘡各4.3%；介入腹膜透析治療後發生肋腹膜滲漏平均起始日為152天，在開始透析治療30天內發生有11人(47.8%)。6位(26.7%)病人經外科技術修補皆成功接續腹膜透析治療無復發情形，術後再接續透析治療起始日為1~122天(平均48.5天)。4位病人採保守治療，其中3位續留腹膜透析治療追蹤照護，1位永久轉血液透析。10位病人直接轉換血液透析，其中3位曾為修補而會診外科，但病人無意願。另有3位病人初步先採行2~3個月不等血液透析，仍因復發永久轉血液透析。整體而言最後共14位(60.9%)病人移除導管永久轉血液透析。

結論:本研究顯示腹膜透析合併肋腹膜滲漏發生率為1.7%，常見於女性病人，發生部位好發於右側，合併症一旦發生永久轉血液透析居多，但病人有意願可接受外科手術修補成功率極高，且短期可再接續腹膜透析治療。

Key words: Peritoneal Dialysis 、Pleuroperitoneal Leak

關鍵字：腹膜透析、肋腹膜滲漏

用 ELISA 套件分析腹膜透析藥水中抑硬素濃度

Analyzing Sclerostin in Peritoneal Dialysate with ELISA Kits

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Background Sclerostin, a glycoprotein (22 kDa) product of the SOST gene in osteocytes, will inhibit osteoblast and bone formation. Sclerostin could represent a messenger in bone and vasculature crosstalk in chronic kidney disease – mineral and bone disorder (CKD-MBD). However, the clearance of sclerostin by the peritoneum is still a question. Nevertheless, there is no currently available cheap and easy way to answer this question. Hence, we tried to use a modified spike-and-recovery and linearity-of-dilution experiments, commonly conducted for the accuracy validation of enzyme-linked immunosorbent assay (ELISA), to perform the quantification of sclerostin in the peritoneal dialysate effluent.

Method The present study collected peritoneal dialysis (PD) patients' dialysate after his/her standard peritoneal equilibration test (PET) studies. Spike-and-recovery assays involve adding ('spiking') a known concentration of the exogenous standard analyte to the diluted sample and testing this sample in the ELISA against an identical concentration of spike added to the sample diluent (Blank). The sample should also be assayed without spike to allow quantification of endogenous analyte. The spiked sample, spiked blank and sample without spike are each measured in the ELISA and the concentrations calculated against the standard curve. A range between 80-120% recovery is considered acceptable and indicates any matrix effect has been overcome. Linearity-of-dilution assays involve serially diluting a sample and is then measured against the standard curve. Once adjusted for the dilution factor, the analyte concentration at each dilution should also be 80-120% of the concentration measured at the previous dilution, which then demonstrates dilutional linearity.

Results There were 10 PD patients enrolled in the test run of this study. The recovery for the spiked samples was $83.3 \pm 9.9\%$, which was quite acceptable. Linearity of dilution was $354 \pm 206\%$ for the unspiked samples, $139 \pm 44\%$ for the spiked samples and $94.0 \pm 24.8\%$ for the blank controls. Linearity of dilution for the unspiked samples was very deviated, which may imply the samples were too diluted and the concentration was out of the detection range. The aforementioned speculation can be proved by that the linearity of dilution for the spiked samples improved post sample spiking. The recovery of blank controls was good enough, which implied substances in the dialysate effluent from patients may interfere with the ELISA exam results, making the linearity worse in the samples of dialysate effluent.

Conclusions There are still few reports in measuring biomarkers in the PD dialysates. Our study probably shed a light on the subsequent directions of measuring biomarkers with commercialized ELISA kits for the coming PD-related studies.

Keywords sclerostin, peritoneal dialysis, biomarker measurement; 抑硬素, 腹膜透析, 生物標記物測量

腎臟移植病患之移植年限與自我照顧行為與臨床檢驗數據之探討

Relationships of Self-care Behavior and Clinical Parameters in Kidney Transplant Recipients with Different Transplant Duration

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前言：腎臟移植是目前末期腎臟疾病（ESRD）患者脫離透析的治療方法之一。但在器官來源的短缺與供需不平衡，若因知識缺乏導致照護不足，進而影響移植腎壽命，不僅增加醫療成本、危害生命，也浪費珍貴且難得腦死器官資源；站在醫護團隊照護層面的角度而言，如何教導病患自我健康管理與提昇自我照護能力，實為重要課題。因此本研究的目的主要針對南部某醫學中心移植照護團隊對此議題更深入之瞭解。

方法：自 107 年 6 月至 107 年 9 月底止，我們收集南部某醫學中心腎臟內科門診已接受腎臟移植滿 3 個月的患者，做為研究對象。我們使用結構式問卷自我照顧-顧行為量表、臨床檢驗數據，進行資料收集。

結果：本研究共收集有 134 個案：平均年齡為 54.1±12.1 歲，男性有 69 人(51.5%)，腎臟移植平均 7.5±5.7 年，平均腎絲球過濾率為 45.6±19.2ml/ min/1.73m²。自我照顧行為量表的總分為 16-80 分，分數越高代表自我照顧行為越好。本研究將接受腎臟移植年限分為 5 年以上及五年以下兩組，病患規律服藥行為中移植時間 5 年以下高於移植時間 5 年以上者(24.3±1.6, 23.1±3.0, $p<0.05$)，有顯著性差異，但在飲食控制、規律運動、監測血壓、吸菸習慣、自我照顧行為總分，在 2 組間則無顯著差異。

在臨床檢驗值方面，腎絲球過濾率平均值為 45.6±19.2，在 2 組間有顯著差異(42.7±19.8, 49.5±18.3, $p<0.05$)；白蛋白平均值為 4.1±0.4g/dl 正常範圍內，營養符合需求，血色素平均值為 10.7±1.7 g/dl，顯示有腎性貧血之問題；膽固醇平均值為 212.3±53.3，代表有高血脂問題。相關檢驗中除腎絲球過濾率在二組間有顯著差異外，其他在移植年限中並無差異。

結論與建議：以此分析顯示，移植病人隨著移植年限越久腎功能穩定其服藥遵從性越低；可能因移植術後使用免疫抑制劑和代謝的改變而產生的血脂異常。有鑑於此，教育腎臟移植病患自我管理其健康行為過程中，隨時監測服藥遵從性，且並適時調整及改變生活型態，以預防與減少併發症發生、確實賦予病人自我照顧的責任達到提昇自我照護品質的目的，增加移植腎及病患的存活率。

關鍵字：腎臟移植、自我照顧行為、服藥遵從性

以機器學習建立移植腎衰竭預測模型**Establish prediction model for graft kidney loss via machine learning approach**

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ABSTRACT

Background: In Taiwan, the incidence and prevalence of end stage renal disease (ESRD) is higher than most of the other countries in the United States Renal Data System (USRDS) report for several years. Renal transplantation (RTx) is the best treatment option for the ESRD patients. In order to prolong the graft survival, careful perioperative evaluation and care is important. In this study, we aim to utilize machine learning technique to establish risk prediction model for graft loss among RTx patients. The proposed model may help the clinicians make more appropriate decision making in the clinical settings.

Methods: We retrospectively analyze the medical data of renal transplant patients follow-up at Taichung Veterans General Hospital. After data collection and cleansing, we applied several machine learning algorithms to build prediction models for short-term risk of graft loss for RTx patients. Performance of different algorithms were compared with statistics parameters such as accuracy, sensitivity, specificity, positive predictive value and negative predictive value.

Results: Various machine learning algorithms, such as linear regression, support vector machine (SVM), gradient boosting machine (GBM) and random forest (RF) were used and the performance were compared.

Conclusions: Our study revealed the feasibility of apply machine learning approach on the risk prediction of graft loss for RTx patients. More study is needed to further optimize the prediction performance in the future.

Key words: Graft loss, Machine learning, Renal transplantation

高的血清骨橋蛋白跟腎臟移植病患第一次住院及死亡率有關

High Serum Osteopontin Level is associated with First Hospitalization and Mortality in Kidney Transplantation Patients

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Background: Osteopontin (OPN) is involved in vascular calcification and atherosclerosis. This study was evaluated the association between serum OPN levels and future first hospitalization or mortality events in patients with kidney transplantation (KT).

Methods: A total of 70 KT patients were enrolled in this study from January through April 2012. The primary end point was the incidence of first hospitalization or mortality. All patients are follow-up until June 30, 2017. Fasting blood samples were obtained from 70 KT patients. Serum OPN levels were determined using a commercially available enzyme immunoassay.

Results: During a median 65-month follow-up, Forty-seven first hospitalization events and eight mortality events occurred. Compared with serum median OPN levels, serum OPN level was positively associated with KT duration ($P = 0.048$), blood urea nitrogen (BUN, $P = 0.043$), creatinine ($P = 0.045$), while negatively associated with glomerular filtration rate (GFR, $P = 0.049$), respectively. KT patients with first hospitalization events and higher prevalence of diabetes ($P = 0.032$), higher BUN ($P = 0.002$), and serum OPN levels ($P = 0.001$), while lower GFR ($P = 0.030$) compared to subjects without first hospitalization events. KT patients with mortality events and higher serum creatinine ($P = 0.009$), and serum OPN levels ($P = 0.001$), while lower GFR ($P = 0.036$) compared to subjects without mortality events. By multivariate Cox analysis after adjusted age, gender, diabetes, hypertension, and GFR showed that OPN levels (hazard ratio (HR): 1.012, 95% confidence interval (CI): 1.000–1.023, $P = 0.048$) was independently associated with first hospitalization events in KT patients and OPN levels (HR: 1.033, 95% CI: 1.008–1.023, $P = 0.058$) was independently associated with mortality events in KT patient.

Conclusion: The results of our study showed that the serum OPN level is a biomarker for future first hospitalization events or mortality events in KT patients.

Key words: osteopontin, first hospitalization, mortality, kidney transplantation

關鍵字：骨橋蛋白，第一次住院，死亡率，腎臟移植

多囊腎病患者腎移植預後分析：中部單一醫學中心研究

Outcome of Kidney Transplantation in Patients with Polycystic Kidney Disease: A Single Center Study

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Background: Renal transplant (RTx) is the best choice of life-quality of renal replacement therapy for patients with end-stage renal disease (ESRD). Autosomal dominant polycystic kidney disease (ADPKD) is a genetic disorder and common cause of ESRD. Different from other causes of ESRD, ADPKD patients need more delicate pre-RTx evaluation for intracranial aneurisms, cardiac manifestation, and complications of liver and renal cysts. The outcome of RTx with ADPKD is still unknown in Taiwan.

Methods: We retrieved our 1327 RTx recipients with 1382 times (two recipients with 3 times, 48 recipients with 2 times) of RTx in the past 35 years. There were 41 recipients with ADPKD. This study evaluated the demographics, outcomes, and complications of RTx in patients with ADPKD compared with other nephropathies.

Results: The mean recipient age at first RTx was 42.9 ± 12.6 years, however, the ADPKD group (52.5 ± 10.1 yrs) was elder than other group (42.7 ± 12.7 yrs, $P = 0.001$). The gender of RTx recipients was female 586 (44.2%) and male 741 (55.8%), though, ADPKD group had higher male gender (28, 68.3%) than other group (713, 55.4%) without statistically significance ($P = 0.245$). Interestingly, the new onset diabetes after transplant (NODAT) was higher in ADPKD group (21, 51.2%) than other group (326, 25.3%; $P = 0.005$), and more malignancy (18; 43.9% vs. 360; 28.0%; $P = 0.041$). The patient survival was inferior in ADPKD group (38.9% vs. 70.3%; $P = 0.018$).

Conclusions: Further studies with multiple centers and greater numbers of patients are needed to compare more precisely the complications and results of transplant between patients with ADPKD and other recipients in Taiwan.

關鍵字：多囊腎病變、移植後新發糖尿病、腎移植

腎臟移植病患慢性抗體性排斥之治療－醫學中心回溯性研究

Treatment of Chronic Antibody-Mediated Rejection in Renal Transplant Recipients – A Single Center Retrospective Study

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Background: A plethora of evidences suggest that the most important cause of late graft loss in renal transplant recipients is chronic antibody-mediated rejection(CAMR). However, there are no consensus on treatment strategies.

Methods: We retrospectively analyzed clinical and pathological data of renal transplant recipients who received kidney graft biopsy with confirmed diagnosis of CAMR in the past 7 years. The patients were divided into two groups according to treatment strategy: Group 1: aggressive treatment (double filtration plasmapheresis and one of the followings: rituximab, intravenous immunoglobulin, antithymocyte globulin, bortezomib, or methylprednisolone pulse therapy); and group 2: supportive treatment.

Results: From February 2009 to December 2016, a total of 82 graft biopsies with diagnosis of CAMR were identified. Kaplan-Meier analysis of death-censored graft survival showed a worse survival in group 2 ($P = 0.015$ by log-rank test). Adverse event-free survival was lower in group 1, whereas patient survival was no significant different. Proteinuria and supportive treatment were independent risk factors for graft loss in multivariate analysis.

Conclusions: Aggressive treatment was associated with better graft outcome. However, higher incidence of adverse events merit personalized treatment, especially for those with higher risk of infection. Appropriate prophylactic antibiotics are recommended for aggressive treatment patients.

應用醫病共享決策於透析病患高血磷的控制—控制高血磷，我是否該自費購買降磷藥物？

Application of Shared Decision Making in Hyperphosphatemia Control in Patients Undergoing Dialysis:“ Should I Choose Self-paid Phosphate Binders to Control Hyperphosphatemia?”

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摘要

2017 年全台末期腎臟疾病之透析人口已突破 8 萬大關，其中患有高血磷患者人數佔總透析人數約 1/3。高血磷症是影響透析患者合併症發生率及存活率的關鍵因素。在長期高血磷狀況下，會造成次發性副甲狀腺功能亢進、皮膚搔癢、腎性骨病變，甚至會增加心血管疾病的風險，導致死亡率增加。高血磷的控制策略，除了規律的透析治療及飲食控制外，多需配合降磷藥物的使用。傳統降磷藥物，包括碳酸鈣及氫氧化鋁，可能增加血管鈣化的風險與重金屬的堆積。故有鑑於傳統降磷藥物的缺點，近年來發展出不含鈣鋁的降磷藥物，大大改善傳統降磷藥物的缺點。然而，不含鈣鋁的降磷藥物如碳酸鏷(Lanthanum carbonate)、檸檬酸鐵(Ferric citrate)、磷能解(sevelamer hydrochloride)等，因價格昂貴，健保並不給付。因此，透析腎友決定選用傳統降磷用藥或自費購買新型降磷藥物需多方考量。

相較於過去醫師代替病患行醫療決策的模式，醫病共享決策的需求日益提高。為鼓勵透析病患主動參與高血磷治療的決策，本團隊藉由此醫病共享決策主題“控制高血磷，我是否該自費購買降磷藥物？”及決策輔助工具的投入與研發，以期讓腎友更了解高血磷控制的重要性，主動參與高血磷治療決策，並與醫療人員共同討論，選擇出最適合自己的降磷藥物。

關鍵字：末期腎臟疾病,高血磷,碳酸鏷,檸檬酸鐵

Keywords: end-stage renal disease,hyperphosphatemia, lanthanum carbonate ,ferric citrate

DPP-4 抑製劑與接受二線藥物之糖尿病患者之結腸直腸癌和肝癌風險之間的關聯性：巢式病例對照研究

Associations Between DPP-4 Inhibitors and Risks of Colorectal and Liver Cancers in Patients with Diabetes Receiving Second-line Agents: A Nested Case-control Study

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Background: In vitro and animal studies showed dipeptidyl peptidase-4 inhibitors (DPP-4is) have procarcinogenic effects in colorectal cancer. Associations between dipeptidyl peptidase-4 inhibitors (DPP4is) therapy and risks of liver and colorectal cancers in patients with T2DM are inconclusive. The objects of this study were to investigate the association between DPP4is exposure and risks of liver and colorectal cancers in patients with T2DM receiving second-line agents.

Methods: In this nested case-control study, we identified 268,520 patients with diabetes receiving DPP4is as second-line agents between 2009 and 2013 from Taiwan's National Health Insurance Research Database, Taiwan Cancer Registry, and National Death Registry of Taiwan. Of these, 948 and 990 patients newly diagnosed with liver and colorectal cancer were matched to 3,792 and 3,956 controls, respectively. The patients with DPP4is users were divided into three dosage groups (low, medium, and high) based on the interquartile range of DPP4is exposure. Stepwise conditional logistic regression was used to examine the association between DPP4is use and the risk of liver or colorectal cancer.

Results: The results showed DPP4is exposure was associated with colorectal cancer risk, and the dose-response effect of DPP4is for colorectal cancer was J-shaped, indicating the dual effects of DPP4is. The low dose DPP-4i exposure had a lower risk of colorectal cancer in patients with colorectal cancer than in their matched controls [adjusted odds ratio (OR): 0.49, 95% confidence interval (CI): 0.32–0.75, $P = 0.001$]. However, the high dose DPP-4i exposure related to a higher risk of colorectal cancer in patients with colorectal cancer than in their matched controls (adjusted OR: 1.86, 95% CI: 1.32–2.61, $P < 0.001$). No association between DPP4is use and liver cancer risk was observed.

Conclusions: The effects of long-term DPP4is use on colorectal cancer risk warrant further study.

Key words: DPP-4 inhibitors; liver cancer; colorectal cancer; second-line agents; type 2 diabetes mellitus

身體組成參數作為評估早期慢性腎臟病兒童心血管疾病的潛在危險因素
**Body Composition Parameters as The Potential Risk Factor for Evaluating
Cardiovascular Disease in the Children with Early CKD**

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Background: Cardiovascular disease (CVD) is the leading cause of death in children and adolescents with chronic kidney disease (CKD). Most studies were focused on children with advanced CKD. For children with early CKD, risk factors of CVD were rarely discussed.

Methods: Sixty-three subjects aged 8-18 and CKD stage G1-G4 were enrolled. Cardiovascular was evaluated by ambulatory blood pressure monitoring (ABPM). Other than the clinical and biochemical characteristics, anthropometric parameters, such as indexed body mass (BMI) / fat mass (FMI) / lean body mass (LBMI), total body fat percentage (TBF), and the ratio of android to gynoid fat (A/G ratio), were compared between the two groups (abnormal ABPM profile vs. normal ABPM profile).

Results: Compared with children with normal ABPM profile, children with abnormal ABPM profile had higher percentage of hyperuricemia (75.0% vs. 21.7%, $p < 0.001$). Furthermore, they even have higher FMI z-score (median: 0.45 vs. -0.41; IQR: -0.32–1.22 vs. -0.78– -0.09, $p = 0.001$) and A/G ratios (median: 0.90 vs. 0.76; IQR: 0.81–1.04 vs. 0.72–0.84; $p = 0.001$). In multivariate analysis, hyperuricemia showed positive correlation with abnormal ABPM profile (odd ratio: 7.6; 95% confidence interval: 1.7–33.1).

Conclusions: Hyperuricemia is associated with abnormal ABPM profiles in children with CKD. Furthermore, we are going to analyze the relation between uric acid and body fat parameters.

超音波導引下經皮腎臟生檢的併發症**Complications of Echo-guided Percutaneous Kidney Biopsies in an Area Hospital**

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Background:

The aim of this study was to evaluate safety, relevant complications and risk factors of renal biopsies in patients of an area hospital.

Material and methods:

Kidney biopsies reported in the Kidney Biopsy Registry of Cheng-Ching hospital from July 2007 to June 2018 were included. Of the 91 biopsies included, 89 were from adults (≥ 18 years), and 2 were from children. Median age was 49.4 years (range from 9 years to 88 years). Risk factors for major complications (blood transfusion and/or angiographic embolization) were analyzed using t test statistics. Numbers of clinical manifestations at time of biopsy were nephrotic syndrome 49 (53%), proteinuria with hematuria 13 (14%), isolated hematuria 2 (2%), Rapidly progressive glomerulonephritis 10 (11%), acute nephritis 8 (9%), acute renal failure 6 (7%), and CKD stage 5 4 (4%).

Results:

Gross hematuria appeared after biopsy in 17 (18.7%) of the patients; 9 (9.9%) of patients needed blood transfusion, and 1 (1.1%) of patients needed angiographic embolization; 71 (78%) of the biopsies were without complications.

The frequencies were 19.1%, 10.1%, and 1.1% in adults and 0.0%, 0.0% and 0.0% in children, respectively. In unadjusted analyses, risk factors for major complications were higher creatinine, prothrombin time, INR, and lower estimated GFR, hemoglobin level.

The prevalence of major complications of patients with nephrotic syndrome or proteinuria with hematuria were (1/48) 2% and (0/13) 0%, respectively. The prevalence of major complication of patients with acute renal failure or CKD stage 5 were (3/6) 50% and (2/4) 50%, respectively.

Conclusions:

Elevated creatinine, prothrombin time, INR and reduced estimated GFR, hemoglobin, acute renal failure, and CKD stage 5 are associated with an increased risk of major complications.

末期腎病治療選擇，導入 SDM 輔助工具之經驗

End-stage renal disease treatment options, experience in introducing SDM assistive tools

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背景及目的：

當末期腎臟病面臨需要腎臟移植或透析抉擇，因焦慮、害怕面對不知如何選擇，或醫師的透析建議有時與病人意願衝突，透過 SDM 決策輔助工具探索病人的偏好及價值觀，共同做出最適合病人的治療與照護決策。此篇分享使用 SDM 輔助工具執行-面對末期腎臟病，我應該選擇哪一種治療？之經驗。

執行方法

制定執行流程及推動:院方成立「醫病共享決策執行小組」，使用衛生福利部公版醫病共享決策輔助工具，制訂腎臟科之「應用醫病共享決策輔助工具作業流程」SOP；於腎臟科部會議及護理人員佈達 SDM 執行流程。此外，在腎臟病房團衛及末期腎友座談會，針對病人及家屬宣導 SDM。門診或住院病人，主治診療為末期腎臟病，開立醫囑單啟動 SDM 流程，病人持 SDM 處方簽至慢性腎臟病衛教中心(住院病人由衛教護理師前往病房)，護理師提供衛生福利部公版醫病共享決策輔助表說明腎臟替代療法及線上觀看共享決策影片，衛教及評估的結果，利用電子留言版回覆主治醫師病人決策。紙本決策輔助表產生電子病歷表單，透過電子病歷記錄 IEMR(Integrated electronic medical record)完成團隊成員交班。1060901~1070731 共 77 病人(階段一)藉由 SDM 完成決策，1070801 持續以 SDM 優化活動完成 27 位病人(階段二)評估問卷及滿意度調查。

執行成效

階段一及階段二評估問卷及滿意度調查結果，在進行決策前，病人還不清楚想要選擇方式佔(63.6% vs.59.3%)，進行決策輔助說明之後未能做出決策的病人下降至(24.7% vs.11.1%)，改善幅度為(38.9% vs.48.2%)，已作出決策的病人有 58(75.3%)vs.24(88.9%)，選擇腹膜透析有 32(55.2%) vs.8(33.3%)，選擇血液透析有 22(37.9%)vs.13(54.2%)，選擇活體腎臟移植有 3(5.2%)vs.3(12.5%)，選擇安寧療護有 1(1.7%) vs.0。

困境與建議：

- 1.醫療人員不瞭解作業流程:接受醫策會之訓練課程熟悉衛福部醫病共享決策平台路徑，不熟悉醫病共享決策輔助工具，於單位會議說明醫病共享輔助工具之運用。
- 2.執行醫病共享決策病人接受衛教時間拉長及病人不想聽、趕時間或否認需要做決策:分階段完成 SDM 過程，優先說明腎替代療法、觀看影片，下次回診先請病人入衛教中心完成醫病共享決策表。

配合衛生福利部導入 SDM 輔助工具提升決策率及下降焦慮，運作過程中面臨困境，經由團隊合作共同突破困境，促進 SDM 推動，將實務推動經驗分享提供給各院參考。

Key words: Shared Decision Making、SDM、IEMR(Integrated electronic medical record)

慢性腎臟病患骨鈣素，骨質疏鬆，腹主動脈血管鈣化的關聯性

Relationship between Osteocalcin, Osteoporosis and Abdominal Aortic Calcification in Chronic Kidney Disease Patients

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Background: Osteocalcin, a bone formation marker, is associated with arteriosclerosis and osteoporosis. We aimed to investigate the relationships among osteocalcin, abdominal aortic calcification (AAC), and bone mineral density (BMD) in chronic kidney disease (CKD) patients.

Methods: A total of 95 CKD patients, stage 2 to 5, were enrolled in our study. Serum osteocalcin was tested by electrochemiluminescence immunoassay. BMD was measured by dual-energy X-ray absorptiometry and AAC by lateral lumbar radiographs findings.

Results: 23(24.2 %) of CKD patients were found with osteoporosis and 43(45.2%) with osteopenia. Compared with normal subjects (N=29) or osteopenia patients, osteoporosis group had older age ($p=.001$), more female ($p<.0001$), lower hemoglobin ($p=.003$), higher Urine protein creatinine ratio (UPCR)($p=.001$), higher osteocalcin ($p<.0001$), higher iPTH ($p=.0001$), higher AAC score ($p=.0002$), and higher phosphorus ($p=.032$). Multivariate logistic regression showed age ($\beta= 1.156$, $p=.012$), osteocalcin ($\beta= 1.11$, $p=.012$) and female gender ($\beta= 12.05$, $p=.032$) are independent risk factors for osteoporosis in CKD patients. Osteocalcin was positively correlated with Na ($r=.23$, $p=.028$), phosphorus ($r=.263$, $p=.013$), HbA1c ($r=.259$, $p=.021$), UPCR ($r=.214$, $p=.038$), AAC score ($r=.225$, $p=.029$), iPTH ($r=.402$, $p<.0001$), calcium channel blocker (CCB) use ($r=.273$, $p=.007$), Erythropoietin (EPO) use ($r=.24$, $p=.019$), while negative correlated with pulse rate ($r=-.26$, $p=.011$), eGFR ($r=-.334$, $p=.001$), hemoglobin ($r=-.298$, $p=.005$), BMD ($r=-0.462$, $p<.0001$), female gender ($r=-.328$, $p=.001$). After stepwise multivariate regression analysis, lower BMD ($\beta= -4.684$, $p=.001$), higher iPTH ($\beta= .114$, $p=.014$), EPO use ($\beta= 19.499$, $p=.022$) were independently correlated with osteocalcin level.

Conclusions: We observed higher osteocalcin level is independent risk factors for osteoporosis in CKD patients. Hyperparathyroidism, EPO use were positively correlated with osteocalcin level in CKD patients.

Key words: osteocalcin, osteoporosis, chronic kidney disease

關鍵字：骨鈣素，骨質疏鬆，慢性腎臟病

血管張力素轉化酶抑制劑 (ACEI) 或血管收縮素受體阻斷劑 (ARB) 單藥治療延緩台灣慢性腎病患者的腎功能惡化

Angiotensin Converting Enzyme Inhibitor (ACEI) or Angiotensin Receptor Blocker (ARB) Monotherapy Retards Renal Function Deterioration in Taiwanese Chronic Kidney Disease Population

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ABSTRACT

Background: How different uses of Angiotensin converting inhibitors (ACEI) and/or angiotensin receptor blocker (ARB) influence the chronic kidney disease (CKD) progression is still unclear. This study explore the CKD progression in a multi-center, longitudinal cohort study conducted on 2983 stage 1-5 CKD patients with hypertension (HTN).

Methods: Patients treated with ACEI and ARB for ≥ 90 days within 6 month period were in the study group and others in control group. Study group was sub-grouped into: ACEI monotherapy, ARB monotherapy, ACEI-ARB combine and ACEI-ARB switch. The renal progression was defined as average eGFR decline by more than $5\text{ml}/\text{min}/1.73\text{m}^2/\text{yr}$ or enters dialysis.

Results: With at least one year follow-up, a significant reduction in eGFR was noted in 25.38% of control and 16.25% of study group. ACEI or ARB monotherapy group had significantly reduced CKD progression events (27(12.5%) in ACEI monotherapy, 233(15.94%) in ARB) compared with ACEI/ARB combine (11(25.58%)) and ACEI/ARB switch group (32(23.02%)).

Conclusion: ACEI or ARB monotherapy might retard the renal function deterioration among hypertensive CKD patients. At least one ACEI or ARB monotherapy is recommended in all hypertensive CKD patients.

降低門診血液透析病人醣化血色素控制不佳率

Reduce the Rate of Poor Glycosylated Hemoglobin Control in Outpatient Hemodialysis Patients

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背景

糖尿病是造成慢性腎衰竭的主要原因之一，據統計國內目前血液透析病人中約有 40% 是糖尿病引起，本透析中心所佔的比率亦是如此，血糖控制不佳易導致合併症增加 (如血管病變、自主神經病變等)，透析中也易出現低血壓，及不利於長期瘻管的建立及通暢，故影響糖尿病的透析患者存活率，而醣化血色素(HbA1C)是糖尿病控制是否得宜的重要指標，因此我們期望讓血液透析病人的 HbA1C 達到標準值，以改善血液透析病人的治療品質。

方法

本期主題以臨床上診斷糖尿病控制成效常用 HbA1C 的檢驗值為改善指標，建立 HbA1C 目標值 $\leq 7.5\%$ ，透過飲食指導、輔助工具使用、多媒體運用等來達其成效。

1. 成立跨部門 HbA1C 專案改善小組，小組成員包括腎臟科醫師、營養師、糖尿病衛教師、透析治療師等。
2. 收案對象為 106 年 1-12 月長期血液透析糖尿病病人，例行抽血報告 HbA1C $> 7.5\%$ 的病人，總共收案有 49 個病人。
3. 針對 49 個病人做糖尿病飲食認知、降血糖藥物服用情形、藥物的種類等問卷調查並彙總分析，然後擬定對策進行改善。
4. 對策實施與檢討後制定標準化作業流程、張貼衛教海報、製作食物代換表，強化病人對糖尿病的知識。
5. 增加客制化糖尿病衛教卡、個別化控糖餐盒烹飪影片教學、增訂飲食記錄表及醫護醫友互動聯絡簿等，強化治療師與病人的互動與聯繫，以利血糖的監控。

結果

HbA1C 專案小組利用改善手法與輔助工具，找出病人的問題與分析原因，運用多樣性個別化的衛教模式，經過 6 個月進行改善後，血液透析糖尿病病人 107 年抽血報告 HbA1C $> 7.5\%$ ，由原來 14.5% 降低至 8.3%，次要目標中控制不佳的三酸甘油酯由改善前 61.2% 減至改善後 48.9%，膽固醇由改善前 18.3% 減至改善後 12.2%；附加效益為統計 49 位病人於 106 年間曾發生低血糖症狀為 18 人次，實施後發生低血糖次數降低為 0 人次，因血糖控制不佳造成感染與病足而住院的人次由 46 人次降為 0 人次，成果相當顯著。

結論

糖尿病的控制對血液透析的病人而言是一個非常重要的課題，因此 HbA1C 專案小組將持續提供病人及時的相關資訊，分析血液透析病人血糖控制不佳的原因，並針對個案的需求與問題一一解決，適時導正糖尿病病人飲食的認知，使血糖的控制達到穩定且 HbA1C 達到標準值，而 HbA1C 的控制與改善需要長期追蹤，我們將持續努力推動並追蹤以提升血液透析病人的治療品質

關鍵字：血液透析、醣化血色素、治療品質

高敏感度心臟肌鈣蛋白 T 對於腎臟功能不全病人的急性心肌梗塞診斷價值
**Diagnostic value of Acute Myocardial Infarction with High-Sensitivity
Cardiac Troponin T Assay in Patients with Renal Insufficiency**

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Background: Cardiac troponins are the preferred biomarkers for the diagnosis of acute myocardial infarction (AMI) in the general population. However, the diagnostic value for patients with renal insufficiency is uncertain. The aim of this work was to examine the diagnostic accuracy of high sensitivity cardiac troponin T (hs-cTnT) assay for AMI in patients with renal insufficiency at initial presentation.

Method: We prospectively identified the patients who admitted to coronary care unit of the Chang Gung Memorial Hospital, Keelung from September 1, 2017 to February 28, 2018. Patients who presented with chest pain, dyspnea or cardiac arrest were enrolled. Receiver operating characteristic (ROC) curve were used to examine the diagnostic value of initial hs-cTnT levels and dynamic change at three hours.

Results: Sixty-one patients with initial estimated glomerular filtration rate (eGFR) ≥ 60 mL/min/1.73 m² and 142 patients with eGFR < 60 mL/min/1.73 m² were identified. AMI was finally diagnosed in 54.9% of patients with initial renal insufficiency. The area under the ROC curve of initial hs-cTnT levels for diagnosis of AMI in patients with renal insufficiency was 0.59 (95% CI, 0.49 to 0.69; P=0.116); the relative change after 3 hours was 0.79 (95% CI, 0.471 to 0.87; P<0.001). A cutoff value of 16% had the sensitivity of 72.9%, specificity of 86%, positive predictive value of 93.4% and negative predictive value of 72.4% for AMI prediction in patients with renal insufficiency.

Conclusion: Dynamic change in hs-cTnT levels during 3 hours significantly increased the diagnostic accuracy for AMI in patients with renal insufficiency at initial presentation.

Key words: Acute myocardial infarction, renal insufficiency

關鍵字：急性心肌梗塞， 腎功能不全

血液透析與腹膜透析病人腸道微生物相的差異

Differences in Intestinal Microbiota between Patients Undergoing Maintenance Hemodialysis and Peritoneal Dialysis

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Background: Analysis of the fecal microbiota in uremic patients revealed a disturbed composition of the microbiota characterized by an overgrowth of aerobic bacteria. The aim of this study was to investigate the differences of intestinal microbiota between hemodialysis (HD) and peritoneal dialysis (PD) patients.

Methods: Patients undergoing maintenance dialysis at NCKUH were enrolled for investigation. Patients with history of inflammatory bowel disease, active infection diseases within 1 month, or use of antibiotics within 1 month were excluded. Stool bacterial composition was assessed by 16S Metagenomics Analysis.

Results: There were 38 patients undergoing maintenance hemodialysis (16 HD and 22 PD) included for analysis. Compared with PD patients, HD patients were older and had higher prevalence of diabetes mellitus and coronary artery disease. HD and PD samples have similar Shannon diversity (richness plus evenness). HD samples have higher alpha diversity than PD based on phylogenetic relationship, and there was significant difference in intestinal microbial population (beta diversity) between HD and PD samples. There was higher prevalence of Verrucomicrobiae (class), Verrucomicrobiales (order), Lactobacillaceae (family), Lactobacillus (genus) and human gut metagenome (species) in the HD group in preliminary analysis.

Conclusions: There was significant difference in intestinal microbiota between HD and PD patients. Further investigation is ongoing to determine the bacteria associated with dialysis patients' infection diseases and medication/treatment.

Key words: intestinal microbiota, peritoneal dialysis, hemodialysis

關鍵字：腸道微生物相、血液透析、腹膜透析

多囊腎病基因突變的多樣性**Diverse Genetic Mutations in Polycystic Kidney Disease**

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Background: To study the disease-causing mutations of polycystic kidney disease (PKD), we examined a total of 10 genes related to kidney and liver cysts, including ADPKD (PKD1, PKD2, GANAB, and DNAJB11), ARPKD (PKHD1), and ADPLD (ALG8, LRP5, PRKCSH, SEC61B, and SEC63).

Methods: We collected a total of 153 ADPKD families and 40 non-PKD cystic kidney individuals. The diagnosis of ADPKD were established by clinical and image studies from nephrologists. Library construction was performed by Fluidigm Access Array, and MiniSeq was used for next generation sequencing followed by bioinformatics analysis by using CLCbio Biomedical Workbench.

Results: We potentially can identify mutations in 76.4% (117/153) of the ADPKD families in Taiwan by our high-throughput method. PKD1 and PKD2 represented 64.7% and 33.6% of diagnosed families, respectively. More than half of PKD2 mutations (22/39) were PKD2 R803* mutation. Microsatellite analysis showed marker D4S1563 differentiated those PKD2 R803* families into two groups.

Discussions: Our study showed clinical diagnosed ADPKD is a genetic heterogeneous disease with different genes and variable clinical spectrum. De novo and compound heterozygous PKD1 mutations were found in individuals who presented with earlier and severe disease. Microsatellite analysis indicated two different but closely related founders leading to the high prevalence of PKD2 R803* mutation in Taiwan. Furthermore, disease-causing ADPLD genes can be found in ADPKD families and PKD1 mutations can be found in individuals diagnosed as simple kidney cysts.

Keywords: polycystic kidney disease

關鍵字：多囊腎

燒炭自殺後蒼白球壞死的發生率及預測因子

Incidence Rates and Predictors of Globus Pallidus Necrosis after Charcoal Burning Suicide

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Introduction: This study aimed to examine predictors of globus pallidus necrosis because there was a paucity of literature regarding risk factors for globus pallidus necrosis after charcoal burning suicide.

Methods: A total of 67 patients with charcoal burning suicide were recruited and stratified into two subgroups based on either presence (n=40) or absence (n=27) of globus pallidus necrosis. Demographic, clinical, laboratory and radiographic data were obtained for cross-sectional analysis. All patients were followed to investigate the risks for mortality.

Results: The patients aged 36.76 ± 11.10 years and 67.2% were male. Patients with globus pallidus necrosis were younger ($P=0.044$) and had less hypertension ($P=0.015$) than patients without globus pallidus necrosis. Furthermore, patients with globus pallidus necrosis suffered from severer medical complications, i.e., fever ($P=0.008$), acute myocardial injury ($P=0.022$), acute rhabdomyolysis ($P=0.022$) and neuropsychiatric symptoms ($P<0.001$) than patients without globus pallidus necrosis. Moreover, patients with globus pallidus necrosis received less hyperbaric oxygen therapy than without necrosis ($P=0.024$). Two patients (3.0%) died at the end of study. In a multivariate regression model, it was revealed that acute myocardial injury (odds ratio 4.602, confidence interval 1.120–18.914, $P=0.034$) and neuropsychiatric symptoms (odds ratio 7.990, confidence interval 2.036–31.350, $P=0.003$), bicarbonate level (odds ratio 0.825, confidence interval 0.692–0.983, $P=0.032$), and age (odds ratio 0.925, confidence interval 0.859–0.996, $P=0.038$) were significant predictors for globus pallidus necrosis.

Conclusion: Although patients with charcoal burning suicide had low mortality rate (3.0%), globus pallidus necrosis was not uncommon (59.7%) in this population. Further studies are warranted.

Key words: charcoal burning suicide, globus pallidus necrosis

關鍵字：燒炭自殺, 蒼白球壞死

利用急診 eGFR 作為肺炎住院死亡率之預測指標

eGFR in the Emergency Department as a Predictor of In-hospital Mortality in Pneumonia

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Background: Pneumonia is one of the leading causes of mortality globally and severity-assessment scores for pneumonia is crucial for guiding the site-of-care. Community-based studies had shown the association between pre-existing decreased estimated glomerular filtration rate (eGFR) and outcome of pneumonia. However, whether a single eGFR measurement at the emergency department is a predictor of in-hospital mortality of pneumonia remains to be investigated.

Materials & methods: We conducted a hospital-based, retrospective cohort study in Wanfang Hospital, Taipei Medical University. After excluding patients under 20 years old, 1554 patients who were hospitalized with pneumonia from January 2013 to December 2015 were enrolled. The main predictor of the study was point-of-care eGFR measured at emergency department calculated by equation suggested by Chronic Kidney Disease Epidemiology Collaboration. The major outcome was in-hospital mortality, while the secondary outcomes included intensive care unit (ICU) admission, the need for ventilator support, duration of hospital stay, ICU stay, and ventilator use. Receiver operating characteristic (ROC) curve and Youden criteria were used for determination of the optimal cut-off eGFR to predict in-hospital mortality. Multivariate logistic regression model was used for confirmation of the predictive capability of eGFR on in-hospital mortality.

Results: Among the enrolled patients, 263 (16.9%) had chronic kidney disease (CKD), who exhibited higher C-reactive protein (CRP) level and SMART-COP score, more events of multilobar pneumonia, acute kidney injury, ICU admission and in-hospital mortality (Table 1). Patients with higher pneumonia severity scores showed a trend of lower eGFR. ROC curve and Youden criteria showed that eGFR of 55.89 mL/min/1.73m² is the optimal cut-off value for prediction of in-hospital mortality (Figure 1). Multivariate logistic regression adjusted for gender, co-morbidities, CRP, liver function tests and the SMART-COP score showed that eGFR of <55.89 mL/min/1.73m² exhibited an odds ratio of 3.2 (95% confidence interval: 2.3-4.4) for in-hospital mortality (Table 2). Our finding demonstrated that eGFR of <55.89 mL/min/1.73m² is an independent predictor of in-hospital mortality in patients with pneumonia.

Limitations: Retrospective design, the unspecified cause of death, unavailable data for pneumonia severity index.

Conclusions: Decreased eGFR at the emergency department is associated with higher pneumonia severity and eGFR of <55.89 mL/min/1.73m² is an independent predictor of in-hospital mortality in patients hospitalized with pneumonia.

Keywords: Chronic kidney disease, eGFR, mortality, Pneumonia

兩側腎臟切除病患術後死亡率與醫師或醫院手術量關係**Post-Operation Mortality of Patients with Bilateral Nephrectomies and Its Relation to Surgeon/Hospital Volumes**許毓軫¹郭德輝^{2,3*}張育誌²孫健耀⁴劉冠宏²李中一³王榮德^{1,3}宋俊明²Yu-Ling Hsu¹ Te-Hui Kuo^{2,3*} Yu-Tzu Chang² Chien-Yao Sun⁴ Kuan-Hung Liu² Chung-Yi Li³ Jung-Der Wang^{1,3} Junne-Ming Sung² Tainan RENal Disease Study (TRENDS) group.

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Background Urothelial cancer is a disease with a high prevalence in Taiwan, especially in the southern Taiwan, where our hospital is located. Bilateral upper urinary tract urothelial carcinoma is not infrequently seen and bilateral nephrectomies becomes a common practice in such an endemic region. However, some unexpected sudden deaths were observed some days or weeks after the operations. Because kidneys play an important role in regulating blood pressure and are highly associated with the cardiovascular system, nephrectomized patients may lose some control over their hemodynamics and face a higher risk of mortality. Our aim of the study is to clarify whether these unexplained deaths observed locally were not just by chance and could be noted in the population level.

Method The present study enrolled patients who underwent bilateral nephrectomies from January 1st, 1998 to December 31st, 2013 in the National Health Insurance Research Database (NHIRD). The bilateral nephrectomies can be either synchronous (surgical removal of bilateral kidneys at the same time) or metachronous (not at the same time) and the index date would be the time when the patient was in the anephric state after the operation. In-hospital mortality would be recorded if death occurred during the hospitalization for the index nephrectomy. Besides, these patients would be followed up from the index date for three months to determine the short-term outcomes of bilateral nephrectomies. Survivals of these two groups will be explored by the Kaplan-Meier method with stratifications according to surgeons/hospitals' volumes and Cox proportional hazards models with multivariate adjustment.

Results There were 457 patients receiving bilateral nephrectomies. Among these patients, 241 received synchronous bilateral nephrectomies and 216 had the surgeries metachronously. The mortality within three months after bilateral nephrectomies was 14.4% (66 patients): 44 were in the synchronous group and 22 in the metachronous group (18.3% and 10.2% respectively, $p=0.014$). Post-operation survivals were high in the stratifications of metachronous group (log-rank test 0.015) and high-volume surgeons (log-rank test 0.004), but no difference according to hospital volumes (log-rank test 0.890). Cox analyses for 3-month mortality after bilateral nephrectomies, adjusted for age, gender, calendar year of index operation, reason for removing kidney of the index operation, revealed that hazard ratio of surgeons with low vs. high volumes was 1.82 (95% CI 1.10-2.99) and 0.97 (0.41-2.29) comparing low- and high-volume hospitals.

Conclusions In this population-based study, synchronous bilateral nephrectomy, in contrast to metachronous operation, as well as surgeons' volumes, may be risk factors contributing to the high mortality within three months after the operation. Therefore, whether to remove both kidneys at the same time and surgeons' experiences should be carefully evaluated before such a major operation.

Keywords bilateral nephrectomies, mortality; 雙側腎臟切除手術, 死亡

第二型糖尿病病患，低密度膽固醇變異性越大會增加心血管事件危險性 Greater Low-Density Lipoprotein Cholesterol Variability Increase the Risk of Cardiovascular Events in Type 2 Diabetes Mellitus

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背景：研究報告指出，血之變異性越大在冠狀動脈疾病病患有較差的心血管預後。本篇研究想探討第二型糖尿病病患，其低密度膽固醇變異性與心血管事件的相關性。

方法：本研究利用高醫資料庫，總共收集 5354 位第二型糖尿病病患。本研究終點為心血管事件，包括：因為冠狀動脈疾病、中風、周邊動脈疾病住院及心血管死亡。利用低密度膽固醇的標準差來代表變異性。

結果：單變項研究結果顯示低密度膽固醇的標準差會增加糖尿病病人心血管事件的風險(風險比：1.016；95%信賴區間：1.006 – 1.022； $p < 0.001$)。進一步多變項分析，發現低密度膽固醇的標準差仍是有顯著意義的會增加糖尿病病人心血管事件的風險(風險比：1.063；95%信賴區間：1.025 – 1.102； $p = 0.010$)。若將糖尿病病患依據低密度膽固醇的標準差分成三等份，在 Kaplan-Meier 曲線顯示：第二三等分位或第三三等份位的糖尿病病人比起第一三等份位得病患有更多的心血管事件的風險(log-rank $p < 0.001$)。

結論：總括而言，本研究低密度膽固醇變異性越大會增加糖尿病病患心血管事件危險性。因此在糖尿病病患需注意其血脂變異性來減少心血管事件。

關鍵詞：第二型糖尿病、低密度膽固醇變異性、心血管事件

探討糖尿病前期病人之血液糖化白蛋白、糖化血色素濃度與糖尿病視網膜病變的相關性

The Association between Glycated Albumin and Glycol Hemoglobin in Diabetes Retinopathy of Pre-Diabetes

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背景：糖尿病前期是糖尿病發病前的階段，這個階段通常被稱為灰色區域。美國糖尿病協會表示，糖尿病前期應視為增加糖尿病和心血管疾病的風險。確定臨床標誌物以檢測糖尿病微血管併發症的進展對於早期糖尿病的管理是非常重要的。糖化血色素（glycohemoglobin；HbA_{1c}）在臨床上可作為糖尿病血糖控制的黃金標準，可以反映體內最近2-3個月的血糖控制情況，但可能受到紅血球壽命和變異血色素的條件影響。糖化白蛋白（glycated albumin；GA）是葡萄糖和血清白蛋白之間，非酶糖化反應的早期Amadori-type glycation protein，是反映之前2至3週的平均葡萄糖指標。它比HbA_{1c}在更短的時期內變化，優於HbA_{1c}在反映血糖波動方面的優勢。此外，GA不受飲食、運動影響，檢測時不需空腹，更適用於監測糖尿病短期疾病情況。在第2型糖尿病患者中已有報告GA濃度與糖尿病性視網膜病變嚴重程度之間的相關性。然而，在台灣糖尿病前期患者中研究血液中糖化白蛋白濃度與糖尿病性視網膜病變之間的關聯性仍然不多。

方法：本研究期間為民國一百零五年一月至民國一百零六年二月，收案地點於高雄市某地區醫院，收案對象為新陳代謝科門診 291 人；經邀請後自願參加者，填寫一份問卷與受試者同意書。測量代謝症候群危險因子變項包括：眼底攝影、血壓、BMI、飯前血糖值、糖化血色素、糖化白蛋白、總膽固醇、三酸甘油酯、高密度脂蛋白、低密度脂蛋白、尿液微量白蛋白、尿液肌酸酐、eGFR。以統計軟體 SPSS20.0 中文版進行分析其關連性。抽血檢測使用生化檢驗機台 BECKMAN COULTER Synchron SYSTEMS UniCel Dx C800，項目有空腹血糖 (oxygen rate method)、血脂質 (end point method)、糖化白蛋白 (Enzymatic assay method 測定)、尿液微量白蛋白 (螢光偏極化免疫法測定)、尿液肌酸酐 (Jaffe method method 測定)；糖化血色素則使用 BioRed D-10 機台 (HPLC method)。

結果：此研究共收集 291 位糖尿病前期受試者，臨床檢驗結果如表 1 所示，161 位男性與 130 位女性，平均年齡 62.5 ± 13.0 歲，24.1% 罹患糖尿病性視網膜病變，GA 與 HbA_{1c} 平均值分別為 14.6 ± 2.8% 與 6.0 ± 0.4%。表 2 以單變項邏輯式迴歸分析糖尿病前期受試者之糖尿病視網膜病變與各變項的相關性，年齡每增加 1 年有 1.096 倍的機會罹患糖尿病視網膜病變，達顯著相關性；男性相對於女性有 1.767 倍的機會罹患糖尿病視網膜病變，達顯著相關性；BMI 每降低 1 kg/m² 有 0.833 倍的機會罹患糖尿病視網膜病變，達顯著相關性；收縮壓每增加 1 mmHg 有 1.035 倍的機會罹患糖尿病視網膜病變，達顯著相關性；GA 每增加 1 % 有 1.164 倍的機會罹患糖尿病視網膜病變，達顯著相關性；HbA_{1c} 每增加 1 % 有 2.556 倍的機會罹患糖尿病視網膜病變，達顯著相關性；總膽固醇每降低 1 mg/dL 有 0.985 倍的機會罹患糖尿病視網膜病變，達顯著相關性；eGFR 每降低 1 mL/min/1.73 m² 有 0.991 倍的機會罹患糖尿病視網膜病變，達顯著相關性。在多變項邏輯式迴歸分析結果，年齡每增加 1 年有 1.088 倍的機會罹患糖尿病視網膜病變，達顯著相關性；男性相對於女性有 1.946 倍的機會罹患糖尿病視網膜病變，達顯著相關性；收縮壓每增加 1 mmHg 有 1.042 倍的機會罹患糖尿病視網膜病變，達顯著相關性；HbA_{1c} 每增加 1 % 有 2.592 倍的機會罹患糖尿病視網膜病變，達顯著相關性；總膽固醇每降低 1 mg/dL 有 0.985 倍的機會罹患糖尿病視網膜病變，達顯著相關性；但 GA 每增加 1 % 有 1.021 倍的機會罹患糖尿病視網膜病變，未達顯著相關性。

結論：本研究之糖尿病前期患者對糖尿病視網膜病變的單變項邏輯式迴歸分析，GA 與 HbA_{1c} 有顯著性差異，但在多變項邏輯式迴歸分析，HbA_{1c} 每增加 1 % 有 2.592 倍的機會罹患糖尿病視網膜病變。在臨床醫學檢驗中，主要以測量 HbA_{1c} 來監測長期血糖控制。但是 HbA_{1c} 的值會受到血糖高低與紅血球細胞壽命的影響而偏低，因此 GA 可反映近期 (2-3 週) 的血糖，可用於糖尿病病人的血糖監控 [19]。Umayahara Y 等人的研究指出，GA/HbA_{1c} ratio 與血糖變化、糖尿病視網膜病變有相關性 [20]，在未來糖尿病前期患者可使用 GA/HbA_{1c} ratio 篩檢提早發現是否發生糖尿病視網膜病變

關鍵詞：糖尿病前期、糖化白蛋白、糖化血色素、糖尿病視網膜病變

腹膜透析病人 MRI 顯影劑使用後腎功能差異個案探討

Effects of Contrast Medium on Chronic Peritoneal Dialysis Patients after MRI Examination: A Case Series Study

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背景：顯影劑大多經由腎臟代謝，對腎臟有直接的毒性與缺氧性的破壞。文獻指出即使顯影劑的使用是安全的，對於腎功能不全病人接受核磁共振使用顯影劑(Gadolinium)會增加發生NSF (nephrogenic systemic fibrosis)的風險，然而不管是血液透析或是腹膜透析都沒有足夠證據顯示可以預防NSF的產生。本次研究將針對個案分析探討腹膜透析仍有殘餘腎功能的病人接受MRI檢查後之相關影響。

方法：記錄分析 6 位於 MRI 檢查且仍具有殘餘腎功能之腹膜透析病人，分析病人接受顯影劑使用後透析一年內的生化檢驗、殘餘腎功能(24 小時尿量)及腹膜平衡試驗(peritoneal equilibration test, PET)、足量透析評估：每週尿毒氮廓清率 (weekly Kt/V) 及肌酸酐之週清除率 (weekly CCr) 是否改變。同時我們也評估是否有 NSF 發生。

結果：分析接受腹膜透析仍有殘餘腎功能曾接受過核磁共振檢查的 6 位病人，平均年齡：49.5±16.3，男性 4 人(66.6%)，女性 2 人(33.3%)，腹膜透析治療方式使用連續性可攜帶式腹膜透析(continuous ambulatory peritoneal dialysis, CAPD)有 2 人(33.3%)，及全自動腹膜透析(automated peritoneal dialysis, APD)佔 4 人(66.6%)；針對治療成效進行生化值與殘餘腎功能、PET、weekly CCr、weekly Kt/V 之變化差異分析，發現病人於接受 MRI 檢查後其治療成效並無顯著性差異 ($P > 0.05$)，而觀察透析一年後殘餘腎功能較少達統計意義 (0.6 ± 0.4 L vs. 0.3 ± 0.2 L) ($P < 0.05$)。追蹤分析檢查前/檢查後一年變化如下：24 小時尿量： $0.6 \text{L} \pm 0.40$ / $0.3 \text{L} \pm 0.2$ ；BUN： $83.8 \text{mg/dL} \pm 41.1$ / $58.3 \text{mg/dL} \pm 20.0$ ；creatinine： $11.6 \text{mg/dL} \pm 3.6$ / $11.9 \text{mg/dL} \pm 3.1$ ；weekly Kt/V： 1.9 ± 0.6 / 1.9 ± 0.2 ；weekly CCr： $66.8 \text{L}/1.73 \text{m}^2 \pm 24.5$ / $52.9 \text{L}/1.73 \text{m}^2 \pm 11.9 \text{L}/1.73 \text{m}^2$ ；4 小時 creatinine D/P 值： 0.6 ± 0.1 / 0.7 ± 0.1 ；albumin： $3.7 \text{g/dL} \pm 0.4$ / $3.8 \text{g/dL} \pm 0.4$ ；hemoglobin： 9.9 ± 1.3 / $10.3 \text{g/dL} \pm 1.1$ 。

結論：本次觀察腹膜透析病人顯示接受 MRI 檢查與觀察一年後殘餘腎功能有顯著性差異。目前無 NSF 情形發生。

Key words：核磁共振、顯影劑、腹膜透析

末期腎病整合式醫病共享決策模式成效

Effectiveness of End Stage Renal Disease Integrated Shared Decision Making

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Background: 慢性末期腎病的病人在遭遇透析模式選擇時，常會遭遇許多醫療及價值上的選擇困境。傳統透析模式衛教，往往缺乏團隊整合及醫病充分溝通。本院在 2017 年 3 月，由於缺乏良好的決策工具及適當的流程，末期腎病病人，選擇腹膜透析模式的比例相較於同儕醫院極度偏低。因此在 2017 年 6 月起導入整合式末期腎病醫病共享決策模式，希望可以透過此模式導入應用，改善本院透析模式選擇比例懸殊之狀況。本研究的目的，希望能探討導入此模式之成效。

Method: 本研究為回溯性研究，收集本院自 2017 年 6 月起，導入『末期腎病整合式醫病共享決策模式』後之相關資料。本模式流程包含建立醫病共享決策輔助表單、建立末期腎病人個案管理流程、醫病共享決策門診、成立專用視聽空間，整合透析模式介紹流程。病人在醫師評估需接受醫病共享決策介入後，轉介至專門門診，將團隊整合在同一看診空間，其中包含腎臟病個管師、腎臟病衛教師、血液與腹膜透析技術師，接受完整的模式介紹、個人價值評估以及決策評估後，再由醫師參考決策評估表與病人討論確認治療模式。在過程中會完成決策輔助工具成效評估，給予評估成效。整體模式的效果評估則為結案病人選擇腹膜透析治療之比例。

Result: 在導入『末期腎病整合式醫病共享決策模式』之前一年，本院末期腎病結案人數為 56 人，選擇血液透析有 20 人 (35.7%)，腹膜透析 3 人 (5.4%)，轉院治療 17 人 (30.3%)，死亡 11 人 (19.6%)，拒絕治療 3 人 (5.4%)，失聯 1 人 (1.8%)，安寧 1 人 (1.8%)。進行本模式導入後，統計收案人數共 38 人，結案統計共 24 人，選擇血液透析有 12 人 (50%)，腹膜透析 11 人 (45.83%)，轉院治療 1 人 (4.16%)。醫療共享決策輔助工具成效問卷，以治療認知來看，完全了解的平均有 78.95%，不確定的有 21.05%，不了解的有 0%。因此本模式有 78.95% 能讓病人對治療的認知完全瞭解，且有效提升本院腹膜透析選擇佔透析總人數由 13.64% 提升至 23.43%。

Conclusion: 我們在醫病共享決策的基礎上，改變了硬體空間以及流程，並將團隊進行整合，修正成為末期腎病整合式醫病共享決策模式。本研究展現本模式不僅讓病人能接受更完整的團隊照護，也能在對治療有充分瞭解的前提下，提升透析模式選擇腹膜透析的比例。未來也值得在各層級之醫院進行類似的軟硬體與流程整合，以其提升決策與病人照護品質。

Key words: Shared Decision Making

關鍵字: 醫病共享決策

高齡末期腎病進入腹膜透析治療之觀察性分析

The Elderly in Peritoneal Dialysis: An Observational Study

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背景：2018 年台灣邁入「高齡社會」，65 歲以上老年人口占總人口比率 14.1%。根據 2015 年美國腎臟數據系統（USRDS）資料顯示：1996 年與 2013 年相比選擇腹膜透析（Peritoneal dialysis, PD）總人數增加 1.2 倍，超過 80 歲的人數增加 1.9 倍；且超過 85 歲以上選擇 PD 人口成長 2.1 倍。由於年長者接受 PD 人數的快速增長，因此本研究分析探討高齡患者接受 PD 治療的成效分析。

方法：回溯分析 2006 年~2017 年 80 歲以上高齡患者進入腹膜透析治療針對共病、治療方式、主要照顧者之成效分析。

結果：回溯分析本院 2006 年~2017 年開始接受腹膜透析治療年齡大於 80 歲之高齡患者，共 19 人，男性 8 人(42%)；平均年齡 82.3 ± 1.7 歲；PD 治療時間(time on therapy)平均值為 23.8 ± 17.3 個月。進入長期腹膜透析原發疾病以慢性腎絲球腎炎 10 人(53%)居多，惡性高血壓、糖尿病各 3 人(16%)。長期腹膜透析前曾接受血液透析有 3 人(16%)，治療模式中選擇全自動腹膜透析(APD)者占 10 人(53%)。治療期間平均生化檢驗 albumin: 3.4 ± 0.3 gm/dL；hemoglobin: 10.5 ± 1.1 g/dL；creatinine: 7.3 ± 2.7 mg/dL；Kt/V: 1.9 ± 0.2 ；CTR: 0.5 ± 0.04 。主要換液為子女者佔 13 人(68%)、外傭 4 人(21%)、本人 1 人(5%)、看護 1 人(5%)。退出腹膜透析治療原因中死亡佔 12 人(63%)為最多，主要死亡原因：非腹膜透析相關之敗血性休克佔 3 人(16%)；心肺衰竭、呼吸衰竭、腦血管意外原因死亡各佔 2 人(11%)。治療期間併發高血壓 13 人(25%)、糖尿病 5 人(10%)。有發生腹膜炎佔 8 人(42%)，而首次感染腹膜炎平均值為 19.5 ± 14.7 個月。

結論：高齡患者選擇腹膜透析平均治療時間約兩年，本研究分析發現營養不良的問題應為照護重點，且 95% 高齡患者需照護人員協助執行換液。如有適當的居家照護人員，考慮選擇居家腹膜透析治療，增加高齡患者身體舒適性並兼顧照護者之生活品質，也不失為高齡末期腎病患者之透析選擇。

關鍵字：高齡末期腎病、腹膜透析

運用醫病共享決策模式幫助病人做透析管路選擇

Using the Shared Decision-Making Model to Help Patients Choose Dialysis Tubing

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背景：醫病共享係促進醫病關係相互尊重與雙向溝通的理念模式，由醫師和病人一同參與，醫療端提出各類處置實證資料，病人端則依個人偏好做出治療上的選擇，透過雙向交換資訊進行討論。臨床血液透析管路選擇，以往多是醫師單方所建議主導，有鑑於病人本身疾病嚴重度不同及社會功能複雜性，若醫療團隊以提供病人醫療資訊為前提，提供醫療選項之優缺點以及決策後該注意之事項，最終協助病人選擇合適的醫療決定。

方法：本院由腎臟科醫師、護理師共同組成醫病共享決策小組，研發製作『面臨血液透析，我應該選擇哪一種管路』決策輔助工具表，經過初稿測試、優化內容以及專家人員審核，此決策輔助工具符合標準。於107年7~9月間由腎臟專科醫師，轉介腎臟分期第4~5期病人至腎臟衛教室，決策引導員運用多媒體與手冊，根據醫病共享決策四步驟，逐步引導病人釐清本身價值觀與偏好，協助找出最適合的治療選項。

結果：共有30位病人完成決策過程，分析結果決策前有53%病人不清楚要做什麼管路，決策後有76%病人可以明確表達自己的選擇；有70%病人選擇手臂式血管；100%病人經由決策後能清楚表達「我已經清楚選項的好處與壞處」；認知理解程度調查達95.8%。根據本調查結果，可知醫病共享模式能促成醫病間良性溝通，適合全面推廣應用。

關鍵字：醫病共享、透析管路

末期腎臟病前期患者之復原力及其相關因素探討**Resilience and Related Factors among Patients with Pre-End Stage Renal Disease**汪碧雲¹ 吳宏蘭² 張世沛³ 劉紋妙⁴

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研究背景:慢性腎臟病(CKD)已成為嚴重危害國人健康新國病，對民眾健康和國家經濟之衝擊不容小覷。由於腎臟病無法治癒，患者若能以正向心態及行為，積極參與醫療計畫，則可延緩腎衰竭及避免面臨透析治療。因此，探討末期腎臟病前期(pre-ESRD)患者的復原力及其相關因素是一重要議題。

研究設計:採橫斷式研究設計，共收案 201 人，研究工具包括人口學特性、因應行為量表、自我效能量表及復原力量表。

研究結果:(一)患者之性別、共病症數、運動次數和月收入狀況在因應行為、自我效能及復原力呈現顯著差異；(二)整體患者多採用解決問題之行為，具有中等程度的自我效能和復原力。腎功能較佳者其適應性行為和復原力較高；(三)問題取向因應與自我效能和復原力呈正相關，逃避行為與自我效能和復原力呈負相關；(四)自我效能是復原力重要的預測變項，意即增強患者自我效能可提昇其復原力。

結論與建議:提升患者解決問題能力可促進其發展復原力，因此護理衛教應納入提昇患者自我效能策略，引導其承擔自我照顧責任。此外，護理人員是 CKD 患者第一線的照顧者，若能將自我效能和復原力訓練納入在職教育課程，引領護理人員重視患者的檢驗數據外，也需重視心理照顧，則能改善慢性腎臟病患者的照顧品質，並擴展護理人員之角色功能。

關鍵字：末期腎臟病前期患者、復原力、因應行為、自我效能

利用醫院電子病歷資料推估 CKD 高風險病人 CKD 疾病進程與轉換機率
Using Real World Data to Estimate CKD Progression and Multi-State
Transitional Probability in High-Risk CKD Patients

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BACKGROUND: In Taiwan, CKD and ESRD incidence and prevalence are highest in the world. Therefore, it is important to investigate progression paths for CKD patients for optimized CKD care to delay progression to ESRD. This preliminary study aimed to use real world data to examine the association between demographic factors and multi-state transitional probability (TP) as well as the mean sojourn time (MST) from state 1 (no CKD), state 2(CKD 1, 2, 3a), state 3 (CKD 3b and 4), state 4(CKD 5) and state 5 (dialysis) among high risk patients in Taiwan.

METHODS: This study estimated multi-state TP and MST in each transition state using maximum-likelihood estimation for multi-state Markov models in continuous time. Patients with at least one CKD related diagnosis code in the outpatient visit and age larger than 20 were identified. The electronic medical records with laboratory information were collected from one large medical center and two community hospitals in southern Taiwan. Longitudinal follow-up visits with the closer lab data (serum creatinine), eGFR and demographic characteristics (age and gender) were collected to capture patient CKD progression.

RESULTS: A total 25,937 patients with 466,448 observations were analyzed. 55.36% were male and mean age was 60.52(±14.5) years old. The overall TPs of initial state to the following state were estimated. For example, the initial state 1 to the state 1-5 were 0.645, 0.321, 0.026, 0.002, and 0.007, respectively; MST was 2.28 (95%CI 2.24- 2.32). In addition, this study found younger age were associated with higher TP and longer MST in each CKD state.

CONCLUSIONS: There were still lack of real world evidences regarding the CKD progression in Taiwan. Our preliminary study findings provided CKD transition probability and the MST for each state among high risk CKD patients. Future study may further investigate factors associated with patients CKD progression.

KEYWORDS: CKD progression; transitional probability

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血液透析用水和透析液的內毒素檢測

Detection of Endotoxin in the Dialysate and the Water Used for Hemodialysis

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目的：內毒素(Endotoxin，如圖 1)在自然界中是無所不在的，即使在惡劣的環境依然可以保持其毒性的穩定。脂多醣體複合物，被水解成其分子量大約 10~20(kilodaltons, kD)或較小的內毒素碎片，可能藉由透析中穿過人工腎臟半透膜的孔隙而到達血液中或附著於半透膜上，誘發人體產生免疫反應，但傳統的細菌培養無法反應出內毒素的含量。

方法：依本醫學中心透析用水及透析液內毒素檢測標準作業，每月至少進行一次內毒素監測，檢測方法為定量的動力濁度法(Kinetic Turbidimetric Assay)，偵測靈敏度為 0.005 EU/ml。採檢點為：每月檢測 RO 膜管後端、超過濾後、迴流入 RO 儲水槽前。每半年檢測移動式純水製造機。每年檢測血液透析機台及現場 RO 出水口。動力濁度法主要是利用內毒素與蠶血試劑(Limulus Amebocyte Lysate; LAL)，反應形成凝膠過程會產生透光度改變的特性，利用此特性在特定波長下偵測吸光度的改變(如圖 2)，所繪製出的標準曲線計算出檢體的內毒素含量。依照法規及藥典(USP<85>)規定：標準曲線的線性 R 取絕對值須大於 0.98、檢體干擾測試反應的回收率必須介於 50~200%、陰性對照組反應必須低於標準曲線的最低濃度，結果才可以判讀。

結果：本院由 2017 年 4 月至 2018 年 9 月共採集 655 檢體，包括 418 個透析用水、43 個移動式純水製造機及 194 個透析液。若採用 2017 年台灣腎臟醫學會的針對(Reverse osmosis, RO)水所訂定的內毒素評鑑標準 < 0.25 EU/ml，但無規範透析液內毒素的含量標準；採檢點與頻率。但依據 2011 年國際標準組織 (ISO) 與美國醫療儀器協進會 (AAMI) 血液透析用液之內毒素含量標準，透析用水內毒素含量應低於 0.25 EU/ml，行動值則應低於 0.125 EU/ml；標準透析液則應低於 0.5 EU/ml，行動值則應低於 0.25 EU/ml。若採用此較嚴格國際的評鑑標準，則透析用水合格率達 93% 與標準透析液的合格率達 99%。另外移動式純水製造機合格率为 88%(如表 1)。

結論：此次內毒素監測結果分析如下，移動式純水製造機的不合格率較高，可能是因為其處理設備較簡單，且未使用時會靜置，而較容易滋生細菌及內毒素所致。透析用水應為固定式純水系統設備較完善，例如有超微過濾膜(UF)，0.02~0.001 μ m 膜孔均可提升微生物的去除率，且純水輸送系統，每兩週就進行一次管路消毒，可預防生物膜(Biofilm)的形成。透析液的合格率为 99%，分析其原因透析機均加裝可以有效的阻隔細菌和內毒素的超過濾濾器，且每 3 個月更換一次。而由監測結果顯示本醫學中心固定式純水系統及透析機之設備及保養維護情形非常良好，而移動式純水製造機內毒素不合格的部分，擬藉由加強消毒頻率及強度或汰舊換新來進行改善。

關鍵字：血液透析(Hemodialysis)，內毒素 (Endotoxin)，動力濁度法(Kinetic Turbidimetric Assay)

長期透析病人的感染性心內膜炎：臨床特點與預後分析

Epidemiology and Outcomes of Infective Endocarditis in Hemodialysis

Patients

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Study Design: A retrospective study of patients who were hospitalized for infective endocarditis (IE) from January 2002 to December 2015.

Objective: To elucidate the epidemiology and prognostic factors of IE in end-stage renal disease patients with maintain dialysis and to identify the impact of chronic dialysis on the outcome of IE.

Summary of Background Data: Although substantial amount of case studies of IE in chronic dialysis patients can be found in the literature, reports of prognostic factors are limited and patients' long-term outcomes have not been well described.

Methods: The cases of 1,817 patients who were hospitalized for IE over a 14-year period were retrospectively reviewed. Of these, 112 patients on maintain dialysis were enrolled in this study. Cox's proportional hazard model was used to evaluate the risk factors of mortality and long-term outcome.

Results: The 112 enrolled patients had an average age of 63.9±13.7 years old and male-to-female ratio of 1:1.13. Hypertension was present in 67% of patients and was the most common co-morbidity of chronic dialysis IE patients. Septic syndrome was the most common initial presentations (87.5% of all) and differed statistically between survivors (78.7%, n = 48) and non-survivors (98.0%, n = 50) ($p = 0.002$). Cuffed-catheter as dialysis access was identified in 35.7% of patients and differed statistically between survivors (23.0%, n = 14) and non-survivors (51.0%, n = 26) ($p = 0.002$). The most common involved cardiac valve was mitral valve (65.2%), and aortic valve lesion differed statistically between survivors (14.8%, n = 9) and non-survivors (33.3%, n = 17) ($p = 0.020$). Methicillin-resistant *S. aureus* was the most common pathogen (56.3%), followed by polymicrobial (38.6%) and Methicillin-sensitive *S. aureus* (34.4%). The patients' in-hospital survival rate was 63.4%; their one-year survival rate was 37.5% and three-year survival rate was 15.2%. Respiratory failure was associated with an increased in-hospital mortality (88.2% vs 19.7%, $p = 0.0001$). Other variables exhibiting significant relationship with patients' in-hospital mortality were hospital day-7 serum albumin, C-reactive protein level and leukocyte count.

Conclusions: The characteristics and outcomes of IE in chronic dialysis patients were elucidated. Demographic factors, like hypertension, pre-IE valvular disease, and clinical variables such as septic syndrome, respiratory failure, elevated leukocyte count, elevated C-reactive protein, low serum albumin level upon hospital day-7, predict patients' in-hospital mortality. Long-term outcome of IE in chronic dialysis patients is extremely poor and mandates aggressive managements.

Keywords: infective endocarditis, chronic dialysis, end-stage renal disease, blood-stream infection, infectious disease, sepsis

透析病患個人化死亡預測模型：貝氏漸進式分析**Individual Risk Prediction Model for Mortality in Patients with Chronic Hemodialysis: A Bayesian Clinical Reasoning Approach**杜美蘭¹ 方昱偉¹ 劉宏祥² 蔡明憲¹Mei-Lan Tu¹, Yu-Wei Fang¹, Hung-Hsiang Liou², Ming-Hsien Tsai¹¹新光醫院腎臟科 ²新仁醫院腎臟科¹Division of Nephrology, Department of Internal Medicine, Shin-Kong Wu Ho-Su Memorial Hospital, Taipei, Taiwan²Division of Nephrology, Department of Internal Medicine, Hsin-Jen Hospital, New Taipei City, Taiwan

Background: The prediction models were largely developed using logistic regression or Cox regression method in clinical practice nowadays. However, the developed prediction function is hard to be updated by the new risk information. We created a Bayesian clinical reasoning model to predict an individual risk of mortality in patients with chronic hemodialysis (CHD), and it can allow the prediction function to be updated.

Methods: A Bayesian statistical model was constructed to estimate the all-cause mortality risk of CHD patients by sequentially incorporating three risk models, including demographic features (basic model), dialysis-related components (dialysis quality score model) and conventional risk factors (enhanced model). The basic function of Bayesian is [posterior odds = prior odds × likelihood]. A cohort that enrolled 871 participants with CHD and followed up over a longest time of 9 years to ascertain mortality cases during the period through 2006 to 2015 was used for the illustration of the proposed models.

Results: The proposed models can be applied to predicting the overall mortality risk with any combination of risk factors. For example, a 55-year-old man with one year dialysis history, the 5-year risk for death with the basic model was 18.1% (95% CI, 2.4%–39.1%). His HD-related quality scores {phosphate (7 mg/dL), creatinine (7 mg/dL), albumin (3 gm/dL), hemoglobin (8 gm/dL) and Kt/V (1.0)}, leading to 1.64 of likelihood ratio, enhanced the risk for death up to 26.6%. As with diabetes history, and with cardiothoracic ratio > 0.5 yielding the likelihood ratios of 1.31 and 1.49 respectively, the risk of mortality is further raised up to 41.6%.

Conclusions: A sequential Bayesian clinical reasoning approach by incorporating routine dialysis information can offer nephrologists a quick reference of individual risk prediction for mortality in CHD patients. Moreover, we can update the risk as the same manner when a new risk factor will be applied.

Keywords: hemodialysis, Bayesian, mortality, end stage of renal disease, prediction
血液透析，貝氏分析，全因死亡，末期腎病，預測

在慢性血液透析患者中，血清肌酸酐對於不同次族群的死亡預測力

Higher Serum Creatinine Levels Associated with Better Prognosis in Patients on Chronic Hemodialysis with Good Nutrition and Dialysis Quality

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Background: In hemodialysis patients, higher serum creatinine level represents larger muscle mass and predicts greater survival. However, whether this association keeps significant in different groups remains uncertain. Therefore, we investigated the impact of serum creatinine levels on mortality in subgroup analysis for chronic hemodialysis (CHD) patient.

Methods: This was a retrospective observational cohort study of 722 Taiwanese patients with CHD, assessing the bivariate predialysis serum creatinine level (≤ 9.5 and >9.5 mg/dL) and continuous creatinine level as a predictor of all-cause and cardiovascular mortality. Fatal events were assessed using the Cox proportional hazards regression model.

Results: During a mean follow-up of 5.3 ± 2.9 years, 272 all-cause and 188 cardiovascular (CV) deaths occurred. Crude analysis showed that the serum creatinine level >9.5 mg/dL significantly reduced the all-cause (hazard ratio [HR]: 0.45; 95% confidence interval [CI]: 0.35-0.58) and CV mortality (HR: 0.43; 95% CI: 0.32-0.59). After further multivariable adjusting, the serum creatinine level >9.5 mg/dL remained significantly reduce for all-cause (HR: 0.56, 95% CI: 0.41-0.78) and CV death (HR: 0.56, 95% CI: 0.38-0.83). Moreover, subgroup analysis revealed that, for subjects with age >55 years, history of diabetes, hemoglobin >10 g/dL, serum albumin levels >4 g/dL, serum phosphate levels >5 mg/dL, and KT/V >1.2 , the higher creatinine level (>9.5 mg/dL) had significant predictive power for all-cause mortality and those with male gender, history of diabetes, hemoglobin >10 g/dL, serum phosphate levels >5 mg/dL, and KT/V >1.2 , the higher creatinine level (>9.5 mg/dL) had significant predictive power for CV mortality after multivariable adjustments.

Conclusion: Our study showed a higher creatinine level was associated with reducing mortality in CHD patients especially in the male gender, diabetes, non-anemia, good nutrition status, and adequate dialysis.

Keywords: hemodialysis, serum creatinine level, all-cause mortality, cardiovascular mortality.

結合人工智慧和紅外光醣體學之創新診斷平台用來改善腎臟病理判讀
The Introduction of Artificial Intelligence into Infrared Glycomics as an Innovative Diagnostic Platform for Improving Renal Pathology

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Background:

Wax physisorption kinetics coupled with fourier transform infrared (WPK-FTIR) imaging is already established to investigate the physisorption between wax n-alkanes with varied carbon number as glycan adsorbent and glycan chains of glycoprotein on biopsied tissues. This innovative method is capable of differentiating malignant tumor from benign tumor by non-destructive targeting altered glycosylation, and even it has better sensitivity than the standard IHC staining. Numerous studies have revealed that elongation and /or branching of glycan chains of altered glycoprotein are happened on the surface of tissues during the development of malignancies and several inflammatory diseases. Thus, we hypothesized that altered glycosylation would be happened in injured kidneys along with the progression of acute glomerulonephritis (GN). Furthermore, we also attempt to develop a feasible, sensitive and automated method for diagnosis and prognostication of children-onset lupus nephritis (LN).

Methods:

WPK-FTIR imaging is implicated to investigate the glycome profile on kidneys collected from the natural course of rat crescentic GN, the mouse model of spontaneous lupus nephritis and on renal biopsies taken from pediatric patients with different types of LN.

Results:

Elongation of glycan chains of glycoprotein in inflamed glomeruli is evident in experimental GN and human LN. The IR absorbance ratio, $A_{28}(\text{n-C}_{28}\text{H}_{58} \text{ remain}) / A_{22}(\text{n-C}_{22}\text{H}_{46} \text{ remain})$, is 0.53 (0.46-0.63) of the normal groups and 1.58 (1.22-1.99) of the severe GN groups, respectively.

Conclusions:

Infrared glycomics by FTIR-WPK imaging is an innovative diagnostics of kidney disease. Furthermore, artificial intelligence implanted WPK-based algorithm is introduced to become a promising and user-friendly platform allowing to precise diagnosis and prognosis prediction.

運用精油按摩緩解慢性腎臟病人的疼痛**Massage with Essential Oil for Alleviation of Pain in Patients with Chronic Kidney Disease**

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疼痛是一種複雜的感覺和情感體驗，根據個人的經歷和心理狀態而影響感受到的疼痛程度，當病人主觀感覺到疼痛持續或反覆發生，時間超過急性疾病或損傷癒合之合理時間一個月以上，或伴隨易怒、焦慮、憂鬱等情緒困擾，影響睡眠及生活品質時，即可定義為慢性疼痛，勞保局統計發現國人發生肌肉骨骼酸痛的比率高達 85%，健保局資料也顯示平均每五人就有一人有肩頸背酸痛情形，它也是慢性腎臟病人常見的健康問題之一，本單位衛教病人時發現腰背痛、肩頸頭痛為最常見之疼痛問題，而多數病人因害怕傷腎而不敢服用止痛藥，造成睡眠及生活品質受影響，因此查證文獻資料，使用中文版簡明疼痛量表 (BPI-C) 來評估病人的疼痛性質及程度，根據其過去病史推斷引起疼痛之原因，如疼痛無法解決仍建議至該專科尋求治療，而非長期依賴止痛劑，教導病人疼痛之照護措施：看電視、使用電腦或手機等 3C 產品時需維持正確姿勢、定時休息及變換姿勢，平時維持正確的站姿及坐姿，預防因姿勢不良導致肌肉僵硬引發疼痛，改善睡眠品質，適量的運動或做伸展操促進血液循環，也有助於減少肌肉酸痛情形。

另外本單位利用植物油搭配適合慢性疼痛的精油如黑胡椒(Black pepper)、甜馬鬱蘭(Sweet Marjoram)、丁香花苞(Clove bud)等，製作「酸痛活絡膏」提供病人使用，並教導使用時同時按摩可達加成效果，一方面按揉肌肉使肌肉放鬆，一方面透過嗅吸及輕柔撫觸的過程提升副交感神經反應，促進深層放鬆讓痛覺舒緩，使用過之病人回饋疼痛情形得以舒緩，惟須提醒曾有報告指出Menthol(薄荷腦)會引起蠶豆症病人的溶血，因此患有蠶豆症之病人禁止使用。

論及腎臟病的 YouTube 影片之分析

Analysis of YouTube Videos on Kidney Disease

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Background: Use of YouTube as a source for health-related information continues to grow. Status of videos on kidney diseases was evaluated.

Methods: YouTube videos were searched using the keywords 'kidney disease (腎臟病)' on September 16, 2018. The top 100 popular videos were examined for uploaders, duration, and total views. Uploaders were categorized into medical professionals, news agencies, advertisements, and undetermined.

Results: Four videos were about kidney diseases of cats, and were excluded. Among the 96 videos included, 52 (53%) videos were categorized as undetermined sources, 28 (29%) as news media, 14 (15%) as medical professionals, and 4 (4%) as advertisements. Length of 70% videos were between 1 and 4 minutes, 22% were between 5 and 9 minutes, and 8% were longer than 10 minutes.

Conclusions: The majority of YouTube videos on kidney disease were not posted by medical professionals, and therefore the quality might be variable. Popular videos usually lasted shorter than 5 minutes. To promote renal patient education, more health care providers can edit short videos on kidney disease.

Keywords: YouTube, Kidney disease, Patient education

關鍵字: YouTube, 腎臟病, 病患衛教

主動式個案管理模式於慢性腎臟病整合照護成效**Proactive Case Management Model for the Multidisciplinary Care Program of Chronic Kidney Disease**

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背景：根據研究顯示慢性腎臟病病人之早期診斷、及早介入與預防進展到末期腎臟病有顯著效果。因此自 2003 年國民健康局開始推廣，以個案管理模式提供以病人為中心的照護，其中針對慢性腎臟病第三期後段的病人，成立 Pre-ESRD 照護計畫。但在實際醫療環境中，由慢性腎臟病病人自行或透過轉介至腎臟科就醫進入 Pre-ESRD 照護收案，過程通常都已經進入慢性腎臟病第四期甚至第五期。本院『主動式個案管理腎臟病照護方案』，自 2016 年起由資訊室建立『主動式個案管理系統』與院內宣導提早轉介之必要性，希望能及早介入，讓病人可以即時進入 Pre-ESRD 照護專案。本研究目的，希望探討本院之主動管理模式，是否能夠讓病人達到早期發現早期進入整合照護之效果。

方法：本研究為回溯性研究，回溯本院腎臟病整合治療之資料庫，將 2014 年 1 月至 2018 年 9 月其間進入 Pre-ESRD 照護專案之病人收案資料進行分析，排除 eGFR > 45ml/min 之病人。由於本院於 2016 年 4 月開始進行『主動式個案管理腎臟病照護方案』，因此將 2016 年 3 月前收案之病人列為對照組，開始實施後收案之病人列為研究組。比較本照護方案之施行流程面成效，並比較兩組病人相關資料，eGFR 為收案前最後一次檢驗報告，使用 MDRD 公式計算，其餘資料為收案時個案管理師在系統中輸入之資料，以統計軟體 STATA 進行相關分析，採用 student T-test 以及迴歸分析。

結果：自 2014 年 1 月到 2018 年 9 月，總共收案 1,140 人，對照組收案時間有 27 個月，收案病人數為 449 人，研究組收案時間為 30 個月，收案數為 694 人。對照組與研究組的年齡分別為 70.89 ± 0.58 與 69.07 ± 0.48 ($p=0.01$)，在性別、糖尿病、高血壓與抽菸比例方面，兩組均無統計學上差異。對照組與研究組 eGFR 為 25.94 ml/min/m^2 與 28.42 ml/min/m^2 ， $p<0.001$ ；經過年齡、性別、糖尿病、高血壓、抽菸比例的校正， $p<0.001$ ，有統計上顯著差異。故得知在導入主動式個案管理後，病人被轉介進入整合照護之 eGFR 值有顯著提升，這表示病人能即早獲得適當的腎臟整合式照護。

結論：因此運用主動式個案管理模式，於病人就診前及就診後疾病追蹤照護，並以團隊的方式提供醫療與護理專業相關服務，有效使病人能提早轉介腎臟科。冀望此照護模式，能提供各院所有關慢性腎臟病個案管理及整合照護之參考。

Key words : chronic kidney disease, Multidisciplinary care program, Proactive case management

關鍵字：慢性腎臟病，腎臟病照護方案，主動式個案管理

資訊化整合檢驗所報告

Integrated Dialysis Report Cards By Health Information System

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整合透析病患各個月的抽血報告，可以同時了解病患數個月的多種檢驗數值，對護理人員衛教及醫師決定透析處方來說都很需要。診所因為檢驗外送，以往每次月抽血後，要等紙本報告由檢驗所送回，再由護理人員統整、抄寫到個別病人的透析檢查紀錄表中，不僅費時耗工，還需要另外上電腦計算透析清除率。所以我們希望採用資訊系統取代文書作業，以網頁代替原有表單，工作人員再以手機瀏覽器瀏覽，來簡化整體流程。

首先，原先需由人工抄錄的檢驗報告部分，改由電腦每日清晨自動連結至檢驗所下載檢驗報告，轉檔後儲存至診所自有資料庫中；透析前後體重及透析參數則由護理人員以網頁輸入資料庫中。當工作人員瀏覽報告網頁時，網頁程式便從自有資料庫中，彙總整年度患者各項資料，再依照欄位性質進行計算(如透析清除率)、單純顯示(如一般抽血報告)、或轉換報告格式(如肝炎報告)，動態產生報告網頁。工作人員並可利用網頁上檢驗項目的連結，查詢到病人單項的詳細歷史報告。

在此模式下，整體工作流程並沒有大幅度的改變，只是由紙本改成網頁，並將不需要的人工作業改由資訊系統自動進行，所以在轉換的過程並沒有太多的障礙。其優點除了大幅減少護理人員的作業外，每月總檢後即可及時查閱，且報告版面整潔，不易有抄寫錯誤或疏漏的情形；此外，表單也可以轉成 PDF 檔後列印或套印，增加可讀性；而且因為資料庫已轉至診所，如果有任何統計分析或其他利用的需求，亦可自行完成。不過，由於表單沒有可供自由填寫的欄位，如果有特殊檢驗或有追蹤覆檢時則無法於同頁面呈現。另外，如果螢幕較小時，整體版面會受限制，需滑動螢幕才能完全查閱。

診所常受限於規模與資源而沒有資訊化的動機，不過，我們逐步挑選了數個人力密集、工作重覆性高、但不需智慧的工作流程，利用資訊系統轉化為以手機及網頁的工作模式，簡化的人工作業不僅可以有效減少錯誤的發生，更能增加人員工作的效率。

關鍵字: 網頁式整合報告，醫療資訊系統，診所。

運用物聯網-智慧型藍芽血壓計建構血液透析中低血壓即時警訊系統 An Istant Alam System to Detect Hypotension during Hemodilalysis by Using Iot-Bluetooth Blood Pressure Monitor Technology

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背景: 在血液透析發生低血壓是最常見的血流動力學不穩定性之一。預防血液透析誘發的低血壓可提供尿毒患者安全、舒適的治療, 提高治療效果。本文提出運用物聯網-智慧型藍芽血壓計技術來偵測病患在透析中是否發生低血壓, 結合透析病歷與用藥紀錄與護理紀錄進而讓護理人員提早處理病患,進而改善透析醫療品質

方法: 20位(8男性和12位女性)接受長期血液透析病患在過去三月發作在血液透析期間低血壓參與研究。血液透析相關的低血壓被定義為血壓下降, 需要護理或醫療干預或下降的收縮血壓大於20 mmHg。患者每次進行血液透析三次,每次4小時。血液透析時間為 9.82+/-3.12年。本研究期間, 所有患者服用降壓藥物跟藥物劑量保持不變。在血液透析當天, 所有患者都沒有服用降壓藥物。我們以台灣沛綠康公司 KP6520無線藍芽血壓計來量測病人血壓, 該藍芽血壓計可自動量測病人血壓, 並將血壓資料透過藍芽送到Clinic Oucare APP軟體, 再由APP即時送到雲端資料紀錄中心。患量測血壓的頻率透過APP來設定。在雲端資料紀錄中心我們可以設定數值範圍來即時發出Line警示通知, 我們可以設定病人這次血壓值若低於上次血壓值達20mmHG以上即透過Line發出掉血壓警示訊息給護理人員或APP本身發出警示訊息來通知護理人員。根據這些訊息調整透析配方、透析機台資訊、抗凝劑、輸血紀錄、血管通路、EPO計畫與治療、用藥紀錄、醫囑與護理交班。資料一併放在雲端資料紀錄中心, 一併產生透析4小時的電子病歷(EMR)。藍芽血壓計於血液透析 0.5-1 hr、1.5-2 hr、2.5-3 hr 和3.5-4 hr 的測量上臂血壓。在每次血液透析療程前後, 記錄低血壓發作的次數。

結果: 透析中低血壓次數在未裝設物聯網-智慧型藍芽血壓計與已裝設物聯網-智慧型藍芽血壓計分別是 1.78 ± 0.56 and 0.74 ± 0.61 . 統計分析 paired-t test 發現使用物聯網-智慧型藍芽血壓計能降低透析中低血壓次數 ($P = 0.037$).

結論: 結果表示運用物聯網-智慧型藍芽血壓計即時警訊系統有助於改善透析中低血壓是一種實用的方法。未來的研究建議開發新的創新與感應器回饋系統, 以提高安全性和治療效率。

關鍵字: 物聯網,血液透析,低血壓,警訊系統