Oral Presentation (English)

December 14, 2024 (Saturday) 09:00 ~ 10:30 Venue：Room 2 (第一講堂)

【Oral-3】 Chair(s)：林志慶/ Chih-Ching Lin、張育誌/ Yu-Tzu Chang

09:00—09:12

1. Multidisciplinary Care Program Reduces the Incidence of Dialysis in CKD Stage 5 Patients
Chen-Zong Hong[1], Min-Yu Chang[1], Yi-Che Lee[1], Hsi-Hao Wang[1], Li-Chun Ho[1], Ching-Yang Chen[1], Po-Jui Chi[2], Ching-Fang Wu[3], Hung-Hsiang Liou[1,4], Shih-Yuan Hung[1]
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09:12—09:24

2. Prognostic Significance of Plasma Galectin-9 and Kidney Histopathology in Biopsy-Proven Kidney Disease
Tz-Heng Chen [1,2], Shuo-Ming Ou[1], Ming-Tsun Tsai[1], Der-Cherng Tarng[1]
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09:24—09:36

3. Cardiorenal Benefits of GLP-1 Receptor Agonists in Patients with Type 1 Diabetes and Acute Kidney Disease: A Propensity Score-Matched Cohort Study
Yu-Wei Sun[1], JY Chen[2], Vin-Cent Wu[3,4]
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09:36—09:48

4. Trends of Sodium-Glucose Cotransporter-2 Inhibitor Prescription, and Its Short- and Long-term Adverse Events in Patients with Acute Kidney Disease
CN Chen[1], JY Chen[2], VC Wu[3,4]
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09:48—10:00

5. Outcomes of Metformin Use in Type 2 Diabetes Mellitus Patients Following Acute Kidney Disease
Zheng-Hong Jiang, Vin-cent Wu
Division of Nephrology, Department of Internal Medicine, National Taiwan University Hospital and College of Medicine

10:00—10:12

6. Validation of the Breath Ammonia Test for Chronic Kidney Disease Screening: Impact of Fasting on Diagnostic Accuracy
Ming-Jen Chan[1], Shuh-Kuan Liau[1], Yi-Jung Li[1], Hsiao-Wen Zan[2], Hsing-Fei Meng[3], Chao-Sung Lai[4], Yuh-Feng Lin[5], Ya-Chung Tian[1]
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1

Multidisciplinary care program reduces the incidence of dialysis in CKD stage 5 patients

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Objectives: The incidence of end-stage renal disease (ESRD) in Taiwan remains highest in the world. Therefore, delaying initiation of dialysis, reducing complications associated with ESRD, and enabling patients to achieve appropriate care are the common goals of renal care teams. We set up an multidisciplinary care program "Clinical Care Program Collaboration-End Stage Renal Disease (CCPC-ESRD)" according to the guide of Joint Commission International (JCI) for care of chronic kidney disease (CKD) stage 5 patients in E-Da hospital.

Methods: The care program enrolled patients with CKD stage 5 without dialysis since 2016. There were combinations of physicians, disease managers, nurses, pharmacists, dietitians, social workers and multiple related teams. Patient care was conducted by team-consensus guidelines and cross-team discussion. Laboratory data, nutritional assessment and drug compliance were monitored at least trimonthly. Educations for disease management, diet control and medication use were performed regularly. The incidence of dialysis initiation, frequency of renal-associated emergency visits, frequency and duration of renal-associated hospitalization were analyzed between 2016 and 2022. A control group receiving conventional care with age, gender and diabetes matched were also included for comparison analysis.

Results: A total of 86 patients were included in the care program and a matched-control group of 87 patients was also enrolled. Both groups were followed up until occurrence of dialysis or up to 1.5 years. The baseline eGFR was 8.78±2.66 and 9.45±2.86 (p=0.1129). The incidence of dialysis was 28.67 (95% C.I. 19.20-41.17) per 100 person-years in study group and 48.18 (95% C.I. 34.42-65.61) per 100 person-years in the control group (p=0.0065). Kaplan-Meier curve for dialysis-free survival between two groups was significantly better in study group (p=0.0207). The duration of angiotensin converting enzyme inhibitor/angiotensin receptor blocker (ACEI/ARB) use was longer in the study group (3.99±6.36 vs 1.76±4.18 months, p=0.0073). The execution of tests for intact parathyroid hormone (iPTH) (84% vs 15%, p<0.0001) and ferritin (83% vs 42%, p<0.0001) were significantly higher in the study group. The frequency of renal-associated emergency visits, frequency and duration of renal-associated hospitalization were significantly lower in study group.

Conclusions: CCPC-ESRD care program in E-Da hospital is a multidisciplinary and integrated team care. The care system provides detail and attentive support when renal failure is ongoing. It reduces the incidence of dialysis in comparison to patients with conventional care, extends the duration of ACEI/ARB use, reminds clinicians to check iPTH and ferritin, and reduces the frequency of renal-associated emergency visits and hospitalization.

2

Prognostic Significance of Plasma Galectin-9 and Kidney Histopathology in Biopsy-Proven Kidney Disease

血漿 Galectin-9 與腎臟組織病理在切片證實之腎臟病中的預後意義

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Background：

Galectin-9 (Gal-9) is a multifunctional protein that has emerged as a potential biomarker in various kidney diseases. Its role in chronic kidney disease (CKD) progression remains underexplored. This study aims to evaluate the relationship between plasma Gal-9 levels and kidney histopathology, as assessed by the Mayo Clinic Chronicity Score (MCCS), while also investigating their predictive value for major adverse renal events (MARE) in patients with biopsy-proven kidney disease.

Methods：

We conducted a prospective cohort study that enrolled individuals undergoing renal biopsy at Taipei Veterans General Hospital between July 2019 and April 2022. Plasma Gal-9 concentrations were measured, and renal biopsies were evaluated using the MCCS. We examined the correlations between the MCCS, plasma Gal-9 levels, estimated glomerular filtration rate (eGFR), and proteinuria. A Cox proportional hazards model was used to access the association of plasma Gal-9 level and MCCS on MARE, defined as a composite outcome of a ≥40% decline in eGFR, initiation of chronic dialysis, or death from renal or cardiovascular causes. The C-index, net reclassification index (NRI), and integrated discrimination improvement (IDI) were calculated to evaluate the ability of the Gal-9 and MCCS to predict MARE.

Results：

A total of 366 individuals were examined in this study. We found that elevated plasma Gal-9 levels significantly correlated with higher MCCS (rho = 0.37, $p < 0.001$). Cox proportional hazards analysis showed that the association between plasma Gal-9 and MARE was attenuated after adjusting for factors associated with CKD progression (aHR, 1.33; 95% CI, 0.90－1.97). In contrast, MCCS remained significantly associated with MARE after adjusting for the same factors (aHR, 1.16; 95% CI, 1.06－1.29). Moreover, adding MCCS to a model with known progression indicators significantly improved its predictive ability (continuous NRI by 0.292 and IDI by 0.065).

Conclusions：

In biopsy-proven kidney disease, higher plasma Gal-9 levels were linked to increased MARE risk, though this association weakened after adjusting for clinical factors. Meanwhile, MCCS remained a strong predictor of adverse outcomes, improving risk stratification when added to clinical models.

Key words：

Biopsy-proven kidney disease; Galectin-9 (Gal-9)**;** Mayo Clinic Chronicity Score (MCCS).

3

Cardiorenal Benefits of GLP-1 Receptor Agonists in Patients with Type 1 Diabetes and Acute Kidney Disease: A Propensity Score-Matched Cohort Study
於急性腎臟病的第 1 型糖尿病患者投予 GLP-1 receptor agonist 對其心腎功能與死亡率的影響

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Background：

Previous studies have explored the effects of glucagon-like peptide-1 receptor agonists (GLP-1 RAs) in reducing cardiorenal outcomes and mortality in type 2 diabetes patients with acute kidney disease (AKD). However, the association between GLP-1 RAs and outcomes in patients with type 1 diabetes and AKD remains insufficiently explored and unclear.

Methods：

This study utilized global healthcare data from the TriNetX database, covering the period from September 2, 2012, to January 1, 2024. Propensity score matching was used to select a cohort of patients, and follow-up was conducted with a maximum duration of 3 years (completed on September 28, 2024) or until the occurrence of an outcome or death.

Results：

A total of 52293 patients with type 1 diabetes and AKD (mean [SD] age, 54.4 [19.7] years; 49.0% men) were enrolled in the study. 2397 individuals (4.5%) were identified as GLP-1 RAs users. Among nonusers, the incidence of mortality was 5.52%, the incidence of MAKEs was 7.24%, and the incidence of MACEs was 12.93%. After propensity score matching, the absolute differences between GLP-1 RAs users and nonusers for incidence of mortality, MAKEs, and MACEs were 4.27%, 2.72%, and 4.04%, respectively. In the treated population, GLP-1 RA use was associated with a significantly lower risk of mortality (adjusted hazard ratio [AHR], 0.59 [95% CI, 0.47-0.73]), MAKEs (aHR, 0.73 [95% CI, 0.60-0.89]), and MACEs (aHR, 0.80 [95% CI, 0.67-0.96]) compared with nonusers.

Conclusions：

In this cohort study of patients with type 1 diabetes and AKD, administration of GLP-1 RAs was associated with lower risks of mortality, MAKEs, and MACEs when compared with nonuse. These findings suggest that GLP-1 RAs may offer substantial cardiorenal benefits in this high-risk population.

Key words：glucagon-like peptide-1 receptor agonists, acute kidney disease, type 1 diabetes mellitus

4

Trends of Sodium-glucose Cotransporter-2 Inhibitor Prescription, and Its Short- and Long-term Adverse Events in Patients with Acute Kidney Disease
於急性腎臟病期投予 SGLT2 inhibitor 及其短期和長期副作用的趨勢

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Background：

The 2024 KDIGO guidelines advocate the prescription of sodium-glucose cotransporter inhibitor (SGLT2i) in individuals with chronic kidney disease (CKD), given their benefits in alleviating CKD progression and extensive cardiovascular outcomes. Nevertheless, current evidence for the administration of SGLT2i in patients with acute kidney disease (AKD) remains unsettled.

Methods：

This study was conducted using the TriNetX Research Network. A total of 128,867,568 individuals were screened between January 1, 2013, and December 31, 2023. AKD was defined as the cessation of previously acute dialysis within three months after hospital discharge. In this intention-to-treat analysis, SGLT2i users were identified based on prescriptions issued during the AKD period.

Results：

A total of 1,225,389 patients diagnosed with AKD were included in which 1.76% of patients (n=21,586) were recognized as SGLT2i users. 36% of the those were female with a mean age of 66.6 years (standard deviation [SD], 13.3). Comorbidity rates of cerebrovascular disease (37% vs 28%), essential hypertension (91% vs 70%), heart failure (73% vs 29%) and ischemic heart disease (73% vs 38%) and concurrent use of aspirin (81% vs 52%), renin-angiotensin system acting agents (92% vs 50%), and metformin (55% vs 17%) were significantly higher in SGLT2i users. Incident rates of adverse events like volume depletion (p-value = 0.008), diabetic ketoacidosis (p-value = 0.002) and amputation of the lower limbs (p-value = 0.028) significantly decreased over the years.

Conclusions：

Prescription of SGLT2i in AKD had significantly risen from 2013 to 2023, regardless of diabetes mellitus, heart failure, proteinuria status or HbA1c level. Incidences of short- and long-term adverse events even decreased with the raising awareness of fluid status monitoring during prescription.

Key words：

sodium-glucose cotransporter-2 inhibitor, acute kidney disease, diabetes mellitus, adverse events

5

Outcomes of metformin use in type 2 diabetes mellitus patients following acute kidney disease

第二型糖尿病病患於急性腎臟病後使用 Metformin 之預後

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Background:
Metformin is a cornerstone in the management of type 2 diabetes mellitus(T2DM). However, its use has been associated with lactic acidosis and is contraindicated in patients with impaired renal function, such as those with acute kidney disease (AKD). The outcomes of metformin use in patients with AKD remain unclear. This study aims to evaluate the outcomes of metformin therapy in T2DM patients with AKD.
Methods:
We conducted a retrospective cohort study utilizing data from the Applied Health Research Data Integration Service provided by the National Health Insurance Administration. The study population comprised T2DM patients between January 1, 2015, and September 1, 2020, with follow-up data extending through December 31, 2020. Eligible patients were those who had experienced an AKD episode during hospitalization, required dialysis at least once, but did not require ongoing dialysis 90 days post-discharge. Propensity score matching (PSM) was utilized to assess the effects of metformin use on outcomes including mortality, re-dialysis, major adverse kidney events (MAKE), major adverse cardiovascular events (MACE), and the incidence of metabolic acidosis.
Results:
There is total 11576 patients were enrolled in the study, including 3487 patients who received metformin and 8089 patients who did not use metformin following the episode of AKD. After 1:1 PSM, 5,334 patients (average age of 69.5 and male of 44.7%), were divided into two groups, with no significant differences observed across 19 baseline variables. Metformin use was associated with lower mortality (HR 0.89; 95% CI 0.82-0.97; p=0.01), lower re-dialysis (HR 0.69, 95% CI 0.61-0.77; p<0.001), lower MAKE (HR 0.78, 95% CI 0.72-0.84; p=0.001). However, metformin was also linked to an increased risk of metabolic acidosis (HR 1.27; 95% CI 1.0-1.6; p=0.045).
Conclusion:
In T2DM patients following AKD, metformin use was associated with improved survival, lower rates of MAKE, and a reduced need for re-dialysis. However, there is a heightened risk of metabolic acidosis, underscoring the necessity of vigilant monitoring for lactic acidosis. While resuming metformin post-AKD appears beneficial, it requires careful clinical oversight to balance its benefits and risks.
Key words: acute kidney disease, metformin, MAKE, lactic acidosis

6

Validation of the Breath Ammonia Test for Chronic Kidney Disease Screening: Impact of Fasting on Diagnostic Accuracy

呼氣氨測試於慢性腎病篩檢的驗證研究：禁食對診斷準確性的影響

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Background：
The breath ammonia test provides a non-invasive, rapid, and cost-effective method for detecting chronic kidney disease (CKD). However, its diagnostic accuracy has not been fully validated, and the impact of dietary intake on test outcomes remains unclear. This study aims to validate the breath ammonia test and evaluate whether fasting prior to testing improves its diagnostic accuracy.
Methods：
We utilized a vertical-channel organic semiconductor sensor system, as described in previous studies, to measure breath ammonia levels. The sensing system consists of a desiccation cylinder, airtight sensing chamber, rotameter, pump, and an electrical signal measurement instrument, offering a rapid, non-invasive means of breath ammonia testing. A total of 216 participants were prospectively enrolled, including 115 patients from the initial cohort, 89 patients from an additional outpatient clinics, and 32 healthy adults from a community health screening. A subgroup analysis was conducted on participants who performed the breath ammonia test under fasting condition.
Results：
The average age of the participants was 61.2 years, with males comprising 50.4% of the cohort. Breath ammonia levels demonstrated a strong correlation with blood urea nitrogen levels ($r=0.754$, $p<0.001$) across all patients. Additionally, breath ammonia showed a significant negative correlation with the inverse of estimated glomerular filtration rate (eGFR) ($r=-0.674$, $p<0.0001$). This correlation was further strengthened in patients who fasted prior to the breath ammonia test, showing even better correlations with eGFR and BUN ($r=0.855$, $p<0.0001$ and $r=0.765$, $p<0.0001$, respectively). In the healthy volunteer group from the community screening, a breath ammonia level below 886 ppb—based on a previously established cutoff—effectively identified all individuals with an eGFR greater than 60 mL/min, ruling out the possibility of CKD (specificity 100%). In patients who did not fast before the breath ammonia test, the cutoff of 886 ppb for identifying an eGFR below 60 showed a sensitivity of 81.6% and a specificity of 67.6%. However, in patients who fasted prior to the test, both sensitivity and specificity were significantly improved, reaching 87.1% and 90.9%, respectively.
Conclusions：
In conclusion, the breath ammonia test is a validated, non-invasive screening tool for CKD, suitable for both clinical outpatient and community health screening settings. Fasting prior to the test significantly enhances its diagnostic accuracy.
Key words：Breath ammonia test, chronic kidney disease, screening, fasting.