Oral Communications 2
Geriatric and Augmented Intelligence (AI)

December 5, 2025 (Friday) 16:10~17:40 **Venue：Room 8 (602)**

Chair(s)	Robert J. Walker, Hsien-Yi Wang	
16:10-16:19	The Impact of Uric Acid-lowering Therapies on The Risk of Incident and Worsening Frailty Among Nephrology Patients: A Cohort Study APCN20250452	**Jui Wang** Institute of Epidemiology and Preventive Medicine, College of Public Health, National Taiwan University
16:19-16:28	The Effect of Exercise During Dialysis on Key Indices of Sarcopenia in Elderly Patients with End-Stage Chronic Kidney Disease (ESRD) APCN20250054	**Atika Anif Prameswari** Department of Nutrition and Health, Faculty of Public Health, Universitas Airlangga
16:37-16:46	Aging-Associated Immune Signature Predicts Early Mortality in End-Stage Renal Disease: Findings From The iESRD Study APCN20250065	**Shu, Kai-Hsiang** Far Eastern Memorial Hospital
16:55-17:04	Evaluating Generative Artificial Intelligence (AI) Models for Patient Education on Immunosuppression Post-Kidney Transplantation: A Comparative Study of ChatGPT, DeepSeek, Gemini, and Grok Models APCN20250514	**Wong Wei Kei** Department of Medicine, University Malaya
17:04-17:13	Non-Inferiority of an Ensemble AI Model Versus Physician-Guided ESA Dosing in Hemodialysis: Retrospective Development and Randomized Controlled Trial APCN20250873	**Ping-Hsun Wu** Nephrology Division, Kaohsiung Medical University Hospital
17:13-17:22	Mathematical Modeling of Ferroptosis Dynamics During Normothermic Perfusion in Human Kidney Grafts: A Multiscale Systems Biology Approach APCN20250926	**Rifaldy Fajar** AI-BioMedicine Research Group, IMCDS-BioMed Research Foundation

17:22-17:31	Improving Renal Biopsy Adequacy Using a Bedside 20x Portable Microscope With Smartphone Attachment APCN20250730	**Amit kumar Mohanty** Department of Nephrology, Asian Institute of Nephrology and Urology, Hyderabad
17:31-17:40	Effect of Increased Fluid Intake and Kidney Function: Dose-Response Meta-analysis APCN20250301	**Jia-Jin Chen** Kidney Research Center, Chang Gung Memorial Hospital

Oral Communications：Geriatric and Augmented Intelligence (AI)
Abstract Submission No.：APCN20250452

The Impact Of Uric Acid-lowering Therapies On The Risk Of Incident And Worsening Frailty Among Nephrology Patients: A Cohort Study

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Abstract

Introduction: Hyperuricemia, defined as serum uric acid (UA) levels ≥ 6.4-7.0 mg/dL, predisposes individuals to gouty flares and may increase cardiovascular risk through associated comorbidities, chronic inflammation, and genetic factors linked to uric acid metabolism. Uric acid-lowering therapies (ULTs) are commonly prescribed for hyperuricemia and gout. However, whether different ULTs vary in their effects on the development or progression of frailty, a degenerative syndrome prevalent in patients with chronic kidney disease (CKD), remains unclear.

Methods: Using the National Taiwan University Hospital Integrated Medical Database (NTUH-iMD), we retrospective identified 19,389 patients who visited nephrology clinics. Patients were categorized by ULT exposure: none, febuxostate only, allopurinol only, or both. Kaplan-Meier and Cox proportional hazards models were used to assess the associations between ULT regimen and incident or worsening frailty, defined by the modified FRAIL scale. Analyses were adjusted for demographics, comorbidities, medications, baseline UA levels, estimated glomerular filtration rate (eGFR), and frailty status.

Results: Among the cohort, 16,147 (83.3%) received no ULT, while 2,485 (12.8%), 598 (3.1%), and 159 (0.8%) received febuxostat, allopurinol, or both, respectively. Mean eGFRs were 61.0±36.6, 29.8±20.1, 34.7±23.4, and 36.0±20.9 mL/min/1.73m2; mean UA levels were 6.5±2.4, 6.1±2.5, 7.8±2.1, and 6.9±2.5 mg/dL. After a median follow-up of 3.3 years, 5.5% and 27.1% of patients developed incident or worsening frailty, respectively. In multivariate Cox models, febuxostat use was associated with an increased risk of incident frailty (hazard ratio (HR) 1.22, 95% confidence interval (CI) 1.01-1.48), while allopurinol use was associated with reduced risk (HR 0.65, 95% CI 0.46-0.93). Combined use showed no significant effect. No significant associations were observed between ULT type and risk of worsening frailty.

Conclusion: ULT regimen influences the risk of incident frailty in nephrology patients. Febuxostat may paradoxically increase the frailty risk despite its UA-lowering potency, aligning with its reported cardiovascular risk. Clinicians should consider the potential impact of ULTs on frailty when managing hyperuricemia or gout in the CKD population.

Keywords：chronic kidney disease; frailty; uric acid; uric-acid lowering treatment

Oral Communications：Geriatric and Augmented Intelligence (AI)
Abstract Submission No.：APCN20250054

The Effect of Exercise During Dialysis on Key Indices of Sarcopenia in Elderly Patients with End-Stage Chronic Kidney Disease (ESRD)

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Abstract

Background: Exercise has been shown to improve sarcopenia outcomes in stable dialysis patients, but there is no clear conclusion in elderly patients with ESRD. This study aimed to evaluate the effects of intradialytic exercise on sarcopenia in elderly patients with ESRD.
Methods: Studies up until 12 January 2024 were identified from many databases. Keywords used as search terms were “chronic kidney disease”, “dialysis”, “exercise”, “physical function”. Study quality was assessed using the Physiotherapy Evidence Database (PEDro) Scale.
Results: A total of 5 RCTs meeting the inclusion criteria were included in this systematic review. Pooled results demonstrated that aerobic training improved the score 6MWT (95%CI [500±30], p<0.001). Resistance training significantly improved the speed of 10MWT (1.45 m/s, 95%CI [1.23 to 1.80 m/s], p<0.001), handgrip strength (21.8 kg, 95%CI [17.5 to 28.0 kg], p<0.05), isometric knee extension strength (43.3%, 95%CI [32.1 to 52.8%], p<0.05), SPPB (12 point, 95%CI [10 to 12 point], p<0.05), 30-s STS (95%CI [9.71±0.42], p<0.01), and 8-foot TUG (95%CI [11.77±3.19], p<0.01). In physical performance, aerobic training and resistance training have some beneficial effect on improving the score 6MWT (95%CI [453.9±96.4], p<0.001; 95%CI [461.0±95.3], p<0.001) and median version of CS-30 (95%CI [15.2±3.7], p<0.001; 95%CI [17.0±4.7], p<0.001).
Conclusion: This review showed that resistance training may lead to improvement in muscle strength and muscle mass of elderly patients during dialysis. Combined exercise (aerobic and resistance) may be a potential strategy to improve muscle strength and physical performance in elderly patients with ESRD undergoing dialysis.

Keywords：Exercise therapy, Elderly, Sarcopenia, Renal dialysis

Author (year), country	Participants	Intervention comparator	Outcomes measures	Duration	Results
Takahashi et al,[1] 2022 (Ohio)	Total participant: n=308; 139 men, 169 women. Duration of dialysis=54.5±15 years.	Intervention: stretching exercise for 20 seconds; resistance training depending on the preference and ability of the participant, total duration 15 minutes per day	Physical function: hand grip strength, isometric knee extension strength, SPPB, 10MWT.	Follow-up: 12 months.	Physical performance • Isometric knee extension strength ⬆* • SPPB ⬆* • 10MWT ⬆*
Watanabe et al,[2] 2021 (Japan)	Total participant: n=53; 41 men, 12 women. Duration of dialysis=5.05±3.51 years Intervention: n=26;20 men, 6 women. Age=66.19±13.05 years. Control: n=27; 21 men, 6 women. Age=64.00±12.95 years.	Intervention: walk for 20-30 minutes, 3-5 times/week. Resistance exercise for upper and lower body, 3 times per week, one set of 10-15 repetitions. Control: usual care.	Physical function: hand grip strength, 30-s chair-stand test, 6MWT.	Follow-up: 6 months	Muscle strength • Handgrip strength (kg) (NS) Physical performance • 6MWT (m) ⬆* (in patients with high adherence to aerobic exercise)
Liao et al,[3] 2016 (Taiwan)	Total participant: n=40; 17 men, 23 women. Duration of dialysis=6.4±5.0 years Intervention: n=20;8 men, 12 women. Age=62±8 years. Control: n=20; 9 men, 11 women. Age=62±9 years.	Intervention: cycling ergometry, 3 times/week for 30 minutes at an intensity of 12-15 on Borg’s RPE scale. Control: usual care.	Physical function: 6MWT.	Follow-up: 12 weeks.	Physical performance • 6MWT (m) ⬆*
Bennett et al,[4] 2016 (Australia)	Total participants: n=171;107 men, 64 women. Duration of dialysis=3.6±2.1 years. Age=68.1±12.6 years. Intervention: 12Wk group: n=51;31 men, 20 women. 24Wk group: n=61;37 men, 24 women. 36Wk group: n=59;39 men, 20 women.	Intervention: progressive free-weight exercises (resistance bands) for upper and lower body, 3 times per week, 2 sets of 15-20 repetitions. Control: usual care.	Strength: 30s STS. Physical function: 8Ft-TUG, Four-Square Step Test. QOL: KD-QOL Index.	Follow-up: 12, 24, 36 weeks.	Physical performance • TUG (s) ⬇* Muscle strength • 30s STS (NS)
Groussard el at,[5] 2015 (France)	Total participants: n=18; 12 men, 6 women Duration of dialysis=3.3±0.7 years. Intervention: n=10; 7 men, 3 women. Age=68.4±3.7 years. Control: n=8; 5 men, 3 women. Age=66.5±4.6 years.	Intervention: progressive cycle ergometry, 3 times weekly for 15-30 minutes at an intensity of 55-60% of the watts determined in an ergometer test for pedal frequency 50r/minute. Control: usual care.	Physical function: 6MWT, VO1peak Muscle mass: lean and fat mass X-ray absorptiometry.	Follow-up: 12 weeks	Physical performance • 6MWT (m) ⬆*

Oral Communications：Geriatric and Augmented Intelligence (AI)
Abstract Submission No.：APCN20250065

Aging-associated immune signature predicts early mortality in end-stage renal disease: findings from the iESRD study

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Abstract

Immune cell subset distribution is altered in end-stage kidney disease, but it remains unknown if immune profiles predict patient survival outcomes in these patients. To investigate this, we conducted a prospective observational iESRD (Immunity in ESRD) study in adults receiving regular hemodialysis, excluding those with active infections or hospitalizations within the past three months. Eleven immune cell subsets were analyzed by flow cytometry at baseline, including neutrophils, CD3-negative lymphocytes, four subsets of CD4 T lymphocytes, four subsets of CD8 T lymphocytes, and three subsets of monocytes. Immune cell distribution patterns were identified through data-driven principal component analysis (PCA). A total of 409 hemodialysis patients were recruited and followed for three years, during which 75 patients died. When cell subsets were analyzed separately, deceased patients had lower counts of CD4 naïve and CD8 naïve T cells but higher levels of CD4 effector memory and CD4 terminally differentiated T cells. PCA identified three major immune cell subset patterns—PC1, PC2, and PC3—accounting for 23%, 17%, and 14% of the variance, respectively. Notably, PC3 was associated with age. In multivariable-adjusted Cox regression analysis, PC3 independently predicted all-cause mortality (hazard ratio [HR] 1.31, P = 0.02) and cardiovascular death (HR 1.49, P = 0.04). Detailed analysis showed that PC3 was driven by the numbers of naïve CD8 T cells (27%) and non-classical monocytes (15%). Our results indicate that data-driven immune cell subset patterns are independent predictors of all-cause and cardiovascular mortality in hemodialysis patients.

Keywords：lymphocyte, monocyte, principal component analysis, immunosenescence, mortality, risk factor, hemodialysis

Oral Communications：Geriatric and Augmented Intelligence (AI)
Abstract Submission No.：APCN20250514

Evaluating Generative Artificial Intelligence (AI) Models for Patient Education on Immunosuppression Post-Kidney Transplantation: A Comparative Study of ChatGPT, DeepSeek, Gemini, and Grok Models

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Abstract
Introduction: Generative artificial intelligence (AI) models' role in patient education on immunosuppression post-kidney transplantation remains uncertain. This study aims to assess and compare the performance of four accessible AI models, i.e. ChatGPT, DeepSeek, Gemini, and Grok, in handling questions related to immunosuppression post-kidney transplantation to determine their suitability for clinical use.
Methods: Eleven standardized immunosuppression post-kidney transplantation questions were input into each AI model with a response word limit of 300. The outputs were anonymized and independently evaluated by three nephrologists and one pharmacist using a 5-point Likert scale across five domains: appropriateness, clarity and comprehensiveness, personalization and relevance, consistency, and human-like empathy. Data were analyzed using Friedman's test for ranked data and post-hoc pairwise comparisons via the Nemenyi test. Inter-rater reliability was assessed using Kendall's W.
Results: From the descriptive analysis, Grok scored highest in most domains (Appropriateness 4.48+/-0.70, personalization and relevance 4.09+/-0.60, consistency 4.34+/-0.53, human-like empathy 4.05+/-0.75) while ChatGPT has the highest mean score in clarity and comprehensiveness domain (4.52+/-0.51).
Upon further analysis, Friedman test demonstrated significant difference between AI models in clarity and comprehensiveness (χ^2=22.92,p<0.001), personalization and relevance (χ^2=32.67,p<0.001), consistency (χ^2=10.61,p=0.014) and human-like empathy (χ^2=35.18,p<0.001) domains. Post-hoc comparison showed that Grok performed significantly better than ChatGPT (q=4.262,p=0.014) and Gemini (q=4.321,p=0.012) in clarity and comprehensiveness domain, supported by its superior average rank of 2.15, 2.16 and 2.99 respectively. Grok also showed scored higher in personalization and relevance domain when compared with ChatGPT (q=value 3.737,p=0.041), Gemini (q=5.138,p=0.002) and DeepSeek (q=6.072,p<0.001) with average ranking of 1.77, 2.5, 2.77 and 2.95 respectively. For human-like empathy domain, Grok was also superior compared to Gemini (q=5.080,p=0.002), ChatGPT (q=5.255,p=0.001) and DeepSeek (q=5.780, p=0.002) with average ranking of 1.72, 2.70, 2.74 and 2.84 respectively. There were no significant differences between AI models in the appropriateness domain.
Overall performance also differed significantly (χ^2=34.95,p<0.001), with Grok ranking significantly higher than ChatGPT, Gemini and DeepSeek. The average ranks of Grok(best), ChatGPT, Gemini and DeepSeek (worst) were 1.62, 2.47, 2.92 and 2.99 respectively. The lack of inter-rater agreement across domains reflects the subjective nature of evaluating AI content.
Conclusion: This study highlights notable differences in the quality of AI-generated responses to immunosuppression post-kidney transplantation questions. Grok demonstrated superior overall performance over other generative AI models, with ChatGPT ranked second. Sophisticated AI models can be integrated in nephrology education, provided they are guided by continued human oversight to ensure contextual relevance and personalized content.
Keywords：Artificial Intelligence , Patient Education , Immunosuppression, Kidney Transplantation , Comparative Study

Table 1: Friedman test between 4 AI models (ChatGPT, DeepSeek, Gemini, Grok) and post-hoc pairwise comparisons via Nemenyi test

Domains	p-value (Friedman test)	Average ranking (Lower is better)	Post-hoc pairwise comparison via Nemenyi test	q-value (Nemenyi test)	p-value (Nemenyi test)
Appropriateness	0.070	Further analysis not done as Friedman test was not significant			
Clarity and comprehensiveness	**<0.001***	1. Grok (2.15) 2. ChatGPT (2.16) 3. DeepSeek (2.70) 4. Gemini (2.99)	DeepSeek - ChatGPT	2.803	0.194
			Gemini - ChatGPT	**4.262**	**0.014***
			Grok - ChatGPT	0.058	1.000
			Gemini - DeepSeek	1.460	0.730
			Grok - DeepSeek	2.861	0.179
			Grok - Gemini	**4.321**	**0.012***
Personalization and relevance	**<0.001***	1. Grok (1.77) 2. ChatGPT (2.50) 3. Gemini (2.77) 4. DeepSeek (2.95)	DeepSeek - ChatGPT	2.335	0.349
			Gemini - ChatGPT	1.401	0.755
			Grok - ChatGPT	**3.737**	**0.041***
			Gemini - DeepSeek	0.934	0.912
			Grok - DeepSeek	**6.072**	**<0.001***
			Grok - Gemini	**5.138**	**0.002***
Consistency	**0.014***	1. Grok (2.17) 2. ChatGPT (2.47) 3. Gemini (2.64) 4. DeepSeek (2.73)	DeepSeek - ChatGPT	1.343	0.778
			Gemini - ChatGPT	0.876	0.926
			Grok - ChatGPT	1.518	0.706
			Gemini - DeepSeek	0.467	0.988
			Grok - DeepSeek	2.861	0.179
			Grok - Gemini	2.394	0.327
Human-like empathy	**<0.001***	1. Grok (1.72) 2. Gemini (2.70) 3. ChatGPT (2.74) 4. DeepSeek (2.84)	DeepSeek - ChatGPT	0.525	0.982
			Gemini - ChatGPT	0.175	0.999
			Grok - ChatGPT	**5.255**	**0.001***
			Gemini - DeepSeek	0.701	0.960
			Grok - DeepSeek	**5.780**	**<0.001***
			Grok - Gemini	**5.080**	**0.002***
Overall scores	**<0.001***	1. Grok (1.62) 2. ChatGPT (2.47) 3. Gemini (2.92) 4. DeepSeek (2.99)	DeepSeek - ChatGPT	2.686	0.228
			Gemini - ChatGPT	2.335	0.350
			Grok - ChatGPT	**4.321**	**0.012***
			Gemini - DeepSeek	0.350	0.995
			Grok - DeepSeek	**7.006**	**<0.001***
			Grok - Gemini	**6.656**	**<0.001***

*Statistically significant ($p<0.05$)

Oral Communications：Geriatric and Augmented Intelligence (AI)
Abstract Submission No.：APCN20250873

Non-Inferiority of an Ensemble AI Model Versus Physician-Guided ESA Dosing in Hemodialysis: Retrospective Development and Randomized Controlled Trial

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Abstract

Background: Optimizing erythropoiesis-stimulating agent (ESA) dosing in hemodialysis (HD) patients remains challenging due to the narrow therapeutic window and inter-patient variability. We conducted this study to validate an AI-based approach to ESA management in HD by combining retrospective development and prospective validation.

Methods and materials: We first developed an ensemble AI model using a large retrospective HD dataset (2013–2020) of 25,632 records, including bi-monthly ESA prescriptions, iron doses, hemoglobin (Hb) values, and related clinical parameters. The model was evaluated using newly designed indices to assess its theoretical ability to maintain Hb near 11 g/dL while minimizing extreme dosing. Subsequently, we tested the model in a double-blind, crossover randomized controlled trial (RCT, NCT05032651). Maintenance HD patients were randomized: Arm 1 received AI-guided ESA dosing for 3 months, then physician-guided dosing after a 1-month washout; Arm 2 followed the reverse sequence. Hb was measured bi-monthly. The primary outcome was maintaining Hb near 11 g/dL (margin ±0.25); the secondary was maintaining Hb within 10–12 g/dL (margin ±15%). A blinded nephrologist reviewed all ESA prescriptions for safety.

Results: In the development phase, the ensemble model outperformed physician-guided prescriptions in theoretical evaluation, achieving higher positive index scores and more stable Hb distribution. In the RCT, 175 patients consented and were randomized (Arm 1: 77; Arm 2: 78). Baseline characteristics were similar except for age (Arm 1: 66.2±12.3 vs. Arm 2: 62.2±13.0 years; P=0.047), with comparable gender (51.9% vs. 39.7% female), diabetes prevalence (44.2% vs. 44.9%), and baseline Hb (both 10.8±0.7 g/dL). The AI-guided and physician-guided dosing achieved non-inferiority in maintaining Hb near 11 g/dL across 12 assessments ($p<0.001$ for both bounds), and secondary outcomes also met non-inferiority criteria. Serious adverse events were similar between groups (22 vs. 18; P=0.63).

Conclusion: Our ensemble AI model for ESA dosing demonstrated non-inferiority to physician-guided dosing in maintaining hemoglobin targets in HD patients. The combination of superior theoretical performance and validated clinical safety and efficacy supports its potential to improve consistency and efficiency in anemia management.

Keywords：artificial intelligence, erythropoiesis-stimulating agent, hemodialysis

Oral Communications：Geriatric and Augmented Intelligence (AI)
Abstract Submission No.：APCN20250926

Mathematical Modeling of Ferroptosis Dynamics During Normothermic Perfusion in Human Kidney Grafts: A Multiscale Systems Biology Approach

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Abstract

Introduction: Normothermic machine perfusion (NMP) is increasingly adopted to preserve and assess marginal kidney grafts, but the use of red blood cell-based perfusates introduces iron overload, which may trigger ferroptosis—an iron-dependent form of regulated cell death characterized by lipid peroxidation and glutathione depletion. While ferroptosis is known to impair renal epithelium, its temporal dynamics during ex vivo perfusion remain unmodeled in silico. This study aimed to develop a multiscale systems biology framework to simulate ferroptotic injury under NMP conditions and evaluate whether computational ferroptosis burden predicts histopathological rejection risk.

Methods: We constructed a hybrid computational model integrating ordinary differential equations (ODEs) to simulate iron metabolism (TFRC, SLC40A1, FTH1), lipid peroxidation (ACSL4, ALOX15), and GPX4 depletion with agent-based modeling (ABM) of 2,400 renal tubular epithelial cells to capture localized ferroptotic propagation. Transcriptomic data were retrieved from the Gene Expression Omnibus (GEO) under accession GSE289688, comprising 43 human kidney graft biopsies sampled before, during, and after NMP with RBC-based and hemoglobin-based perfusates. Perfusate iron concentration metadata were used to calibrate simulation thresholds. Outputs included ferroptosis-positive cell percentage, relative erythropoietin (EPO) expression, and estimated viable parenchymal tissue fraction, with time-resolved simulation outputs recorded at 1-hour intervals throughout perfusion. Predictive ability of the simulated ferroptosis burden to classify histological rejection categories (acute, borderline, none) was evaluated using logistic regression with AUROC and 95% confidence intervals.

Results: Perfusate iron >21.5 μmol/L triggered marked ferroptotic shifts: ALOX15 was upregulated >4.3-fold and GPX4 downregulated by 51.7% within 4 hours. Simulated ferroptosis-positive cells reached 61.2% ± 7.6 in RBC-perfused grafts versus 23.1% ± 6.1 in hemoglobin-based perfusates ($p < 0.001$), while EPO expression dropped by 75.4% (95% CI: 68.1–82.7). Estimated viable parenchymal tissue fraction and tubular structural integrity declined to 42.3% ± 6.4 in acute rejection versus 72.6% ± 4.8 in non-rejection ($p < 0.001$). Logistic regression using ferroptosis burden alone achieved an AUROC of 0.81 and 77.9% accuracy (95% CI: 69.2–86.0) in predicting rejection phenotype. Notably, ferroptosis burden peaked between hours 3–5 of perfusion, aligning with the inflection point of GPX4 decline and maximal lipid ROS accumulation, suggesting a critical temporal window for therapeutic modulation.

Conclusions: This study presents a multiscale in silico model of ferroptosis during human kidney normothermic perfusion, integrating molecular and cellular dynamics to simulate injury progression. The model enables digital assessment of graft viability and offers ferroptosis burden as a novel computational biomarker, with potential to guide perfusate design and inform transplant decision-making in real time.

Keywords：Ferroptosis, Normothermic Machine Perfusion, Kidney Transplantation, Multiscale Modeling, Computational Nephrology

Oral Communications：Geriatric and Augmented Intelligence (AI)
Abstract Submission No.：APCN20250730

Improving Renal Biopsy Adequacy Using a Bedside 20x Portable Microscope With Smartphone Attachment

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Abstract
Introduction: Adequate renal biopsy cores are essential for accurate histopathological diagnosis. Factors such as needle gauge and real-time glomerular assessment influence adequacy. This study evaluated whether the use of a 20x portable microscope with smartphone attachment enhances core adequacy and diagnostic yield in native and allograft kidney biopsies. Secondary objectives included comparing adequacy between 16G and 18G needles, assessing glomerular count estimation accuracy, and evaluating the correlation between core length and glomerular number.
Methods: This prospective-retrospective observational study was conducted over three years at a tertiary nephrology center and included 611 adult patients undergoing native or allograft renal biopsy. A total of 1133 cores were analyzed. Patients were divided into four groups based on needle size (16G or 18G) and the use of a 20x CARSON portable microscope with smartphone attachment. Four groups were compared: 18G without microscope (Group A), 18G with microscope (Group B), 16G without microscope (Group C), and 16G with microscope (Group D). Core adequacy, glomerular visualization, correlation with histopathology, and length discrepancies were studied. Bedside core length and glomerular estimates were recorded, and final values from biopsy reports were compared.
Results: The use of the 20x microscope significantly improved core adequacy from 74.56% to 90.37% with 18G ($p < 0.001$) and from 89.66% to 94.67% with 16G ($p = 0.043$). IF diagnostic yield with 18G improved from 93.44% to 99.28% ($p = 0.019$). Cores with no diagnostic yield decreased from 7.04% to 1.66% (18G) and from 2.59% to 0.94% (16G). Glomerular count estimation under 20x showed moderate correlation with final histology ($r = 0.58$ for 18G, $r = 0.62$ for 16G), with ≥94% accuracy in predicting adequacy. Mean glomerular count was significantly higher with 16G (13.36 ± 3.81) than 18G (8.43 ± 3.96, $p < 1\times10^{-49}$). Core length correlated poorly with glomerular number ($r = 0.31$–0.34), and bedside length overestimated true core length in 68.39% of cases.
Conclusion: The 20x portable microscope significantly enhances renal biopsy adequacy, particularly with 18G needles, and improves diagnostic yield by enabling real-time glomerular assessment. Reliance on core length alone is misleading, whereas glomerular visualization provides a reliable and practical tool to guide adequacy.
Keywords：renal biopsy, core adequacy, portable microscope

Table 1: Baseline Characteristics and Results

	Group A	Group B	Group C	Group D
BASELINE CHARACTERISTICS				
Total number of Cases	214	162	64	171
Total number of Cores	397	301	116	319
Native kidney LM Cores	183	139	52	148
Allograft LM cores	31	23	12	23
Native kidney IF cores	183	139	52	148
OUTCOMES				
Adequate Cores	296 (74.56%)	272(90.37%)	104 (89.66%)	302 (94.67%)
No diagnostic yield	28 (7.04%)	5 (1.66%)	3 (2.59%)	3 (0.94%)

Oral Communications：Geriatric and Augmented Intelligence (AI)
Abstract Submission No.：APCN20250301

Effect of Increased Fluid Intake and Kidney Function: Dose-Response Meta-analysis

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Abstract

Importance: Lifestyle modification and dietary recommendations remain central to kidney care. Increasing fluid intake is commonly advised by physicians especially in patients with kidney disease, but whether it offers renoprotective benefits remains uncertain.

Objective: To evaluate whether increased fluid intake is associated with slower renal function decline, reduced risk of advanced CKD, and whether these associations are linear or non-linear.

Data sources: A systematic review was conducted using databases: EMBASE, PubMed, and Cochrane Library up to Nov 2024.

Study selection: Studies reported total fluid intake, plain water intake, or urine volume and assessed their association with eGFR decline or the prevalence of advanced-stage CKD were included.

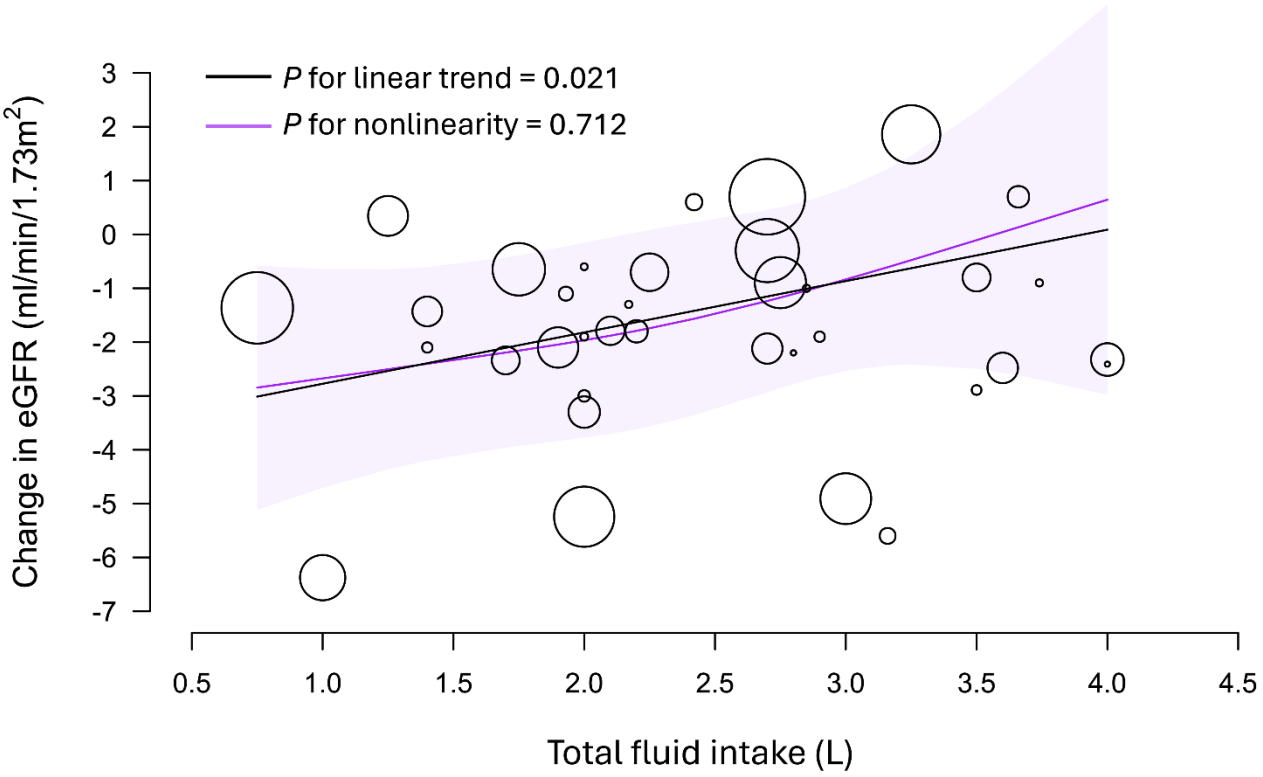
Data Extraction and Synthesis: Two investigators independently extracted data and assessed risk of bias. Random-effects meta-regression was used to examine linear and non-linear relationships between fluid intake and eGFR decline. Two-stage dose–response meta-analysis was performed to evaluate the association between fluid intake volume and advanced CKD prevalence. Pre-specified subgroup analyses were conducted.

Main Outcomes and Measures: The primary outcome was the decline rate of eGFR across levels of fluid intake. The secondary outcome was the prevalence of advanced CKD.

Results: Sixteen studies comprising 70,053 participants were included. Higher total fluid intake was linearly associated with a slower eGFR decline (P for linear trend = 0.021; regression coefficient [β] = 0.95, 95% confidence interval [CI]: 0.14–1.77) and a reduced risk of prevalent advanced-stage CKD (P for linear trend = 0.001; β = –0.27, 95% CI: –0.43 to –0.11). In subgroup analysis, individuals with baseline mean eGFR ≥ 60 mL/min/1.73 m² showed a significant linear association between higher fluid intake and slower eGFR decline (P for linear trend = 0.017; β = 1.02, 95% CI: 0.18–1.86), whereas no significant association was found in those with eGFR < 60. No significant associations were observed for plain water intake or urine volume, likely due to limited data.

Conclusions and Relevance: Increased daily fluid intake—when clinically appropriate—may modestly slow renal function decline and reduce the risk of advanced CKD among individuals without CKD or with early-stage disease. These findings provide new insight into the long controversial question of whether increased fluid intake may be renoprotective.

Keywords：Fluid intake, dose-response analysis, meta-analysis, eGFR, chronic kidney disease


P for linear trend = 0.021
P for nonlinearity = 0.712
Change in eGFR (ml/min/1.73m2)
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Total fluid intake (L)