

Real-World Effects of Finerenone in Diabetics Kidney Disease: Data From Fine-Turk Study

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Abstract

Background: Randomized trials have established the benefits of finerenone in type 2 diabetes with CKD; however, real-world evidence with high SGLT2 inhibitor uptake remains limited.

Methods: FINE-TURK was a multicenter retrospective cohort study conducted at 56 nephrology centers in Turkey. Adults with type 2 diabetes and CKD initiating finerenone (January 2025 to June 2025) were assessed at baseline, month 1, and month 3. Primary endpoints were changes in estimated glomerular filtration rate (eGFR), serum potassium, and urinary albumin-to-creatinine ratio (UACR); hyperkalemia was defined as potassium >5.5 mEq/L.

Results: Among 1,091 patients (60.6±11.5 years, 55% male), 87% received an SGLT2 inhibitor and 100% renin-angiotensin system blockade. Finerenone started at 10 mg in 85%. Paired analyses included 576 for eGFR, 648 for potassium, and 487 for UACR. Mean eGFR fell from 58.51±24.20 to 55.78±23.19 mL/min/1.73 m² at month 1 and remained 55.78±23.13 at month 3 (both P<0.001 vs baseline). Mean potassium increased from 4.49±0.39 to 4.75±0.47 and 4.78±0.44 mEq/L (P<0.001). Median UACR declined from 690.6 (271.4-1538.0) mg/g to 468.0 (173.5-1195.5) at month 1 and 450.0 (154.5-1041.0) mg/g at month 3, corresponding to 32.2% and 34.8% reductions (P<0.001). Hyperkalemia occurred in 5.0% at both visits, commonly managed with potassium binders; hospitalizations were infrequent (2.8% and 3.1%), and no deaths occurred.

Conclusions: In routine care with high SGLT2 inhibitor uptake, finerenone achieved a rapid reduction in albuminuria, with a modest early decline in eGFR, manageable potassium elevations, and low short-term event rates, supporting early use alongside standard therapy in contemporary clinical practice.

Introduction

Chronic kidney disease (CKD) remains a major global health burden, and type 2 diabetes (T2D) is the leading cause of kidney failure worldwide ^{1,2}. Over the past decades ³, renin-angiotensin system (RAS) inhibition has been the foundation of kidney protection in albuminuric diabetic CKD ⁴⁻⁶, and sodium-glucose cotransporter 2 (SGLT2) inhibitors have further reduced cardiovascular events and slowed CKD progression ⁷. Nevertheless, a substantial residual risk persists, and many patients continue to have clinically relevant albuminuria despite guideline-directed therapy ⁸. Mineralocorticoid receptor overactivation contributes to inflammation and fibrosis in diabetic CKD. Although steroidal mineralocorticoid receptor antagonists can reduce albuminuria, their use is often limited by hyperkalemia and endocrine adverse effects ⁹⁻¹¹. Finerenone is a selective nonsteroidal mineralocorticoid receptor antagonist that provides anti-inflammatory and anti-fibrotic effects with fewer endocrine-related adverse events ¹²⁻¹⁵. In the phase 3 FIDELIO-DKD and FIGARO-DKD trials, finerenone reduced the risk of kidney disease progression and cardiovascular events, with consistent cardiorenal benefits in the pooled FIDELITY analysis ¹⁶. However, uptake of SGLT2 inhibitors was low in the pivotal

trials, and contemporary real-world evidence, particularly from settings with widespread SGLT2 inhibitor use, remains limited.

Because finerenone dosing and continuation decisions depend on early monitoring of eGFR and serum potassium, real-world trajectories in the first months after initiation are clinically important. The FINE TURK cohort was established to quantify early changes in eGFR, urinary albumin-to-creatinine ratio, and serum potassium at 1 and 3 months after initiation of finerenone in adults with T2D and CKD across multiple centers in Turkey and to describe hyperkalemia management, hospitalization events, and determinants of short-term responses.

MATERIALS AND METHODS

Study Design and Population

This multicenter, retrospective cohort study evaluated the early efficacy and safety of finerenone in patients with type 2 diabetes mellitus and chronic kidney disease (CKD) receiving contemporary kidney-protective therapy. Data were collected from 56 nephrology centers across Türkiye between January 2025 and June 2025. The study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines and conducted in accordance with the Declaration of Helsinki. All participating centers obtained institutional review board approval, and informed consent was waived due to the retrospective nature of the study and the use of de-identified clinical data.

We included adults aged ≥ 18 years with established type 2 diabetes mellitus and CKD who initiated finerenone for kidney protection during the study period. Patients were excluded if baseline or follow-up laboratory measurements were substantially incomplete. Of 1,168 patients screened, 77 were excluded due to insufficient data, yielding a final cohort of 1,091.

Data Collection

Standardized data collection protocols were implemented across all participating centers. Baseline demographic data included age, sex, body mass index, and comorbidities, including hypertension, cardiovascular disease, and diabetes duration. Concomitant medications were systematically recorded, including renin-angiotensin system (RAS) inhibitors, sodium-glucose cotransporter 2 (SGLT2) inhibitors, glucagon-like peptide 1 receptor agonists, diuretics, and lipid-lowering therapies. Laboratory measurements were obtained at baseline and approximately 1–3 months thereafter, in accordance with routine clinical practice protocols at each center. Measured parameters included serum creatinine, estimated glomerular filtration rate (eGFR, calculated using the CKD-EPI equation), serum potassium, and urinary albumin-to-creatinine ratio (UACR). Finerenone was initiated at 10 mg or 20 mg once daily according to clinical judgment, baseline eGFR, and serum potassium levels. Dose adjustments and discontinuation were managed by treating physicians according to clinical response and tolerability.

Outcomes

Primary endpoints were changes in eGFR (mL/min/1.73m²), serum potassium (mEq/L), and UACR (mg/g) from baseline to months 1–3. Secondary endpoints included the incidence and severity of hyperkalemia, management strategies employed, reasons for finerenone discontinuation and reinitiation, hospitalizations, and all-cause mortality.

Statistical Analysis

All continuous variables were assessed for normality using the Shapiro-Wilk test. As all primary variables and their changes from baseline were found to be non-normally distributed (Shapiro-Wilk $p < 0.001$ for all), non-parametric tests were used as the primary analytical approach, with parametric tests reported in parallel. Continuous variables are presented as median [interquartile range (IQR)] or mean $\pm$ standard deviation (SD) as appropriate, and categorical variables as counts and percentages.

Changes from baseline to months 1–3 were evaluated using the Wilcoxon signed-rank test as the primary analysis and paired t-tests as a secondary analysis. Effect sizes were calculated using Cohen's d . For albuminuria, which exhibited a highly right-skewed distribution, analyses were performed on both raw and natural log-transformed data to ensure robustness. Two-tailed p -values < 0.05 were considered statistically significant.

As a sensitivity analysis, linear mixed models (LMMs) with random intercepts were fitted for all three primary endpoints to assess the robustness of the paired analyses and to account for within-patient correlation. The model specification was: $Y = \beta_0 + \beta_1(\text{Time}) + \beta_2(\text{Baseline}) + u + \epsilon$, where β_1 represents the fixed time effect (primary parameter of interest) and u the random intercept for patient i . Models were estimated using restricted maximum likelihood (REML). Analysis of covariance (ANCOVA) models were fitted to evaluate the predictive value of baseline parameters on follow-up values. Treatment responses were examined across predefined subgroups stratified by baseline eGFR category (≤ 30 , 30–45, 45–60, > 60 mL/min/1.73m²) and baseline albuminuria category (microalbuminuria < 300 mg/g vs. macroalbuminuria ≥ 300 mg/g). Spearman's rank correlation coefficient was calculated to assess the relationship between baseline values and the magnitude of treatment response. All analyses were performed using Python 3.11 with SciPy, statsmodels, and scikit-learn.

Results

Study Population

The final cohort comprised 1,091 patients (mean age 60.6 ± 11.5 years, 55.0% male) with type 2 diabetes and CKD. Hypertension was nearly universal (99.6%), and 37.8% had established cardiovascular disease with a mean diabetes duration of 12.4 ± 8.9 years. At baseline, median eGFR was 53.5 [IQR: 41.0–74.0] mL/min/1.73m², mean serum potassium was 4.48 ± 0.39 mEq/L, and median UACR was 781.6 [IQR: 336.1–1542.5] mg/g. All patients were receiving RAS blockade (64.4% at maximally tolerated doses), and

notably, 87.0% of patients with available data were concurrently treated with SGLT2 inhibitors, reflecting contemporary practice patterns. Finerenone was initiated at 10 mg in 85.0% of patients and at 20 mg in 15.0%. Among those who initiated at 10 mg and had dose data available at month 3 (n = 460), 140 (30.4%) were uptitrated to 20 mg. Paired baseline and months 1–3 measurements were available for eGFR in 571 patients (52.4%), serum potassium in 646 (59.2%), and UACR in 474 (43.5%), reflecting routine clinical practice patterns across 56 centers.

Primary Endpoints

Finerenone initiation was associated with statistically significant changes in all three primary endpoints, consistent with the study hypothesis (Table 1, Fig. 1).

Table 1
Primary Endpoints—Changes from Baseline to Months 1–3

Endpoint	n	Baseline	Month 1–3	Change	% Change	p-value	95% CI
eGFR (mL/min/1.73m ²)	571	53.5 [41.0–74.0]	51.0 [38.0–73.0]	-2.34 ± 11.88	-3.8%	< 0.001	[-3.32, -1.36]
Serum K⁺ (mEq/L)	646	4.50 [4.20–4.80]	4.80 [4.50–5.10]	+ 0.30 ± 0.46	+ 6.8%	< 0.001	[0.27, 0.34]
UACR (mg/g)	474	781.6 [336.1–1542.5]	468.2 [155.0–1042.0]	-248.0 [-600.0, -53.5]	-40.1%	< 0.001	[-310.0, -205.0] [†]
Log-UACR	474	6.53 ± 1.29	5.92 ± 1.45	-0.607 ± 0.78	-45.5%	< 0.001	[-0.68, -0.54]

Data presented as median [IQR] or mean ± SD. p-values are from Wilcoxon signed-rank tests. [†]95% CI for median change in UACR was calculated using bootstrapping (10,000 iterations).

Among 571 patients with paired eGFR measurements, median eGFR declined from 53.5 [41.0–74.0] to 51.0 [38.0–73.0] mL/min/1.73m² (mean change - 2.34 ± 11.88 mL/min, 95% CI -3.32 to -1.36; Wilcoxon p < 0.001; Cohen’s d = -0.20). This modest 3.8% median relative decline is consistent with an adaptive hemodynamic dip commonly observed with mineralocorticoid receptor antagonism and does not reflect progressive kidney injury.

Among 646 patients with paired potassium measurements, median serum potassium increased from 4.50 [4.20–4.80] to 4.80 [4.50–5.10] mEq/L (mean change + 0.30 ± 0.46 mEq/L, 95% CI 0.27 to 0.34; Wilcoxon p < 0.001; Cohen’s d = 0.66). Despite the statistically significant increase, mean potassium remained within the normal range at all time points.

Among 474 patients with paired UACR measurements (excluding one patient with a follow-up value of zero for log-transformation), median UACR decreased from 781.6 [336.1-1542.5] to 468.2 [155.0-1042.0] mg/g, corresponding to a 40.1% median reduction (Wilcoxon $p < 0.001$). Log-transformed analysis confirmed a mean change of -0.607 ± 0.78 log units (95% CI -0.68 to -0.54; $p < 0.001$; Cohen's $d = -0.78$), corresponding to a 45.5% reduction. This substantial and rapid reduction in albuminuria represents a clinically meaningful early response to finerenone therapy.

Sensitivity Analysis

Linear mixed model analysis confirmed the robustness of all primary findings (Fig. 2). The fixed time effects were near-identical to paired analyses: eGFR -2.34 mL/min/ 1.73m^2 (SE 0.50, $p < 0.001$); potassium $+0.31$ mEq/L (SE 0.02, $p < 0.001$); and log-UACR -0.607 (SE 0.04, $p < 0.001$). Minimal random intercept variances across all three models indicated that, after accounting for baseline values, treatment effects were homogeneous across the patient population. The near-perfect concordance between two fundamentally different analytical approaches—one assuming independence (paired test) and the other modeling within-patient correlation (LMM)—provides strong evidence that the observed treatment effects are robust and not an artifact of the analytical method.

Subgroup and Correlation Analyses

Subgroup analyses demonstrated consistency of treatment response across diverse patient populations (Fig. 3). eGFR decline was observed across all baseline eGFR categories: ≤ 30 mL/min ($n = 39$, -0.85 ± 5.16 mL/min), 30–45 ($n = 159$, -1.23 ± 5.85), 45–60 ($n = 149$, -2.52 ± 8.35), and > 60 ($n = 224$, -3.27 ± 16.83). Albuminuria reduction was consistent regardless of baseline severity, with median reductions of -35.6% in microalbuminuria ($n = 109$) and -40.3% in macroalbuminuria ($n = 366$).

ANCOVA models showed that baseline eGFR explained 76.8% of the variance in follow-up eGFR ($R^2=0.768$), baseline potassium explained 17.7% ($R^2=0.177$), and baseline log-UACR explained 71.4% ($R^2=0.714$). Crucially, the treatment effect remained statistically significant for all primary outcomes after adjusting for these baseline covariates ($p < 0.001$), indicating consistent efficacy regardless of initial values.

Correlation analysis between baseline values and the magnitude of change revealed weak correlations for eGFR (Spearman $\rho=-0.145$, $p = 0.001$) and log-UACR ($\rho=-0.034$, $p = 0.458$), indicating that treatment effects are largely independent of baseline status (Fig. 4). A moderate negative correlation was observed for potassium ($\rho=-0.419$, $p < 0.001$), consistent with regression toward the mean. These findings collectively support the generalizability of finerenone therapy across diverse patient populations.

Safety Profile

Hyperkalemia ($K^+ >5.5$ mEq/L) occurred in 27 of 646 patients (4.2%), and severe hyperkalemia ($K^+ >6.0$ mEq/L) in only 5 (0.8%). Among the 27 patients who developed hyperkalemia, the predominant management strategy was initiation of a potassium binder (40.7%, $n = 11$), finerenone discontinuation (33.3%, $n = 9$), and observation alone (18.5%, $n = 5$) (Fig. 5, **Panel A**).

Finerenone was discontinued in 39 patients (3.6%) by month 3. The most common reasons were hyperkalemia (33.3%), other causes (28.2%), and financial reasons (20.5%) (Fig. 5, **Panel B**). Among the 27 patients with follow-up data after discontinuation, 8 (29.6%) were re-initiated on finerenone, predominantly after potassium normalization.

During the follow-up period, 6 deaths (0.5%) were recorded. Causes of death included coronary artery disease, hemorrhagic stroke, decompensated heart failure, and gastrointestinal bleeding. None of the deaths were considered by the investigators to be directly attributable to finerenone therapy or hyperkalemia.

DISCUSSION

In this multicenter, retrospective, real-world cohort spanning 56 nephrology centers, initiation of finerenone in adults with type 2 diabetes and chronic kidney disease receiving contemporary kidney-protective therapy was associated with three consistent early trajectories at routine follow-up within 1 to 3 months. First, albuminuria declined rapidly and substantially. Second, kidney function showed a small early eGFR dip of limited magnitude. Third, serum potassium increased modestly, while clinically relevant hyperkalemia remained uncommon and was generally manageable in routine practice. The scale of FINE-TURK and the high prevalence of background sodium-glucose cotransporter 2 (SGLT2) inhibitor use provide an updated real-world complement to the pivotal finerenone program conducted in an era of comparatively low SGLT2 inhibitor uptake^{16–18}.

The most clinically salient signal was the magnitude of albuminuria reduction. Among patients with paired measurements, UACR decreased by approximately 40% within the first 1 to 3 months, with concordant findings on log-transformed analyses, supporting a robust early anti-albuminuric effect despite the inherent variability of spot UACR in routine care. This degree and timing of response are consistent with the early albuminuria-lowering observed in FIDELIO-DKD and FIGARO-DKD, reinforcing the biological plausibility that finerenone's anti-inflammatory and anti-fibrotic effects translate into measurable short-term biomarker improvement in contemporary practice^{10,12–14,17,18}. Although early UACR reduction has been linked to long-term cardiorenal benefit in clinical trials, the current observational design and short follow-up preclude inference regarding long-term endpoints; continued follow-up in this national cohort will be essential to determine whether early biomarker changes translate into sustained eGFR benefit and fewer clinical events^{17,18}.

Kidney function changes were modest. The early mean eGFR decline of approximately 2 to 3 mL/min/1.73 m² is consistent in direction with the hemodynamic dip commonly observed after initiation

of several kidney-protective agents, including renin-angiotensin system (RAS) blockade and SGLT2 inhibition ^{6,19}. Importantly, sensitivity analyses using linear mixed models yielded estimates that closely match paired analyses, arguing against analytic artifact and supporting the robustness of the observed trajectory. Subgroup analyses suggested that this early eGFR change occurred across baseline eGFR categories, supporting the feasibility of finerenone use across a broad spectrum of kidney function within indicated ranges, while emphasizing the need for early monitoring in those at highest risk of acute declines.

Hyperkalemia remains the principal safety concern with mineralocorticoid receptor antagonism ^{11,15}. In this cohort, serum potassium increased by approximately 0.30 mEq/L; however, hyperkalemia above 5.5 mEq/L occurred in only 4.2% of patients with paired potassium data, and severe hyperkalemia above 6.0 mEq/L was rare (0.8%). When hyperkalemia occurred, management most commonly involved initiation of a potassium binder, and discontinuation rates were low by month 3, with a notable proportion of patients later re-initiated after potassium normalization. Several factors may plausibly contribute to this favorable early potassium profile, including high concomitant use of SGLT2 inhibitors, contemporary diuretic utilization patterns, and common initiation at lower finerenone doses. Collectively, these findings support the feasibility of integrating finerenone into the modern therapeutic “stack” when early potassium surveillance and structured potassium-lowering strategies are applied ^{17,18}.

An important practical implication is the generalizability of early finerenone-associated biomarker effects in contemporary care. The cohort reflects routine nephrology practice, with high uptake of background kidney-protective therapy, including near-universal RAS blockade and widespread use of SGLT2 inhibitors ⁴⁻⁷. Early responses were broadly consistent across albuminuria and eGFR strata, and correlations between baseline values and magnitude of response were weak for eGFR and UACR, suggesting that early albuminuria lowering is not limited to a narrow phenotype. In contrast, a more pronounced association between baseline potassium and the change in potassium is consistent with regression toward the mean and underscores the continued importance of baseline potassium as a safety signal.

This study has limitations inherent to retrospective observational designs. The absence of a control group limits causal inference and leaves residual confounding, including potential changes in concomitant medications, blood pressure, glycemic control, diet counseling, and laboratory timing that are not fully standardized across centers. Paired laboratory measurements were available in roughly half of the cohort, which may introduce selection bias; documenting baseline differences between patients with and without paired follow-up would strengthen interpretability. Outcomes were not adjudicated. While short-term mortality was low, deaths occurred during follow-up and attribution cannot be established in this design. Finally, the current report focuses on early biomarker trajectories rather than hard kidney or cardiovascular outcomes; longer follow-up is required to assess sustained eGFR slope, hospitalization patterns, and clinical endpoints.

In summary, in a large national real-world cohort characterized by contemporary background therapy and high SGLT2 inhibitor use, finerenone initiation was associated with rapid and substantial albuminuria reduction, a small early eGFR dip, and a manageable potassium profile with low rates of severe hyperkalemia and low overall discontinuation. These findings support early integration of finerenone into combination kidney-protective therapy with appropriate laboratory monitoring and proactive hyperkalemia management ^{17,18}.

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Figures

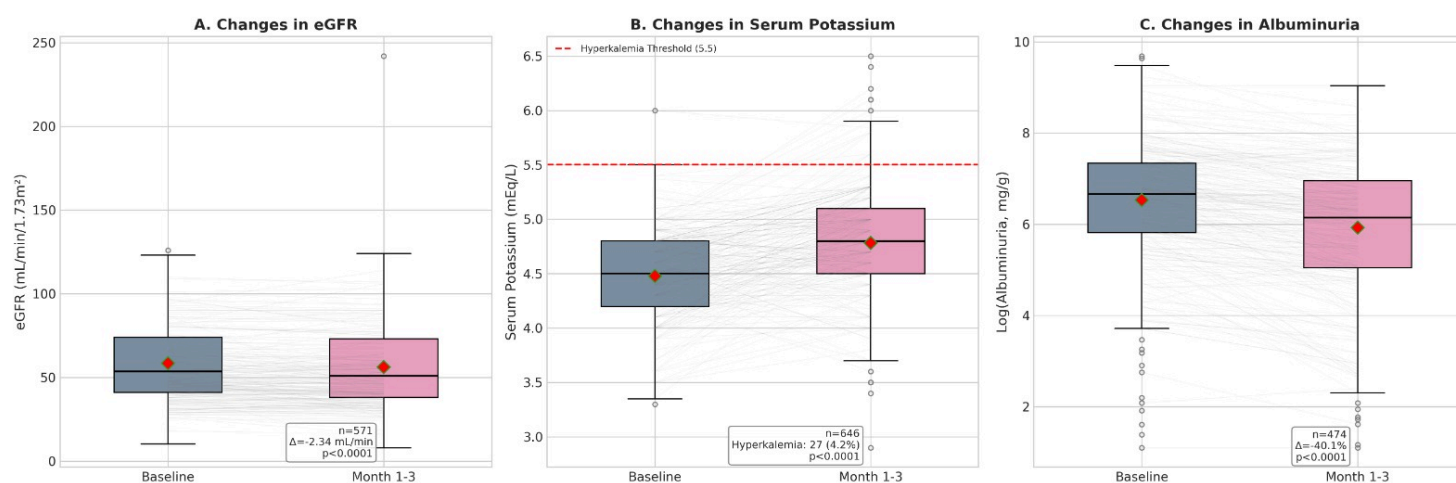


Figure 1

Primary Outcomes—Changes in eGFR, Serum Potassium, and Albuminuria from Baseline to Months 1-3. Paired changes in primary endpoints from baseline to months 1-3. Panel A displays eGFR changes (n=571) with individual patient trajectories (gray lines) and mean $\pm$ SE (red). Mean eGFR declined by 2.34 mL/min/1.73m² (p<0.001). Panel B shows serum potassium changes (n=646) with a mean increase of 0.30 mEq/L (p<0.001); the dashed line indicates the hyperkalemia threshold (5.5 mEq/L). Panel C displays albuminuria changes on a log scale (n=474), with a 40.1% median reduction (p<0.001).

Linear Mixed Model Results

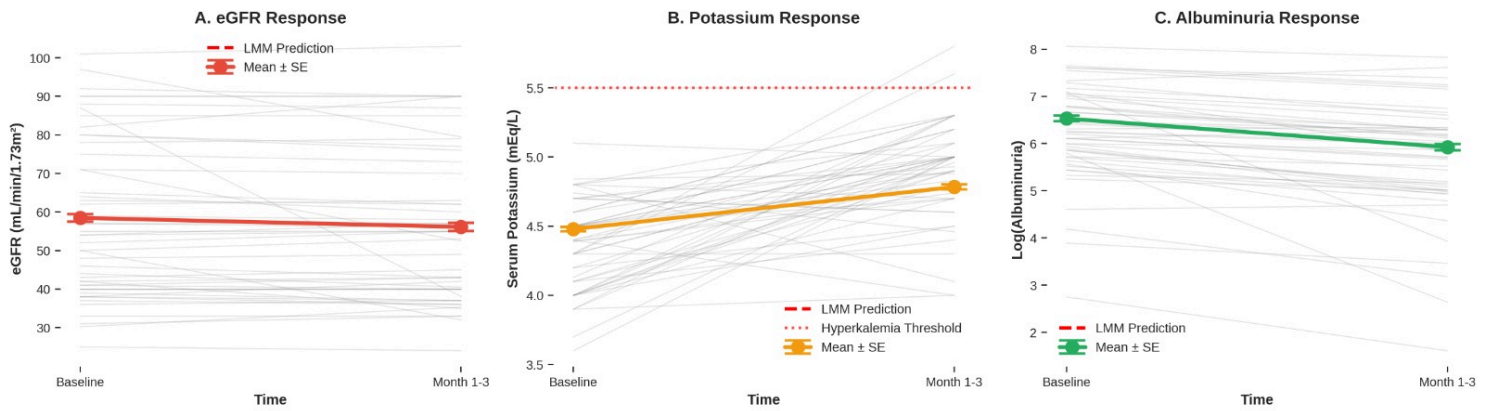


Figure 2

Linear Mixed Model Results—Individual Trajectories and Model Predictions. LMM results for all three primary endpoints, displaying individual patient trajectories (gray lines), observed mean ± SE (colored markers), and LMM-predicted population trajectory (dashed red line). The near-perfect concordance between LMM predictions and observed means demonstrates the robustness of primary findings.

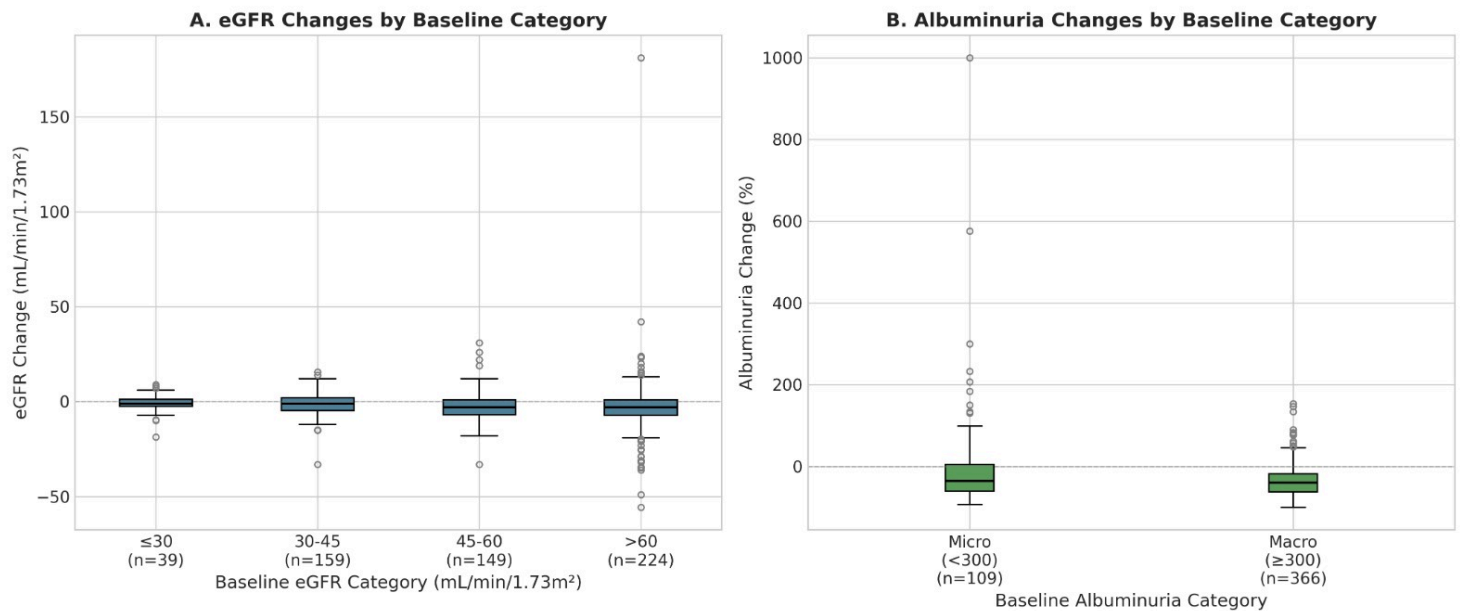


Figure 3

Subgroup Consistency—Treatment Response Across Patient Populations. Consistency of treatment response across predefined subgroups. Panel A shows eGFR decline stratified by baseline eGFR category. Panel B displays albuminuria reduction by baseline category (microalbuminuria <300 mg/g, n=109; macroalbuminuria ≥300 mg/g, n=366).

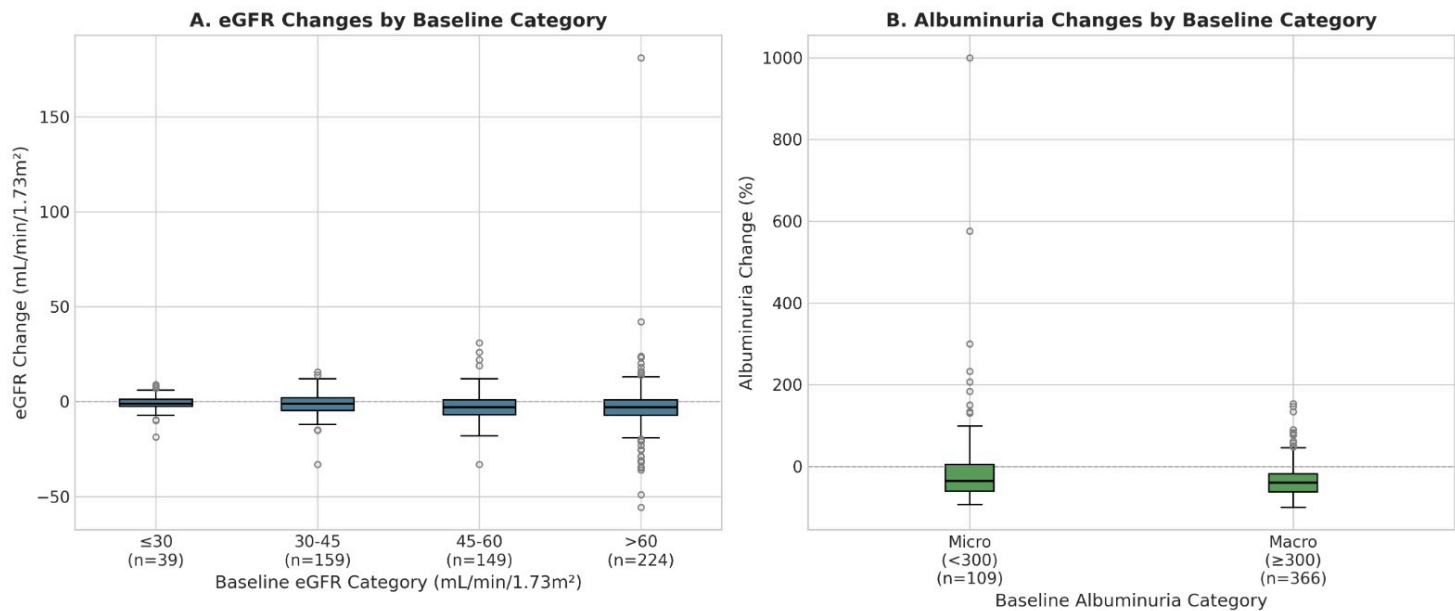


Figure 4

Correlation Analysis—Baseline Independence of Treatment Response. Relationship between baseline values and magnitude of treatment response using Spearman's rank correlation. Panel A: baseline eGFR vs. eGFR change ($\rho=-0.145$, $p=0.001$). Panel B: baseline K^+ vs. K^+ change ($\rho=-0.419$, $p<0.001$). Panel C: baseline log-UACR vs. log-UACR change ($\rho=-0.034$, $p=0.458$).

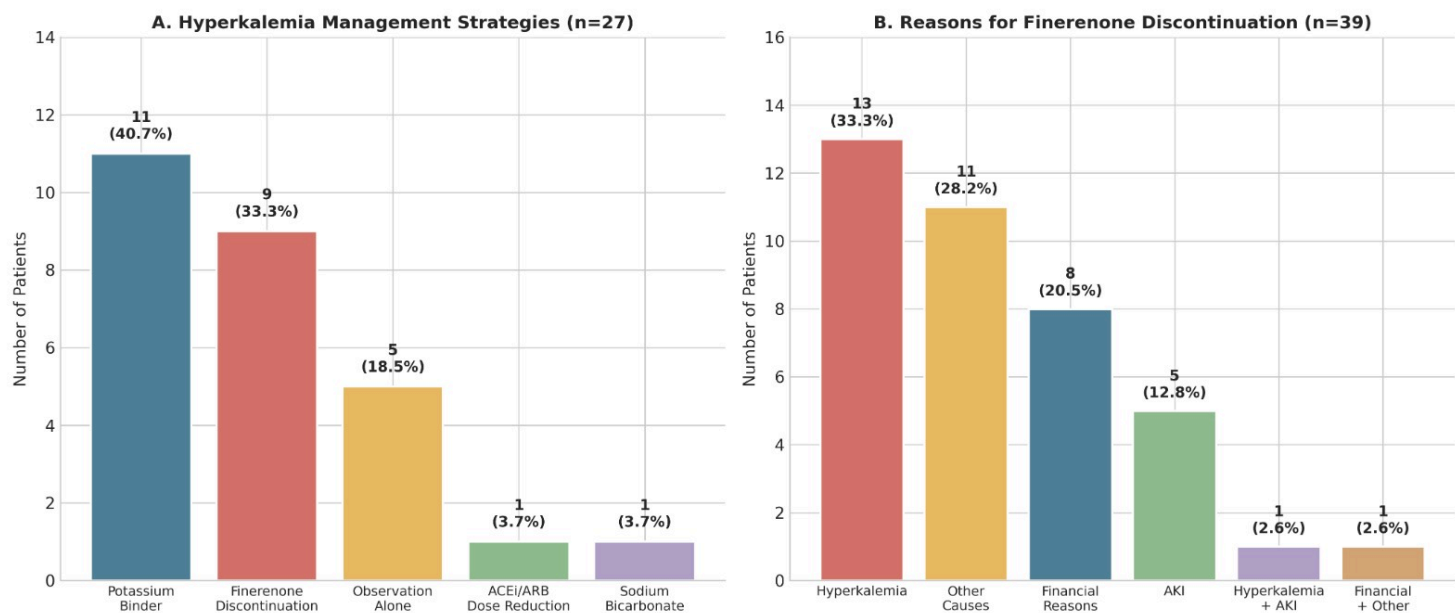


Figure 5

Hyperkalemia Management and Finerenone Discontinuation. Panel A shows management strategies for 27 patients who developed hyperkalemia ($K^+ >5.5$ mEq/L). Panel B displays reasons for finerenone discontinuation among 39 patients.

