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Impact of finerenone on acute eGFR changes in patients with type 1 diabetes and chronic kidney disease: a prespecified analysis of the FINE-ONE trial

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BACKGROUND

- Type 1 diabetes (T1D) is a major risk factor for the initiation and progression of chronic kidney disease (CKD), which affects approximately one quarter to one third of individuals with T1D[1,2]
- In FINE-ONE, the nonsteroidal mineralocorticoid receptor antagonist finerenone reduced urine albumin-to-creatinine ratio (UACR) and improved kidney outcomes in adults with T1D and CKD[3]
- Therapies that slow kidney disease progression through haemodynamic mechanisms can induce an acute, reversible decline in estimated glomerular filtration rate (eGFR)[4]
- This "dip" has been observed with finerenone treatment and is associated with eGFR preservation during prolonged treatment in other populations, but evidence in adults with T1D and CKD is limited[4,5]

AIM

- To evaluate acute changes in eGFR following finerenone initiation in FINE-ONE and assess the impact of these changes on safety

METHOD

- This prespecified analysis used data from FINE-ONE, a double-blind, phase 3 study in 242 adults with T1D and CKD[3]
- Participants with HbA1c <10.0%, eGFR ≥25 to <90 ml/min/1.73 m^2, UACR ≥200 to <5000 mg/g and receiving stable renin–angiotensin system inhibitor treatment were randomised 1:1 to finerenone (target dose 20 mg once daily) or placebo[3]
- The prespecified primary outcome was acute change in eGFR from baseline to Month 1 (28 days post-randomisation)
  - Reversibility of the acute eGFR change was assessed during the post-treatment washout period, defined as the change in eGFR from end of treatment (Month 6) to follow up (30 days after the last dose of study intervention)
- Acute eGFR changes and reversibility were assessed using mixed model repeated measures
- Participants were categorised into three groups according to acute eGFR change at Month 1: no decline or an increase in eGFR, a >0–≤10% decline, and a >10% decline
  - Baseline characteristics and safety were described in these subgroups
- Subgroup analyses were performed according to baseline eGFR (<45, 45–<60, ≥60 ml/min/1.73 m^2), UACR (<300, 300–1000, >1000 mg/g), history of CVD, and diuretic use
- Associations between acute eGFR change at Month 1 and changes in eGFR, serum potassium, systolic blood pressure (SBP; Month 1) and UACR (Month 3) were assessed across the eGFR change subgroups
- Safety was evaluated by treatment-emergent adverse events (TEAEs), including hyperkalaemia, across the eGFR change subgroups

RESULTS

Baseline characteristics

- Of 234 participants analysed, 44% (102/234) had no change or an increase in eGFR, while 32% (75/234) had a >0–≤10% dip in eGFR and 24% (57/234) had a >10% dip. More patients receiving finerenone experienced a >10% dip compared with those on placebo (**Table 1**)

Table 1. Baseline characteristics by acute eGFR change from baseline at month 1 in eGFR categories (safety analysis set)

	Acute eGFR change subgroup		
	eGFR increase[a] (n=102)	>0–≤10% eGFR reduction (n=75)	>10% eGFR reduction (n=57)
Treatment group, n (%)			
Finerenone	51 (50.0)	32 (42.7)	33 (57.9)
Placebo	51 (50.0)	43 (57.3)	24 (42.1)
Age, years, mean (SD)	50.6 (14.1)	52.2 (13.9)	51.2 (12.5)
Male, n (%)	70 (68.6)	50 (66.7)	36 (63.2)
Race, n (%)			
White	66 (64.7)	59 (78.7)	43 (75.4)
Asian	25 (24.5)	12 (16.0)	11 (19.3)
Black	8 (7.8)	4 (5.3)	2 (3.5)
Other	3 (2.9)	0	1 (1.8)
Serum [K+], mmol/l, mean (SD)	4.6 (0.5)	4.6 (0.4)	4.5 (0.4)
eGFR, ml/min/1.73 m^2, mean (SD)	55.3 (18.2)	61.1 (20.2)	64.6 (18.2)
UACR, mg/g, median (min, max)	563.6 (92.8, 4845.2)	518.9 (76.9, 3406.9)	591.4 (130.8, 3100.2)
BMI, kg/m^2, mean (SD)	26.5 (5.3)[b]	27.2 (5.5)[b]	29.7 (7.2)
History of CVD, n (%)	26 (25.5)	20 (26.7)	11 (19.3)
Diuretic use	40 (39.2)	26 (34.7)	18 (31.6)

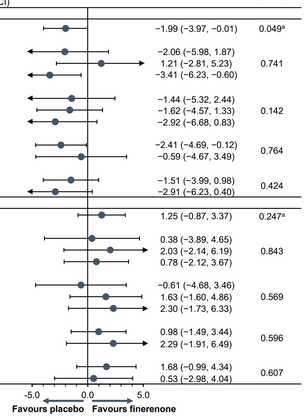
Subgroup and treatment group populations include only participants with available eGFR data at Month 1; the total number of participants was 234.
[a]Category includes participants with no change in eGFR. [b]One missing value.
BMI, body mass index; CVD, cardiovascular disease; eGFR, estimated glomerular filtration rate; SD, standard deviation; UACR, urine albumin-to-creatinine ratio.

Acute change in eGFR

- At Month 1, acute eGFR dip was greater with finerenone (−2.78 ml/min/1.73 m^2; 95% confidence interval [CI] –4.15, –1.40) vs placebo (−0.78 ml/min/1.73 m^2; 95% CI −2.22, 0.66; p=0.049)
  - The acute eGFR dip with finerenone was similar across baseline subgroups including eGFR, UACR, history of CVD, or diuretic use ($p_{interaction}$>0.05 for all analyses) (**Figure 1**)

Figure 1. Finerenone versus placebo: mean change in eGFR according to baseline eGFR and UACR subgroups and history of CVD and diuretic use

Baseline subgroup	Finerenone (n=119) n	Finerenone (n=119) LSM change from baseline (95% CI)	Placebo (n=122) n	Placebo (n=122) LSM change from baseline (95% CI)	LSM treatment difference from baseline (95% CI)	*P*-value for interaction
Baseline to month 1						
Overall	116	−2.78	118	−0.78	−1.99 (−3.97, −0.01)	0.049[a]
Baseline eGFR (mL/min/1.73 m²)						
<45	31	−4.12	29	−2.07	−2.06 (−5.98, 1.87)	
45–<60	29	−1.23	28	−2.44	1.21 (−2.81, 5.23)	0.741
≥60	56	−2.83	61	0.59	−3.41 (−6.23, −0.60)	
Baseline UACR (mg/g)						
<300	28	−1.10	33	0.33	−1.44 (−5.32, 2.44)	
300–1000	55	−2.51	52	−0.89	−1.62 (−4.57, 1.33)	0.142
>1000	33	−4.65	33	−1.73	−2.92 (−6.68, 0.83)	
History of CVD						
No	84	−2.92	93	−0.51	−2.41 (−4.69, −0.12)	0.764
Yes	32	−2.37	25	−1.78	−0.59 (−4.67, 3.49)	
Use of diuretics at baseline						
No	76	−2.35	74	−0.84	−1.51 (−3.99, 0.98)	0.424
Yes	40	−3.60	44	−0.69	−2.91 (−6.23, 0.40)	
Month 6 to follow-up						
Overall	110	1.61	107	0.36	1.25 (−0.87, 3.37)	0.247[a]
Baseline eGFR (mL/min/1.73 m²)						
<45	27	−3.80	24	−4.18	0.38 (−3.89, 4.65)	
45–<60	29	1.28	26	−0.75	2.03 (−2.14, 6.19)	0.843
≥60	54	4.00	57	3.23	0.78 (−2.12, 3.67)	
Baseline UACR (mg/g)						
<300	28	−0.07	31	0.54	−0.61 (−4.68, 3.46)	
300–1000	50	2.26	47	0.62	1.63 (−1.60, 4.86)	0.569
>1000	32	2.05	29	−0.25	2.30 (−1.73, 6.33)	
History of CVD						
No	78	1.79	83	0.81	0.98 (−1.49, 3.44)	0.596
Yes	32	1.12	24	−1.17	2.29 (−1.91, 6.49)	
Use of diuretics at baseline						
No	70	1.63	68	−0.05	1.68 (−0.99, 4.34)	0.607
Yes	40	1.58	39	1.05	0.53 (−2.98, 4.04)	



Subgroup and treatment group populations include only participants with available eGFR data at Month 1 (visit 3); the total number of participants was 234 (n=116 for finerenone and n=118 for placebo).
[a]Overall *p*-value is reported separately.
CI, confidence interval; CVD, cardiovascular disease; eGFR, estimated glomerular filtration rate; LSM, least squares mean; UACR, urine albumin-to-creatinine ratio.

Reversibility after treatment discontinuation

- After treatment discontinuation (from Month 6 to follow up), there was a greater increase in eGFR with finerenone (1.61 ml/min/1.73 m^2 [95% CI 0.12, 3.09]) compared with placebo (0.36 ml/min/1.73 m^2 [95% CI −1.15, 1.86]), although this was not statistically significant (p=0.247)
  - A similar increase in eGFR was seen across subgroups ($p_{interaction}$>0.05 for all analyses) (**Figure 1**)

Association between acute eGFR change, UACR, serum potassium, and SBP

- Greater acute eGFR dip with finerenone was associated with progressively larger reductions in UACR (Month 3), with mean percentage changes increasing from −23.6% to −36.7% across the eGFR change subgroups (**Table 2**)
  - In the placebo group, UACR change ranged from 1.5% to −32.2% as the magnitude of eGFR dip became greater
- Higher serum potassium increases at Month 1 were observed with increasing magnitude of the acute eGFR dip in finerenone-treated participants, with mean changes ranging from 0.03 to 0.30 mmol/l, with similar changes in placebo-treated participants (0.05 to 0.23 mmol/l)
- Reductions in SBP at Month 1 ranged from −5.6 to −1.9 mmHg across the eGFR change subgroups with finerenone and from −1.1 to −7.8 mmHg with placebo

Table 2. Change from baseline in eGFR, UACR, serum potassium and SBP by acute eGFR change subgroups (safety analysis set)

	Acute eGFR percentage change from baseline at Month 1					
	eGFR increase[a]		>0–≤10% eGFR reduction		>10% eGFR reduction	
	Finerenone (n=51)	Placebo (n=51)	Finerenone (n=32)	Placebo (n=43)	Finerenone (n=33)	Placebo (n=24)
eGFR, ml/min/1.73 m^2 (95% CI)	3.57 (2.58, 4.56)	6.12 (4.53, 7.71)	−3.56 (−4.28, −2.83)	−3.33 (−3.91, −2.74)	−11.85 (−14.46, −9.24)	−10.87 (−13.21, −8.53)
UACR[b] % (95% CI)	−23.63 (−33.79, −11.90)	1.54 (−13.65, 19.39)	−33.99 (−45.25, −20.42)	−11.26 (−24.95, 4.92)	−36.67 (−48.78, −21.69)	−32.24 (−43.94, −18.10)
Serum potassium, mmol/l (95% CI)	0.03 (−0.07, 0.12)	0.05 (−0.08, 0.17)	0.16 (0.01, 0.32)	0.03 (−0.10, 0.16)	0.30 (0.13, 0.47)	0.23 (0.10, 0.36)
SBP, mmHg (95% CI)	−5.61 (−8.87, −2.35)	−1.08 (−4.85, 2.70)	−4.00 (−8.87, 0.87)	−1.72 (−6.31, 2.87)	−1.85 (−6.21, 2.52)	−7.79 (−13.73, −1.85)

[a]Category includes participants with no change in eGFR. [b]Data were unavailable in the finerenone-treated arm for eGFR increase[a] (n=2), >0–≤10% eGFR reduction (n=2), and >10% eGFR reduction (n=1) subgroups, and in the placebo arm for eGFR increase[a] (n=3) and >0–≤10% reduction (n=2) subgroups.
Changes in UACR from baseline to Month 3 were expressed as mean percentage changes (95% CI). Changes in eGFR, serum potassium and SBP from baseline to Month 1 were expressed as mean (95% CI).
CI, confidence interval; eGFR, estimated glomerular filtration rate; SBP, systolic blood pressure; UACR, urine albumin-to-creatinine ratio.

Safety

- Overall, the proportions of TEAEs were similar between the finerenone and placebo groups at Month 1, although hyperkalaemia was more common with finerenone (9.1–12.5%) than with placebo (0–5.9%) across the eGFR change subgroups (**Table 3**)
- The incidence of treatment-emergent SAEs was similar between treatment arms within each eGFR category, and no deaths were reported

Table 3. Safety by acute eGFR change category and treatment arm at Month 1 (safety analysis set)

	Acute eGFR change subgroup by treatment arm, n (%)					
	eGFR increase[a]		>0–≤10% eGFR reduction		>10% eGFR reduction	
	Finerenone (n=51)	Placebo (n=51)	Finerenone (n=32)	Placebo (n=43)	Finerenone (n=33)	Placebo (n=24)
Any treatment-emergent AE	21 (41.2)	22 (43.1)	18 (56.2)	23 (53.5)	16 (48.5)	12 (50.0)
Intervention related	7 (13.7)	8 (15.7)	5 (15.6)	1 (2.3)	6 (18.2)	3 (12.5)
Leading to permanent discontinuation	1 (2.0)	0	1 (3.1)	1 (2.3)	0	0
Any treatment-emergent SAE	6 (11.8)	6 (11.8)	5 (15.6)	3 (7.0)	2 (6.1)	4 (16.7)
Intervention related	1 (2.0)	0	1 (3.1)	0	0	0
Leading to permanent discontinuation	1 (2.0)	0	1 (3.1)	0	0	0
Requiring hospitalisation	6 (11.8)	4 (7.8)	4 (12.5)	3 (7.0)	1 (3.0)	3 (12.5)
Life-threatening[b]	2 (3.9)	0	1 (3.1)	1 (2.3)	0	0
Any hyperkalaemia[c]	5 (9.8)	3 (5.9)	4 (12.5)	0	3 (9.1)	1 (4.2)
Any serious hyperkalaemia[c,d]	1 (2.0)	0	1 (3.1)	0	0	0

Subgroup and treatment group populations include only participants with available eGFR data at Month 1; the total number of participants was 234.
[a]Category includes participants with no change in eGFR. [b]None of the life-threatening treatment-emergent SAEs were related to study drug according to the investigators. [c]Hyperkalaemia includes investigator-reported AEs with the Medical Dictionary for Regulatory Activities terms hyperkalaemia and blood potassium increased. [d]All cases of serious hyperkalaemia were in the finerenone group.
AE, adverse event; eGFR, estimated glomerular filtration rate; K+, potassium; SAE, serious adverse event; SAS, safety analysis set.

CONCLUSIONS

- In FINE-ONE participants with T1D and CKD, finerenone induced an acute dip in eGFR that was partially reversible following treatment discontinuation
- A greater acute eGFR dip was associated with greater reductions in UACR
- The magnitude of acute eGFR dip aligned with expected haemodynamic effects, reflecting reduced glomerular hypertension
- The eGFR dip was well tolerated, with no unexpected safety signals

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