



Clinical trial results:

A study to investigate the potential renoprotective role of sodium-glucose transporter-2 (SGLT-2) antagonist Dapagliflozin in Type 2 diabetic patients with diabetic nephropathy

Summary

EudraCT number	2013-004042-42
Trial protocol	GB
Global end of trial date	08 July 2025

Results information

Result version number	v1 (current)
This version publication date	28 August 2026
First version publication date	28 August 2026
Summary attachment (see zip file)	DEER CSR FINAL 18Feb26 (DEER CSR FINAL 18Feb26.pdf)

Trial information

Trial identification

Sponsor protocol code	DEER
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Additional study identifiers

ISRCTN number	-
ClinicalTrials.gov id (NCT number)	-
WHO universal trial number (UTN)	-

Notes:

Sponsors

Sponsor organisation name	King's College London
Sponsor organisation address	The Strand, London, United Kingdom, WC2R 2LS
Public contact	Dr Janaka Karalliedde, King's College London, 0044 02078484464, j.karalliedde@kcl.ac.uk
Scientific contact	Dr Janaka Karalliedde, King's College London, 0044 02078484464, j.karalliedde@kcl.ac.uk
Sponsor organisation name	Guy's and St Thomas' NHS Foundation Trust
Sponsor organisation address	Great Maze Pond, London, United Kingdom, SE19RT
Public contact	Dr Janaka Karalliedde, King's College London, 0044 02078484464, j.karalliedde@kcl.ac.uk
Scientific contact	Dr Janaka Karalliedde, Guy's and St Thomas' NHS Foundation Trust, 0044 02078484464, j.karalliedde@kcl.ac.uk

Notes:

Paediatric regulatory details

Is trial part of an agreed paediatric investigation plan (PIP)	No
Does article 45 of REGULATION (EC) No 1901/2006 apply to this trial?	No
Does article 46 of REGULATION (EC) No 1901/2006 apply to this trial?	No

Notes:

Results analysis stage

Analysis stage	Final
Date of interim/final analysis	05 December 2019
Is this the analysis of the primary completion data?	Yes
Primary completion date	05 December 2019
Global end of trial reached?	Yes
Global end of trial date	08 July 2025
Was the trial ended prematurely?	No

Notes:

General information about the trial

Main objective of the trial:

To study the potential protective role of Dapagliflozin on renal disease in patients with Type 2 diabetes and diabetic renal disease. We aim to evaluate in this trial if the combination of Dapagliflozin and Ramipril (an established reno-protective drug) significantly reduces microalbuminuria (a markers of renal damage) as compared to Ramipril alone in patients with type-2 diabetes with preserved renal function and residual albuminuria despite currently available optimal treatments.

Protection of trial subjects:

Patients were free to withdraw from the study at any time without giving a reason. Patients were informed that if they requested to withdraw from the study, at any time during the trial, then this would have no negative consequences. The investigator could also withdraw patients from the trial if they deemed it appropriate for safety or ethical reasons or if it was considered detrimental to the well-being of the patient. Patients who withdrew or were withdrawn underwent a final evaluation at [visit]. Patients who did not complete the study through to [visit], unless removed due to toxicity, could have been replaced.

Full documentation was made of any withdrawals that occurred during the study in the CRF. The Investigator documented the date and time of the withdrawal and results of any assessments made at this time. If the patient withdrew because of an adverse event (AE), or a serious adverse event (SAE) then details were forwarded to the Ethics committee as required. The investigator also forwarded details to King's College University. King's College University forwarded details to the regulatory authorities as appropriate.

Background therapy:

Over a lifetime diabetic nephropathy occurs in approximately 30-35 per cent of type-1 and type-2 diabetic patients. These patients are at heightened risk of premature cardiovascular death and progression to end stage renal disease. Diabetes and in particular diabetic renal disease is characterised by activation of the RAAS. Despite the development and increased use of inhibitors of the RAAS, in recent decades there remains an unmet need for novel treatments to address the growing global burden of diabetic renal disease.

We hypothesise that the increase inhibition of proximal tubule sodium reabsorption and concomitant increased delivery of urinary sodium to the distal nephron induced by SGLT2 inhibitor Dapagliflozin would trigger the RAAS and, in patients treated with ACE-inhibitors or ARB, this would result in an increase in angiotensin-I and II levels. As both angiotensin-I and II are substrates for ACE-2, the combination treatment with Dapagliflozin + ACE-inhibitor (Ramipril) would result in increased ACE-2 activity and excess production of angiotensin 1-9 and 1-7 which will be beneficial as these isoforms have cardiovascular-renal protective effects.

In summary Dapagliflozin treatment may provide cardio-renal benefits by potentiation of RAAS blockade with concomitant production of beneficial/protective RAAS metabolites as well reducing intraglomerular pressure that will aid/confer both renal and vascular protection.

Evidence for comparator: -

Actual start date of recruitment	01 September 2015
Long term follow-up planned	No
Independent data monitoring committee (IDMC) involvement?	No

Notes:

Population of trial subjects

Subjects enrolled per country

Country: Number of subjects enrolled	United Kingdom: 33
Worldwide total number of subjects	33
EEA total number of subjects	33

Notes:

Subjects enrolled per age group

In utero	0
Preterm newborn - gestational age < 37 wk	0
Newborns (0-27 days)	0
Infants and toddlers (28 days-23 months)	0
Children (2-11 years)	0
Adolescents (12-17 years)	0
Adults (18-64 years)	25
From 65 to 84 years	8
85 years and over	0

Subject disposition

Recruitment

Recruitment details: -

Pre-assignment

Screening details: -

Pre-assignment period milestones

Number of subjects started	68 ^[1]
Number of subjects completed	33

Pre-assignment subject non-completion reasons

Reason: Number of subjects	Not meeting inclusion criteria: 34
Reason: Number of subjects	Declined to participate: 1

Notes:

[1] - The number of subjects reported to have started the pre-assignment period are not the same as the worldwide number enrolled in the trial. It is expected that these numbers will be the same.

Justification: we do not count screening participants as enrolled

Period 1

Period 1 title	Overall trial (overall period)
Is this the baseline period?	Yes
Allocation method	Randomised - controlled
Blinding used	Not blinded

Blinding implementation details:

Trial design is prospective randomised parallel group open label trial but all data analyses was performed blinded to group allocation and all patient data was anonymised.

Arms

Are arms mutually exclusive?	Yes
Arm title	Dapagliflozin + Ramipril

Arm description: -

Arm type	Experimental
Investigational medicinal product name	Dapagliflozin and Ramipril
Investigational medicinal product code	
Other name	
Pharmaceutical forms	Film-coated tablet
Routes of administration	Oral use

Dosage and administration details:

Dapagliflozin 10 mg Once daily + Ramipril 10mg Once daily

Arm title	Ramipril only
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Arm description: -

Arm type	Active comparator
Investigational medicinal product name	Ramipril
Investigational medicinal product code	
Other name	
Pharmaceutical forms	Film-coated tablet
Routes of administration	Oral use

Dosage and administration details:

Ramipril 10mg Once daily

Number of subjects in period 1	Dapagliflozin + Ramipril	Ramipril only
Started	17	16
Completed	17	14
Not completed	0	2
Lost to follow-up	-	2

Baseline characteristics

Reporting groups

Reporting group title	Dapagliflozin + Ramipril
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Reporting group description: -

Reporting group title	Ramipril only
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Reporting group description: -

Reporting group values	Dapagliflozin + Ramipril	Ramipril only	Total
Number of subjects	17	16	33
Age categorical Units: Subjects			

Age continuous Units: years arithmetic mean standard deviation	55.5 ± 9.7	60 ± 8.3	-
Gender categorical Units: Subjects			
Female	4	5	9
Male	13	11	24

End points

End points reporting groups

Reporting group title	Dapagliflozin + Ramipril
Reporting group description: -	
Reporting group title	Ramipril only
Reporting group description: -	

Primary: Albumin Excretion Rate (AER)

End point title	Albumin Excretion Rate (AER) ^[1]
End point description:	

End point type	Primary
End point timeframe:	
Baseline	

Notes:

[1] - No statistical analyses have been specified for this primary end point. It is expected there is at least one statistical analysis for each primary end point.

Justification: 'Please see uploaded report

End point values	Dapagliflozin + Ramipril	Ramipril only		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	17	16		
Units: mcg/min				
arithmetic mean (inter-quartile range (Q1-Q3))	35 (27 to 71.1)	108 (72.4 to 316)		

Statistical analyses

No statistical analyses for this end point

Primary: Albumin Excretion Rate (AER)

End point title	Albumin Excretion Rate (AER) ^[2]
End point description:	

End point type	Primary
End point timeframe:	
End of study	

Notes:

[2] - No statistical analyses have been specified for this primary end point. It is expected there is at least one statistical analysis for each primary end point.

Justification: Please see uploaded report

End point values	Dapagliflozin + Ramipril	Ramipril only		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	17	16		
Units: mcg/min				
arithmetic mean (inter-quartile range (Q1-Q3))	17.9 (7.8 to 119.2)	98.8 (42.3 to 184.0)		

Statistical analyses

No statistical analyses for this end point

Primary: Difference in Albumin Excretion Rate (AER)

End point title	Difference in Albumin Excretion Rate (AER) ^{[3][4]}
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End point description:

End point type	Primary
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End point timeframe:

Baseline to 24 Weeks

Notes:

[3] - No statistical analyses have been specified for this primary end point. It is expected there is at least one statistical analysis for each primary end point.

Justification: Please see uploaded report

[4] - The end point is not reporting statistics for all the arms in the baseline period. It is expected all the baseline period arms will be reported on when providing values for an end point on the baseline period.

Justification: Please see uploaded report

End point values	Dapagliflozin + Ramipril			
Subject group type	Reporting group			
Number of subjects analysed	17			
Units: mcg/min				
arithmetic mean (confidence interval 95%)	-0.544 (-1.07 to -0.02)			

Statistical analyses

No statistical analyses for this end point

Adverse events

Adverse events information

Timeframe for reporting adverse events:

Baseline to end of study

Assessment type	Systematic
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Dictionary used

Dictionary name	MedDRA
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Dictionary version	26.1
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Reporting groups

Reporting group title	Dapagliflozin + Ramipril
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Reporting group description: -

Reporting group title	Ramipril only
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Reporting group description: -

Serious adverse events	Dapagliflozin + Ramipril	Ramipril only	
Total subjects affected by serious adverse events			
subjects affected / exposed	3 / 17 (17.65%)	1 / 16 (6.25%)	
number of deaths (all causes)	0	0	
number of deaths resulting from adverse events	0	0	
Eye disorders			
Endophthalmitis after an eye injection			
subjects affected / exposed	1 / 17 (5.88%)	0 / 16 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Right Orbital Inflammatory Syndrome (orbital infection)			
subjects affected / exposed	1 / 17 (5.88%)	0 / 16 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Reproductive system and breast disorders			
Resection of endometrial fibroids			
subjects affected / exposed	1 / 17 (5.88%)	0 / 16 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Respiratory, thoracic and mediastinal disorders			

Hypersensitive airways disease on background of undiagnosed chronic airways disease			
subjects affected / exposed	0 / 17 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	

Frequency threshold for reporting non-serious adverse events: 0 %

Non-serious adverse events	Dapagliflozin + Ramipril	Ramipril only	
Total subjects affected by non-serious adverse events			
subjects affected / exposed	13 / 17 (76.47%)	12 / 16 (75.00%)	
General disorders and administration site conditions			
Weakness; Pedal oedema; Dry mouth; Mild bilateral pretibial oedema			
subjects affected / exposed	3 / 17 (17.65%)	1 / 16 (6.25%)	
occurrences (all)	3	1	
Reproductive system and breast disorders			
Resection of endometrial fibroids			
subjects affected / exposed	1 / 17 (5.88%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Respiratory, thoracic and mediastinal disorders			
Cough; Night cough; Hypersensitive airways disease on background of undiagnosed chronic airways disease			
subjects affected / exposed	2 / 17 (11.76%)	2 / 16 (12.50%)	
occurrences (all)	2	3	
Injury, poisoning and procedural complications			
Fall			
subjects affected / exposed	0 / 17 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Cardiac disorders			
Angina; Palpitations; Atrial fibrillation			
subjects affected / exposed	2 / 17 (11.76%)	1 / 16 (6.25%)	
occurrences (all)	2	1	
Nervous system disorders			

Pins and needles, numbness at his feet; Involuntary movement of four limbs; Diabetic neuropathy subjects affected / exposed occurrences (all)	1 / 17 (5.88%) 1	2 / 16 (12.50%) 3	
Eye disorders Swelling of the face and eyes; Endophthalmitis after an eye injection; Right Orbital Inflammatory Sy subjects affected / exposed occurrences (all)	2 / 17 (11.76%) 2	1 / 16 (6.25%) 1	
Gastrointestinal disorders Diarrhoea, gas, belching; Right upper quadrant pain; constipation; gastritis; gastric polyps; helico subjects affected / exposed occurrences (all)	3 / 17 (17.65%) 4	4 / 16 (25.00%) 7	
Skin and subcutaneous tissue disorders Skin abrasion and rash; Lichen Sclerosus subjects affected / exposed occurrences (all)	2 / 17 (11.76%) 2	1 / 16 (6.25%) 1	
Renal and urinary disorders Urinary frequency exacerbation; Urinary frequency; Macroscopic haematuria; Hyperkalaemia subjects affected / exposed occurrences (all)	2 / 17 (11.76%) 2	3 / 16 (18.75%) 3	
Musculoskeletal and connective tissue disorders Musculoskeletal and connective tissue disorders subjects affected / exposed occurrences (all)	3 / 17 (17.65%) 3	1 / 16 (6.25%) 1	
Infections and infestations Flu; Urinary tract infection; Fungal genital infection; respiratory tract infection; flu-like sympto subjects affected / exposed occurrences (all)	4 / 17 (23.53%) 3	3 / 16 (18.75%) 4	
Metabolism and nutrition disorders Low blood glucose; Hypoglycaemia; Iron deficiency anaemia subjects affected / exposed occurrences (all)	1 / 17 (5.88%) 1	2 / 16 (12.50%) 2	

More information

Substantial protocol amendments (globally)

Were there any global substantial amendments to the protocol? Yes

Date	Amendment
05 January 2016	SA0001: Protocol amended to reflect current practice: Inclusion criteria amended to only require one result for urine albumin creatinine ratio (ACR>3 mg/mmol) and also to allow any anti-diabetic treatment. Patients can now be included if they are on insulin.
21 September 2016	SA0002: In light of the SmPC change exclusion criteria will be update : Patients with a history of DKA or at high risk of DKA (T2DM patients with known low C-peptide (<0.25nmol/l), patients with a history of pancreatitis, patients with conditions that lead to restricted food intake or severe dehydration. Other changes to PIS and Protocol • Urine dipstick analysis (Urinalysis) will be performed at screening visit 1. Protocol pages 10, 18 and 23 Previous wording Urinalysis (Visits 3,5,6 and 7): New Wording Urinalysis (Visits 1,3,5,6 and 7): This is will enable a more recent/up to date status of urine proteinuria/albuminuria status to be documented and to ensure a recent history of albuminuria is available and can be documented. • Clarification that liver function tests will be checked at screening (visit 1). Protocol pages 10, 18 and 23 Previous wording in trial flow chart. Liver function tests (visit 3, 5 and 6): New Wording Liver function tests (visit 1, 3, 5 and 6): The need for a liver function test (LFT) check at screening has been more clearly detailed in trial protocol, description of procedures and related flow chart. Inclusion of local GP practices as patient identification centres (PIC)
01 December 2018	SA0003: Update to RSI and protocol V2 (Includes additional responses to REC queries, updating protocol to V2.1)
26 June 2019	SA0004: Extension of study/ clarification of study end Update to Protocol V3.0
29 August 2019	SA0005: Notification of update RSI to MHRA

Notes:

Interruptions (globally)

Were there any global interruptions to the trial? No

Limitations and caveats

Limitations of the trial such as small numbers of subjects analysed or technical problems leading to unreliable data.

Age group breakdown for trial participants data was not provided in the CSR so a manual calculation was made to provide this information into EudraCT however, there was 1 missing data and an inference was made that they were in the 18-64 category.

Notes: