

Accuracy of glomerular filtration rate (GFR) estimation using creatinine and cystatin C and albuminuria for monitoring disease progression in patients with stage 3 chronic kidney disease: the eGFR-C study

Submission date 26/09/2013	Recruitment status No longer recruiting	☒ Prospectively registered ☒ Protocol
Registration date 08/10/2013	Overall study status Completed	☐ Statistical analysis plan ☒ Results
Last Edited 05/06/2026	Condition category Urological and Genital Diseases	☐ Individual participant data

Plain English summary of protocol

<https://www.journalslibrary.nihr.ac.uk/hta/HYHN1078#plain-language-summary>

Contact information

Type(s)

Scientific

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Additional identifiers

ClinicalTrials.gov (NCT)

NCT02433002

Central Portfolio Management System (CPMS)

15268

Study information

Scientific Title

Accuracy of glomerular filtration rate (GFR) estimation using creatinine and cystatin C and albuminuria for monitoring disease progression in patients with stage 3 chronic kidney disease - prospective longitudinal study in a multi-ethnic population: the eGFR-C study

Acronym

eGFR-C

Study objectives

The eGFR-C study will assess the accuracy of current and alternative tests of kidney function against a reference test in people with moderate (stage 3) chronic kidney disease (CKD).

More details can be found at: <http://public.ukcrn.org.uk/Search/StudyDetail.aspx?StudyID=15268>

More details can be found at: <http://www.nets.nihr.ac.uk/projects/hta/1110301>

Protocol can be found at: <https://www.birmingham.ac.uk/egfrc/documents> (version 4.0 02.02.17)

Ethics approval required

Old ethics approval format

Ethics approval(s)

South East Coast Surrey REC, 09/10/2013, ref 13/LO/1349

Primary study design

Observational

Study design

Observational prospective longitudinal cohort study

Study type(s)

Screening

Health condition(s) or problem(s) studied

Topic: Renal and Urogenital; Subtopic: Renal and Urogenital (all Subtopics); Disease: Renal

Interventions

Main study: 1300 patients. Biological variability study: In a sub-study 20 participants will undergo the reference test four times over four weeks and then exit the study.

Iohexol GFR tests, 1300 participants will undergo baseline (month 0) and final (month 36) reference GFR, estimated GFR (eGFR) and urinary albumin-to-creatinine ratio (ACR) tests. Additionally they will provide ACR and eGFR tests at 6-monthly intervals. A subset of the cohort (n=375) will receive annual reference GFR tests.

Participants will be recruited from hospital clinics and GP practices at six major UK centres.

Participants will undergo reference GFR testing at study entry with a second follow-up reference test three years later. The reference test involves injecting a small amount of iohexol into a vein and taking blood samples over the next 4 hours to see how quickly the iohexol disappears from the blood stream as a result of glomerular filtration. The rate at which iohexol disappears is equivalent to the level of kidney function. Blood tests for monitoring kidney function, including testing for creatinine and cystatin C, and measurement of urinary albumin will be done every six months during the study period. Iohexol measured GFR will be accepted as the reference (gold standard) measure of kidney function against which each GFR-estimating equations will be compared. The alternative estimated measures of GFR, derived from measuring substances (creatinine and cystatin C) in the blood, will be compared against the reference test. An important outcome is how much the reference test changes over the three years of the study, and how well the surrogate measures reflect this change. We will also collect accurate test cost data for subsequent cost-effectiveness analysis (e.g. do the relative costs of the tests justify any change in practice due to improved performance of one test compared to another?).

Follow-up length: 36 months

Intervention Type

Other

Primary outcome(s)

1. To estimate and compare the accuracy and precision of GFR-estimating equations based on the Modification of Diet in Renal Disease (MDRD) equation and three Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equations using either creatinine or cystatin C or a combination of both in people with stage 3 CKD.

2. To estimate the accuracy and precision of the GFR-estimating equations according to ethnic group (particularly Caucasians, African-Caribbean and South-Asian), and baseline diabetes and proteinuria.

Percentage error in eGFR compared to reference GFR. Values will be computed (primary outcome measures 1 and 2) using baseline data for each of the four eGFR equations, and the proportions within 30% (P30) of the reference standard quoted and compared as a measure of accuracy and precision.

3. To evaluate and compare how accurately these GFR-estimating equations reflect change in GFR over three years. Difference in rate of change in eGFR compared to rate of change in reference GFR. Rates of change will be estimated using linear regression and the change per annum and percentage change per annum compared to baseline values will be computed. Large error will be defined as differing by more than 3 mL/min/1.73 m²/year or by 5 percent points per annum.

Key secondary outcome(s)

1. To establish which GFR-estimating equation, together with ACR, or ACR alone, most accurately predicts those people that have progressive loss of kidney function (CKD progression). Progressive loss of kidney function defined as decline in GFR of more than 10 mL/min/1.73 m²/3 years or increase in albuminuria category as defined by Kidney Disease: Improving Global Outcomes (KDIGO).

2. To compare the effectiveness and costs of monitoring strategies for identifying people that have progressive loss of kidney function (CKD progression) utilising different GFR-estimating equations and test schedules, accounting for differences in risk of progression. Measured using Cost per quality-adjusted life-year (QALY).

Sub-study of patterns of disease progression

To estimate and model disease progression (decline in GFR or increase in ACR) according to ethnic group (particularly Caucasians, African-Caribbean and South-Asian), and baseline diabetes and proteinuria. Difference in rate of change in eGFR compared to rate of change in reference GFR based on measurements made every 12 months.

Additional study of intra-individual biological variation

Within-individual (CVI) variation and the critical difference (reference change value, RCV) for reference GFR and the estimated GFR equations.

Completion date

05/06/2021

Eligibility

Key inclusion criteria

1. Male and female, aged 18 years or over
2. Patients with stage 3 CKD (GFR 30-59 mL/min/1.73 m²) as defined internationally, diagnosed using Modification of Diet in Renal Disease/Chronic Kidney Disease Epidemiology Collaboration (MDRD/CKD EPI) eGFR (at least two consecutive test results in this range at least 90 days apart, with the most recent test in the last 12 months)
3. Written informed consent

Participant type(s)

Patient

Healthy volunteers allowed

No

Age group

Mixed

Lower age limit

18 Years

Upper age limit

100 Years

Sex

All

Total final enrolment

0

Key exclusion criteria

1. History of untoward reactions to iodinated contrast media or allergy to topical iodine
2. Episode of acute kidney injury in previous 6 months (as defined by the Acute Kidney Injury Network criteria)
3. Amputation of whole or part limb
4. Pregnant or breastfeeding

5. Known alcohol or drug abuse
6. Any clinical condition with an expected survival of less than study duration
7. Inability to comply with study schedule and follow-up
8. Inability to provide informed consent e.g. due to cognitive impairment

Date of first enrolment

01/02/2014

Date of final enrolment

25/01/2017

Locations

Countries of recruitment

United Kingdom

England

Study participating centre

Birmingham Clinical Trials Unit

Public Health Building

University of Birmingham

Birmingham

England

B15 2TT

Sponsor information

Organisation

University of Birmingham (UK)

ROR

<https://ror.org/03angcq70>

Funder(s)

Funder type

Government

Funder Name

Health Technology Assessment Programme

Alternative Name(s)

NIHR Health Technology Assessment Programme, Health Technology Assessment (HTA), HTA

Funding Body Type

Government organisation

Funding Body Subtype

National government

Location

United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan**IPD sharing plan summary**

Not provided at time of registration

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		01/08/2019	10/08/2020	Yes	No
Results article		01/07/2024	29/07/2024	Yes	No
Protocol article		14/01/2014		Yes	No
Abstract results	Year three results	19/03/2026	31/03/2026	No	No
HRA research summary			28/06/2023	No	No
Study website	Study website	11/11/2025	11/11/2025	No	Yes