

# Cytokine removal in kidney transplantation

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<b>Registration date</b> 06/02/2024	<b>Overall study status</b> Ongoing	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 16/12/2025	<b>Condition category</b> Surgery	<input type="checkbox"/> Individual participant data <input checked="" type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

When kidneys are removed from an organ donor they are normally stored on ice until they are ready to be transplanted. A kidney can be preserved safely at a low temperature in these conditions. However, there is some degree of deterioration and the longer the kidney is left in this condition the more it deteriorates.

We have developed a technique that may improve the quality of the kidney. This involves placing the kidney on a machine and passing a warmed, oxygen-rich solution containing red blood cells through it. This is called warm perfusion. Under these conditions the kidney can start to function again and produce urine.

We have trialled warm perfusion in kidney transplantation with no adverse effects. From our research we know that whilst being perfused, kidneys release cells that cause inflammation. In a small number of patients, we want to test whether adding a specialised filter to the machine has any beneficial effects. The filter may be able to remove the molecules that cause inflammation and so improve the condition of the kidney. The results of this small study may be used to design a larger clinical trial to test the use of the filter in warm perfusion in a larger number of patients.

### Who can participate?

You are able to participate if you are aged over 18 years, are on renal replacement treatment (dialysis) and are on the waiting list for a first or second kidney transplant in the East of England. You are unable to participate if you are younger than 18 years, are pre-dialysis, are receiving a third or subsequent kidney transplant, or are receiving a kidney along with another organ (e.g. dual kidney transplant, simultaneous pancreas-kidney transplant). We are unfortunately unable to facilitate participation for patients waitlisted outside the East of England region.

### What does the study involve?

You will be prepared for surgery in the normal way. Standard care involves keeping the transplant kidney under cold storage in ice until the time of the transplant operation.

If you consent to take part in this trial then the transplant kidney will be taken out of ice and will undergo warm perfusion. It will be placed on a machine and warmed with an oxygenated blood-based solution before it is transplanted. Kidneys that are perfused will be randomly assigned to one of two groups. In one group a special filter will be added to the perfusion circuit to reduce the risk of inflammation. In the other group the kidney will be perfused without the special filter in the circuit. These treatments are not part of standard care.

Should there be any problem with the warm perfusion procedure then the kidney can be quickly

removed from the perfusion machine and returned to cold storage in ice before transplantation. While you are still in surgery we will take a small tissue biopsy from the kidney after transplantation. Although there is a small risk of causing bleeding from the kidney biopsy site (less than 5%) your surgeon will be able to repair the bleeding site if this happens. Genetic analysis will be carried out on the biopsy tissue from the transplanted kidney. The analysis will look at the expression of genes involved in inflammation. The results of this genetic analysis will not be fed back to you.

If you take part in the study you will be asked to provide a few additional blood and urine samples for analysis. Blood and urine samples will be taken at the start of surgery and then at 2 and 5 days after transplant. The samples are needed to measure levels of inflammation in your body before and after transplantation. This is to test whether adding a filter into the circuit during warm perfusion can reduce the inflammatory response and reduce injury.

Follow-up after transplant will follow normal standard care which usually involves clinic visits at least twice a week for six weeks and then weekly for a further six weeks.

The data collected from the study will be stored in a secure database. Tissue, blood and urine samples will be stored within secured laboratories only accessed by the transplant research team. Samples will only be transferred outside the research site in a pseudonymised format (with identifiable information removed) and will only be analysed at labs within the UK. Once the samples have been analysed, they will be disposed of as per Human Tissue Authority guidance.

What are the possible benefits and risks of participating?

This study is being performed to test whether the specialised filter added during warm perfusion can improve the condition of the kidney. The first step is to assess whether this is practical before carrying out a larger trial. We cannot guarantee that this will improve the outcome of your kidney transplant but it will help us to improve future techniques of kidney preservation. This may enable us to transplant more kidneys in the future.

There are no potential side effects to you. This technique of warm perfusion is applied to the kidney only, before it is transplanted. There is a small risk that the kidney might be damaged during the assessment and therefore could not be transplanted. This has not happened in our experience of 200 cases so far but it remains a potential risk.

Where is the study run from?

The research is being organised by the Transplant Research Team, Department of Surgery, University of Cambridge and carried out at the Addenbrooke's Transplant Unit, Cambridge University Hospitals NHS Foundation Trust (UK)

When is the study starting and how long is it expected to run for?

December 2022 to April 2027

Who is funding the study?

National Institute for Health and Care Research (NIHR) (UK)

Who is the main contact?

Dr Sarah Hosgood, sh744@cam.ac.uk

## Contact information

**Type(s)**

Public, Scientific, Principal investigator

**Contact name**

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**Additional identifiers**

**Integrated Research Application System (IRAS)**

322728

**Study information**

**Scientific Title**

A randomised pilot study to assess the safety and feasibility of adding a Cytosorb filter during kidney normothermic machine perfusion.

**Study objectives**

It is hypothesised that adding a Cytosorb filter to the circuit during ex-vivo normothermic machine perfusion of human deceased-donor kidneys prior to transplantation, will reduce the inflammatory and immune response in the kidney after transplantation.

**Ethics approval required**

Ethics approval required

## **Ethics approval(s)**

1. approved 28/07/2023, HRA Ethics Committee (Health Research Authority, 2 Redman Place, Stratford, London, E20 1JQ, United Kingdom; +44 207 104 8000; approvals@hra.nhs.uk), ref: IRAS 322728

2. approved 23/05/2023, NHSBT RINTAG (500 North Bristol Park, Filton, Bristol, BS34 7QH, United Kingdom; +44 300 123 23 23; Lucy.Roberts2@nhsbt.nhs.uk), ref: Study 148

## **Study design**

Interventional Phase I (safety and feasibility) randomized pilot study

## **Primary study design**

Interventional

## **Study type(s)**

Efficacy, Safety, Treatment

## **Health condition(s) or problem(s) studied**

Kidney transplantation from deceased donors.

## **Interventions**

Prospective kidney transplant recipients on the waiting list at a single centre (Cambridge University Hospitals NHS Foundation Trust), who are eligible to participate in this study, will be approached for consent. A total sample size of 20 patients will be recruited.

Consenting participants will be randomised in a 1:1 ratio, to each of the two study groups:

1. Normothermic machine perfusion (NMP)
2. Normothermic machine perfusion with a Cytosorb filter (NMP+C)

Randomisation will be performed after the transplant recipient and kidney have both arrived in the transplant centre and a final decision to proceed with transplantation has been made. The randomisation will be performed by an independent company that will use a sealed envelope system created using a computer-generated randomisation sequence. The patients and doctors caring for the patients after surgery will be blinded to the groups.

The intervention will be 6 hours and follow-up will be 3 months post-transplant.

## **Intervention Type**

Device

## **Phase**

Phase I

## **Drug/device/biological/vaccine name(s)**

Cytosorb filter

## **Primary outcome(s)**

Inflammatory and immune gene expression measured in cortical biopsy from the kidney 60 minutes post-transplant

## **Key secondary outcome(s)**

1. Rates of delayed graft function, defined as the requirement for dialysis in the first 7 days post-transplant
2. Duration of delayed graft function, measured from the first to the last episode of dialysis post-transplant
3. Incidence of primary non function, defined as a non-functioning graft up to 3 months post-transplant
4. Graft function at 3 months post-transplant measured by levels of serum creatinine and estimated glomerular filtration rate (eGFR)
5. Incidences of biopsy-proven rejection measured by histopathology up to 3 months post-transplant
6. Complications (infection, re-operation due to bleeding) recorded up to 3 months post-transplant
7. The length of hospital stay post-transplant
8. Levels of inflammation/immune and injury markers measured in the perfusate and urine collected from the kidney during NMP (pre, 2, 4 and 6 h). Samples will be analysed using ELISA techniques
9. Isolation of peripheral blood mononuclear cells blood samples collected pre-transplant and on day 1 and day 5 post-transplant
10. Biomarkers of kidney injury measured by ELISA using plasma samples collected from the patients on day 1 and day 5 post-transplant

**Completion date**

30/04/2027

## Eligibility

**Key inclusion criteria**

Current inclusion criteria as of 17/06/2025:

1. Patients receiving a kidney from donation after brain death (DBD) and/or donation after circulatory death (DCD) donor  $\geq 50$  years
2. Transplant recipients aged  $\geq 18$  years
3. Patients undergoing a 1st or 2nd kidney transplant
4. Patients who have given written informed consent

Previous inclusion criteria:

1. Patients receiving a kidney from donation after brain death (DBD) and/or donation after circulatory death (DCD) donor  $\geq 50$  years
2. Transplant recipients aged  $\geq 18$  years
3. Patients undergoing a 1st or 2nd kidney transplant
4. Patients who have given written informed consent
5. Patients who are receiving renal replacement therapy

**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**

Current exclusion criteria as of 17/06/2025:

1. Patient receiving a kidney from DCD and DBD donor <50 years old
2. Patients receiving a 3rd or subsequent kidney transplant
3. Patients receiving multi-organ transplants e.g. simultaneous pancreas-kidney transplantation
4. Patients receiving dual kidney transplants
5. Paediatric en-bloc kidney transplants
6. Kidneys with complex vascular anatomy

Previous exclusion criteria:

1. Patient receiving a kidney from DCD and DBD donor <50 years old
2. Patients receiving a 3rd or subsequent kidney transplant
3. Patients receiving multi-organ transplants e.g. simultaneous pancreas-kidney transplantation
4. Patients receiving dual kidney transplants
5. Paediatric en-bloc kidney transplants
6. Patients that are pre-dialysis
7. Kidneys with complex vascular anatomy

**Date of first enrolment**

01/01/2025

**Date of final enrolment**

31/10/2026

**Locations****Countries of recruitment**

United Kingdom

England

**Study participating centre**

**Addenbrookes**

Addenbrookes Hospital

Hills Road

Cambridge  
England  
CB2 0QQ

## Sponsor information

### Organisation

University of Cambridge

### ROR

<https://ror.org/013meh722>

### Organisation

Cambridge University Hospitals NHS Foundation Trust

### ROR

<https://ror.org/04v54gj93>

## Funder(s)

### Funder type

Government

### Funder Name

National Institute for Health and Care Research

### Alternative Name(s)

National Institute for Health Research, NIHR Research, NIHRresearch, NIHR - National Institute for Health Research, NIHR (The National Institute for Health and Care Research), NIHR

### 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**

Data sharing statement to be made available at a later date