

# Remote Post-Conditioning (RPC) in renal transplantation

<b>Submission date</b> 02/08/2011	<b>Recruitment status</b> No longer recruiting	<input type="checkbox"/> Prospectively registered
		<input type="checkbox"/> Protocol
<b>Registration date</b> 19/09/2011	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan
		<input checked="" type="checkbox"/> Results
<b>Last Edited</b> 29/01/2018	<b>Condition category</b> Urological and Genital Diseases	<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

In end-stage renal failure the usual functions of the kidney stop working. A kidney transplant is the best treatment, but it is important to find ways in which we can improve kidney function and prolong the survival of the transplanted kidney. Immediately after transplantation there is unavoidable inflammation that can reduce kidney function. This is influenced by many factors but could be reduced by using new techniques that directly target this response. The aim of this study is to find out whether a technique called remote postconditioning (RPC) can improve the function of the kidney after transplantation. Remote postconditioning (RPC) is a simple technique that activates the body's natural defences, rather like warming up before exercising to prevent injury. We can use this to target the inflammatory response in the kidney after transplantation. The treatment involves restricting the blood flow to the leg during surgery to convey the protective effect to the transplanted kidney. We do this by inflating a blood pressure cuff placed around the lower leg in short sequenced cycles to restrict the blood flow.

### Who can participate?

Patients aged 18 or over receiving a kidney transplant.

### What does the study involve?

To determine whether RPC improves kidney function after transplantation participants are randomly allocated into one of the two groups. One group undergoes the RPC procedure, in which a blood pressure cuff is inflated to restrict the blood flow to the leg while the patient is under general anaesthetic during the transplant operation. For the other group the blood pressure cuff is inflated but not enough to restrict the blood flow to the leg. After transplantation participants receive the normal treatment and care associated with receiving a kidney transplant and the surgery will not be altered in any way, regardless of the group that the patient is in. In addition to normal tests to assess kidney function, various other tests will be used to measure the effects of RPC. During surgery a flow monitor is used to monitor the blood flow into the kidney immediately after transplantation. This is removed before the end of the operation and does not prolong the operation in any way. Blood samples are taken to measure kidney function. Extra samples are also collected to measure the inflammatory response. Many of these are obtained at the same time as routine sampling to limit the number of times that patients are asked to give a sample. If possible, samples of urine are also collected to measure

the level of kidney injury. Biopsies (samples) of the kidney are taken at various times after transplantation to determine injury and recovery and are part of normal practice. A small amount of extra tissue is taken during the biopsy for later analysis. Two extra samples will also be taken 30 minutes after transplantation and then within the first 3 days. Participants are also required to attend the normal clinic visits at weekly intervals for the first month after transplantation, then at 1, 2 and 3 months for routine patient assessment.

What are the possible benefits and risks of participating?

Participants will experience no additional effects to their lifestyles, other than that which is expected following transplantation. There are no long-term risks associated with RPC. The procedure causes a brief absence of circulation to the lower leg which can cause some discomfort but this is quickly reversed after completion. However, as the study will be performed while the patient is under general anaesthetic, no discomfort will be felt. This technique has been used in other studies with the blood pressure cuff being applied to the either the upper arm or leg and is known to cause no lasting harm or symptoms. The kidney biopsy procedure is of low risk but complications such as bleeding can occur in a small number of cases (5-8%).

Where is the study run from?

University Hospitals of Leicester NHS Trust Leicester General Hospital (UK).

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

August 2011 to August 2014.

Who is funding the study?

University Hospitals of Leicester NHS Trust and University of Leicester (UK)

Who is the main contact?

Sarah Hosgood  
sah76@le.ac.uk

## Contact information

### Type(s)

Scientific

### Contact name

Prof Michael Nicholson

### Contact details

Transplant Group  
University of Leicester  
Leicester General Hospital  
Leicester  
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LE5 4PW

## Additional identifiers

Protocol serial number

## Study information

### Scientific Title

A double-blinded randomised controlled trial of Remote Post-Conditioning in renal transplantation

### Acronym

RPC

### Study objectives

Remote Post-Conditioning (RPC) can improve post transplant function and graft survival in renal transplant recipients

### Ethics approval required

Old ethics approval format

### Ethics approval(s)

National Research Ethics Service East Midlands, Leicester, 06/05/2010, ref: 11/EM/0130

### Study design

Double-blinded randomised controlled trial

### Primary study design

Interventional

### Study type(s)

Treatment

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

Kidney injury after transplantation

### Interventions

Patients will be randomised to either receive RPC during transplantation or the standard transplant with sham procedure

### Intervention Type

Procedure/Surgery

### Primary outcome(s)

Live donor:

1. Slow graft function measured by creatinine fall in the first 24 hours and Area under the curve (AUC) serum creatinine over the first 7 days post transplant
2. Graft function rates: incidences of delayed graft function and primary non-function
3. Glomerular filtration rate (eGFR) and serum creatinine levels: 1 and 3 months
4. Graft survival
5. Patient survival
6. Episodes of rejection within the first 3 months (cell and antibody mediated)

Deceased donor:

1. Slow graft function measured by creatinine fall in the first 24 hours and Area under the curve (AUC) serum creatinine over the first 7 days post transplant
2. Graft function; incidences of delayed graft function and primary non-function
3. Glomerular filtration rate (eGFR) and serum creatinine levels: 1 and 3 months
4. Graft survival
5. Patient survival
6. Episodes of rejection within the first 3 months (cell and antibody mediated)

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

Live and deceased donor:

In addition, we wish to further understand the mechanisms by which remote postconditioning (RPC) conveys its protective actions.

1. The renal blood flow into the kidney in the immediate post transplant phase will be measured using a Doppler flow probe. The renal vascular resistance will be calculated from the kidney weight and renal arterial blood flow
2. Mediators of RPC: Nitric oxide levels and adenosine levels determined by ELISA using plasma samples taken from the renal vein 30 minutes after reperfusion and from peripheral venous samples (see blood sample protocol)
3. Markers of ischaemic injury: Neutrophil gelatinase-associated lipocalin (NGAL)- small protein that is increased with ischaemic injury, KIM-1, Oxidative damage (protein carbonyl, Lipid peroxidation, DNA damage), Inflammation; levels of cytokines (IL-1, IL-6, IL-8, IL-10, TNF- $\alpha$ ), determined using plasma and urine samples
4. Measure the level of repair: Determination of up and down regulated genes using gene array analysis in renal biopsies. The presence of genes such as those involved in apoptosis (anti-apoptotic Bcl-2), Protection [Hemeoxygenase-1 (HO-1) and Heat shock protein (HSP)] and fibrosis will be validated by RT-PCR.
5. Histological changes: Biopsies will be stained with H&E for histological scoring, immunohistochemistry techniques to determine injury and Sirius red (an extracellular matrix stain) to measure interstitial fibrosis

### **Completion date**

21/08/2014

## **Eligibility**

### **Key inclusion criteria**

1. Age greater than or equal to 18 years
2. Patients receiving a primary or secondary renal allograft from a live or donation after Brain Stem Death (DBD donor)
3. Patients with second transplants must have maintained their primary graft for at least six months after transplantation (with the exception of graft failure due to technical reasons)
4. Signed written informed consent

### **Participant type(s)**

Patient

### **Healthy volunteers allowed**

No

**Age group**

Adult

**Lower age limit**

18 years

**Sex**

All

**Key exclusion criteria**

1. Blood type ABO incompatible live donor transplants
2. Donation after cardiac death donors
3. Patients with severe peripheral vascular disease
4. Patients on ATP-sensitive potassium channel opening or blocking drugs

**Date of first enrolment**

21/08/2011

**Date of final enrolment**

21/08/2014

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

United Kingdom

England

**Study participating centre**

Leicester General Hospital

Leicester

United Kingdom

LE5 4PW

**Sponsor information****Organisation**

University of Leicester (UK)

**ROR**

<https://ror.org/04h699437>

**Funder(s)**

**Funder type**

University/education

**Funder Name**

University Hospitals of Leicester NHS Trust (UK)

**Funder Name**

University of Leicester (UK)

**Alternative Name(s)**

UniofLeicester, UoL

**Funding Body Type**

Private sector organisation

**Funding Body Subtype**

Universities (academic only)

**Location**

United Kingdom

## Results and Publications

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

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Results article</a>	results	01/08/2015		Yes	No
<a href="#">Participant information sheet</a>	Participant information sheet	11/11/2025	11/11/2025	No	Yes