

# The role of MRI in heart attacks with normal heart arteries

<b>Submission date</b> 31/01/2019	<b>Recruitment status</b> No longer recruiting	<input type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
<b>Registration date</b> 06/02/2019	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 10/02/2020	<b>Condition category</b> Circulatory System	<input type="checkbox"/> Individual participant data <input type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

90% of heart attacks are caused by blocked or narrowed heart arteries. However up to 10% of patients do not have a primary problem with their heart arteries. These patients are now classified as having 'MINOCA' (myocardial infarction with non-obstructive coronary arteries). These patients were thought to be low risk and were often discharged with no treatment or follow up. However, they have a 12-month mortality approaching 5%. The majority of these patients have one of three conditions: inflammation of the heart (myocarditis), stress cardiomyopathy (takotsubo cardiomyopathy) or a missed heart attack. Cardiac MRI is very good at identifying between these causes. There is a link between the heart and brain and this is a very 'hot topic' in cardiology at the moment. It has been shown in small, retrospective studies that patients who have stress cardiomyopathy have certain structural and functional differences in their brain compared to people who do not develop this condition in response to stress. In this study functional brain MRI is performed at the time of cardiac MRI to study this prospectively for the first time. The aims are to improve the diagnostic pathway of patients with MINOCA compared to standard practice, and to acquire pilot data showing structural and functional brain differences in patients with stress cardiomyopathy.

### Who can participate?

Patients of any gender between the ages of 18 and 80 who present to the Bristol Heart Institute with MINOCA, and control patients of any gender between 18 and 80 who present to the Bristol Heart Institute with a myocardial infarction with obstructive coronary artery disease.

### What does the study involve?

The study involves four 'visits'. The first visit is as an inpatient and involves multiple questionnaires, a brain and heart MRI scan. The second visit is at 4-6 weeks and involves a heart tracing, blood test, heart MRI scan and ultrasound of the heart. The third visit is at 6 months and involves questionnaires, heart racing, heart and brain MRI, ultrasound of the heart and blood tests. The final visit is a phone call at 12 months to see how the participants are doing. The study is the same for the control patients excluding the second visit.

### What are the possible benefits and risks of participating?

There may be no direct benefit to patients from participating in this study. However, it will

hopefully improve care for similar patients in the future. The main risks from participating in this study is the chance of finding 'incidental' abnormal findings on heart and brain imaging. If this is the case this information and recommendations are passed onto the participant's GP or cardiologist for further action.

Where is the study run from?  
Bristol Heart Institute (UK)

When is the study starting and how long is it expected to run for?  
February 2018 to January 2021

Who is funding the study?  
The James Tudor Foundation

Who is the main contact?  
Dr Matthew Williams  
MINOCA@uhbristol.nhs.uk

## Contact information

**Type(s)**  
Scientific

**Contact name**  
Dr Matthew Williams

**Contact details**  
Cardiac MRI Unit (C502)  
Level 5 Bristol Heart Institute  
Upper Maudlin Street  
Bristol  
United Kingdom  
BS2 8HW  
+44 (0)117 342 5888  
MINOCA@uhbristol.nhs.uk

## Additional identifiers

**Protocol serial number**  
2018/2138

## Study information

**Scientific Title**  
The Incremental role of MRI in myocardial infarction with non-obstructive coronary arteries

**Acronym**  
MINOCA

**Study objectives**

90% of heart attacks are caused by blocked or narrowed heart arteries. However up to 10% of patients do not have a primary problem with their heart arteries. These patients are now classified as having 'MINOCA' (myocardial infarction with non-obstructive coronary arteries). These patients were thought to be low risk and were often discharged with no treatment or follow up. However, they have a 12-month mortality approaching 5%. The majority of these patients have one of three conditions: inflammation of the heart (myocarditis), stress cardiomyopathy (takotsubo cardiomyopathy) or a missed heart attack. Cardiac MRI is very good at identifying between these causes.

There is a link between the heart and brain and this is a very 'hot topic' in cardiology at the moment. It has been shown in small, retrospective studies that patients who have stress cardiomyopathy have certain structural and functional differences in their brain compared to people who do not develop this condition in response to stress. As an additional sub-study we will be performing functional brain MRI at the time of cardiac MRI in our participants to study this prospectively for the first time.

The aims of this study are:

1. To improve the diagnostic pathway of patients with MINOCA compared to standard practice.
2. To acquire pilot data showing structural and functional brain differences in patients with stress cardiomyopathy.

### **Ethics approval required**

Old ethics approval format

### **Ethics approval(s)**

South Central - Hampshire B Research Ethics Committee, Level 3 Block B, Whitefriars, Lewins Mead, Bristol

BS1 2NT, Tel: +44 (0)207 104 8052, Email: nrescommittee.southcentral-hampshireb@nhs.net, 21/08/2018, ref: 18/SC/0380

### **Study design**

Prospective observational case-control study

### **Primary study design**

Observational

### **Study type(s)**

Diagnostic

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

Myocardial Infarction with Obstructive Coronary Arteries (MINOCA)

### **Interventions**

Patients undergo sequential echo, cardiac and brain MRI scanning, blood tests and psychological testing as an inpatient at 6 weeks and at 6 months. The trialists will look for changes in clinician's diagnosis before and after cardiac MRI and the psychological, anatomical and functional differences between patients with takotsubo cardiomyopathy and control patients. This will help tailor treatments to each patient and improve patient experience and outcomes.

### **Intervention Type**

Other

## **Primary outcome(s)**

Change in clinical diagnosis or change in clinical management measured via questionnaire at baseline

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

1. CMR mechanistics (LV function/volumes, presence and amount of oedema, native T1/T2 values, speckle tracking values, late gadolinium presence and pattern) measured at baseline, 6 weeks and 6 months
2. Differences in structural or resting functional brain MRI parameters in MINOCA patients compared to controls, measured at baseline and 6 months
3. All-cause mortality, cardiovascular readmissions (myocardial infarction, angina, heart failure, stroke), measured at 12 months

## **Completion date**

31/01/2021

# **Eligibility**

## **Key inclusion criteria**

Current participant inclusion criteria as of 10/02/2020:

1. Aged 18 to 80 years
2. Meets the ESC universal definition of myocardial infarction
3. <50% epicardial coronary artery stenosis on invasive or CT coronary angiography in any potential infarct-related territory
4. No other clinically overt specific cause for the acute presentation at the time of angiography
5. Written informed consent

Previous participant inclusion criteria:

1. Age 18-75 years
2. They meet the ESC universal definition of myocardial infarction
3. <50% epicardial coronary artery stenosis on invasive or CT coronary angiography in any potential infarct related territory
4. No other clinically overt specific cause for the acute presentation at the time of angiography
5. Written informed consent

## **Participant type(s)**

Patient

## **Healthy volunteers allowed**

No

## **Age group**

Adult

## **Lower age limit**

18 years

## **Upper age limit**

80 years

## **Sex**

All

## **Key exclusion criteria**

Current participant exclusion criteria as of 10/02/2020:

1. Invasive or CT coronary angiography not performed or not diagnostic
2. Contraindications to MRI
3. Pregnant or breastfeeding
4. Prisoners
5. Unable to meet the follow-up requirements.
6. Timing of the initial CMR of >2 weeks after presentation
7. Previous CABG (coronary artery bypass graft)

Previous participant exclusion criteria:

1. Invasive or CT coronary angiography not performed or not diagnostic
2. Contraindications to MRI
3. Pregnancy or breastfeeding
4. Prisoners
5. Patients unable to meet the follow up requirements.
6. Timing of the initial CMR of >2 weeks after presentation

## **Date of first enrolment**

31/01/2019

## **Date of final enrolment**

31/01/2020

## **Locations**

### **Countries of recruitment**

United Kingdom

England

### **Study participating centre**

#### **Bristol Heart Institute**

Cardiac MRI Unit (C502)

Upper Maudlin Street

Bristol

United Kingdom

BS2 8HW

## **Sponsor information**

### **Organisation**

University of Bristol

ROR

<https://ror.org/0524sp257>

## Funder(s)

### Funder type

Charity

### Funder Name

James Tudor Foundation

## Results and Publications

### Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study are/will be available upon request from the chief or primary investigators. Data will not be made available for sharing until after publication of the main results of the study. Thereafter, anonymised individual patient data will be made available for secondary research, conditional on assurance from the secondary researcher that the proposed use of the data is compliant with the MRC Policy on Data Preservation and Sharing regarding scientific quality, ethical requirements and value for money. A minimum requirement with respect to scientific quality will be a publicly available pre-specified protocol describing the purpose, methods and analysis of the secondary research, e.g. a protocol for a Cochrane systematic review. The second file containing patient identifiers would be made available for record linkage or a similar purpose, subject to confirmation that the secondary research protocol has been approved by a UK REC or other similar, approved ethics review body. Contact details will be made available at the end of the study. Patients have been consented for the use of their anonymised data in future studies.

### IPD sharing plan summary

Available on request

### Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">HRA research summary</a>			26/07/2023	No	No