

***Participant Information Sheet***

Study title:

**When Are Blood Vessels “Ready to Rupture”? Cerebrovascular Health Following Spinal Cord Injury(ERN\_ 19-1574PA4)**

**An invitation to take part:**

Thank you for taking the time to read this leaflet. We would like to invite you to take part in this study. Before you decide if you want to participate or not, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully and discuss it with friends or relatives, if you wish. Please ask us if there is anything that is not clear or if you would like more information.

1. **What is the purpose of this study?**

This study is investigating the effects of spinal cord injury (SCI) on brain health. Individuals with cervical and upper-thoracic SCI commonly experience transient episodes of high and low blood pressure as a consequence of their injury. Essentially, the automatic control of the heart and blood vessels (achieved via the autonomic nervous system) is disrupted below the level of SCI, resulting in erratic blood pressure fluctuations over a twenty-four-hour period. In the general population, sustained high (hypertension) and low (hypotension) blood pressure has been linked with changes in blood supply to the brain, associated with an increased risk of stroke and cognitive dysfunction. We do not currently understand whether temporary episodes of high blood pressure (a condition called autonomic dysreflexia) or low blood pressure (orthostatic hypotension, triggered by a change in posture) experienced frequently by individuals with SCI result in similar alterations in brain health. The purpose of this study is to compare brain health (e.g., brain blood flow and cognitive functioning) between individuals with unstable blood pressure (**Group 1:** SCI and a history of unstable blood pressure) and control participants (**Group 2:** Age- and sex-matched, healthy, able-bodied individuals). **Specifically, we are looking for control group volunteers who match our already recruited individuals with SCI.**

1. **Why have I been chosen?**

You have been chosen because you are:

* Aged between 18-65 years old
* Have no history of cardiovascular, respiratory, metabolic or neurological disease
* Have no history of severe cognitive impairment
* Have no clinical diagnosis of depression (confounder of cognition)
* Have not sustained a traumatic brain injury at any point in your life
1. **Do I have to take part?**

No. Taking part in this study is entirely voluntary. If you would like to participate, you will be given this information sheet to keep and be asked to sign a consent form, but you are still free to withdraw at any time and without giving a reason. You should feel under no pressure to participate and if at any time you are asked questions that you are not comfortable with answering (e.g., those asked in the General Health Questionnaire) you are free to not disclose this information. Though please do bear in mind that all information collected will be kept strictly confidential. However, if you do decide to withdrawal, any data collected relating to you will only be retained following your consent at the time of withdrawal.

1. **What will happen to me if I agree to take part?**

You will be invited to complete a general health and physical activity questionnaire as part of the screening procedure for the study and asked to sign a consent form. You are encouraged to ask questions prior to and throughout the study protocol if there is anything you do not understand or feel uncomfortable with. Following provision of informed consent and providing the information provided in the questionnaires does not exclude you from the study, your participation in the study starts and you will be booked in for your data collection trial, to take place no less than 48 hours after the screening has been completed. If you do not meet our eligibility criteria, you will take no further part in the study and any information collected about you so far will be destroyed.

1. **What do I have to do for the measurements made during the experimental visit?**

The total time demand will be approximately 3 hours and involves one visit to the University of Birmingham. We will also ask you to wear a 24-hour ambulatory blood pressure monitor following your visit, which will be collected by a member of the research team. Please note that prior to the experimental laboratory visit, you will be asked to complete a questionnaire relating to symptoms of COVID-19.

*Before the experimental visit*

You will be asked to attend the lab following a 4-hour fast. You will also be asked to refrain from vigorous exercise and the consumption of alcohol and caffeine for 24 hours prior to testing, as well as have a full night’s sleep prior to your testing session. You are advised to drink approximately 0.5 litres of water within 4 hours of beginning testing and 0.25 litres of water within 15 minutes of testing in order to ensure adequate hydration.

Visit #1

This session will involve several assessments to evaluate your blood pressure, heart rate and blood flow to the brain. Firstly, you will be given two questionnaires relating to depressive symptoms and physical activity. A verbal cognitive test battery will be administered in a well-lit room by an experienced examiner. You will then be transferred on to a tilt table and fitted with two blood pressure monitors (one on the arm and one on the finger). A headset with ultrasound probes will also be placed on your head to measure blood flow in your brain. These blood pressure measurements will be performed continuously while you are lying down for 10 minutes and also during a tilt test, where you will be gradually tilted into an upright position which is maintained for 20 minutes.

*After the experimental visit*

Following the assessments, you will be fitted with a 24-hour blood pressure monitor, which you will be required to wear for 24 hours. You will also be given a journal to record various daily activities while wearing the monitoring device. The purpose of the journal is to justify sudden spikes and drops in the blood pressure readings.

**Details of measures obtained**

* **Brain blood flow using transcranial Doppler:** Blood flow in major arteries supplying the brain will be assessed by transcranial Doppler. This consists of placing an ultrasound probe in the area above the cheekbone. A small amount of ultrasound gel will be placed between the probe and your skin to obtain the highest quality images. The probe is fixed in place using an adjustable headband.
* **Heart rate:** This will be monitored using an electrocardiogram via electrodes placed on your chest.
* **Blood pressure:** This will be monitored periodically via an automated blood pressure monitor using a cuff placed around your upper arm. While strapped to the tilt table, continuous blood pressure will be monitored via a cuff placed around your middle finger.
* **Cognitive functioning:** Seven cognitive assessments will be verbally delivered by an experienced examiner looking at different cognitive domains (i.e., working memory, attention, processing speed and executive functioning).
* **Questionnaires:** Short questionnaires evaluating physical activity levels, symptoms of depression and symptoms relating to COVID-19.

**6. What are the possible disadvantages and risks of taking part?**

Performing a head-up tilt test carries the following risks that we feel you should be made aware of, as well as some of the things we are doing to minimise these risks:

* Fainting – during the orthostatic challenge (i.e., the head up tilt), you might experience orthostatic hypotension, which is associated with light-headedness. In the event of fainting during the head up tilt, the investigator will return you to the supine position. If consciousness does not return within a few seconds (as would be expected following a fainting episode), medical assistance will be sought. Orthostatic hypotension in able-bodied individuals is unlikely, as many times throughout the day you will stand for longer than 20 minutes without losing consciousness.

Trained investigators will supervise these head up tilt tests, and there will be at least one CPR-certified investigator with automated external defibrillator (AED) training present during testing (the AED is located in the corridor outside where the testing will take place). If at any time during the test you want to stop, you can signal as instructed and the test will be stopped. Investigators will observe you carefully throughout the study and you are encouraged to notify an investigator immediately if you have any worrisome symptoms in addition to those symptoms described above.

* Pins and needles – The inflation of the blood pressure cuffs on your upper arm and finger can result in a tingling sensation, similar to ‘pins and needles’. These symptoms will quickly subside once the cuff is deflated. If this discomfort becomes excessive, you will be able to ask for the cuff to be deflated prematurely.
* Negative emotions when completing the depression questionnaire – You might find completing questions relating to your mood stressful. If you are worried about any aspect of your physical or mental health then we advise you contact your doctor or relevant healthcare practitioner. In addition, below is contact information for UK organisations that provides emotional support for people experiencing distress.

*The Samaritans (UK) – general mental health support, including suicidal and other distressing thoughts*

<https://www.samaritans.org/>

*MIND (UK) – mental health and COVID-19 mental health support*

<https://www.mind.org.uk/>

If you are a member of staff or a student at the University of Birmingham you can access the following wellbeing services:

*Your wellbeing – links to support services, self-help guides and apps*

<https://intranet.birmingham.ac.uk/student/your-wellbeing/index.aspx>

*UBHeard – a confidential listening and support service for all registered students that provides immediate emotional and mental health support 24 hours a day, 7 days a week, 365 days a year.*

*Tel: 0800 368 5819*

In addition, if any of the tests show incidental findings related to your health (e.g., high resting blood pressure) we will inform you of this observation – and at your request can prepare a report of this finding for you to take to your GP.

**7. What are the possible benefits of taking part?**

You will have the opportunity to take part in a study that uses world class equipment and facilities whilst improving our knowledge of blood pressure instability and brain health. You will also help us expand our understanding of declining brain health following SCI, which is a critical first step in ensuring people with SCI “*have healthy lives, free of stroke*”. At your request, you will be able to obtain information on your 24-hour free-living blood pressure responses, how your brain blood flow responds to an orthostatic challenge and feedback on the cognitive assessments.

**8. Will my taking part in this study be kept confidential?**

Yes, your participation in this study will be kept confidential. Data generated throughout the duration of the study will be managed in accordance with the University’s Code of research Practice and the terms and conditions of the Data Protection Act (2018). Specifically, both hard copies and electronic data collected during the study will only be accessible to responsible employees from the University of Birmingham. In accordance with the University of Birmingham’s data storage policy, all data will be stored securely and confidentially for up to 10 years. After this time, it will be permanently destroyed.

**9. What will happen to the results of the research study?**

The results of this project may be published anonymously in a scientific journal and presented at international conferences; however, names of participants will never be published.

**10. Who is organising and funding the research?**

The School of Sport, Exercise and Rehabilitation Sciences is supporting this research. Drs Nightingale and Lucas are organising and conducting the research under the Programme of Work entitled: Understanding and optimising how exercise influences vascular health (Ethical Review Number: ERN\_19-1574P).

**11. Can I obtain feedback from the study?**

Yes, if you wish to know the results of the study you took part in a summary of the results can be provided once the study has concluded. On the Consent Form there is a space to indicate if you would like to receive a study summary.

**12. What will happen if I wish to withdraw from the study?**

You are free to withdraw from the study at any time, including following data collection, without giving a reason. If the data collected until the time of withdrawal could be used, you will specifically be asked to give your consent to having the data included in any analysis. Additionally, you can withdraw your data from the study for up to two weeks following completion of the data collection, by notifying us via email or telephone. If you withdraw and do not consent to having the data collected so far included in the analysis, the data will be permanently deleted/destroyed.

**13. What will this research cost me?**

You should not incur any personal expenses as a result of travelling to participate in this study. Reimbursement of £20 will be provided for parking or other transportation costs. Receipts are not required and transportation reimbursements will be given at the end of the laboratory visit.

**14. Do you have any further questions?**

If you have any further questions about the study, please feel free to contact:

Dr Tom Nightingale: T.E.Nigtingale@bham.ac.uk (+44 121 414 6977)

Dr Sam Lucas: S.J.E.Lucas@bham.ac.uk