

**INFORMED CONSENT FORM**

**STUDY TITLE: ISCHEMIC CONDITIONING IMPROVES WALKING FUNCTION POST  
STROKE**

**DATE OF DOCUMENT: 7/26/2019**

MARQUETTE UNIVERSITY

AGREEMENT OF CONSENT FOR RESEARCH PARTICIPANTS  
Ischemic Conditioning Improves Walking Function Post Stroke

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You have been invited to participate in this research study. Before you agree to participate, it is important that you read and understand the following information. Participation is completely voluntary. Please ask questions about anything you do not understand before deciding whether or not to participate.

**Below is key information to help you decide if you would like to participate in the study:**

**Why is the study being done?** The purpose of this research study is to understand how a treatment called ischemic conditioning combined with treadmill training affects leg and walking function post stroke.

**What am I being asked to do?** If you agree to be in this study, you are being asked to:

- Participate in test sessions in which we will make measurements of leg function, balance, coordination, walking function, and cardiovascular function.
- Participate in training sessions where you will receive the ischemic conditioning treatment, followed by 30 minutes of treadmill training at a moderate intensity.
  - Ischemic conditioning is a non-invasive treatment in which an inflatable cuff, like a blood pressure cuff, is used to cause 5 minutes of transient ischemia to your leg. The cuff is inflated for 5 minutes and then deflated for 5 minutes. This is repeated 5 times.
  - You will be randomly placed in to one of three treatment groups: ischemic conditioning at a higher intensity + treadmill training, ischemic conditioning at a lower intensity + treadmill training, or ischemic conditioning with no treadmill training.
- Participate in up to 8 testing sessions each lasting 2-3 hours.
- Participate in 12 treatment sessions each lasting 1-1.5 hours.
  - Total duration in the study may last 6-8 weeks.

**Are there any possible risks or discomforts?** There are minor risks to participating including: muscle soreness, fatigue, adverse cardiovascular response to exercise, lightheadedness and mild discomfort due to electrical stimulation, cuff inflation or electrode placement.

**Are there any direct benefits for me?** Following the study, you may have improvements in walking speed and strength in your affected leg.

Taking part in this research project is voluntary. You don't have to participate, and you can stop at any time.

**Please take time to read this entire form and ask questions before deciding whether to take part in this research project.**

**PROCEDURES:** You may be asked to participate in a familiarization session and up to 7 testing sessions and 12 training sessions. All sessions will take place at Marquette University in the Department of Biomedical Engineering or Physical Therapy in Cramer Hall.

**Familiarization Session:** At this session, a member of the study team will familiarize you with the equipment and the activities you will be asked to perform. This will help you understand all the study protocols and provide an opportunity for you to ask questions about study procedures. If you have participated in similar studies in Dr. Hyngstrom's laboratory within the last year, you may not need to participate in the familiarization portion. Dr. Hyngstrom or a study team member will inform you of this option at the time of consent.

**Testing Sessions (Baseline, post 6 training sessions, post 12 training sessions, and 2 weeks post training sessions):** The purpose of the testing sessions is to measure how fast you walk, your ability to balance while sitting and standing and walking, your strength, and your blood flow response to exercise. These sessions will last approximately 3 hours each.

First, a member of the study team will familiarize you with the equipment and the activities you will be asked to perform. If you have participated in similar studies in Dr. Hyngstrom's laboratory within the last year, you may not need to participate in the familiarization portion. Dr. Hyngstrom or a study team member will inform you of this option at the time of consent. Each testing session will consist of the testing procedures below:

- A. **Clinical and Gait Testing:** A member of the study team will measure your blood pressure, pulse, breathing rate, height and weight. A brief medical history will be taken to understand the nature of your stroke as well as any current therapies you are undergoing. You will be asked questions regarding your level of physical activity. You will then be assisted onto a treatment table and a member of the study team will evaluate the strength, coordination and muscle tone in both of your legs. Next, study personnel will assess your balance in while doing different tasks. You will be asked to remove your orthosis, if you use one. Then, you will be asked to walk certain distances at varying speeds while a study team member times your walking speed.
- B. **Motor Testing:** Dr. Hyngstrom or one of the other members of the research team will then help you into a chair that measures the force that your leg muscles produce. Your leg will be secured to the chair with a Velcro strap. Next, electrodes that measure your muscle activity (or "EMG") will be placed on the skin over several leg muscles. Additionally, two 4 cm adhesive electrodes may be placed on

the skin of your leg. Both electrodes will assess blood flow using light and you will feel nothing. Finally, electrodes to apply electrical stimulation may be secured to your leg using surgical tape. If electrical stimulation is used, Dr. Hyingstrom or one of the research study team members will set the intensity of the stimulation at a comfortable level. While sitting in the chair, you will be asked to perform the following activities:

1. *Maximal Muscle Contraction Task*: You will be asked to briefly contract one of your leg muscles as hard as you can, as you push or pull against the leg brace. You will be asked to do this several times and be given at least a minute of rest between efforts. On a computer screen, you will see how hard you are contracting your leg muscles. Your leg will not move during contraction. Dr. Hyingstrom or a member of the research study team will cue you to push or pull harder as necessary. During some of the maximal contractions you receive brief electrical stimulation as you contract and while your muscles are resting. The electrical stimulation will make your leg muscles contract. Please tell study personnel if the stimulation is uncomfortable to you and we will lower the intensity.
2. *Sub-maximal Muscle Endurance Task*: For this task, we will be interested how long you can maintain a low-level contraction of your leg muscles. You will be asked to maintain a level of leg muscle contraction while seated in the testing chair. The level at which you are asked to contract your leg muscles will be less than the level in the maximal muscle contraction task. This task may take several minutes, but you will only be asked to do this task one time per session. You may also be asked to repeat this sub-maximal contraction for a briefer amount of time (16-30s). You will receive both verbal and visual cueing regarding your performance. Your leg will not move as you are sustaining the contractions.
3. *Brief Sub-Maximal Muscle Contraction Task*: For this task, you will be asked to contract your muscles to produce specific amounts of force and then hold this contraction for a short amount of time (5-20 seconds). On a computer screen, you will, again, see how hard you are contracting your leg muscles. You will see a line that moves corresponding to the amount of force you are producing laying over a trapezoid shape to trace with your muscle force.

*Recovery*: Following all tests, you will be given the opportunity to recover if you are experiencing any fatigue. Study personnel will perform measurements of heart rate, blood pressure and respiration rate and ask you how much effort it is taking to perform a given task.

- C. Cardiovascular Testing: Members of the study team may make measurements of the blood vessels in your thigh and upper arm while you are seated. This will be done using an ultrasound machine. The ultrasound probe will be placed on your skin over blood vessels in your thigh and upper arm. You will not feel anything as the measurements are being made. **You may be asked to ride a bicycle until exhaustion so we can measure your tolerance to exercise.**

**Training Sessions (12 sessions over 4 weeks):** We are testing how an intervention called ischemic conditioning affects walking speed when done alone or in combination with treadmill training.

The ischemic conditioning protocol is as follows: while lying down with your head supported, study personnel will place an inflatable cuff around your thigh. This cuff is like the cuff used to measure blood pressure. We will then inflate the cuff to a pressure that will temporarily reduce blood flow to your leg. The cuff will be inflated for 5 minutes and then deflated for five minutes. This pattern of inflation and deflation is repeated 5 times. If at any time the pressure of the cuff is intolerable, please let study personnel know and we will reduce the pressure. The protocol will be performed at least 3x/week for a total of 12 sessions with no more than 1 week between ischemic conditioning sessions.

You will be randomly assigned to one of three treatment groups. A member of the study team will discuss your group assignment with you. Please note, there is only one designated person on the study team who knows which group you are in. This is for purposes related to the data analysis portion of this study. **Please only discuss your group membership and intervention session schedule with this designated person.**

Groups 1 and 2 will receive 12 sessions of ischemic conditioning + treadmill training, but each Group 1 will have a different cuff inflation pressure than Group 2.

Group 3 will receive 12 sessions of ischemic conditioning and no treadmill training.

**Treadmill Training:** You will undergo 12 sessions of treadmill training at a preferred frequency of 3 times per week with no more than 72 hours between sessions. Treadmill training sessions will immediately follow your ischemic conditioning sessions. At the start of the treadmill sessions, a study team member will place a heart rate monitor around your chest. To ensure safety, you will be assisted into a fall-arrest harness. You will then be assisted onto the treadmill and instructed to use the handrails as often as you need to. You will then be asked to walk for six 5-minute intervals. While constantly monitoring your heart rate, the walking speed will be continuously adjusted by a member of the research team so that you maintain a heart rate between 50 and 60% of your age-estimated maximum heart rate. Throughout the session study personnel will also ask you how hard you are exerting yourself while walking.

**Before, during, and after all study procedures, study personnel will be monitoring your heart rate, blood pressure, respiration rate, and effort level. Please let the study staff know if you are uncomfortable in any way.**

**DURATION:** Your participation will consist of 7 testing sessions and up to 12 intervention sessions, each lasting from 1.5 hours to 3 hours. If you have not participated in studies in the laboratory before, we will ask you to participate in a familiarization session.

**RISKS:** The risks associated with participation in this study include

- 1. Fatigue:** You will be asked to contract your leg muscles until they fatigue. You may experience transient feelings of tiredness or weakness in your legs due to the fatigue. To prevent any prolonged feeling of muscular fatigue (i.e. more than 15-20 minutes,) the fatigue task will only be performed one time. You will be allowed to recover before leaving. Study personnel will monitor your blood pressure and pulse before, during, and after the fatigue task.
- 2. Muscle Soreness:** Because you will be asked to maximally contract muscles in your legs, some soreness in your muscles may appear after the muscle testing. This soreness will be slight, will in no way impede normal daily activity and if present will subside within a few days. If soreness does persist, you will tell your physician as well as Dr. Hyngstrom.
- 3. Skin Irritation:** You may experience some mild skin irritation from the surface EMG electrodes. This irritation involves redness of the skin and, if present, usually subsides within a few hours.
- 4. Discomfort from Electrical Stimulation:** You may experience some discomfort from the electrical stimulation to your leg. Please tell Dr. Hyngstrom or other study personnel immediately if you are experiencing any discomfort, and the level of stimulation will be adjusted to a comfortable level.
- 5. Cardiovascular Response to Exercise:** Although the risk of having a stroke during exercise is rare, you may have an adverse response to exercise. Dr. Hyngstrom and study personnel will be monitoring your blood pressure, heart rhythms, heart rate, breathing rate, and effort levels at rest, during exercise and following exercise. Based on these measurements, Dr. Hyngstrom will determine whether testing may proceed.
- 6. Discomfort from Cuff Inflation:** You may experience some discomfort during the brief periods of cuff inflation of the ischemic conditioning protocol. The cuff will be inflated around your leg to a level that is like what is experienced when you are having your blood pressure measured. The difference here is that the cuff will stay inflated for a longer period of time. Please tell study personnel present during testing if you are experiencing discomfort and the level of inflation will be adjusted to a comfortable level. We will also ask you about your comfort level before, during, and after the inflation.
- 7. Light Headedness:** You may feel light headed due to fasting prior to cardiovascular testing. Mostly this will be done in the morning, therefore, fasting for 8 hours during the nighttime hours should only require skipping breakfast. You will be given a snack and something to drink when they are complete with the study.

**BENEFITS:** The benefits associated with participation in this study include a better understanding of your condition.

This research may benefit society by improving knowledge of how treatments that may help people with stroke walk better.

**CONFIDENTIALITY:** All information you reveal in this study will be kept confidential. All your data will be assigned an arbitrary code number rather than using your name or other

information that could identify you as an individual. Dr. Hyingstrom will keep a key to the code in a file on her password protected computer. Paper files will be kept in a locked cabinet in Dr. Hyingstrom's office. Electronic files that are coded will be kept in password protected computers. When the results of the study are published, you will not be identified by name. The data will be destroyed by shredding paper documents and deleting electronic files 10 years after the completion of the study. Your research records may be inspected by the Marquette University Institutional Review Board or its designees, NIH and (as allowable by law) state and federal agencies. In addition, disclosure of information that you may reveal in this study may be required to fulfill reporting duties or obligations of licensed study personnel under rules of professional conduct.

**COMPENSATION:** You will be paid \$50.00 in cash at the completion of each familiarization or testing session. After 6 Intervention Sessions, you will be paid \$100.00 and after 12 Intervention Sessions, you will receive another \$100.00. You will thus receive a maximum of **\$600.00** if you participate in all sessions.

**EXTRA COSTS TO PARTICIPATE:** There are no funds set aside to pay for transportation to each session.

**INJURY OR ILLNESS:** If you think you have experienced a research-related injury, illness, or adverse event, you should contact the researcher (see Contact Information below). Marquette University does not have money set aside to pay for treatment, lost wages, lost time, or pain. However, you do not waive any rights by signing this consent form.

**VOLUNTARY NATURE OF PARTICIPATION:** Participating in this study is completely voluntary and you may withdraw from the study and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled. If you choose to withdraw from the study please contact Dr. Hyingstrom and inform her of your decision. In addition, please tell Dr. Hyingstrom if data collected from you from previous sessions may be included in the study. If you decide you would like to withdraw your data, Dr. Hyingstrom will shred paper files and delete electronic files associated with your participation.

**CONTACT INFORMATION:** If you have any questions about this research project, you can contact Allison Hyingstrom PT, PhD ([Allison.hyingstrom@marquette.edu](mailto:Allison.hyingstrom@marquette.edu), 414-288-4566). If you have questions or concerns about your rights as a research participant, you can contact Marquette University's Office of Research Compliance at (414) 288-7570 or [orc@mu.edu](mailto:orc@mu.edu).

**FUTURE USE OF INFORMATION:** The data collected in this study may be deidentified and used for future research or given to another investigator for future research without additional informed consent.

**FUTURE CONTACT:** I give Dr. Hyingstrom or other study personnel permission to contact me in the future to participate in other studies.

I HAVE HAD THE OPPORTUNITY TO READ THIS CONSENT FORM, ASK QUESTIONS ABOUT THE RESEARCH PROJECT AND AM PREPARED TO PARTICIPATE IN THIS PROJECT.

\_\_\_\_\_  
(Printed Name of Participant)

\_\_\_\_\_  
(Signature of Participant)

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Printed Name of Individual Obtaining Consent)

\_\_\_\_\_  
(Signature of Individual Obtaining Consent)

\_\_\_\_\_  
Date