PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM

Investigating tissue composition, mechanics and function using MRI

Professor Lynne Bilston

1. What is the research study about?

You are invited to take part in this research study. The study aims to investigate the mechanical properties and architecture of human body tissues including brain, liver, kidneys, muscle and fat using magnetic resonance imaging (MRI). We will measure tissue elasticity (stiffness) using magnetic resonance (MR) elastography, and track tissue motion and compression using tagged-MR techniques. In the case of skeletal muscle, electromyography (EMG) will also be used to measure muscle motor unit (electrical) activity.

This data will be used to develop subject-specific computational models accounting for physiology, deformation and in some cases, neural drive. This research will contribute towards a more comprehensive understanding of how these factors interact to contribute to tissue function and respond to deformation or injury.

2. Who is conducting this research?

The study is being carried out by the following researchers from NeuRA and the University of New South Wales:

Role	***Name***
Chief Investigator	*Professor Lynne Bilston*
Co-Investigator/s	*Professor Rob Herbert* *Professor Jane Butler* *Dr Bart Bolsterlee*
Associate Researchers	*Dr Lauriane Jugé* *Dr Rob Lloyd* *Ms Alice Hatt* *Dr Elizabeth Brown* *Dr Martin Heroux* *Mr Ryan Castillo*
Student Investigators	*Hossein Ahmadi Nejad Joushani* *Jiayi Zhu* *Yilan Zhang* *Fiona Chen*

This research is being funded by the Australian Research Council (ARC).

3. Inclusion/Exclusion Criteria

Before you decide to participate in this research study, we need to ensure that it is ok for you to take part. To participate in this project you need to:

- Be an adult over the age of 18 years.
- Be in good health with no known history of nervous system, skeletal or muscular disease or injury.

- Have no known medical conditions or implantation that would preclude you from undergoing MRI scanning.

Pregnant women, people with medical conditions, devices or implantation that cannot be safely imaged using MRI, people weighing over 140 kg, or people with a history of MRI related claustrophobia will be excluded from participating.

If you have a known allergy to skin preparation solutions, conductive gels/creams or medical tape; or an extreme aversion to needles such as a history of fainting, you will be excluded from participating in the muscle activity study.

4. Do I have to take part in this research study?

Participation in this research study is voluntary. If you do not want to take part, you do not have to. If you decide to take part and later change your mind, you are free to withdraw from the study at any stage. Your decision will not affect your relationship with NeuRA or The University of New South Wales.

If you decide you want to take part in the research study, you will be asked to:

- Read the information carefully (ask questions if necessary);
- Sign and return the consent form if you decide to participate in the study;
- Take a copy of this form with you to keep.

5. What does participation in this research require, and are there any risks involved?

If you volunteer for this study, we will ask the following of you (ticked sections only):

☐ **STUDY 1: MRI STUDY.**

The study will require one to two hours for completion. You will be asked to travel to NeuRA (Barker St, Randwick) where you will have a one-off MRI scan of your:

☐ head and neck; ☐ spinal cord; ☐ leg; ☐ arm; ☐ buttocks; ☐ abdomen.

Screening: A one-page screening questionnaire will be given to you before you begin the study. This will determine if you are eligible to take part. The questionnaire asks you about the presence of things that might make it unsafe for you to have an MRI scan such as a pacemaker, metal shards (e.g. from shrapnel or association with metal work) or some types of implants in your body. Completing the screening questionnaire will take a few minutes. The screening questionnaire will be administered to you via email or by phone. The radiographer at the scanning facility will also independently approve you for scanning before you are allowed to enter the MRI magnet room. If the screening questionnaire shows that you meet the criteria for inclusion, then you will be able to start the research project. If you cannot be safely scanned in our MRI scanner, you will not be able to participate in this study. Please read the patient screening form carefully before coming, and fill in the information wherever you are able. Please also read the informed consent form, but do not sign it until you have spoken with the researcher requesting your participation.

During the scan: You will be asked to lie down on a comfortable padded table that goes inside the large tube that is the imaging magnet. You will have a series of pictures taken of your body using the MRI scanner, a device that uses radio waves and a large magnet to record data. Because of the

powerful magnetic field of the MRI scanner, you must not bring any metal into the instrument. For your comfort, we suggest you wear loose-fitting, comfortable clothing without zippers or other fittings (e.g. loose fitting T-shirt and elastic-waisted shorts). Please do not wear workout or athletic wear (e.g. yoga pants or training shirts) as these garments can be made of materials containing metallic microfibers to deter odour and bacteria, which can heat up during scanning. Jewellery items will be asked to be removed before scanning. In rare cases, certain types of eye makeup – especially eye liners – may cause problems with the MR images. You may wish to come without makeup to avoid having to remove it for the scan. Avoid drinking coffee and other diuretics that may require you to urinate often before the scan as you will generally not be able to use the restroom for the duration of the scan.

You will be asked to lie very still for periods of up to 5 minutes at a time. While the scanner is operating, it will make loud beeping or banging noises. To minimise the disturbance to you, you will be given earplugs or headphones.

While measurements of elasticity are being recorded, vibration will be transmitted into the tissue being investigated via a purpose-built device. The vibrating device will consist of either a small plastic probe or a patient specific mouthpiece. A portion of the scan time will be involved with positioning the vibrating device correctly. This device will vibrate during small portions of the scan and you will be warned when this is about to occur. The vibration may be an unfamiliar sensation, but should not be uncomfortable - similar to touching vibrating machinery.

We may also apply some compression to the body area, which will be a light to moderate pressure and should not be uncomfortable. This will allow us to measure how the tissue properties change during deformation.

If the tissue being investigated is skeletal muscle, you will have the muscle passively stretched by a researcher, or be asked to contract or stretch the relevant muscle for periods of the scan. In the leg, this will be done by rotating your ankle joint and asking you to press against a footplate. In the tongue, this will be done by gently stretching the tongue using dental tape or asking you to protrude your tongue.

We may follow the scan with some anatomical measurements (height, weight etc.). You can stop the experiment and withdraw your consent to participate at any time without prejudice.

Risk: Magnetic resonance imaging is a non-invasive and painless imaging technique that has been in routine clinical use for over two decades and is approved by the Australian Therapeutic Goods Administration, the European Union and the USA Food and Drug Administration for this purpose. Unlike CT scans or X-ray, MRI does not use any form of ionising radiation to record images, but radio waves and a large magnet. There are no known harmful effects from being in an MRI scanner. There is, however, a danger if you take metal objects into the MRI scanner (this can include anything from a set of house keys to a cardiac pacemaker). The MRI scanner is a very strong magnet that is always “on” and any metal object taken in to the scanner may become a dangerous projectile or in some instances heat up. For this reason, we will ask that you complete the screening questionnaire truthfully and remove any metal from your person or clothing before you enter the scanner room. The radiographer will check thoroughly to ensure you do not have any metal on you before entering the scanning room.

There should be only minimal risks to you as a result of this scan. The scan may cause discomfort if you are uncomfortable with the confined space inside the MRI scanning machine. Additionally, the scanner makes loud noises during this procedure, but you will be given ear-plugs or ear-muffs to minimise this. The techniques used in this study have been shown to be safe and painless in other studies. If you are unsure if you can tolerate the confined space, we have a "mock" MRI scanner that you can try out beforehand.

What happens if something abnormal is found in my scans? MRI is most commonly used in diagnosing human diseases, and rarely may find unexpected pathology. In that event, a radiologist (medical specialist), who will look at all images, will release the report to the researcher in charge of this study (Prof Lynne Bilston) who would then be responsible for any follow up. If abnormalities should be found, a medically qualified person (Professor Simon Gandevia) would be responsible for advising you of the abnormal report and liaising with you for the submission of the report to your primary health care provider.

☐ **Use of the gravitational magnetic resonance elastography transducer:**
If this box is ticked, the type of vibrating device that will be used is a *gravitational elastography transducer*. This device is a new class of transducer, and is the subject of a clinical trial notification with the Therapeutic Goods Administration (reference CT-2021-CTN-01514-1) due to the fact that not yet listed on the Australian Register of Therapeutic Goods. However, the device is being used safely and successfully by the manufacturers and others internationally, and the conduct of this study has been approved as a clinical trial with the UNSW Human Research Ethics Committee. The device is classified as 'low risk'. Your participation in this research study requires that you agree to the use of this device if this box has been ticked.
The transducer consists of a small, rectangular plastic box that will be positioned over or on the body region we will be investigating. Inside the box is a small belt connecting two rotating shafts. One of the shafts has a small weight attached to one side. When the shaft spins, the weight spins around, and the rotation of the mass makes the transducer vibrate. Connected to the transducer is a long rubber tube, which surrounds a plastic core that is free to rotate within the hose. We call this the axis.
We connect the axis to a purpose built motor, which transmits the rotation to the transducer, rotating the eccentric mass to produce the vibration frequency that we need.
All components of the transducer that are in contact with you are non-conductive, non-magnetic and spill-proof, meaning there is no risk of heating or electric shock. The transducer casing consists of a hardy plastic box that has been designed to be very strong and resistant to shock or damage. The amplitude of the vibrations that the transducer is capable of supplying are well below any EU/FDA safety limits for the safe exposure level of workers to vibration. The control system of the device is equipped with a safety system that monitors the current provided to the motor, and shuts it down if there is any blockage of the rotation.

Risk relating to the use of the gravitational magnetic resonance elastography transducer:

There is a risk of tripping over some of the equipment. This equipment will be placed out of your way and taped down. There is a risk of bruising or mild friction burns if the transducer is placed directly over a bony region. For this reason, we may position a gel pad between you and the transducer.

☐ **STUDY 2: MUSCLE ACTIVITY STUDY.**

Additional studies involving the recording of muscle activity (electromyography or EMG) in your leg, arm or tongue may be performed in the laboratory in some subjects following their MRI scan. Clarification regarding this part of the study will be provided should we seek to enrol you in this part of the experiment.

During the study: If you are asked to participate in this study, testing will take a further one hour following your MRI scan during which we will make recordings of the electrical activity in your:

☐ tongue; ☐ lower leg ☐ upper arm.

Fine-wire electrodes (approximately the width of a hair) will be inserted into the muscle through the skin via a hypodermic needle. Insertion of the wires may cause brief discomfort and a sensation like that with a small bruise, but there should be no long-lasting effects. We will use an ultrasound machine to aid in the placement of these electrodes. Any pain and discomfort should be transient and should not result in major stress.

Recordings will be made while you perform the same stretching/pressing manoeuvres that were performed whilst in the MRI scanner. You will receive visual feedback during the scan so you can maintain a consistent contraction. You can stop the experiment and withdraw your consent to participate at any time without prejudice.

Risk: There is a risk of bruising and local infection as a result of skin penetration. However, no infections have been reported by these investigators who have used this technique for over 15 years in hundreds of individuals. Minor muscle tenderness can occur, but this recovers within several days following the procedure. No other significant consequences with the use of the wire technique have been reported.

Additional Costs and Reimbursement: There are no costs associated with participating in this research project, nor will you be paid. However, you will receive $50 to reimburse you for any reasonable travel, parking, meals and other expenses while completing the MRI scan, and where relevant, a further $30 for completing the laboratory muscle study.

6. What will happen to information about me?

By signing the consent form, you consent to the research team collecting and using information about you for the research study.

The research team will store the data collected from you for this research project for a minimum of 15 years after the publication of research results. The information about you will be held electronically, in a way that you cannot be identified, on a password protected NeuRA server only accessible to the approved research investigators.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission, except as required by law. If you give us your permission by signing this document, we plan to discuss/publish the results in scientific journals or at scientific conferences so that other people may learn about our findings. In any publication, information will be provided in such a way that you cannot be identified.

MR scanning is a time-consuming and expensive procedure. To maximise the benefits to medical research we will, with your permission, allow access to your stored, de-identified data by approved researchers, subject to the approval of their studies by an appropriate Human Research Ethics Committee. All data would be provided in such a way that it cannot be identified with you. We may be able to use the data collected in this study for purposes that we have not yet foreseen. This research will be an extension of, or closely related to, the original project; or is in the same general area of research. Your information will only be shared in a format that will not identify you. Consequently, we are also asking your permission to use the data collected in this study in future studies if needed. All measures to preserve confidentiality and disclosure of information still apply, and you can withdraw your consent for your data to be used in this way at a later date by ticking the relevant box on the 'Withdrawal of Consent Form' and forwarding to the research team. If you consent to this, please tick the box on page 7 headed 'Optional Consent for reuse of data and future research'.

The information you provide is personal information as per the Privacy and Personal Information Protection Act 1998 (NSW). You have the right of access to personal information held about you by NeuRA and UNSW, the right to request correction and amendment of it, and the right to make a complaint about a breach of the Information Protection Principles as contained in the PPIP Act. Further information on how NeuRA protects personal information is available in the NeuRA Privacy Policy (available at https://www.neura.edu.au/privacy/).

7. How and when will I find out what the results of the research study are?

The research team intend to publish and/ report the results of the research. All information will be published in a way that will not identify you.

If you would like to receive a copy of the results you can let the research team know by inserting your email or mailing address in the consent form. We will only use these details to send you the results of the research.

8. What if I want to withdraw from the research study?

If you do consent to participate, you may withdraw at any time. You can do so by completing the 'Withdrawal of Consent Form' which is provided at the end of this document or you can ring the research team and tell them you no longer want to participate. Your decision not to participate or to withdraw from the study will not affect your relationship with NeuRA or UNSW. If you decide to leave the research study, the researchers will not collect additional information from you. You can request that any identifiable information about you be withdrawn from the research project.

9. What if I have a complaint or any concerns about the research study?

If you have a complaint regarding any aspect of the study or the way it is being conducted, please contact the UNSW Human Ethics Coordinator:

Complaints Contact

Position	UNSW Human Research Ethics Coordinator
Telephone	+ 61 2 9385 6222
Email	humanethics@unsw.edu.au
HC Reference Number	HC200971

10. What should I do if I have further questions about my involvement in the research study?

The person you may need to contact will depend on the nature of your query. If you require further information regarding this study or if you have any problems which may be related to your involvement in the study, you can contact the following member/s of the research team:

Research Team Contact Details

Name	Mrs Alice Hatt
Position	Research Assistant
Telephone	02 9399 1891
Email	a.hatt@neura.edu.au
Postal Address:	NeuRA, Barker Street, Randwick NSW 2031

Name	Ms Yilan Zhang
Position	PhD Candidate
Telephone	04 2626 0314
Email	yilan.zhang@neura.edu.au
Postal Address:	NeuRA, Barker Street, Randwick NSW 2031

Name	Mr Hossein Ahmadi
Position	PhD Candidate
Telephone	04 1176 9936
Email	h.ahmadi@neura.edu.au
Postal Address:	NeuRA, Barker Street, Randwick NSW 2031

Chief Investigator

Name	Professor Lynne Bilston
Position	Senior Principal Research Scientist, Conjoint Professor UNSW Medicine

Telephone	02 9399 1673
Email	l.bilston@neura.edu.au
Postal Address:	NeuRA, Barker Street, Randwick NSW 2031

Consent Form – Participant providing own consent

Declaration by the participant

- ☐ I understand I am being asked to provide consent to participate in this research study;
- ☐ I have read the Participant Information Sheet, or someone has read it to me in a language that I understand;
- ☐ I understand the purposes, study tasks and risks of the research described in the study;
- ☐ I provide my consent for the information collected about me to be used for this research study.
- ☐ I have had an opportunity to ask questions and I am satisfied with the answers I have received;
- ☐ I freely agree to participate in this research study as described and understand that I am free to withdraw at any time during the study and withdrawal will not affect my relationship with any of the named organisations and/or research team members;
- ☐ I understand that I will be given a signed copy of this document to keep.
- ☐ I understand that the results of the research will be made available on the NeuRA website www.neura.edu.au

Specific Consent relating to the use of the gravitational transducer (cross through if not applicable)

- ☐ I understand that I am being asked to participate in a trial using a medical device that is not registered on the Australian Register of Therapeutic Goods (ARTG);
- ☐ The conduct of this trial has received ethical approval from the UNSW Human Research Ethics Committee and the device has been registered with the Therapeutic Goods Administration.
- ☐ I understand that this medical device is a small, plastic unit that transmits vibration during MRI studies, and is referred to as a 'gravitational magnetic resonance elastography transducer';
- ☐ I have had the risks of its use explained to me, been given an opportunity to ask questions and I am satisifed with the answers I have received;
- ☐ I provide my consent for the gravitational transducer to be used during this research study.

Optional Consent for reuse of data and future research:

- ☐ I give my permission for my de-identified data, obtained in this study, to also be used in other medical research studies as described in section 6 of this document.
- ☐ Collection of data and recruitment of volunteers in medical research is a time consuming and potentially costly exercise. Would you be interested in potentially taking part in further medical research studies?
- ☐ I would be interested in receiving information via mail about other potential research studies (include contact details in box below). I understand that this would involve information only and would not oblige me to take part in these studies. I understand that this information would be limited to two potential studies per year.

Name:	

Address:	
Email Address:	

Participant Signature:

Name of Participant (please print):	
Signature of Research Participant:	
Date:	

Declaration by Researcher:*

☐ I have given a verbal explanation of the research study; its study activities and risks and I believe that the participant has understood that explanation.

Researcher Signature*

Name of Researcher (please print):	
Signature of Researcher:	
Date:	

⁺An appropriately qualified member of the research team must explain and provide the information concerning the research study.

Note: All parties signing the consent section must date their own signature.

Form for Withdrawal of Participation

I wish to **WITHDRAW** my consent to participate in this research study described above and understand that such withdrawal **WILL NOT** affect my relationship with NeuRA or The University of New South Wales. The terms of this withdrawal are (tick relevant boxes below).

- ☐ I am withdrawing my consent and I would like any identifiable information collected about me which I have provided for this research study to be withdrawn.
- ☐ I am withdrawing my consent to participate in further components of this research and provide my permission for the research team to retain and/or use information collected about me which I have provided for the purpose of this research.
- ☐ I understand that any information already published and/or not linked to my identity cannot be withdrawn from the research.
- ☐ I am withdrawing my consent for information collected about me to be made available to other researchers as described at section 6 of this document.

Participant Name

Name of Participant (please print)	
Date	

The section for Withdrawal of Participation should be forwarded to:

CI Name:	Professor Lynne Bilston
Email:	l.bilston@neura.edu.au
Phone:	+612 9399 1673
Postal Address:	NeuRA, Barker Street, Randwick NSW 2031