RESEARCH NOTIFICATION ***20.2.2024 (Achilles tendinopathy patients)***

Research title

ACHILLES – Achilles tendon structure and function in healthy and tendon injury patients.

Request to participate in the research study

You will be asked to take part in a study to investigate the function and structure of the Achilles tendon in healthy people, Achilles rupture patients and patients with Achilles pain. You will be asked to participate in the study as a subject with a diagnosed Achilles tendon pain condition, called tendinopathy. We have assessed that you are suitable for this study because you are between 18 and 55 years old, in good health and have no other mobility impairments apart from tendon pain. This notification describes the research and your potential involvement in it.

The Regional Medical Research Ethics Committee of the Wellbeing Services County of Central Finland has assessed the study design and given a favourable opinion.

Voluntariness of participation

Participation in this research is voluntary. You may refuse to take part in the study, discontinue your participation or withdraw your consent without giving any reason at any time during the study. If you wish to stop participating in the research or withdraw your consent, please contact the researcher. Your treatment will not be affected if you refuse or withdraw from the study. However, if you withdraw from the study, the data already collected may be used for research purposes.

After you have read this information sheet, been briefed orally on its main contents and been asked questions, you will be asked if you are willing to participate in the study and the different parts of it. If you agree to take part in the study, you will be asked to sign a written informed consent form.

Study organiser

This study is carried out by the Faculty of Sport and Health Sciences at the University of Jyväskylä. The register holder of the study is the University of Jyväskylä, which is responsible for the lawfulness of the processing of personal data relating to the study and for answering questions about data protection and information on data protection legislation.

The contact person for the study is Professor Taija Juutinen, phone: 040-5566582, email: taija.m.juutinen@jyu.fi.

Purpose of the study

The purpose of this study is to increase knowledge about the structure and function of the Achilles tendon in healthy, Achilles rupture patients and patients with Achilles pain, and to develop training and rehabilitation methods.

The study is open to volunteers aged between 18 and 55 who suffer from Achilles tendon pain. You are not eligible if you have an underlying condition affecting your tendon health, such as hypertension, diabetes or metabolic syndrome, or have had corticosteroid injections in the last 12 months, or have any other disability or condition that affects mobility. A

member of the research team will talk to you to assess whether you are suitable to take part in the study. You can take part in one or more parts of the study described in this notification.

A total of 300 subjects will take part in the study, 100 healthy, 100 Achilles rupture patients and 100 Achilles pain patients. Some of the patients will only take part in a questionnaire study.

The course of the study

You can participate in one or more parts of the study. The main and first part of the study is the USTIM study visit, which lasts about 1.5 h. The MRI scan visit takes about 20 minutes. The part where tendon forces are measured lasts about 2 h. The visits of the Shockwave Therapy intervention study last about half an hour. Functional measurements take about 2 h. In the questionnaire validation study, you will not be asked to visit the laboratory, but will be asked to complete the questionnaire on two separate occasions within 1-2 weeks.

The USTIM study visit is the main part of the study where you will be subjected to the following measurements or tests: at the beginning of the study visit, you will be asked to fill in a short questionnaire regarding your basic information and your body composition will be measured with a bioimpedance device. While lying on your stomach, we will use ultrasound, motion analysis and electrical stimulation of the calf muscles to examine the structure of the Achilles tendon. Your feet should be exposed from the knee down. The Achilles tendon and the calf will be imaged with ultrasound from several different points with the ankle in different positions. At the same time, your calf muscles are electrically stimulated from the surface of the skin. The calf muscle is anatomically made up of three different parts, and each of these parts will be stimulated separately. To determine the magnitude of the stimulation of the electrical stimulation, individual impulses are first applied to the muscle at increasing intensities until we detect movement in the muscle. Each muscle is then stimulated 1-3 times in a series of 1 second stimulations. Finally, in a sitting position, you are asked to extend the ankle with maximum force while the Achilles tendon is imaged with ultrasound at several points. Exercises that require maximum force and strength are only done if you have done them during rehabilitation or in your normal life. This is done after warming up the muscles. After maximum performance, we ask you to extend the ankle more gently with the ankle in different positions. In addition to the measurements described above, we ask you to fill in questionnaires about your physical activity and tendon sensations.

As part of your USTIM visit, you may be asked to undergo an MRI scan, where standard MRI images of your legs are taken. If you have a pacemaker or metal in the leg being imaged, we will not take MRI images. We will check these things before the scan.

During the tendon force measurement visit, a device measuring Achilles tendon force is attached around your ankle with soft straps. The force measuring device taps the skin at the Achilles tendon and the resulting wave is detected by an accelerometer, and the data can be used to estimate the tendon's force level. Reflective markers are attached to the lower limbs for motion analysis. After preparation, you will be asked to run, walk, jump and do various rehabilitation exercises. You will also be asked to extend your ankle while sitting on a strength measuring machine. In the same position, the calf muscles will also be electrically stimulated from the skin surface to produce a gentle ankle extension.

In the Shockwave Therapy intervention study, you will be assigned to either the usual care group or the usual care plus Shockwave Therapy group. For both groups, your usual treatment will continue according to the current instructions you are receiving. If you are not currently receiving treatment, you will be instructed on a treatment protocol. Shockwave Therapy involves applying a shockwave to the tendon. The treatment`s efficacy is based on improving tissue metabolism and oxygenation, facilitating the healing process of a

prolonged inflammatory reaction, and increasing the elasticity of any scar tissue. The treatment is given once a week for 12 weeks in addition to the usual treatment. The duration of the intervention is 12 weeks and includes weekly laboratory visits for both groups. The visits are the same for both groups and you will not be able to tell which group you belong to from the treatment. At each treatment session, we also take ultrasound images of the tendon. During your treatment, you will also fill in a self-report form about your sensations.

Measurements of tendon structure, properties and function are taken at the beginning of the study, after 6 weeks and at the end of the treatment period. Participants in both groups will be asked to complete questionnaires on physical activity and tendon symptoms at the beginning, after 6 weeks and at the end of the treatment period. If you participate in shockwave therapy, you will have to make 13 additional visits. Volunteers who are assigned into the usual treatment group will be offered the opportunity to receive shockwave therapy after 12 weeks.

In functional measurements, you will be equipped with EMG electrodes, to measure the electrical activity of your muscles, and reflective markers on the skin of your lower limbs for motion analysis. The Achilles tendon is imaged using ultrasound. After preparation, you will be asked to perform the following exercises: heel raises and drops in a seated and standing position on both one and two legs, bilateral squats and hops. In addition, measurements will be done during walking and running.

In the questionnaire validation study, you will complete the same questionnaire (TENDINS-A) on two separate occasions. The first time the form will be filled in at the first study visit and approximately 1-2 weeks afterwards the form will be sent to you to be filled in again digitally. If you do not take part in the other parts of the study, the forms will be sent to you digitally both times and we will ask you questions about your basic information and tendon symptom history at the same time. The TENDINS-A questionnaire will take up to 10 minutes to complete. In the last section of the questionnaire, you will be asked to perform four different exercises: heel raises and jumps on both one and two legs. The other questions on the form are multiple-choice questions on tendon pain and symptoms.

You will be informed of any future changes to the study that may affect your participation in it.

Potential benefits of the study

You may not benefit from participating in this study. This study aims to provide new information about individual structure of the Achilles tendon and its relationship to tendon properties and function. The knowledge gained from this study may also help in the development of new rehabilitation methods for Achilles tendon injuries. The study will provide you with an overview of tendon structure and function, ultrasound images of your own tendon and an analysis of body composition measurements.

Possible harms and discomforts of the study

Taking part in the study will take up your time to familiarise yourself with the study, participate in the study visits and complete the questionnaires. The relatively long duration of the USTIM protocol, which requires you to lie on your stomach, can make the study uncomfortable. You will be instructed to wear shorts when functional movements are measured. In this case, the motion analysis requires the application of reflective markers with tape to the skin of the lower limbs. Measuring muscle activity with EMG electrodes requires skin cleaning and shaving, and for some people EMG electrodes can cause skin

irritation, but this is transient. Magnetic resonance imaging makes a loud noise, which is why you will be given ear plugs.

Electrical stimulation is done at a very low intensity, but it can feel uncomfortable, or in rare cases cause nausea due to an autonomic nervous system reaction. If this happens, the study will be discontinued for you. During the study, you will also be asked to extend your ankle maximally, run and jump, in which there is a risk of soft tissue injury (e.g. muscle tear). Warming up before maximal exercise is done to reduce this risk, which is no greater than for an active person in various types of exercise. Maximal performances are only performed if you have done so in your normal life.

The tendon force measuring device can potentially cause minor sensations, as it must be attached tightly enough to bare skin to keep the accelerometers in place. Measuring with the device makes a buzzing sound, and you may feel a slight tickling sensation in the tendon. However, it is not dangerous.

Shockwave therapy can cause unpleasant sensations, but the intensity of the treatment is adjusted according to your sensations.

You will be asked to report any discomfort and the measurements can be discontinued without you having to give any specific reason. There will be no consequences for you in case of discontinuation.

Processing of personal data and data confidentiality

Your personal data is processed for scientific research purposes. Your study results or responses will not be shared with the carer of your disability and your results will only be used by the research team. The information collected about you and the results of the study will be treated confidentially as required by law. All parties and persons handling your data are bound by confidentiality obligations. For a description of the processing of personal data in the study, please see the end of this notification.

Study costs and compensation to the participant

The study visits and related procedures are free of charge to you. You will not be paid for participating in the study. Travel expenses may be compensated for those coming from outside Jyväskylä, but they are taxable income.

Study funding and affiliations of the researchers

The study is funded by the Academy of Finland's ACHILLES project (lead researcher Taija Juutinen). With the support of the University of Jyväskylä's Visiting Fellow-programme, Dr Stephanie Cone will visit Jyväskylä and participate in the research. Researchers have no affiliations.

Insurance coverage of subjects

The staff and operations of the University of Jyväskylä are insured.

The University of Jyväskylä's insurance does not cover the situation where the respondent answers the questionnaire or interview at home (remotely). The University of Jyväskylä's insurance does not apply if the subject's residence is not in Finland.

The insurance includes patient insurance, liability insurance and a voluntary accident insurance. For research studies, subjects are insured against accidents, damage and injuries caused by external causes during the study. Accident insurance is valid during measurements and during travel directly related to the measurements. In addition to accidents, compensation is provided for strain injury to a muscle or tendon directly caused by a specific and individual effort and movement of the insured person, for which medical treatment has been given within 14 days of the injury. Compensation is paid for a maximum of 6 weeks after the onset of the injury. Treatment of a strain injury caused by effort and movement does not include the cost of an MRI scan or surgical intervention.

Informing about research results and future changes to the study

The participants will receive a briefing on the structure, function and health of the Achilles tendon according to current research. They will also receive images of their own Achilles tendon and feedback from body composition measurements. If the study reveals any findings concerning your health, the researchers will inform you after consulting your doctor.

Participants will be informed of any changes to the study that may affect their participation.

Termination or discontinuation of the investigation

Your participation may have to be terminated prematurely by the lead researcher. If this happens, you will be consulted about the reasons for the discontinuation and possible further action.

Further information

If you have any questions about the study, you can ask the lead researcher or other contact person.

Lead researcher: Taija Juutinen, Professor, Faculty of Sports and Health Sciences, University of Jyväskylä.
Phone number: 040-5566582
Email: taija.m.juutinen@jyu.fi
Work address: Rautpohjankatu 8a (VIV227), P.O BOX 35, 40014 University of Jyväskylä.

Description of the personal data processing in the study and the rights of the research subject related to it

The register holder for the research is the University of Jyväskylä, which is responsible for the lawfulness of the processing of personal data in connection with the research.

Only personal data necessary for the purpose of the research will be recorded in the research register: name, e-mail address, address, telephone number, age, gender, height, weight, questionnaire responses, laboratory measurements, body composition, MRI and ultrasound images, and videos of the motion analysis and ultrasound scans. These images or videos do not show your face and are not associated with any unique identifiers. Data collection is based on the research design.

Your personal data will be processed for the purposes of the scientific research described in this notification. In accordance with the General Data Protection Regulation, the processing of personal data is based on*:*

- *scientific research purposes in the public interest (General Data Protection Regulation article 6.1.e, sensitive personal information article 9.2.j)*

In the research, your personal information will only be processed by the persons appointed to the research team, whose tasks include processing your personal data. The information collected about you and the results of the research will be treated confidentially, as required by the law.

The identity of the subjects is known only to the research staff, who are all bound by confidentiality. All data collected in the research will be coded after collection, which means that the name, personal identification number and other directly identifiable data will be deleted and replaced by a unique identification code. Thereafter, the data on the participants cannot be identified without a code key, which will be kept by the lead researcher. No member of the research team or third parties will have access to the code key, which will be destroyed at the end of the study (30.6.2031). In this case, the research register will be archived, but full anonymity cannot be guaranteed due to the nature of some of the data. This is the case, for example, for videos of motion analysis, where it is possible to identify a person by his/her movement style, or MRI or ultrasound images, where anatomical anomalies can be detected. However, identification in this way is highly unlikely. Data will only be published when the identification of an individual is extremely unlikely. The results of the study will be analysed in coded form and reported at the group level, so that no individual can be identified, and no data or person can be identified from the study results, reports or publications related to the research.

In the research, your personal data will be collected from the following sources: questionnaires and laboratory measurements.

The information collected in the survey will not be stored in your medical records.

Your data will not be transferred outside the EU and the European Economic Area (EEA).

The retention period of personal data is regulated by the law and good scientific research practice. The University of Jyväskylä is responsible for the storage of personal data.

If you discontinue the research, withdraw your consent or otherwise stop participating in the research, the information collected about you up to that point will be used as part of the research data. This is necessary to ensure the safety of the study results and the participants.

You have the right to be informed about the processing of your personal data and to request restriction of the processing of your personal data. You also have the right to inspect your data and request that it be corrected or completed (for example, if you discover an error, incompleteness or

inaccuracy). You also have the right to have your personal data deleted in certain cases or to restrict the processing. Your rights are explained in more detail in the Privacy Policy.

However, in the context of scientific research, these rights may be restricted. The law may oblige the register holder to keep your research data for a certain period of time, irrespective of the rights of the data subject. The law allows for exceptions to the rights of the data subject where this is necessary to ensure the scientific results and the safety of the participants.

Your personal data will not be used for automated decision-making in the research. The purpose of the processing of personal data in the research is not to assess your personal characteristics, i.e. profiling, but to assess your personal data and characteristics in the context of a broader scientific analysis and research.

A privacy policy has been drawn up for the research, which is available from the researchers.

You can ask at any time whether we are processing personal data concerning you and the basis for the processing. You can also ask us where we obtained your data and what it has been disclosed for. You have the right to receive the information free of charge and within a reasonable time (within one month of your request).

If you have any questions about your rights as a registered data subject, you can contact the University's Data Protection Officer. All requests for the exercise of rights should be sent to The Registry Office of University of Jyväskylä. Registry office and Archives, P.O BOX 35 (C), 40014 University of Jyväskylä, phone. 040 805 3472, e-mail: kirjaamo(at)jyu.fi. Visiting address: Seminaarinkatu 15 C-building (Main building, 1st floor), room C 140.

Contact information of the lead researcher:
Taija Juutinen, e-mail: taija.m.juutinen@jyu.fi, phone. 040-5566582. Rautpohjankatu 8a (VIV227), P.O BOX 35, 40014 University of Jyväskylä.

Contact details of the register holder's data protection officer:
Data Protection Officer of University of Jyväskylä: tietosuoja@jyu.fi, 040 805 3297. Seminaarinkatu 15, P.O BOX 35, 40014 University of Jyväskylä.

You have the right to file a complaint, in particular with the supervisory authority of your place of residence or work, if you consider that the processing of your personal data violates the EU General Data Protection Regulation (EU) 2016/679. In Finland, the supervisory authority is the Data Protection Officer (tietosuojavaltuutettu).

Office of the Data Protection Ombudsman
Lintulahdenkuja 4, 00530 Helsinki,
P.O BOX 800, 00521 Helsinki
Switchboard: 029 566 6700
E-mail (registry): tietosuoja@om.fi

Appendix on MRI imaging and bioimpedance body composition measurement

Criteria for participation in the MRI-study

You meet the entry criteria for the Achilles -research
You participate in the Achilles -research laboratory tests, which examine the structure of the Achilles tendon using ultrasound (USTIM)
Body weight < 159 kg

Contraindications to taking part in an MRI-study

You have metal implants in your shin, ankle or foot area
You have another foreign device installed in your body, such as a pacemaker or medicine pump
You suffer from claustrophobia
You are in the early stages of pregnancy

The potential benefits of the MRI scan

There are no immediate benefits for you from taking part in an MRI scan. MRI images are used for research purposes and cannot be used to obtain a medical opinion.

Possible harms of the MRI scan

Participation in the MRI study requires a separate visit to the laboratory. During the MRI scan, you will be exposed to three intense magnetic fields, which are harmless to eligible participants. The radiofrequency magnetic fields can cause mild tissue heating and the gradient fields can cause temporary muscle tremors. The MRI scan is performed in a tube about 60 cm wide, which some subjects may find uncomfortable.

The course of the MRI study visit

When you arrive at the research laboratory, you will be asked to fill in a pre-examination form, which will be reviewed with you personally by the radiologist conducting the examination before the examination starts. In the changing room, you will be asked to change from your own clothes into the patient's clothes and to remove any loose jewellery such as watches, piercings and other jewellery. During the examination, you will be directed to lie on your back on a padded examination table. The leg to be measured will be placed on a support designed for the examination to ensure correct positioning. The radiologist will give you earplugs/ear protectors to absorb noise (tapping, clicking) from the MRI machine during the measurement. You will be given a bell to use during the measurement to contact the radiographer via the microphone if necessary. The examination table is moved inside the MRI machine during the measurement. The measurement is performed with a 1.5 Tesla examination machine and takes approximately 20 minutes. You will be asked to remain as still as possible during the imaging. The radiographer will be present in the observation room behind the glass wall throughout the measurement.

Body composition measurement is done with a bioimpedance device. Bioimpedance measurement is based on conducting a very small electric current through the body via several different pathways (from hand and foot electrodes). Tissues and fluids influence the flow of the electric current. This is used to analyse the composition of the body in its different parts. To ensure a reliable measurement, follow these steps.

The day before, avoid alcohol and heavy physical exertion. On the day of the test, avoid heavy eating 3 to 5 hours before the test. Avoid coffee, tea, caffeinated soft drinks or energy drinks a few hours before the test. You will be asked to go to the toilet before the test as your bladder should be empty. You should wear light, loose clothing such as a t-shirt and shorts. Metal objects should be removed and make sure your skin is dry. You will not be measured if you have a pacemaker. Before the

measurement, the soles of your feet and hands will be wiped with a damp paper towel. The measurement is done standing up and takes about one minute.