The effect of MitoQ on the recovery of muscle function following eccentric exercise

PARTICIPANT INFORMATION SHEET

We invite you to participate in a supplementation study aimed to assess if a mitochondria-targeted antioxidant (MitoQ) improves recovery of muscle function following exercise. Your participation in the research is entirely voluntary (your choice). If you do agree to take part, you may contact the investigators to withdraw from the research at any time, without having to give a reason. You can also request that any data you provide for this research be withdrawn prior to the analysis.

Principal Investigator

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Who can take part?

To take part in this study you must be a healthy male aged 20-35 years. You can take part in this study if you are sedentary to moderately active, have had no regular lower body resistance training in the previous 6 months, do not have any acute or chronic injuries or health conditions, have not taken any antioxidant supplements in the last two months, are a non-smoker, are not taking any medications that may affect your response to exercise and do not have a history of alcohol abuse. You must be willing to visit the University of Auckland Grafton Campus on six occasions. The duration of each of these visits will vary from 1 to 4 hours.

The study will involve the collection and analysis of blood and urine samples. You may hold beliefs about a sacred and shared value of any tissue samples removed. The cultural issues associated with sending your samples overseas and/or storing your tissue should be discussed with your family/whanau as appropriate. There are a range of views held by Māori around these issues; some iwi disagree with storage of samples citing whakapapa and advise their people to consult prior to participation in research where this occurs. However, it is acknowledged that individuals have the right to choose. We encourage you to consult with your friends and whanau before agreeing to participate. If you have any cultural requirements or questions that relate to your potential participation in this project, please ask the research team before signing the consent form. It is the role of the investigators to ensure that you understand all procedures and risks, so please feel free to ask any questions.

Who designed the trial?

This trial was designed by research staff at the University of Auckland. The researchers conducting this trial are interested in understanding if a mitochondria-targeted antioxidant (MitoQ) improves the recovery of muscle function and decreases
muscle damage following exercise. This research project will form part of a PhD thesis for one of the investigators.

**Background**

Mitochondria-targeted antioxidants, like MitoQ, get into our muscle and potentially protect them from damage that exercise may cause. Therefore, it is possible that supplements like MitoQ can improve the recovery of muscle function following exercise.

**What is the aim of the research?**

The aim of the research is to assess the effect of MitoQ supplementation on the recovery of muscle function and markers of muscle damage following eccentric exercise (when your muscle contracts whilst lengthening).

**What happens if I decide to take part?**

You will be required to visit the University of Auckland Grafton Campus on six occasions. You will be asked to take a tablet once a day for 3 weeks. The tablet will contain MitoQ or a placebo (a tablet with no MitoQ in it). MitoQ is a supplement that you can buy from most pharmacies and health food stores, and the dose you will be taking is the same as that recommended for general consumption at the pharmacy.

**Visit 1:**

During visit 1, you will have the details of the study explained to you and be asked to provide informed consent by signing the consent form. You will be asked to complete a questionnaire, which will ask for information on your health and activity levels. Your height and weight will also be measured. You will be familiarised with the exercise machine (Biodex isokinetic dynamometer), which is designed to resist forces that are applied to it and to control the speed of exercise at a set rate. This visit will last 1 hour.

**Supplementation:**

You will be asked to take one tablet per day, which will contain MitoQ (20 mg) or a placebo, for 3 weeks. You will be randomly assigned to one of two groups, which will determine whether you receive MitoQ or the placebo. Therefore, half of the participants will receive MitoQ and half will receive the placebo.

You will be provided with urine collection containers and be asked to collect all urine produced in the 24 hours before visit 2, between visit 2 and visit 3 and between visit 3 and visit 4 (3 days in total). Each urine sample will be collected over a 24-hour period.

You will be asked to complete a 3-day food diary during the intervention, which will involve you writing down everything that you eat over a 3-day period.

**Visit 2:**

We ask that you abstain from exercise for at least 48 hours before this visit. We also ask that you do not eat anything after 10 pm the night before and arrive to the laboratory in the morning having only consumed water (not coffee, tea or juice). During this visit you will complete a muscle-damaging exercise protocol, which will involve...
you sitting on the exercise machine and pushing as hard as possible against a pad fastened to your ankle that will push back at a constant speed. You will complete 300 maximal eccentric contractions of your thigh muscles. This exercise will be broken up into 20 sets of 15 repetitions with 30 seconds of rest between each set.

When you arrive at the laboratory for this visit, a small needle will be placed into your arm vein. This is slightly painful and can cause discomfort. This needle has a plastic cannula that will be left in your arm vein. This is also a little uncomfortable and you will not be able to fully bend your arm. The researcher will take blood samples and assess your muscle strength, range of motion, vertical jump performance, and muscle soreness before the exercise and immediately and 2 hours after you complete the exercise. Your muscle strength and range of motion will be measured using the same exercise machine used to perform the exercise. Your vertical jump performance will be measured during squat (start with knees bent), countermovement (start from standing, bend knees and jump in a continuous movement) and drop (when you jump down from a small platform and jump up again as quickly as possible) jumps. You will be asked to rate your muscle soreness whilst being seated, standing up and sitting down using a visual scale.

This visit will last 4 hours.

Visit 3-6:
These visits will last 1 hour. You will be asked to return to the laboratory 24, 48, 72 and 168 hours after you complete the exercise. We ask that you do not eat anything after 10 pm the night before these visits and arrive to the laboratory in the morning having only consumed water (not coffee, tea or juice). The researcher will place a small needle in your arm vein and take a blood sample. This is slightly painful and can cause discomfort. You will also provide 24-hour urine samples and have your muscle strength, range of motion, vertical jump performance and muscle soreness assessed.

Follow-up care:
Research personnel will contact you after each study visit to check how you are feeling.

The risk and benefits of the research

Overall there are no major risks associated with taking part in this research. There is a risk of injury associated with eccentric exercise, such as muscle strain, however we believe the risk of injury to be small in healthy individuals. It is likely that you will feel soreness in your muscle, which is a characteristic of the muscle damage induced by the exercise protocol. This soreness should disappear within a few days. There is also a small risk of feeling faint/nausea associated with the exercise. We ask that if you feel faint or wish to stop at any point that you advise the research team and we will stop the test.

There are minor risks associated with blood sampling, which are minimised by having all procedures undertaken by a qualified phlebotomist using accepted antiseptic techniques. There is a small chance of minor discomfort, bleeding and/or bruising as a result of insertion of the catheters or venepuncture. Very occasionally, however,
there can be infections. We consider the risk extremely low given the aseptic/barrier techniques used.

MitoQ is a well developed and tested product, it is available to buy from most pharmacies and health food stores, and it has also been investigated as a potential treatment option for various diseases like Parkinson’s disease, Hepatitis C and impaired vascular function. Some studies that have investigated the safety of MitoQ have shown that a very small number of people can experience a mild upset stomach and/or nausea when taking MitoQ. If this occurs, please contact the research team.

The research will be stopped should any harmful effects appear or if research investigators feel that it is not in your best interest to continue. Any symptoms that you may experience will be recorded as part of the trial.

What will happen with my blood and urine samples?

We will analyse your blood and urine samples for gene levels (genes are the instructions that tell the cells in your body how to function) and the concentration of different proteins and products used and produced by chemical reactions happening in your body. Samples will be stored in secure freezers in an access-restricted area at the University of Auckland until analysis is completed. Samples will be stored in the same facility as animal tissue. Samples will be analysed at the University of Auckland and may be sent overseas for expert analysis where appropriate. There will be no future unspecified research made on your samples without your prior approval. After completion of the study, we will keep your contact details for 10 years, but you will only be contacted in the unlikely event that we would like to perform further unspecified analysis. If we cannot contact you at this time we will not perform this analysis. After these analyses have been performed on your blood samples, it may not be possible to return any unused samples to you, although you are welcome to request their return prior to any analysis.

Your samples will be kept until the end of the analysis for a total of 10 years. At the end of this time a medical waste contactor will dispose of your tissue. If you would like a karakia performed at this time, please indicate so on the consent form. Any samples for disposal by karakia will be clearly marked. It is possible that the entire sample may be used for analysis, in that case there will be no need for disposal and a karakia is not possible.

What will happen if the research finds any results that could impact my health?

If any of the testing procedures or analysis of any samples produces findings that could have an adverse impact on your health status the principal investigator will discuss with clinicians within the Department of Nutrition and Dietetics at the university who will review the results to see if any are of potential significance to your health and you may be advised to contact your health professional. If we make any findings that may adversely impact on your health you and, with your permission, your GP will be informed.
If you were injured in this study, you would be eligible to apply for compensation from ACC just as you would be if you were injured in an accident at work or at home. This does not mean that your claim will automatically be accepted. You will have to lodge a claim with ACC, which may take some time to assess. If your claim is accepted, you will receive funding to assist in your recovery. If you have private health or life insurance, you may wish to check with your insurer that taking part in this study won’t affect your cover.

Confidentiality

Your data will be labelled using a code, which is unique to you and identifies you to the researchers only. When the analysis is completed the researchers will analyse the whole group’s data and report on averages. This data will be used for scientific publication and presentations. No material that could personally identify you will be used in any reports on this research. All data will be stored on a password protected University of Auckland computer, backed up by a server. Upon completion of the research your records will be stored for 10 years in a secure place, before being destroyed by the principle investigator or co-investigators. If this is not possible for any reason the head of the principle investigators department or otherwise designated research department will take responsibility for this process. A copy of your results will be given to you upon completion of the research at your request.

Reimbursement

To support any parking and travel expenses incurred as a result of your participation in the study you will be provided with vouchers totalling $200 at the end of the study.

Finally

Thank you for considering your participation in this study

Ngā Tāngata hei whakapānga atu - For more information please contact:

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If you want to talk to someone who isn’t involved with the study, you can contact an independent health and disability advocate on:
Phone: 0800 555 050
Fax: 0800 2 SUPPORT (0800 2787 7678)
Email: advocacy@hdc.org.nz

You can also contact the health and disability ethics committee (HDEC) that approved this study on:
Phone: 0800 4 ETHICS
Email: hdecs@moh.govt.nz
This research was approved by Northern B Health and Disability Ethics Committee. Reference Number 19/NTB/40.

The investigators of the research are:

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