**Impact on repeated sprint performance and perceptions of fatigue from administration of high dose inhaled salbutamol**

As a trained cyclist you are invited to take part in the above named research study. Please take time to read the following information carefully and feel free to ask any of the research team questions regarding the study.

**What is the purpose of the study?**

Salbutamol is commonly used to treat athletes with asthma. There is little research available that investigates whether these medications provide a performance enhancing effect. The purpose of this study is to investigate the effect of high doses of inhaled salbutamol on repeated cycle sprint performance. The findings of this study will inform the World Anti-Doping Agency policy on athletes using these medications in the future.

**Who is taking part?**

We would like to recruit male trained cyclists aged between 18-45 years. These cyclists must train in cycling at least 3 times a week and compete regularly.

You will not be able to participate if you have had a chest infection in the 4 weeks or any other illnesses within 2 weeks prior to the tests, use inhaled corticosteroids and/or β2 Agonists on a daily basis, cardiovascular problems (e.g. high blood pressure or any kind of heart problems), metabolic diseases (e.g. diabetes), neurological conditions (e.g. stroke, epilepsy), if you are injured or if you have any conditions that limit mobility.

If you decide to take part we will inform your GP that you intend to do so to ensure that there is no medical reason that may affect your participation.

**Do I have to take part?**

No. It is up to you to decide whether or not to take part. If you agree to be included but later change your mind, you can withdraw from this study at any time without explanation. A decision to withdraw, or a decision not to take part, will, result in all data collected to that point being deleted.

**What will happen to me if I take part?**

If you decide to take part, you will be asked to attend the Respiratory Clinic (SSES Laboratory in Medway Park Sports Centre in Gillingham) on four separate occasions.

The first visit will be to complete a respiratory assessment. The second visit will be for a maximal exercise challenge. These visits will each last around 1 hour and 1 hour 30 minutes respectively. The remaining two visits will be to complete a cycling trial involving a mixture of sprints and steady cycling whilst taking a different combination of inhaler treatment. These visits will take around 2 hours 30 minutes each.

***Visit 1***

**Part 1:** You will be asked to fill out a health questionnaire and also a consent form which you will need to initial and sign to state that you are aware of what the study entails and are happy to continue.

**Part 2:** You will have a respiratory assessment as follows:

* *Exhaled Nitric Oxide Measurement: A test to measure the level of Nitric Oxide gas in your breath.* The fraction of exhaled Nitric Oxide (FeNO) is an indicator of inflammation in the respiratory system. You will breathe in through a mouthpiece until your lungs are full and then breathe out through the mouthpiece for 10 seconds on a steady rate. During the breath out the amount of exhaled nitric oxide that is in your breath will be recorded. You will do this test 2 times.
* *Spirometry: A test to measure the maximum amount of air that can be inhaled and exhaled from your lungs.*

This will be done before and after the breathing challenge. From a stable, seated position, you will breathe in until you feel that your lungs are full. Then you will purse your lips tightly around a mouthpiece and breathe out as hard and as fast as you possibly can until your lungs are empty (which takes approximately 6 seconds). You will have an opportunity for three trials with one minute rest between each, and the maximum measurement will be recorded.

* *Breathing challenge: A test to challenge your airways using dry air.* To complete the breathing challenge you will be asked to breathe ‘hard and fast’ through the mouthpiece at approximately 85% of your maximal breathing rate (similar to breathing during high intensity exercise) for 6 minutes. You will breathe a cold, dry gas mixture that contains 21% Oxygen, 5%Carbon Dioxide, and 74%Nitrogen. Following the 6 minute high intensity breathing, your maximal lung function will be measured once again using spirometry after 3, 5, 7, 10 and 15 minutes. If your lung function reduces by 10% from the baseline following the test, you will be offered medication in the form of a Salbutamol inhaler to reverse this reduction. Inhaled Salbutamol is commonly used by asthmatic individuals to relieve bronchoconstriction (reduction in lung function). It works by relaxing muscles in the air passages of the lungs. It helps to keep the airways open, making it easier to breathe. Inhaled Salbutamol is fast acting (starts working after 30 seconds) and makes breathing easier.

***Visit 2***

This will entail an assessment of your fitness. The assessment will be clearly and thoroughly explained and there will be opportunity for any questions.

* *Maximal exercise test: An incremental exercise test on a stationary bike to assess your fitness.*

During the test you will be required to wear a facemask so that the air you breathe out can be analysed. The test will start with a 5 minute warm on a stationary bike. Immediately following the warm up the test will cycle at an intensity of 100 Watts. The power will then be increased by 25 Watts every minute – this means it will become harder and harder to continue cycling as you progress through the test. You will be instructed to maintain your preferred cadence throughout the test. The test will be terminated upon your when you are no longer able to maintain the required cadence (i.e. dropped by > 10 rpm). Your heart rate will also be monitored throughout the test.

***Visits 3 & 4,***

On these four visits you will complete the same cycling protocol, but will be given different combinations of inhalers for each. The study is a blinded study, which means you will not know which treatment you are taking in each trial until the study has finished.

* *Cycle trial protocol: A combination of sprints, rest and steady cycling which will be repeated in each visit.*

You will first be given the inhaler treatment and after 20 min you will perform a 6 second repeated sprint test (6SRS) on a cycle ergometer. This sprint test will comprise 5 x 6 second sprints with a 24 second rest in between each sprint. You will then complete a 45min steady state cycle at 70% of your maximum. On finishing this you will repeat the 6SRS test. You will then have a 30min recovery period during which you will be given a repeat dose of the inhaler treatment. You will then perform another 6SRS test.

During the cycling trial you will have your heart rate monitored and we will be asking you your rating of perceived exertion (RPE). We will also be monitoring your muscle oxygenation of your thigh using Near Infrared Spectroscopy (NIRS). In the periods where you are not cycling we will be asking you about your mood, your perception of fatigue and about any side effects that you may be experiencing. We will also ask you to perform a reaction time task on a computer at regular intervals.

* *Inhaler treatment:* There will be four combinations of treatment that you will be given. We need to leave 5 days between each trial so that there is complete recovery and drug washout from the previous trial.
	+ *Trial A*: First treatment dose: Eight inhalations of 100µg Salbutamol (800µg). Second dose: Eight inhalations of 100µg Salbutamol (800µg).
	+ Trial B: First treatment dose: Eight inhalations of placebo inhaler. Second dose: Eight inhalations of placebo inhaler.

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

* You will get a free assessment of your airway health (worth £216.00)
* A free VO2 max (maximal exercise test) assessment (worth £200.00).

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

Yes. All the information about your participation in this study will be kept confidential. The information collected will be stored on a password protected computer. Only the principal researcher and supervisor will have access to your data.

**If I take part in this study, how will you protect my privacy?**

The findings may be published in medical journals or presented at conferences, but this would not include any information that would let others know who you are. All data that we collect from you will be held anonymously using a participant code made up of numbers and letters. We will hold your personal records separately. These personal records will be destroyed within 12 months of you completing the study. We will continue to hold the data from the testing for 5 years after the study has finished.

**What are the risks and possible discomforts from being in this study?**

* The breathing challenge has the potential to provoke narrowing of your airways. This may feel a little uncomfortable. You may feel like it is more difficult to breathe air out, or your chest may feel tight. The dry air used in the challenge may make you feel like you want to cough for a little while after the challenge. Drinking water will relieve this. You will not be able to take part in the study if your resting lung function appears obstructed (If it is less than 70% of your predicted value). Your lung function will be closely monitored during the breathing challenge. If your lung function falls below 10% of your baseline level following either the breathing or exercise challenge you will be offered a Salbutamol inhaler to use which will reverse the reduction in lung function. You will be advised not to leave the laboratory until your lung function is within 10% of your resting value.
* The risks associated with the maximal exercise test are fatigue, muscle soreness, irregular heartbeat, chest pain and sudden heart attack. To minimize these risks you will undergo a warm-up exercise prior to the starting of testing. You will have your heart rate and the rate of perceived exertion monitored continuously throughout the test. The test will be stopped at any point if we think that you are either (a) having difficulty breathing or (b) incurring any other form of distress. Also, the test will be terminated if you feel that either of the above conditions is occurring. Immediate first aid will be provided by qualified individuals in the unlikely event that something adverse occurs.
* If you compete in a competition that may result in you being drug tested there is a possibility your urine may present with high levels of Salbutamol. This may result in you being sanctioned with an Anti-Doing violation. You should therefore avoid competing in these events if you take part in this study.
* There are potential side effects to taking the drugs Salbutamol. These include: fine tremor, nervous tension, muscle cramps, palpitations, tachycardia and arrhythmias (irregular heart beat), sleep disturbances, headache, anxiety, quivering, restlessness, oropharyngeal irritation (mouth and gum irritation), taste disturbances, rash, nausea. Salbutamol use will be overseen by a trained Sports Physician. If you develop significant side effects from Salbutamol you will be instructed to stop participation in the study.
* If you are concerned about the potential side effects of taking part in trial you can discuss this with the study sports physician (Dr. Mike Loosemore) or contact your GP. If you experience any of the above side effects you should inform a member of the research team immediately.

**Who will know I am taking part?**

* The research team and your GP. We will write to your GP to let them know of your intention to take part in the study.

**How long does the study participation last for?**

In total, your involvement will be no more than 8 hours over a 5 week period.

**How do I prepare for each testing visit?**

You will be asked to prepare for each of the test visit by doing the following:

* No high intensity exercise 24 hours before each visit.
* No food within 2 hours of testing. Please also try to eat a similar meal before each testing occasion.
* No alcohol within 24 hours before each visit.
* No sports drinks or caffeine intake 4 hours prior to each test.
* Free from illness or infection in the two weeks before the tests.
* Arrive fully hydrated for your test.
* Abstain from taking the following medication: Short acting β-agonists within 12 hours of testing. Long acting β-agonists, antihistamines, leukotriene modifiers and sodium cromoglycate within 48 hours of testing.

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

This research study is being organised and funded by the School of Sport and Exercise Sciences at the University of Kent.

**If I have questions or concerns about this study, who can I contact?**

You can contact the principal researcher listed below for questions specifically related to this study.

Anna Jackson

School of Sport and Exercise Sciences,

University of Kent,

Medway Building,

Chatham Maritime,

Kent, ME4 4AG

Email: arj20@kent.ac.uk

**What if there is a problem?**

If you have complaints or concerns about this research you can contact Professor Samuele Marcora, the Director of Research at the School of Sport and Exercise Sciences (e-mail: s.m.marcora@kent.ac.uk; phone: 01634 882971).

**What do I do now?**

If you understand the information given in this form, and wish to participate, then please fill in the attached consent form.