

## Medex 2015 Research Project Lay Descriptions

|  |                                       |              |                                       |
|--|---------------------------------------|--------------|---------------------------------------|
| <b>1 The sources of stress and associated coping strategies when working at altitude</b>   |                                       |              |                                       |
| Sue Paddon   |                                       |              |                                       |
| <b>What's the idea</b>   |                                       |              |                                       |
| Working (and travelling) at altitude can be stressful. The way in which people prepare for, and develop techniques for coping with these stresses will be investigated. The study aims to suggest recommendations for how people can be better prepared when going to altitude in the future.  |                                       |              |                                       |
| <b>What will be done to you</b>  |                                       |              |                                       |
| You will be asked to provide written answers to a questionnaire before, during and after the expedition.<br>You will be asked to keep a personal diary to make notes during the trip, which will be handed in at the end, but need only be identified by your participant code number.<br>Your information will remain anonymous throughout the project. |                                       |              |                                       |
| <b>Why you might not be allowed to take part</b>   |                                       |              |                                       |
| <b>Frequency of testing</b>  |                                       | <b>Links</b> | <b>Blood</b>                          |
| Pre Exp  | <input checked="" type="checkbox"/> Y | 1st BC       | <input checked="" type="checkbox"/> Y |
| Acclim.  | <input type="checkbox"/>              | Post Exp     | <input checked="" type="checkbox"/> Y |
| More often   | <input type="checkbox"/>              |              |                                       |
| <b>Log Book</b>  |                                       |              |                                       |
| <b>Further info from:-</b> Sue Paddon, <a href="mailto:sue.paddon@btopenworld.com">sue.paddon@btopenworld.com</a>  |                                       |              |                                       |

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| <b>2 Effect of positive expiratory pressure on symptoms, extravascular water accumulation and cardiovascular function at high altitude</b>   |                                       |              |                                       |
| Samuel Verges, Thomas Rupp, Pierre Bouzat, Guillaume Walther, Francois Esteve  |                                       |              |                                       |
| <b>What's the idea</b>   |                                       |              |                                       |
| High altitude and low oxygen levels can cause breathing problems and symptoms of acute mountain sickness (AMS), including a build-up of fluid on the lungs (high altitude pulmonary oedema). Breathing out against a restriction (positive expiratory pressure or PEP) has been shown to increase the level of oxygen in the blood and reduce some of the symptoms. Exactly how this works has not been fully tested or explained under real altitude conditions. This project aims to investigate the effects of PEP on the lungs, heart and blood oxygen levels to understand how it works and if it can be used safely to manage altitude sickness without drugs. |                                       |              |                                       |
| <b>What will be done to you</b>  |                                       |              |                                       |
| You will be asked to lay on a bed and breath through a mouthpiece for 1 ½ hours. You will have a pulse oximeter on your finger and similar system on your forehead to check your blood oxygen levels. Your lungs will be checked for fluid using ultrasound and the performance of the heart and brain will also be checked using a type of ultrasound. On the expedition you will be asked to record any symptoms using an AMS score.<br>The same tests will be repeated at base camp.  |                                       |              |                                       |
| <b>Why you might not be allowed to take part</b>   |                                       |              |                                       |
| You should not have done any intensive or prolonged physical exercise within 3hrs before the test.   |                                       |              |                                       |
| <b>Frequency of testing</b>  |                                       | <b>Links</b> | <b>Blood</b>                          |
| Pre Exp  | <input checked="" type="checkbox"/> Y | 1st BC       | <input checked="" type="checkbox"/> Y |
| Acclim.  | <input checked="" type="checkbox"/> Y | Post Exp     | <input type="checkbox"/>              |
| More often   | <input type="checkbox"/>              |              |                                       |
| <b>Log Book</b>  |                                       |              |                                       |
| Y  |                                       |              |                                       |
| <b>Further info from:-</b> Samuel Verges, <a href="mailto:sverges@chu-grenoble.fr">sverges@chu-grenoble.fr</a>   |                                       |              |                                       |

**3 Testing the relationship between fitness and expedition success: is being fitter associated with less illness, more enjoyment and better performance?**

Sam Oliver, Jamie Macdonald

***What's the idea***

Success on expeditions can be defined by such things as reaching a summit or level of enjoyment. How physical or mental fitness influence these is not clear. This project will test people's fitness prior to the expedition. It will then assess how people respond by looking at: altitude success, ascent rate, responses to exertion, self-confidence and mood. The study aims to determine the importance of fitness for high altitude expeditions.

***What will be done to you***

Your fitness will be tested at the pre-expedition weekend on both days.

On one day you will be asked to exercise to exhaustion on a treadmill.

On the other day you will be asked to take a step test (in time to a metronome) involving 4 minutes rest breathing normal oxygen, 4 minutes rest breathing low oxygen, 4 minutes exercise breathing normal oxygen and 4 minutes exercise breathing low oxygen.

During both tests you will have a mouthpiece for gas analysis, a fingertip pulse oximeter and blood samples taken from your earlobe.

You will fill in a general questionnaire and have AMS and mood questionnaires explained to you for completing on the expedition.

Two 5 minute step tests will be done at base camp, taking the same measurements as at the pre-expedition weekend. One will be on a day when you are rested and one when you have either crossed a high pass or returned from a summit ascent.

There will be an entry in the daily log book for your mood to be recorded.

***Why you might not be allowed to take part***

***Frequency of testing***

Pre Exp  1st BC  Acclim.  Post Exp  More often

***Links***

***Blood***

***Log Book***

Y

Y

***Further info from:-*** Sam Oliver, [s.j.oliver@bangor.ac.uk](mailto:s.j.oliver@bangor.ac.uk)

**4 Cerebrovascular benefits of remote ischaemic preconditioning during ascent to high-altitude; implications for acute mountain sickness**

Damian Bailey, Julian Brugniaux, Luke Liddle, Naomi Dodd, Kate Thomas

***What's the idea***

One symptom of acute mountain sickness is headache. This may be due to shortage of blood to the brain caused by lack of nitrous oxide (NO) - which helps increase blood flow. Daily training during ascent, which involves the use of cuffs to decrease and increase the blood flow to the legs, may release more NO and help reduce AMS headaches.

***What will be done to you***

At the pre-expedition weekend while both resting and exercising hard, a blood sample will be taken, the blood supply in your heart and brain will be monitored using ultrasound, your oxygen saturation will be measured using a fingertip pulse oximeter, and you will breathe through a mouthpiece.

This same test will be repeated at base camp.

During the trek to base camp you will have cuffs on your legs for 40 minutes each morning and evening which will be repeatedly inflated and deflated.

***Why you might not be allowed to take part***

***Frequency of testing***

Pre Exp  1st BC  Acclim.  Post Exp  More often

***Links***

***Blood***

***Log Book***

Y

Y

***Further info from:-*** Jamie Macdonald, [j.h.macdonald@bangor.ac.uk](mailto:j.h.macdonald@bangor.ac.uk)

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|--|--------------------------|--------|--------------------------|--|--------------------------|--------------|--------------------------|-----------------|--------------------------|---|--|--|---|
| <b>5</b>   |                          |        |                          | <b>Heart Rate fall off may predict AMS</b> |                          |              |                          |                 |                          |   |  |  |   |
|  |                          |        |                          | Chris Wolff                                |                          |              |                          |                 |                          |   |  |  |   |
| <b>What's the idea</b>   |                          |        |                          |  |                          |              |                          |                 |                          |   |  |  |   |
| The severity of symptoms of Acute Mountain Sickness typically increase as the oxygen saturation of the blood decreases. It has also recently been shown that as the oxygen saturation drops there is usually an increase in heart rate. It is likely that by pumping more blood around the body the amount of oxygen supplied to the muscles and organs is maintained. In some people there seems to be a point where the heart rate does not continue to increase, and hence the AMS symptoms may worsen. Plotting the oxygen saturation and heart rate on a simple graph may help to predict when you are going to suffer from increased AMS symptoms. |                          |        |                          |  |                          |              |                          |                 |                          |   |  |  |   |
| <b>What will be done to you</b>  |                          |        |                          |  |                          |              |                          |                 |                          |   |  |  |   |
| You will keep a daily record in your log book of oxygen saturation, heart rate and AMS symptoms.<br>You will plot this information on a graph in the log book with the assistance of a researcher in your group.   |                          |        |                          |  |                          |              |                          |                 |                          |   |  |  |   |
| <b>Why you might not be allowed to take part</b>   |                          |        |                          |  |                          |              |                          |                 |                          |   |  |  |   |
| <b>Frequency of testing</b>  |                          |        |                          |  |                          | <b>Links</b> | <b>Blood</b>             | <b>Log Book</b> |                          |   |  |  |   |
| Pre Exp  | <input type="checkbox"/> | 1st BC | <input type="checkbox"/> | Acclim.                                    | <input type="checkbox"/> | Post Exp     | <input type="checkbox"/> | More often      | <input type="checkbox"/> | Y |  |  | Y |
| <b>Further info from:-</b> Jamie Macdonald, <a href="mailto:j.h.macdonald@bangor.ac.uk">j.h.macdonald@bangor.ac.uk</a>   |                          |        |                          |  |                          |              |                          |                 |                          |   |  |  |   |

*The following project will not be performed on the members of the expedition, but is included to give details of a project which research volunteers may wish to get involved in during the expedition*

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| <b>6</b>   |  |  |  | <b>Medex 2015 Porter Survey</b> |  |  |  |
|  |  |  |  | Mary Morrell (and you?)         |  |  |  |
| <b>What's the idea</b>   |  |  |  |                                 |  |  |  |
| The purpose is to raise the awareness of foreign nationals in their duty of care for the Nepalese staff employed to support their expeditions and treks, particularly in remote regions. The project will build on experience gained during the 2010 project published in High Altitude Medicine and Biology (Preparation and Medical Outcomes of Nepalese Staff and Porters Compared with Foreign Nationals on the Annapurna Trekking Circuit, Volume 12, Number 4, 2011). Remote regions of Nepal have less infrastructure to support expeditions/treks, requiring more Nepalese support and reduced access to assistance in the event of accidents and illness. We hypothesize that there will be a high risk of serious medical mishap to Nepalese when supporting expeditions/treks in remote regions |  |  |  |                                 |  |  |  |
| <b>What will be done</b>   |  |  |  |                                 |  |  |  |
| Data from other trekking groups and their associated Nepalese staff will be collected through questionnaires during the 2015 Medex Expedition to gain better understanding of the nature of any incidents, the preparedness of the expedition/trek and the awareness of foreign nationals of responsibility. The outcome will be the absolute number (and proportion) of Nepalese serious medical mishaps per number of foreign nationals on expedition/trek on a remote area. We will also record the nature of the medical incidents recorded, evaluate the preparedness of the expeditions questioned and evaluate the awareness of responsibility for trek safety by Foreign Nationals   |  |  |  |                                 |  |  |  |
| <b>Further info from:-</b> Mary Morrell, <a href="mailto:m.morrell@imperial.ac.uk">m.morrell@imperial.ac.uk</a>  |  |  |  |                                 |  |  |  |

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| <b>7</b>  |                                     |        |                                     | <b>Sleep disturbances, tissue oxygenation and acclimatisation at high altitude</b> |                                     |              |                          |                 |                          |  |  |   |
|   |                                     |        |                                     | Samuel Verges, Thomas Rupp, Pierre Bouzat, Guillaume Walther, Francois Esteve      |                                     |              |                          |                 |                          |  |  |   |
| <b>What's the idea</b>  |                                     |        |                                     |  |                                     |              |                          |                 |                          |  |  |   |
| It is common while sleeping at altitude for people to take a number of breaths, and then have a short period without breaths. This is known as periodic breathing or sleep apnea. This was thought to be showing poor acclimatisation, but recent laboratory research has indicated it may actually be showing good acclimatisation, and people who do more periodic breathing may have higher average blood oxygen levels during sleep. This project will test these ideas while sleeping on a real expedition at altitude by monitoring breathing and the blood oxygen levels in the muscles and brain. |                                     |        |                                     |  |                                     |              |                          |                 |                          |  |  |   |
| <b>What will be done to you</b>   |                                     |        |                                     |  |                                     |              |                          |                 |                          |  |  |   |
| Before you go to sleep you will be fitted with a small sensor to monitor your breathing, and sensors on your forehead, finger and thigh to monitor the blood oxygen levels. The sensors will be removed the following morning. Some tests will be done at the pre-expedition weekends, but the main test will be done at base camp on the first night of your arrival and then again a few days later. Some people who plan to climb Larkya Peak may be asked to wear the oxygen sensors during their climb. The AMS score recorded in your daily log book will be noted.                                 |                                     |        |                                     |  |                                     |              |                          |                 |                          |  |  |   |
| <b>Why you might not be allowed to take part</b>  |                                     |        |                                     |  |                                     |              |                          |                 |                          |  |  |   |
| <b>Frequency of testing</b>   |                                     |        |                                     |  |                                     | <b>Links</b> | <b>Blood</b>             | <b>Log Book</b> |                          |  |  |   |
| Pre Exp   | <input checked="" type="checkbox"/> | 1st BC | <input checked="" type="checkbox"/> | Acclim.  | <input checked="" type="checkbox"/> | Post Exp     | <input type="checkbox"/> | More often      | <input type="checkbox"/> |  |  | Y |
| <b>Further info from:-</b> Samuel Verges, <a href="mailto:sverges@chu-grenoble.fr">sverges@chu-grenoble.fr</a>  |                                     |        |                                     |  |                                     |              |                          |                 |                          |  |  |   |