



MOUNT EVEREST FOUNDATION

SUMMARY REPORT FORM

from an MEF SUPPORTED SCIENTIFIC RESEARCH EXPEDITION

Support for an expedition is offered on condition that you submit detailed reports to the MEF. To assist in fulfilling this commitment, it is requested that you fill in this form and return (preferably by E-mail) to the secretary within four weeks of return from the expedition. Please expand/contract the spaces in this form as required. Include or attach at least one good digital photo from your scientific work in progress and, if relevant, photos of any interesting findings.

1 - Name of Expedition:

Widening participation for females: Sex differences in cardiovascular acclimatisation to high altitude

2 - Expedition Leader/Organiser: Dr Lydia Simpson

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3 - MEF reference: 22-33

4 - Country/Region: White Mountain Research Station, CA, USA

5 - Names of all members who took part in this expedition. Please include explanations if the team varied from the originally-stated plan

All team members originally stated on the MEF application took part in the expedition: Dr Lydia Simpson, Dr Jonathan Moore, Dr Mike Stenbridge and Dr Alex Williams.

6. List here each of the main scientific objectives from your original proposal, and provide brief notes on the extent to which you were able to make observations or collect sufficient data in order to have a fair chance of addressing them. Only a sentence or brief paragraph is required per objective: please save the details for the final report. We understand that it may take time to analyse and interpret the results fully and are simply seeking a summary of how well things went, what is likely to work, and what might have failed.

The aims and objectives of our research trip changed to focus on examining vascular function amongst males and females at rest and during exercise at high altitude, rather than cardiac function.

Original Specific objective 1: Examine cardiac structure and function amongst males and females at rest and during exercise following 7-14 days at high altitude.

Updated Specific objective 1: Examine *vascular* structure and function amongst males and females at rest and during exercise following 7-14 days at high altitude.

In line with the updated specific aim 1, we examined intra-arterial blood pressure, vascular and blood flow responses to HA at rest and during exercise in males and females. Furthermore, at rest, we assessed several aspects of blood pressure control. First, we measured the sympathetic constrictor and heart rate responses to large, pharmacologically-induced changes in blood pressure, comparable to those experienced during standing, in order to determine the function of the arterial baroreflex (body's major short-term blood pressure control mechanism). In addition, we assessed the responsiveness of alpha-adrenergic receptors within the blood vessels that translate the sympathetic signal sent by the baroreflex into a vascular response, which corrects alterations in blood pressure. Furthermore, we also examined the blood pressure, blood flow and vascular responses to exercise, in both the active and non-active muscles. This was to determine whether adequate oxygen is being delivered to the exercising muscle at high altitude and whether there are adequate responses within the inactive muscle, which helps to direct oxygen to exercising muscles.

Original Specific objective 2: Characterise changes in blood volume, pulmonary arterial pressure and sympathetic nervous system control on cardiac function in males and females, to identify mechanisms underlying potential differences in cardiac structure and function.

Updated Specific objective 2: Characterise changes in blood volume, pulmonary arterial pressure and sympathetic nervous system control on *vascular* function in males and females, to identify mechanisms underlying potential differences in *vascular* structure and function.

In line with the updated specific aim 2, we characterised sympathetic nervous system activation at high altitude, and investigated the role of both elevated pulmonary pressure and the input from the body's main oxygen sensor (peripheral chemoreceptors) in eliciting these responses in males and females. Furthermore, we investigated the contribution of alpha-adrenergic and beta-adrenergic receptors in eliciting the vascular and blood flow responses observed at rest and during exercise at HA, via local intra-arterial infusion of pharmacological blockades (phentolamine and propranolol).

Unfortunately, due to research team illness, and unforeseen circumstances we were able to collect repeated measures data in 7 males and 7 females, rather than the 15 anticipated. Due to personal reasons, one participant tested at low-altitude could not take part in the HA portion of the trip. Furthermore, the expedition physician was not able to insert the brachial artery catheter into two subjects at HA and two participants contracted COVID-19 and were required to isolate for the entirety of the trip and excluded from testing.

7 - Overall dates of the expedition from leaving home country to return:

Departure date was 9th September and return date was 25th September 2023

9 - Comment on any other relevant aspects related to travel to the area, logistics, permits, and any planned or opportunistic collaborations that happened during the fieldwork.

Most aspects of the research expedition to the Barcroft Research Station in California went smoothly. We experienced no issues relating to importing research equipment and travel to the Barcroft research station by car. The facilities at the Barcroft Research station were excellent for performing research, although, on several occasions there was an intermittent power supply that minorly affected data collection. However, staff at the Barcroft Research centre were fantastic in providing help and support in resolving these issues quickly and ensuring the smooth running of the facility. Due to the close geographical proximity of the Barcroft laboratory to the major city of Bishop, any issues relating to the supply of consumables and gases could be easily sorted.

The larger expedition will be the subject of a blog in Physiology News at the Physiological Society and during our trip, some of our research was included in an ABC10 video published on Youtube (<https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fyoutu.be%2F-dGglEIPSu4&data=05%7C01%7Cmstembridge%40cardiffmet.ac.uk%7C75211aae5d444e2821f208dab1621d28%7C189dc61c769b40488b0f6de074bba26c%7C0%7C0%7C638017332540976710%7CUnknown%7CTWFBpGZsb3d8eyJWljoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6I6k1haWwiLCJXVCi6Mn0%3D%7C2000%7C%7C%7C&sdata=X9bQ9VwlnS%2BebLplqgKRAMhbWMFY9M92W1JQC6w%2F%2BSw%3D&reserved=0>).

10 - Expected date of submission of Final Report. We expect the Final Report to be delivered within three months from the date of the expedition's return. If you feel unable to comply with this, please give reasons:

Due to the large volume of data that was generated during this expedition, which is anticipated to result in a minimum of 5 peer-reviewed publications, it will take a considerable amount of time to process and analyse. Expected submission of the final report is anticipated at the end of March 2023.

When completed return to secretary@mef.org.uk

MEF-Z (2022)