

## **INFORMATION AND CONSENT FORM**

Department of Kinesiology  
University of Waterloo

Study Title: **Physiological Demands during Mars Analogue Extravehicular Activity**

Conducted By: Kenneth S. Pizzolitto, MSc. and Richard L. Hughson, PhD.

### **Purpose of the Study:**

The purpose of this study is to determine the physical fitness requirements for performance of simulated extravehicular activity (EVA), such as: setting up and repairing of equipment, collection of rock samples, and geographical exploration, during a training/research expedition at a simulated Mars colony in the Utah desert. Understanding of the rigors of such work will aid in the prescription of exercise programs and the implementation of performance criteria for those engaging in long term space flight and extraterrestrial exploration. A thorough examination of performance parameters will also aid in the design of efficient EVA suits.

### **Description of Experiments:**

You are being asked to take part in research designed to determine physiological cost of simulated Mars extravehicular activity (EVA). We will monitor the demands of EVA drills so that we can suitably associate these demands with crew selection criteria and/or exercise prescription. We will also monitor the actual and perceived cost of wearing the Mars analogue EVA suit consisting of a computer ventilated helmet, backpack with water supply, gloves, and boots.

There are three components to this testing. The exact duration of the EVA is to be determined on site according to the requirements of the mission. You may, or may not be involved in all three components and you may withdraw from testing at anytime.

Component 1 - Graded Exercise Test – This will be a ramp test on a treadmill where following 4 minutes of warm up at a light running speed the velocity will be increased to a comfortable running pace and the grade increased two percent every two minutes thereafter. The test will be terminated when you reach volitional fatigue – the point at which you feel you can no longer continue.

Component 2 – Measurement of the energy requirements and thermoregulatory demands of Mars analogue EVA tasks. These tasks will include standard emergency drills (evacuation/repair of habitat/rover) as well as various planetary research scenarios. These tasks will be performed both with and without the donning of the EVA suit.

Component 3 - Measurement of recovery following EVA.

**Benefits to you: You will have the opportunity to learn more about your individual physiologic responses to simulated Mars EVA as well as your current physical condition with regards to aerobic and anaerobic power.**

## **The procedures and risks are explained below:**

We will measure oxygen uptake (VO<sub>2</sub>), carbon dioxide output (VCO<sub>2</sub>), and heart rate (HR) in all experiments and we will monitor skin and core temperature in some experiments.

### Oxygen Uptake and carbon dioxide output:

Oxygen uptake is monitored using a portable breath by breath gas collection system. A sterilized rubber mask is placed over the nose and mouth. The mask is held in place by 4 elastic straps attached to cloth head piece.

### Heart Rate:

Heart rate is continuously monitored by Polar heart rate band. The band is moistened with a wet towel prior to application. The band is held in place by a single elastic strap.

### Skin temperature:

In experiments where the duration of the test in combination with the potential heat load might cause a marked elevation of body temperature, skin temperature will be continuously monitored by remote skin temperature probes. The probes have hypoallergenic adhesive and will be placed in various locations. If required, hair on the skin will be removed by a single use, disposable shaver to facilitate placing and removing the probes. There is a small risk of skin rash in response to the adhesive. If this occurs, keep the area clean and avoid scratching. It should resolve in one-three days.

### Core temperature:

In experiments where the duration of the test in combination with the potential heat load might cause a marked elevation of body core temperature, this will be measured by an ingestible radio capsule. The capsule is a single use plastic device certified for human use that is swallowed with water. It will simply pass out of your digestive tract in a day or two.

### Medical Screening Form:

This questionnaire asks some simple questions about your health status. This information is used to guide us with your entry into the study. Only current health problems related to cardiovascular diseases including bleeding disorders, kidney problems or chronic back pain indicated on this form will exclude you from the study.

### Confidentiality of Data:

For all testing, the data collected will be strictly confidential and will not be released to anyone for any reason without your full written approval. For the purpose of the research, all participants will receive a number/letter coding that will not permit identification of an individual. Data will be stored in a secured location available only to the main investigators and technical support staff.

### Contact Information:

Professor Richard L. Hughson - office 888-4567 ext. 2516, or laboratory ext. 6137.  
Office of Research Ethics at the University of Waterloo, Dr. Susan Sykes, 888-4567ext. 6005.

**Consent of Participant**

I have read the information presented above about the procedures and risks involved in this study and have received satisfactory answers to my questions related to this study. If you have any questions about participation in this study, please feel free to ask the researchers. If you have additional questions at a later date, please contact Dr. Hughson at 519-888-4567, extension 2516, or e-mail [hughson@healthy.uwaterloo.ca](mailto:hughson@healthy.uwaterloo.ca).

This project has been reviewed and received ethics clearance through the Office of Research Ethics at the University of Waterloo. In the event you have any questions or concerns about your participation in this study, please contact Dr. Susan Sykes at 519-888-4567, extension 6005. I am aware that I may withdraw from the study at any time simply by advising the researchers of this decision. With full knowledge of all foregoing I agree, of my own free will, to be a participant in this study.

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Dated at Mars Desert Research Station, Utah

\_\_\_\_\_  
Witnessed

**Medical Screening Form**

STUDY: **Physiological Demands during Mars Analogue Extravehicular Activity**

Name: \_\_\_\_\_  
\_\_\_\_\_

Local Address: \_\_\_\_\_

Phone #: \_\_\_\_\_ Birth Date: \_\_\_\_\_ Course at U of W: \_\_\_\_\_  
Regular Physician (Name & Address) \_\_\_\_\_

**SELF REPORT CHECK LIST**

**Past Health Problems:**

- |                                  |     |                           |     |
|----------------------------------|-----|---------------------------|-----|
| Rheumatic Fever                  | ( ) | Epilepsy                  | ( ) |
| Heart Murmur                     | ( ) | Varicose Veins            | ( ) |
| High Blood Pressure              | ( ) | Disease of Arteries       | ( ) |
| High Cholesterol                 | ( ) | Emphysema, Pneumonia,     | ( ) |
| Congenital Heart Disease         | ( ) | Asthma, Bronchitis        | ( ) |
| Heart Attack                     | ( ) | Back Injuries             | ( ) |
| Heart Operation                  | ( ) | Other (describe overleaf) | ( ) |
| Diabetes (diet or insulin)       | ( ) | Kidney and liver disease  | ( ) |
| Ulcers                           | ( ) | Heartburn                 | ( ) |
| Bleeding from Intestinal Tract   | ( ) |                           |     |
| Enteritis/colitis/diverticulitis | ( ) |                           |     |
| Bleeding disorders               | ( ) |                           |     |

**Present Health:**

List current problems:

- 1.
- 2.

For females: Pregnant \_\_\_\_ Nursing \_\_\_\_

List medications taken now or in last 3 months:

- 1.
- 2.

**List Symptoms:**

- |                      |     |                  |     |
|----------------------|-----|------------------|-----|
| Irregular Heart Beat | ( ) | Fatigue          | ( ) |
| Chest Pain           | ( ) | Cough Up Blood   | ( ) |
| Short of Breath      | ( ) | Back Pain/Injury | ( ) |
| Persistent Cough     | ( ) | Leg Pain-Injury  | ( ) |
| Wheezing (asthma)    | ( ) | Dizziness        | ( ) |

**Current Training Status:**

I consider my training status to be: High ( ), Average ( ), Low ( ).

List the types of activities that you do on a regular basis

Habits: Smoking: Never ( ) Ex-smoker ( ) Regular ( ) Average # cigarettes/day ( )

Signature \_\_\_\_\_ of \_\_\_\_\_ Subject: \_\_\_\_\_  
Witness: \_\_\_\_\_

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The current study has been identified as requiring medical clearance: Yes \_\_\_\_\_ No X