

Mask Configurations for CO₂ Washout

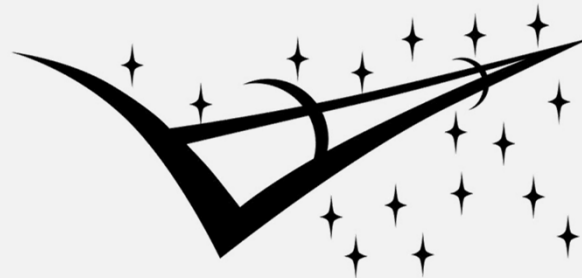
Ellie Ahlquist

University of Nebraska-Lincoln

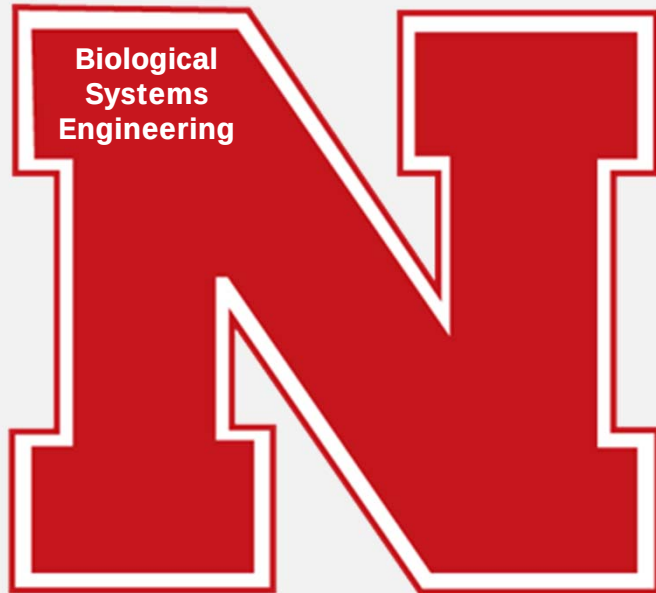
Jason Norcross, M.S.

Extravehicular Activity Physiology

SPACE LIFE SCIENCES
SUMMER INSTITUTE



Introduction



Objectives of Internship

- To gain invaluable experience in the career field I plan to pursue
- To work on a project that is of use to NASA's plans for overall astronaut health and performance
- Make progress in the downselect of mask configurations to accurately monitor inspired carbon dioxide in a suited environment

Background

- Testing CO₂ washout in various mask configurations
- Must be certain astronauts do not inspire too much CO₂ in an EVA suit
- Symptoms of hypercapnia include: rapid breathing, dizziness, headache, fogginess in thoughts, increased blood pressure and heart rate

Methods/Procedures or Skills

□ For suited testing:

Resting data

1000 BTU/hr – arm ergometer

2000 BTU/hr – treadmill or arm ergometer (subject's choice)

3000 BTU/hr – treadmill

□ Values measured:

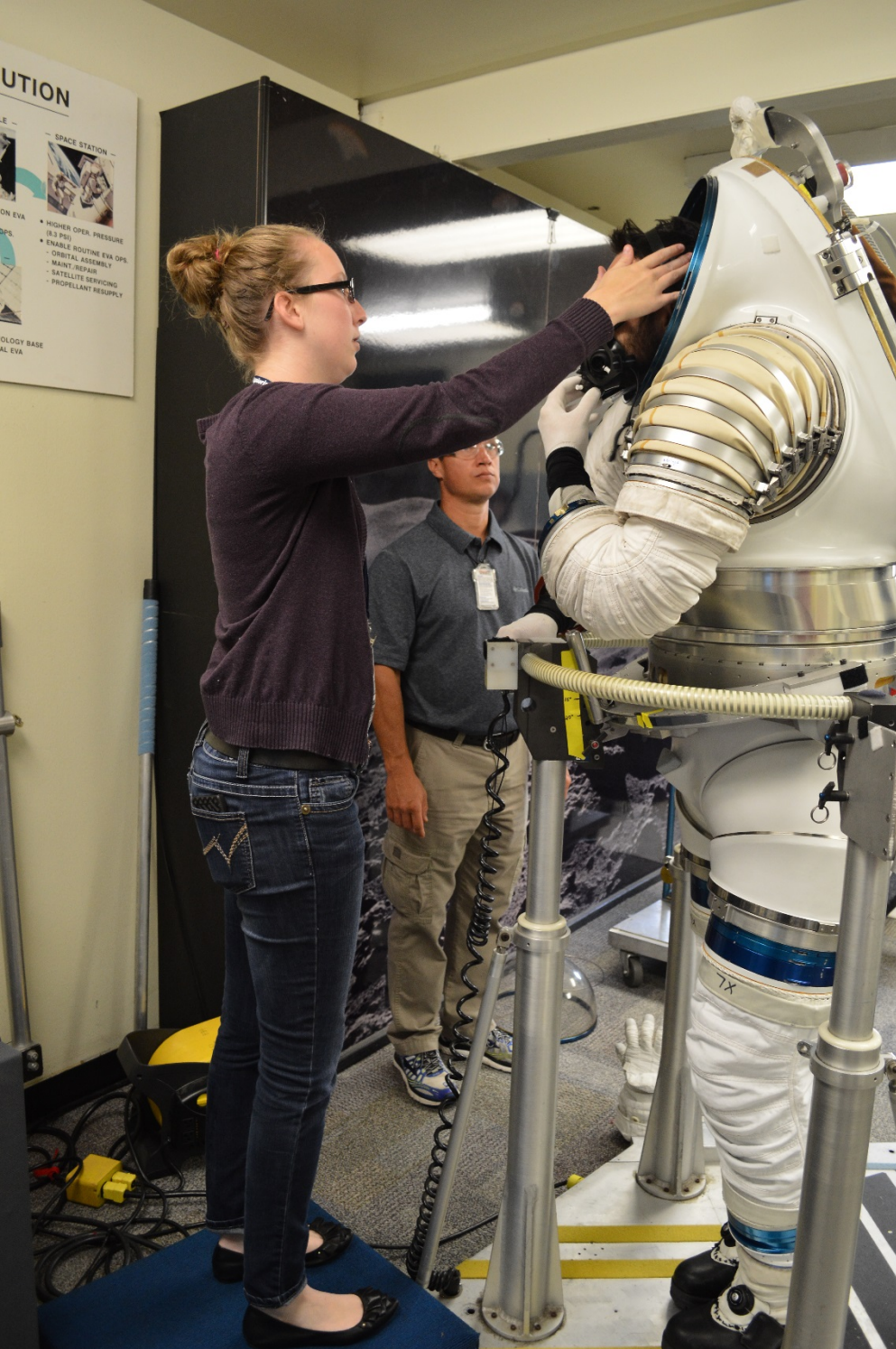
Metabolic rate – Constant gas sampling of exhaust umbilical using CO₂ analyzer and O₂ analyzer as well as inlet suit flow rate

Inspired and expired CO₂ – 2 to 4 gas sample ports surrounding nose and mouth routed to CO₂ analyzer

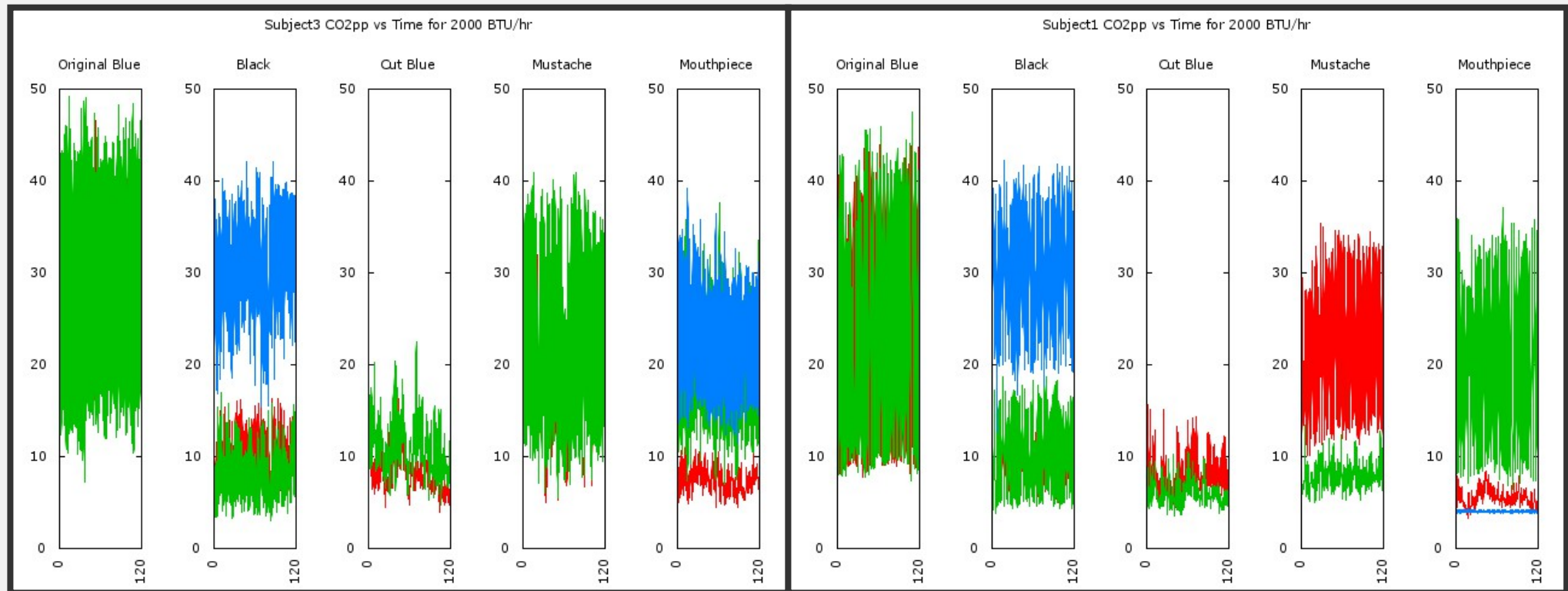
Heart rate – wireless







Results



Discussion

- Leaning toward the horseshoe/mustache design for future testing

Redesign to improve human factors

Test in MACES suit at the end of August

Test in vacuum environment in March 2015

Develop potential suit analog using a resting metabolic rate ventilated hood and a supine ergometer

