Human Performance Projects

Project Description

Project: Performance Patch (Wearable Predictive Diagnostics for War Fighter Maintenance)

Partners

QUT

The University of Queensland AUSTRALIA

CREATE CHANGE

une University of New England

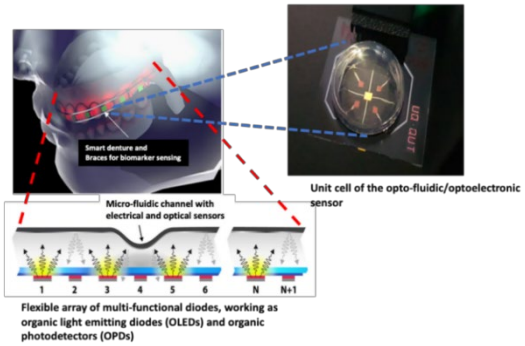
Griffith UNIVERSITY Queensland, Australia

Purpose

- Multi-function performance patch to detect predictive and response biomarkers of human stress and performance.
- Understand the effect on human physiology and select tissue specific biology of various common stressors

Product

- Wearable sensor technology
- Blood, saliva and sweat biobank



Human Performance Projects

Path to Impact

Project: Performance Patch (Wearable Predictive Diagnostics for War Fighter Maintenance)

What we have learnt so far?

- ✓ Ethical clearance; Staff onboarded
- ✓ Heat, Muscle, Psychosocial and Sleep Deprivation trials underway
  - Additional samples, proposed and approved
- ✓ Initial biofluid data expected Jan 2023
- ✓ Developed:
  - Robust Data Management Architecture
  - Established biobank of samples with projected 32,000 samples / aliquots
- ✓ Sensor platforms

What does that mean for ADF capabilities?

- ✓ Predict and Monitor human performance / stress
- ✓ Enable optimised task management during deployment
- ✓ Optimise individual and team performance

Human Performance Projects

The Science

Project: Performance Patch (Wearable Predictive Diagnostics for War Fighter Maintenance)

A/Prof Tony Parker
Project Lead
Biomarkers

Prof Graham Kerr
Project Co-Lead
Exercise and Neuroscience

Dr Andrew Hunt
Project Management
Heat Stress

Prof Ian Stewart

Dr Jonathan Peake

Prof Simon Smith

Dr Cassandra Pattinson

Prof Karen Sullivan

Prof Ottmar Lipp

A/Prof Chamindie Punyadeera
Saliva diagnostics

Dr Daniel Broszczak
Proteomics / metabolomics

Biomarkers

A/Prof Ajay Pandey
"O-skin" Sensor engineering

A/Prof Marianella Chamorro-Koc
Sensor Design

Prof Christian Cook
SIS Sensor development

Sensors

Dist/Prof Kerrie Mengerson
Statistics & Data Science

Prof Clinton Fookes
Machine learning; AI; AV Systems Dev

Data Science

Sensor development

PHASE 1: Body and Mind (BaM) Stress Trials (~1.5 years)

Heat stress	*Musculoskeletal stress*	*Sleep stress*	*Psychosocial stress*

Sample collection: Blood, saliva, sweat / Interstitial fluid
Physiology: ECG, HRV, EEG, body temperature, blood pressure, respiration
Physical function: Endurance, muscular strength, muscle soreness, limb circumference
Cognitive function: Cognitive stress test, reaction time tests, fear/anxiety, decision making

Biomarker analysis for proteins, metabolites and miRNA in biofluids

Data analysis: Machine learning, multivariate statistical analysis, Bayesian modelling

Presentation and discussion of Phase 1 findings with Defence stakeholders

PHASE 2: Refinement and field testing of patch technology (~ 2 years)

Biomarker selection from Phase 1 for integration into sensors

Refinement of optoelectronic sensors and subdermal interstitial sampling

Field testing; sensor data collection; sampling of interstitial fluid; environmental monitoring

Data analysis: Machine learning, multivariate statistical analysis, Bayesian modelling

Presentation and discussion of Phase 2 findings with Defence stakeholders