

Outline of Human Spaceflight and Microgravity Programme funding

The funding from the Human Spaceflight and Microgravity Programme has been awarded to the following four academics and individual scientists working at UK research organisations:

1. **Validation of blood transcriptome-based biomarkers for the effects of microgravity on human physiology – Dr Simon Archer, University of Surrey - £16,631**

Essential physiological processes such as immune and inflammatory responses, cardiovascular function, sleep and circadian rhythms, are all jeopardised during spaceflight. Molecular processes associated with the disruption of these processes remain largely unknown. This project will use sophisticated bioinformatics approaches to interrogate our unique human time series genome-wide whole-blood gene expression data to develop and optimise a gene expression study that could be undertaken aboard the ISS to identify molecular biomarkers for the effects of spaceflight on human physiology.

2. **Motile microbes in space (MOTILE) - Professor Charles Cockell, University of Edinburgh - £70,000**

Microbes are used in many processes on Earth from drug production to fermentation. In space, they will also play vital roles in life support systems, waste water treatment and even in economic uses such as removal of economically useful elements from rocks. However, at the core of these applied uses are some fundamental scientific questions. One of these questions is how microbes behave in microgravity and how microgravity influences microbial growth. This study will use existing expertise and previous space microbial reactor design to finalise an experiment design to investigate how does microgravity affect microbes that are able to swim (motile bacteria) compared to those that (non-motile bacteria) in space.

3. **Terahertz Atmospheric/Astrophysics Radiation Detection in Space – Dr Daniel Gerber, RAL Space - £75,000**

This project proposes the deployment of an innovative remote sensing instrument that will advance Earth Observation (EO) and Astronomy: Terahertz Atmospheric/Astrophysics Radiation Detection in Space (TARDiS). TARDiS will view the present state, and future climate influence of the turbulent upper atmosphere of our planet, and also image regions of deep space tracing the birth of stars and planets and unveiling their evolution. This project will study and refine the TARDiS instrument payload requirements and specifications so as to enable integration with the ISS Bartolomeo platform.

4. **Microgravity as a model for accelerated skeletal muscle ageing - Professor Malcolm Jackson, University of Liverpool - £78,285**

Loss of skeletal muscle mass and function are important factors in increasing frailty and loss of independence in older people. There is considerable interest in the possibility that exposure to microgravity provides an accelerated model for skeletal muscle ageing and that analogous mechanisms may underlie loss of muscle mass and function in both situations. This project will undertake a series of preliminary studies to determine the feasibility of examining the effect of contractile activity on responses of skeletal muscle cells (myotubes) in microgravity in comparison with myotubes stimulated in an identical manner in earth's normal gravity.