

NASA HRP	NASA BIOCHEMICAL PROFILE PROJECT	BIOCHEMICAL PROFILE
Principal Investigator		
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Description		
<p>The National Aeronautics and Space Administration (NASA) Human Research Program (HRP) develops, conducts, and delivers research findings and countermeasures that will maintain the health and safety of crews aboard the International Space Station (ISS) and future explorations class missions. Research operations are conducted on the ISS including the collection of human physiological samples and their return to Earth for analysis. These operations include the areas of clinical medicine, cardiovascular, bone and muscular systems, immunology, endocrinology, and urology. To support these objectives, the Biochemical Profile Project will be instituted to strategically support these investments to meet the challenges of human research.</p> <p>Blood and urine are commonly used to assess an astronaut's health as well as conduct research in physiological disciplines by measuring key biomarkers found in these fluids. In support of research studies, this project will collect, process and store blood and urine samples obtained during the preflight, in-flight and postflight phases of ISS missions and maintain a database of results from the analysis of these samples. This database will offer supporting evidence to scientists by providing metabolic profiles of the effects of space flight on human physiology.</p> <p>The operation of the Biochemical Profile Project will allow a rapid response to research scientists requesting flight research data investigating effects of microgravity on human physiology and to evaluate the effectiveness of countermeasures ensuring the health and performance of humans during and after space flight. Human physiological systems work together and the establishment of this biochemical profile will provide a resource enabling the recognition of interactions through a cross-discipline approach.</p>		
Objectives		
<p>The objective of this project is to collect, process, store blood and urine samples. The project will develop a database of pre-, in- and postflight biomedical data that can be shared with multi-disciplinary investigators and medical operations to assess the effects of space flight on human physiology, provide evidence to evaluate potential countermeasures and inform medical risks and standards to protect human health and performance during space missions.</p>		
Relevance		
<p>The International Space Station (ISS) provides a platform to investigate the effects of microgravity on human physiology prior to exploration class missions. Biological samples provide a means for investigating the physiological responses to space flight. The samples collected for this project will focus on blood and urine samples. The collection and analysis of these samples in a single database will be a valuable resource with which researchers can validate scientific hypotheses, perform operational assessments, study space-flight related changes, and investigate physiological markers. This comprehensive database may be also used for the assessment of proposed countermeasures evaluating their effect on different physiological systems. Multiple samples from an individual will be collected, processed and stored during the pre-, in- and postflight phases of ISS missions. The establishment of the NASA Biochemical Profile Project will provide a multi-disciplinary database enabling supporting evidence to meet the goals of scientific and programmatic relevance to the space program.</p>		
BDC Summary		
<p>L-180 and L-45: 48-hour urine collection, blood draw and exercise history for 1 week leading up to session. DEXA scan between L-365 and launch.</p> <p>L-10: 24-hour urine collection, blood draw</p> <p>R+0: 48-hour urine collection, blood draw, DEXA scan (or as soon as possible for DEXA)</p> <p>R+30: 48-hour urine collection, blood draw and exercise history for 1 week leading up to session.</p>		
In-flight Operations Summary		
<p>In-flight operations will consist of five sessions scheduled on FD 15, 30, 60, 120, and 180. Each in-flight session includes a fasting blood draw and 24-hour void-by-void urine collection. Approximately 30 ml of blood will be collected during each of the scheduled in-flight sessions. In-flight blood will be processed using the ISS centrifuge and stored in the Minus Eighty-Degree Laboratory Freezer for ISS (MELFI) until return to earth. Two urine aliquots will be removed from the in-flight urine collection device and frozen. When possible, all blood and</p>		

urine collection sessions will be combined with medical operations testing or on-going research investigation to minimize inconveniences for crewmembers.

Subject Selection/Participation Criteria