



Human Research Program

Nutritional Biochemistry Laboratory

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May 2013

Biochemical Profile

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Background

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The Nutritional Status Assessment SMO resulted in significant findings in many areas, including:

- **Vision** Documented evidence that biochemical markers of one-carbon metabolism were altered in crewmembers who experienced vision-related issues during and after flight
- **Exercise** Documented that well-nourished crewmembers exercising with the ARED returned with BMD virtually unchanged from preflight
- **Fish/Bone** Documented a relationship between fish intake and bone loss in astronauts (that is, those who ate more fish lost less bone)
- **Iron/Oxidative Damage/Bone** Documented a relationship between increased iron stores and oxidative damage to DNA, along with evidence that a greater increase in iron stores is associated with bone loss
- **Calcium** Contributed to the ISS Program by helping engineers understand how and why the Urine Processor Assembly clogged
- **Vitamin K** Documented that vitamin K status and bone vitamin K-dependent proteins are unaffected by space flight
- **Testosterone** Documented that testosterone is unchanged during flight, but a transient decline occurred after landing



Objectives

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Following the success of the Nutritional Status Assessment project, HRP decided it would be valuable to develop a database of blood and urine biochemistry from virtually all ISS crewmembers

This protocol is designed to collect data to populate that database



Design

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Schedule

- 3 pre-flight blood/urine collections
- 5 in-flight blood/urine collections
 - FD15, FD30, FD60, FD120, FD180
- 2 post-flight blood/urine collections
 - R+0
 - R+30

Samples will be analyzed for a battery of tests

Vitamins/Minerals Proteins Bone Markers
Antioxidants Renal Stone Risk Hormones
General Chemistry Cytokines



Importance

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- This protocol will provide critical information about the time course of inflight biochemical changes for multiple physiological systems
- Inflight sample collections allow better insight into countermeasure effectiveness
- Likely significant application to Earth-based populations



References

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