NASA Facts

National Aeronautics and
Space Administration

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Renal Stone
Renal Stone Risk During Spaceflight: Assessment and Countermeasure

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Increment(s) Assigned: 3, 4, 5, 6, 8 and 11
Operations: Inflight

Objective

This experiment examines the risk of renal (kidney) stone formation in crewmembers during the preflight, in-flight and post-flight timeframes. Potassium citrate (K-cit) is a proven ground-based treatment for patients suffering from renal stones. In this study, K-cit tablets will be administered to astronauts and multiple urine samples will be taken before, during and after spaceflight to evaluate the risk of renal stone formation. From the results, K-cit will be evaluated as a potential countermeasure to alter the urinary biochemistry and lower the risk for potential development of renal stones in microgravity. This study will also examine the influence of dietary factors on the urinary biochemistry, investigate the effect flight duration on renal stone formation and determine how long after spaceflight the risk exists.

Brief Summary

Kidney stone formation is a significant risk during long-duration spaceflight that could have serious consequences since it cannot be treated as it would on Earth. Quantification of the renal stone-forming potential that exists during long-duration spaceflight and the recovery after spaceflight is necessary to reduce the risk of renal stone formation. This is a long-term study to test the efficacy of potassium citrate as a countermeasure to renal stone formation. NASA fuels discoveries that make the world smarter, healthier and safer.

Strategic Objective Mapping

This is a long-term study to test the efficacy of potassium citrate as a countermeasure to renal stone formation. Kidney stone formation is a significant risk during long-duration spaceflight that could impair astronaut functionality.

Space Applications

Human exposure to microgravity results in a number of physiological changes. Among these are changes in renal function, fluid redistribution, bone loss and muscle atrophy, all of which contribute to an altered urinary environment and the potential for renal stone formation during and immediately after flight. In-flight changes previously observed include decreased urine volume and urinary citrate and increased urinary concentrations of calcium and sodium. The formation of renal stones could have severe health consequences for crewmembers and negatively impact the success of the mission.

This study will provide a better understanding of the risk factors associated with renal stone development during and after flight, as well as test the efficacy of potassium citrate as a countermeasure to reduce this risk.

Earth Applications

Understanding how the disease may form in otherwise healthy crewmembers under varying

environmental conditions will also provide insight into stone forming diseases on Earth.

For more information visit:
http://www.nasa.gov

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