

## Monitoring for Renal Stone Recurrence in Astronauts With History of Stone

### Monitoring for Recurrence of Renal Stones in Astronauts

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#### Introduction

After an initial stone episode persons are at increased risk for future stone formation. A systematic approach is required to monitor the efficacy of treatment and preventive measures, and to assess the risk of developing new stones. This is important for persons working in critical jobs or austere environments, such as astronauts.

#### Methods

A literature review of the current standards of care for renal stone monitoring and imaging was done. Military and civil aviation standards were also reviewed, as well as the medical precedents from the space program. Additionally, a new, more effective, renal stone ultrasound protocol has been developed. Using this work, a monitoring algorithm was proposed that takes into consideration the unique mission and operational environment of spaceflight.

#### Results

The approach to imaging persons with history of renal stones varies widely in the literature. Imaging is often done yearly or biannually, which may be too long for mission critical personnel. In the proposed algorithm astronauts with a history of renal stone, who may be under consideration for assignment, are imaged by a detailed, physician-driven, ultrasound protocol. Unassigned personnel are monitored by yearly ultrasound and urine studies. Any positive ultrasound study is then followed by low-dose renal computed tomography scan. Other criteria are also established.

#### Discussion

The proposed algorithm provides a balanced approach between efficacy and reduced radiation exposure for the monitoring of astronauts with a renal stone history. This may eventually allow a transition from a risk-averse, to a risk-modifying approach that can enable continued service of individuals with history of renal stone that have adequately controlled risk factors.