

ASSESSING THE RISK OF DISC HERNIATION RELATED TO LANDING IMPACT FOLLOWING LONG-DURATION SPACEFLIGHT

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Previous research has shown that crewmembers returning on the Space Shuttle have an increased incidence of herniated nucleus pulposus after spaceflight [SMITH REF]. This increased risk is thought to be related to disc volume expansion due to unloading and prolonged exposure to microgravity. Although there is an increased risk of disc herniation in Space Shuttle astronauts, it is unknown if dynamic landing loads further contribute to the risk of herniation.

To determine if dynamic loads increase the risk of incidence, data from crewmembers (excluding cosmonauts) returning on the Soyuz spacecraft will be compared to Space Shuttle astronauts. These data will be obtained from the Lifetime Surveillance of Astronaut Health (LSAH) Project at NASA. Severity and incidence after spaceflight will be mined from the data, and statistical analyses will be used to determine if Soyuz crewmembers have a higher incidence of disc herniation than Space Shuttle crewmembers.

The results are expected to show no difference between Space Shuttle and Soyuz crewmembers, indicating that higher dynamic loads on landing and long-duration spaceflight do not significantly increase the risk of disc herniation.

If no difference is shown between the two crewmember populations, then disc volume expansion due to microgravity does not significantly increase the risk of injury due to dynamic loads for deconditioned crewmembers. Any risk associated with deconditioning would be primarily due to bone structure changes and resulting bone strength changes.

This study is an important first step in determining whether the spinal disc plays a role in injury due to dynamic loads.