

SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Human Physiology in Space (1) (2)

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MICROGRAVITY-INDUCED BACK PAIN AND INTERVERTEBRAL DISC HERNIATION:  
INTERNATIONAL SPACE STATION RESULTS**Abstract**

There are yet unresolved spinal changes during and after microgravity exposure. Crewmembers frequently report moderate to severe back pain in space and upon return to Earth a high incidence of intervertebral disc (IVD) herniation in the cervical and lumbar spine. In response to NASA's Critical Path Roadmap Risks and Questions regarding disc injury and higher incidence of HNPs after space flight (IRP Gap-B4), we are performing state-of-the art imaging analyses of crewmembers to investigate the mechanisms of in-flight back pain and IVD herniation post-flight. Twelve International Space Station (ISS) crewmembers are approved for participation in this study. To date, seven crew members have consented to our protocol and three have completed all pre-flight and post-flight testing. Crewmembers complete a battery of six tests before and after a 6 month mission to determine how the discs and other spinal structures change and whether anatomical alterations correlate with reported back pain. Pre-flight and post-flight baseline data are derived from six tests: 1. supine MRI lumbar and cervical spines (morphology/water content), 2. MR Spectroscopy (IVD metabolites), 3. Upright MRI (axial load with 10