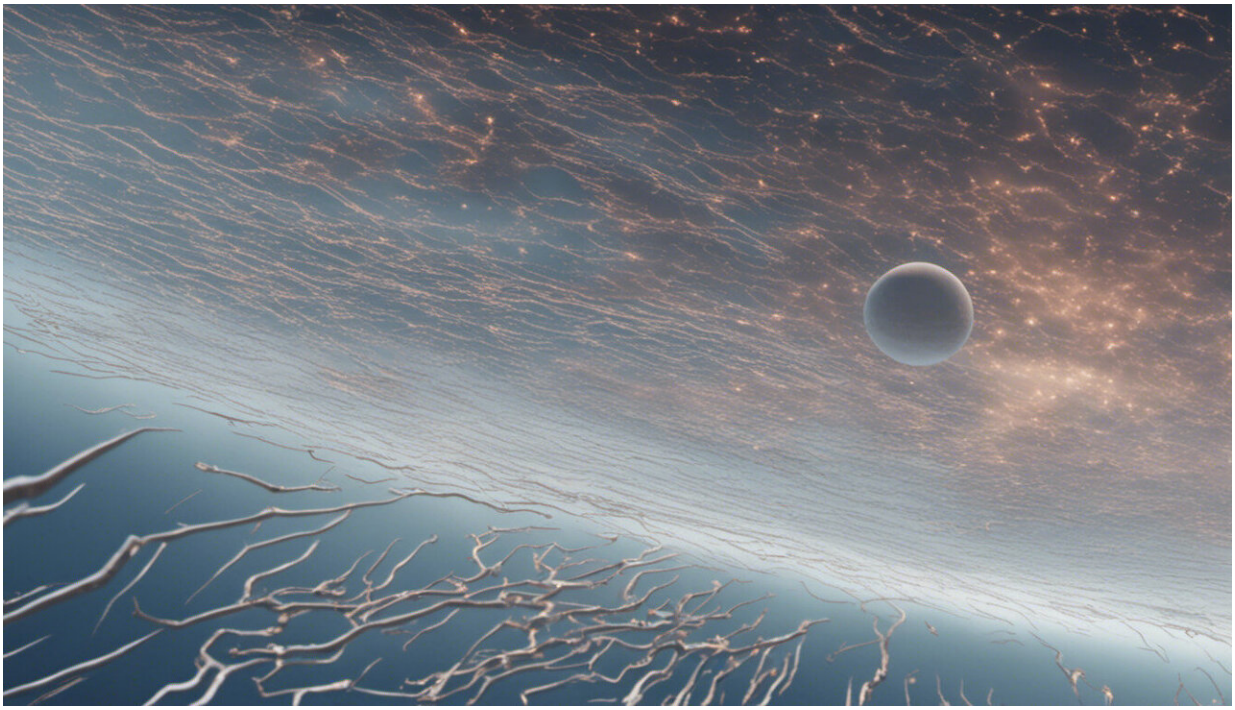
Station spinal ultrasounds seeking why astronauts grow taller in space

January 4 2013, by Jessica Nimon



Credit: AI-generated image (disclaimer)

(Phys.org)—Did you ever wish you could be just a teensy bit taller? Well, if you spend a few months in space, you could get your wish—temporarily. It is a commonly known fact that astronauts living aboard the International Space Station grow up to 3 percent taller while living in microgravity. They return to their normal height when back on

Earth. Studying the impact of this change on the spine and advancing medical imaging technologies are the goals of the Spinal Ultrasound investigation.

"This is the very first time that spinal ultrasound will be used to evaluate the changes in the spine," said Scott A. Dulchavsky, M.D., Ph.D., principal investigator for the station study. "Spinal ultrasound is more challenging to perform than many of the previous ultrasound examinations done in space."

Part of the difficulty with imaging the spine is quite simply human anatomy. Using Ultrasound 2, the machine aboard station as a facility for human health studies, astronauts have an advanced tool to view the inner workings of their bodies.

"Today there is a new ultrasound device on the station that allows more precise musculoskeletal imaging required for assessment of the complex anatomy and the spine," Dulchavsky said. "The crew will be able to perform these complex evaluations in the next year due to a newly developed Just-In-Time training guide for spinal ultrasound, combined with refinements in crew training and remote guidance procedures."

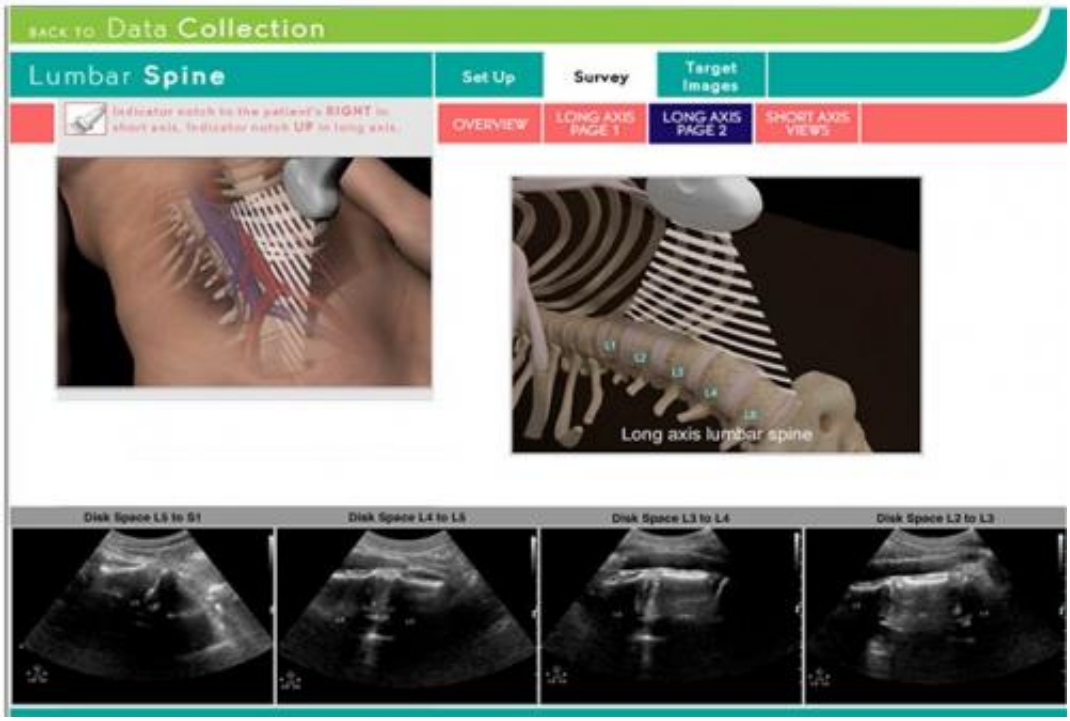
The opening 'Splash screen' from the Spinal Ultrasound Just-In-Time training tool that launched in the fall of 2012 to aid crew training in ultrasound of the cervical and lumbar spine. The learner can select the buttons to launch the intensity of training required, from a simple familiarization to complete overview. Credit: Dulchavsky

The research could help with developing exercises for better crew health and guiding improved rehabilitation techniques when astronauts return to Earth. Understanding how changes to the spine occur in real-time response to life in space also will help crews prepare for future long-duration missions.

Another benefit of this research is that spinal ultrasound could gain clinical acceptance on the ground for medical testing. Dulchavsky points out that this shift could reduce costs and provide a safer imaging option

for patients.

"Ultrasound also allows us to evaluate physiology in motion, such as the movement of muscles, blood in vessels, and function in other systems in the body," said Dulchavsky. "Physiologic parameters derived from ultrasound and Doppler give instantaneous observations about the body non-invasively without radiation."



The body navigator portion of the Just-In-Time tool reveals the internal anatomy structure as the user moves the mouse over an area of the body image. By allowing the user to see below the skin surface, they can identify the region of interest and correctly orient the ultrasound imaging transducer. Credit: Dulchavsky

Six crew members will serve as test subjects for these spinal ultrasound scans. The data sessions are scheduled to take place on orbit starting in

January 2013. An astronaut will scan the spinal area of a fellow crew member at 30, 90, and 150 days into flight. Researchers will watch in real time from the ground via streaming video downlinks. Ultrasound images will focus on the cervical and lumbar areas of the spine and surrounding tissues. The test subjects will also undergo pre- and post-flight ultrasound and MRI scans on Earth to provide baseline data.

Ultrasound technology is convenient for use not only in space, but also here on Earth. Due to the portability of the machines, the rapid training methods developed by NASA researchers and the repeatability, ultrasound can offer an inexpensive and scalable alternative to MRIs for healthcare needs. Medical personnel already make use of the training methods developed for the space station crews when using ultrasound in remote areas.

"This technique in spinal ultrasound may someday serve as a clinical data source where standard MRI imaging is not available, even if this seems ambitious," Dulchavsky said. "The vast majority of the global population has no access to an MRI. The in-flight tools such as the interactive Spinal Ultrasound guide can also be used to train other complex procedures, albeit medical or otherwise."

So just why do astronauts get taller in space? Researchers are hoping this study will help answer that question, while also growing medical knowledge of the spine and improving ultrasound methods and procedures.

Provided by NASA