LSAH Newsletter

A semiannual publication of the Longitudinal Study of Astronaut Health

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Study gets "off the ground"

Participants begin receiving physical examinations

The Longitudinal Study of Astronaut Health (LSAH) is up and running. The study's first civil service participants, who are serving as the control subjects for the LSAH, have come in for their physical examinations and more are being scheduled.

As a reminder, the purpose of this study is to examine the risks of illness and mortality associated with the occupational exposures experienced by astronauts. Current and former civil service employees of the Johnson Space Center have been randomly selected, from age/sex specific groups, and invited to participate in the LSAH. Those employees who consented to participate in the study will, throughout the course of the study, receive medical examinations at the JSC Occupational Medicine Clinic or provide their medical records for data collection. The incidence of medical events among civil service employees will be compared to the astronauts' experiences.

Comparison Group Update

The recruitment of comparison subjects for the LSAH has thus far been a success. Letters were mailed to 837 civil service employees, who were identified as potential comparison subjects. The study's goal is to obtain 585 of those employees as comparisons to the astronauts.

As of April 1, 1993, 653 (78 percent) invitees have responded. Of those responses, 572 (88 percent) have agreed to participate in the LSAH. The study now has 98 percent of the participants needed.

Current addresses are being verified for the 200 who have not yet responded. If *YOUR* address, or telephone number, has changed, please see the back of this newsletter for instructions on how to notify the LSAH Project Office of the change.

JSC security will provide temporary badges and parking permits for those who need them. A limited number of reserved parking spaces, at Building 37, will also be available for study participants.

Letters of welcome have been mailed with a detailed set of instructions regarding procedures for the physical examination. Participants are notified, according to their birthdays, when it is time to schedule their examinations. Those participants with birthdays occurring January through April have

***Study update** continued on page 4*

Welcome all participants!

Study logo magnet enclosed

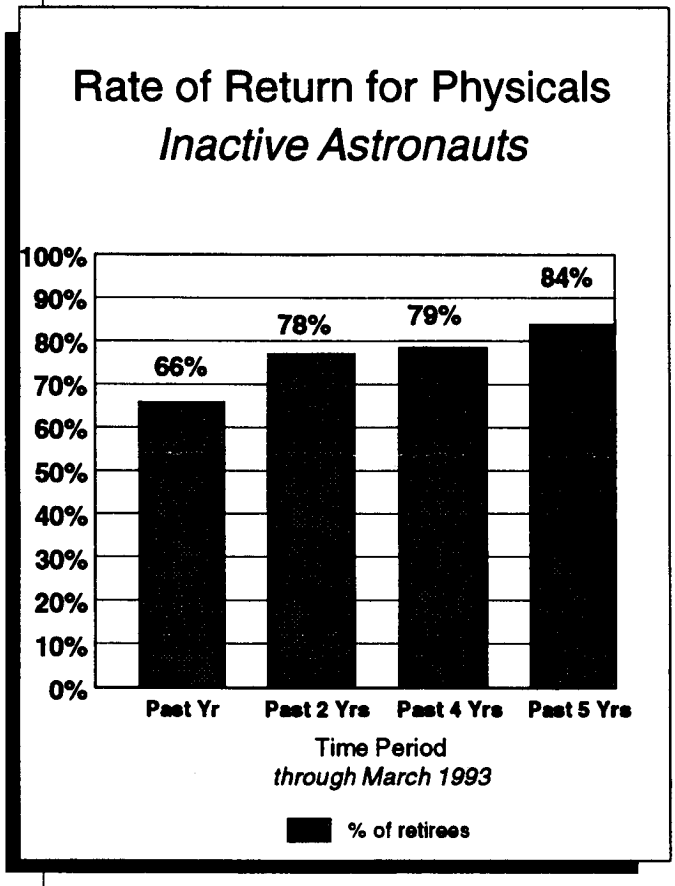
The LSAH staff takes this opportunity to welcome all participants to the study! The study is underway now, and we need your continued commitment and support to help make it a success.

Some of you have already been contacted to schedule your physical examinations. Others of you may not hear from us for awhile, depending on when your birthday is, but we will be in touch.

You will find enclosed in this newsletter a magnet with the study logo. We want to offer an appreciative gesture for your participation in this important study. The magnet also provides you with a visible reminder that you are a member of this study. Display it proudly!

More participation needed from inactive astronauts

The graph below illustrates that, while most do, not all inactive astronauts return each year for physical examinations. We are striving for 100 percent participation by inactive astronauts in this study. By not returning for a physical examination, important data is missing and risk estimates become less certain. Please check your calendars and schedule your return visit. Encourage your peers to return also. If you cannot return, medical event data from your physician would be helpful. Call the JSC Flight Medicine Clinic, (713) 483-7999, to schedule your appointment.



Bone density study to include some LSAH participants

As early in the U.S. space program as the Gemini and Apollo missions, bone mineral loss during space flight has been observed and studied in astronauts.

As part of its study on the long-term effects of space travel on humans, the Longitudinal Study of Astronaut Health is participating in the collection of bone density data from astronauts and from the study's comparison group—JSC civil servants.

There are about 30 astronauts who have volunteered for bone density measurements thus far, with more astronauts being recruited all the time. A subsample of about 90 civil servant study participants will be asked to undergo the same measurements. That number is consistent with the study's 3:1 ratio for the comparison group to astronaut population The subsample of civil servants will expand as new astronauts volunteer for the study.

The randomly selected subsample will include only individuals who reside in the Houston area. This will allow scheduling of appointments separate from the annual physical examination at the JSC Occupational Medicine Clinic.

Identification of the Bone Density Study comparison subjects is underway. These study subjects are being matched to the participating astronauts, with respect to age, sex, body mass index, exercise patterns, and smoking habits.

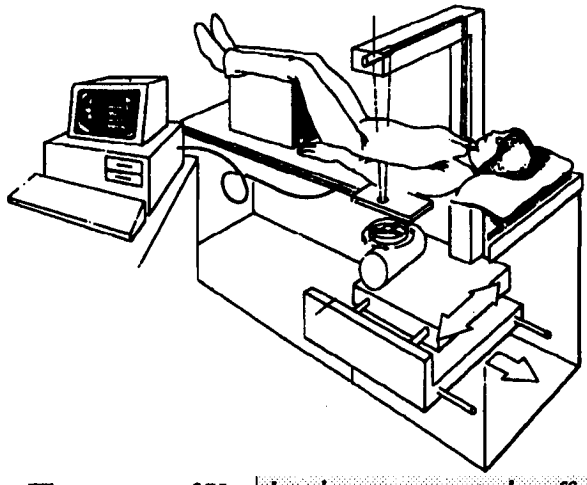
When individuals have been identified as matches, they will be invited to participate. The JSC Bone and Mineral Laboratory will schedule appointments, do the measurements, and collect the resulting data.

Participants will be provided information regarding the results of the bone density measurements. This is a good opportunity to learn about personal bone density status, and the measurements are a noninvasive procedure. If you are selected to participate in the study, you are encouraged to take advantage of this opportunity.

Bone densitometry to provide important data on bone loss

Included in the medical data the LSAH is collecting is bone mineral density data. Bone density is an assessment of the strength of bone based on the concentration of its mineral content. Bone densitometry, the measurement of bone density, is important for determining the risk of osteoporosis and bone fracture.

Why is the LSAH interested in performing bone densitometry on astronauts? We are interested in determining if, over time, astronauts are at increased risk for osteoporosis. Data collected from previous space flights indicate bone mineral loss occurs during flight. The study is primarily concerned with the long–term effects of space flight. We will collect baseline data with state-of-the-art densitometry. Early scans will provide good baseline data that will be compared with future measurements. Diagnosis and risk assessment of osteoporosis and bone fractures can be made.



Currently, the most effective technology for measuring bone mineral density is Dual Energy X-ray Absorptiometry (DEXA), which is the scanning technology that will be used to collect bone density data. Low-dosage X-rays are used for the scans—a dosage much less than that received from dental or chest X-rays. The source of X-ray energy is in the table. The detector is in the arm above (see the diagram). The arm moves in increments along the length of the table taking samples. Each sample detects how much X-ray energy is passing through the bones.

In addition to a full body scan, specific scanning sites include the hip, lumbar spine, and wrist. The hip and spine are the most effective areas for determining fracture risk from bone mineral density values. The whole body scan provides an overall view of the skeletal bone mineral content and bone mineral density, as well as body composition (percent fat, percent lean, and percent bone). Participants in the Bone Density Study will receive three scans—full body, lumbar spine, and hip. The total scan time for the whole body scan is about 15 minutes. Each of the spine and hip scans takes about five minutes. The bone scans will be performed every other year.

About osteoporosis

The National Institute of Health defines osteoporosis as an age-related disorder characterized by decreased bone mass and increased susceptibility to fractures in the absence of other recognizable causes of bone loss. Osteoporosis is more prevalent in women than men. From early childhood, bone density increases in both men and women and reaches a peak in early adulthood. Thereafter, a gradual decrease in bone density occurs for both men and women. Women experience an accelerated bone loss associated with the hormonal changes of menopause. Accelerated bone loss may occur for up to 15 years after menopause, resulting in loss of more than 25 percent of the peak bone mass. On average, up to 50 percent of peak bone mass may be lost before spontaneous bone fracturing occurs.

There is some evidence of bone resorption, but there is question as to whether peak bone density can be recouped once minerals have been lost. Nothing has been proven to be effective in significantly replenishing bone mineral, but estrogen replacement therapy is the most effective treatment by which women can retard bone loss after menopause.

In addition to estrogen replacement therapy, there are other preventive measures one can take. Weight bearing exercise (e.g. walking, tennis, golf) helps build bone density. Adequate intake of dietary calcium and vitamin D is beneficial. The National Academy of Sciences recommends life-long dietary calcium intake of at least 800 mg per day. Postmenopausal women are now encouraged to meet an RDA of 1500 mg per day. Smoking cessation is another way to reduce the risk of bone mineral loss and fracture. Cigarette smoking is associated with a twofold increase in the risk of hip fracture. Slender individuals with small bone structures are more prone to bone loss than those individuals with larger bone structures.

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been reminded to schedule an appointment for a physical examination.

In-flight Study Status

One aspect of the LSAH, which has recently been initiated, is the collection of data on the occurrence of medical events during space flight. The In-flight Astronaut Health Study (IFAHS) investigates the incidence of acute and chronic morbidity and mortality during space travel. This focus on space travel distinguishes the IFAHS as an individual component of the LSAH.

This information is important to the overall conduct of the LSAH because it provides individual astronaut exposure data as well as information on short-term physiological effects of exposure to the space environment. As with the LSAH, medical data collected for the IFAHS is confidentially maintained in accordance with the Privacy Act of 1974. As the study is concerned with assessing the effects of space flight on a population, no individual data will ever be reported. In fact, a computer program removes any patient-identifiable data before the data is analyzed.

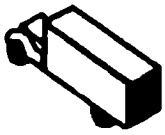
Astronauts undergo a series of physical exams in the pre- and postflight periods. These medical records are reviewed and relevant data is abstracted. In addition, data from astronauts' reports of medical events occurring during flight (such as sinus congestion and backache) are obtained. These data, in combination with overall health history, will be used to assess the short- and long-term effects of space flight on the health of astronauts. Again, IFAHS researchers are committed to ensuring the privacy of these medical data. Only group findings will be reported, thus preserving the anonymity of the individual study participants.

Analog Populations Considered

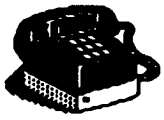
Since exposure to space travel is still very limited, an adequate amount of data is not available for stable statistical analyses. The LSAH's data needs to be supplemented with data from analogous populations. These analog populations provide the necessary sample size to stabilize risk estimates. Populations which have been identified as analogous to the astronaut population include polar/winter-over expedition crews, pilots, submariners, and other military personnel.

These populations are being considered and investigated for data they may provide the LSAH. Of particular interest to the LSAH is the occurrence of acute medical incidents, such as appendicitis, which require emergency medical care and/or evacuation.

Moving? New phone number?



Let us know so we can update our records.
We don't want to lose track of you;
you're an important part of this study!



Call **(713) 212-1362** or **(713) 483-5785**
OR
write to us at the address below:

Longitudinal Study of Astronaut Health
Flight Medicine Clinic/SD26
NASA/Johnson Space Center
Houston, Texas 77058