LSAH

LONGITUDINAL STUDY of ASTRONAUT HEALTH
Newsletter

February 1992

What is the Longitudinal Study of Astronaut Health?

The Longitudinal Study of Astronaut Health (LSAH) will examine basic medical and performance data obtained from manned space programs to determine whether the unique occupational exposures encountered by astronauts are associated with increased health risks.

Baseline physiological variables which may have a confounding effect on morbidity are measured during the selection exam or during the first annual examination after selection. In order to assess change over time, those same physiological variables will be repeatedly measured at specific follow-up annual visits. Risks of morbidity and mortality are to be measured relative to civil service employees located at Johnson Space Center who work and live in the same geographical area as the astronauts.

This study will provide important data which will be useful in: 1) identifying the needs of health care facilities for longer term missions; 2) identifying specific exposures, if any, which increase risk of morbidity and thereby provide direction for the institution of protective measures.

While individual data must be collected in order to obtain group information, the purposes of this study can only be met with the utilization of group data. Individualized clinical care is provided based on individual data; no individual data will be presented in the results of this study. For your information, group data will be made available to you periodically in this newsletter. You may find it of interest to make your own comparisons of your individual data to that of the group.

As an example of how the data is utilized, the following graph shows the mean values of total serum cholesterol for astronauts at different ages. Data from the Lipid Research Clinics Prevalence Study, which included occupational groups and individuals from free-living households, are also shown on this graph. The gradual increase in mean values as age increases is consistent between the astronaut group and the Lipid Research Clinic Prevalence Study population. The more irregular line on the graph, representing the astronaut group, reflects the small number of subjects at each age interval. Variation is reduced with increased numbers of subjects, thus the lines are smoother for the larger study than for the astronaut group.

Even though older groups tend to have higher serum cholesterols levels than do younger groups, it does not necessarily follow that an individual will experience a rising cholesterol level as aging occurs. We will be better able to present you with time dependent data for the entire cohort of astronauts as we progress with the Longitudinal Study.

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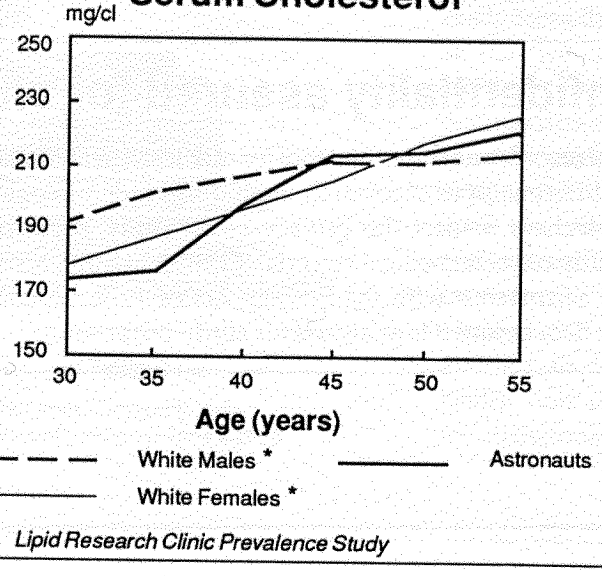
Serum Cholesterol



* *Lipid Research Clinic Prevalence Study*

Attention inactive astronauts:

Longitudinal Study of Astronaut Health depends on your participation

You are the key to the success of the LSAH. This study can not be done without you. In order to determine whether exposure to microgravity has any long-term health effects, we need specific health information from you on a routine basis over the course of time.

When you return to JSC for your physical examination, you will be asked about any illnesses you have experienced since your last visit. The combination of the physical exam and your report of your health history for the past year will be added to the database representing all astronauts.

If we are missing data from anyone, the study is weakened.

A missed annual physical examination visit results in missing study data. Missing data or incomplete data, always a problem in statistical analyses, can pose particularly serious problems in longitudinal studies with restricted numbers of subjects. If we are missing data from anyone, the study is weakened. The sample size is small in terms of epidemiological studies and the ability to make any statistical inferences depends on obtaining complete data. Missing data will reduce the ability of the study to identify real associations.

Traditional methods of analyzing longitudinal data require that subjects without complete data be dropped from the analysis. Few techniques exist to handle the problem of missing data.

We know it is hard to schedule a visit to JSC every year. If you do not return during a given year, we will call you and do a health history interview over the telephone and/or send you a questionnaire to complete. Also, we will ask for your permission to obtain medical records for any hospitalizations or other significant medical events. This method of obtaining health information is not as satisfactory as a visit from you to the Flight Medicine Clinic but it lessens the quantity of missing data. If you usually return, the combination of the two methods of collecting data will allow satisfactory statistical analyses.

If you have not been returning to JSC for your annual physical examination, please consider making a schedule change and make active participation in this study one of your contributions to the body of scientific knowledge. This study will best serve you and future astronauts if you take an active role in making sure that accurate data is collected.

Confidentiality assured for all study participants

The medical record is an important tool for medical research. It contains invaluable clinical data which can be used in different types of research iincluding epidemiologic studies, as is the case with the LSAH. The LSAH researchers respect the privacy of all study participants and are committed to maintaining confidentiality of their medical records. Confidentiality, access, and release of the medical records are handled in accordance with the Privacy Act of 1974. A computer program will remove all patient-identifiable data before it is analyzed for study purposes.

What happens to all that data ?

A question often asked by astronauts returning for their annual exams is, "what are you guys doing with all that data you've been collecting from me over the years?"

In answering that question, let's first look at how much data currently exists. The Flight Medicine Clinic maintains medical data on all the astronauts, from the time of their entrance into the program to present. The figure below graphically portrays the volume of data for 195 crewmembers, the astronaut population's total to date. These available follow-up time data are measured in person years, and, currently, we have a total of 2,605 person years of available medical data. So, besides adding your data to the pile, what else are we doing with it?

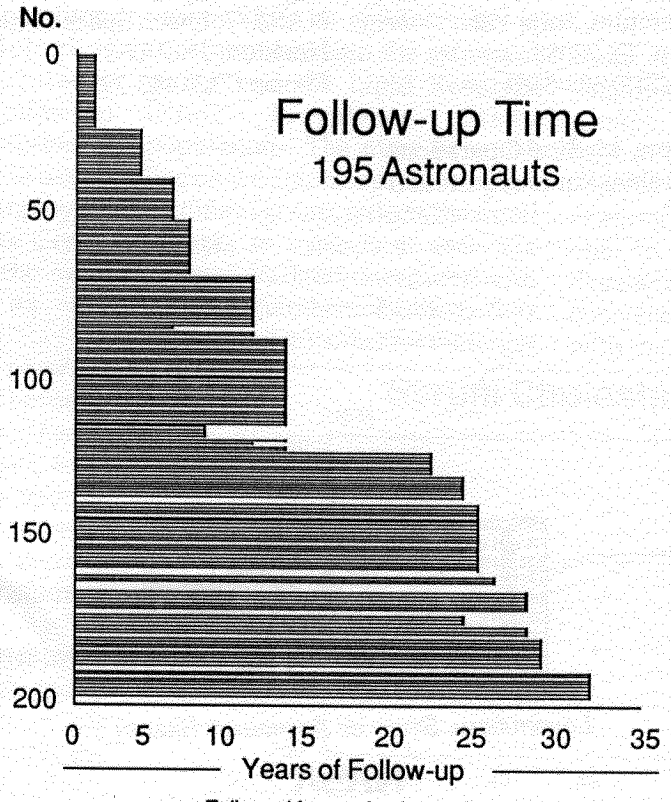
Both your flight surgeon and the LSAH are using the data for research and analyses. Unfortunately, the standard medical chart format is not very user-friendly for performing research, so a database is being created to facilitate research and data analyses. The Longitudinal Study of Astronaut Health will create and use this database for its ultimate goal of assessing health risks associated with being an astronaut. Your flight surgeon will benefit as well, using the database as an effective tool for health care provision.

With the mass of data we have comes the monumental task of converting it into a database that is meaningful and readily accessible for analyses. Therefore, LSAH personnel have begun the task of extracting data from the charts and maintaining it in a computer database.

This database allows for detailed statistical analyses and, as a spinoff, the creation of an electronic medical record. This quickly affords your flight surgeon data that normally would be very time-consuming to compile. For example, you want to see what your total cholesterol and other cardiac risk factors have been since you entered the astronaut corps. This database can display the data, and help identify trends.

To assure confidentiality, access to the database is severely limited by both administration as well as electronic security measures. When group data is analyzed, no names or identifying factors are associated with the data. Information is maintained on an individual basis, but examined by selection classes, by active vs. inactive, and as a whole.

The LSAH staff continues to convert the file cabinet drawers of records into a usable, easily accessible format so that we can better understand the occupational and lifestyle effects upon astronaut health. The data we collect from one astronaut is very important for the research and analyses needed to improve health care provision for all astronauts.



Followed from selection to date.
Person Years of Follow-up Time = 2605

Newsletter will keep participants informed

This is the first LSAH newsletter. Hopefully, from the articles included, you will understand what the study is about as well as what your role is in the study. The purpose of this newsletter is to inform you about the study and keep you updated on the study's findings. Objectives for the newsletter are to print interesting and pertinent information, and to publicize the study and garner support for it. The newsletter will be published at least semi-annually, possibly more if study findings offer timely or significant information. This is *your* newsletter so, of course, your input and questions are encouraged. If you have any questions, comments, or suggestions, please write to the editors at one of the addresses below.

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