THE LONGITUDINAL STUDY OF ASTRONAUT HEALTH

LSAH Newsletter

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Surveillance of Health Risks Among Older Adults

Advances in medical technology, research, and health education have helped individuals aged 65 years and older become the fastest growing segment of the U.S. population, with a predicted increase from 13% in 1999 to 22% in 2030. In addition, the National Center for Health Statistics reports an increase in the U.S. estimated life expectancy from 57.1 years in 1929 to 76.9 years in 2000. These are amazing public health feats. As many diseases and health conditions are more prevalent among older adults, the public health community wants to ensure that not only do adults live longer lives but also maintain good health, independence, and a good quality of life.

Factors leading to morbidity and mortality among older adults include overweight, inadequate fruit and vegetable consumption, physical inactivity, and cigarette smoking. Healthy People 2010 (HP) is a comprehensive set of health objectives that identify public health priorities and quantifiable objectives for the nation by the year 2010. Relevant HP goals include a *decrease* in underweight and overweight to 40% of the adult U.S. population greater than 20 years of age, an *increase* in the percentage who consume a minimum of 2 fruits and 3 vegetables per day to 75% and 50%, respectively, a *decrease* in the number who participate in no leisure-time physical activity to 20%, and a *decrease* in the number of cigarette smokers to 12%.

These factors have been evaluated within the LSAH study populations in comparison with the general public through LSAH data and the Behavioral Risk Factor Surveillance System (BRFSS), 1994-97. The BRFSS is an ongoing, state-based surveillance system maintained by the Centers for Disease Control. The survey is administered annually to a random sample of the noninstitutionalized U.S. civilian population 18 years of age and older. Body mass index (BMI) data for LSAH participants were extracted from medical records in both the JSC Flight Medicine Clinic and Occupational Medicine Clinic. Nutritional data were taken from the Food Frequency Questionnaire (FFQ), and smoking and physical activity data were obtained from the Lifestyle Questionnaire (LSQ). Both the LSQ (1995) and the FFQ (1998) were designed to collect essential data on study participants that were not otherwise collected. There were no responding female LSAH survey participants over the age of 55. Consequently, these

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The Risks and Benefits of Hormone Replacement Therapy

This past July, the Journal of the American Medical Association (JAMA) published an article discussing the results from a major randomized controlled trial looking at the major health benefits and risks of using combined hormonal therapy in postmenopausal women. Hormone replacement therapy (HRT) is effective at relieving menopausal symptoms, and many women can stop taking them after a few years without recurrence of the symptoms. For those women who continued usage of HRT, there had been the comfort of past observational studies that showed long-term use of HRT can reduce osteoporosis, bowel cancer, cardiovascular events, Alzheimer's, and stroke. However, despite this observational evidence, the balance of benefit and harm in healthy postmenopausal women remained uncertain.

In order to gain a better understanding of the use of this therapy, two large randomized trials of postmenopausal long-term use were started in the early 90's. The article featured in JAMA summarized

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data have been excluded for all populations. With the exception of BMI for LSAH populations, all data collected are self-reported; therefore, the estimates may be misreported. However, the skew may be in the same direction for all three populations and may still give a general trend for the health risks being assessed.

OVERWEIGHT

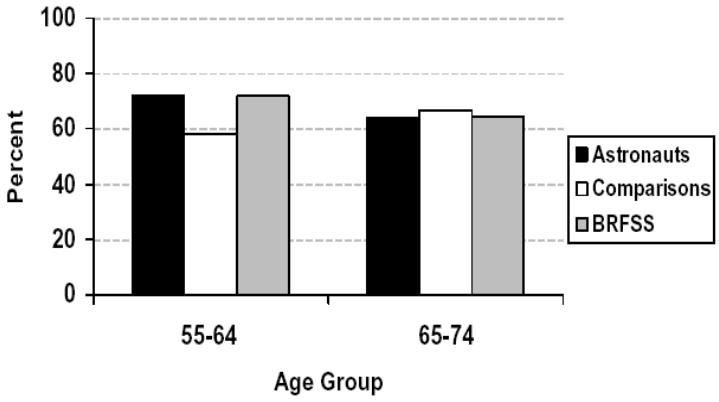
Overweight and obesity account for an estimated 300,000 deaths per year in the U.S. with an economic burden of $117 billion in 2000. Associated health problems include, but are not limited to, heart disease, diabetes, cancer, arthritis, reproductive complications, and psychological disorders. Here, the term 'overweight' includes two individual public health terms: overweight, a BMI of 25.0-29.9 kg/m^2, and obesity, a BMI greater than or equal to 30.0 kg/m^2. BMI is a measure of obesity, which is obtained by dividing the weight in kilograms by the height in meters squared. Individuals are considered overweight if they reported a BMI of greater than 25 kg/m^2.

The median values by state (for 50 U.S. states, the District of Columbia, and Puerto Rico) of overweight persons aged 55 years or older were gathered from 81,137 BRFSS respondents. The corresponding values were gathered from 55 astronauts and 257 comparison participants, and the resulting values are summarized in Figure 1. The prevalence of overweight tends to decrease with increasing age for both the astronaut and BRFSS populations, but increases in the comparison participants. Nevertheless, as all three groups show more than 50% overweight prevalence in both age groups, they fall far short of the desired HP 2010 goal.

INADEQUATE FRUIT AND VEGETABLE CONSUMPTION

Diets rich in fruits and vegetables have been associated with a reduction in cardiovascular disease, some cancers, and diseases of the gastrointestinal tract. This led to the establishment of *5 A Day for Better Health*, a comprehensive health promotion program designed to increase the consumption of fruits and vegetables to five or more servings per day by 2010. This program is sponsored by the National Cancer Institute in conjunction with the U.S. Department of Health and Human Services and the Produce for Better Health Foundation. Since the program's inception in 1991, the U.S. Department of Agriculture reports that the average daily consumption of fruits and vegetables by adults aged 18 years and older increased from 3.9 to 4.4, which is only about half a serving less than the recommended 5 servings per day.

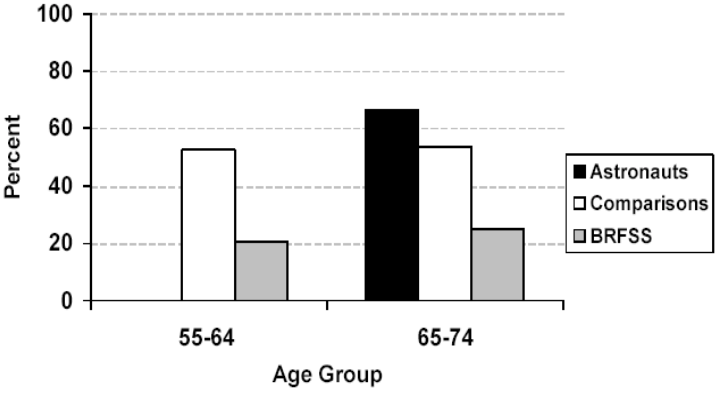
Figure 1. Prevalence of Overweight Individuals by Age Group



Subjects in the LSAH and BRFSS populations were asked about their general dietary habits, including the frequency of fruit and vegetable consumption. Excluded is the consumption of fruits and vegetables served as mixed dishes. The eligible participants for this portion of the surveys are 29 Astronauts, 207 comparisons, and 71,517 BRFSS participants. The data were then analyzed to determine the percent of participants who consumed at least five servings of fruits and vegetables per day, as summarized in Figure 2.

The prevalence of individuals who reported eating at least 5 servings of fruits and vegetables per day tends to increase with increasing age for each of the populations. Overall, both groups of LSAH participants have a higher prevalence of those eating at least five servings of fruits and vegetables as compared to the U.S. population, and are well on their way to meeting the HP 2010 goals.

Figure 2. Prevalence of Individuals Consuming 5+ Servings of Fruits and Vegetables per Day by Age Group



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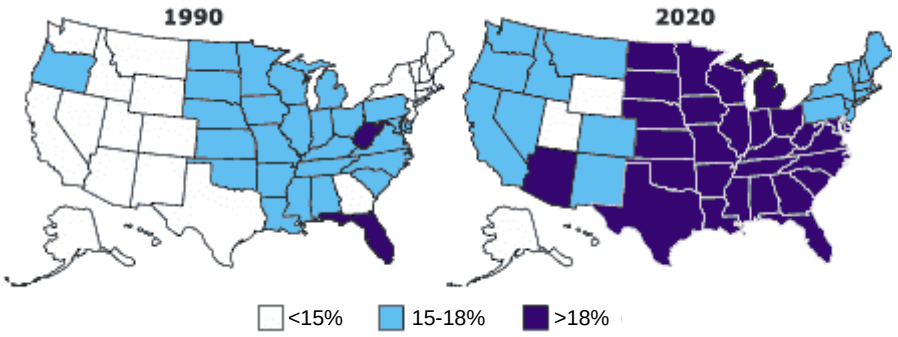
Arthritis and Physical Activity

The most debilitating disease in the U.S. is arthritis. The term 'arthritis' commonly refers to over 100 forms of the disease as well as all other rheumatic diseases. This family of diseases causes inflammation of the joints and other supporting structures and may also be accompanied by pain and stiffness. Arthritis affects approximately 43 million people (15% of the U.S. population) with related healthcare costs totaling $65 million per year. The disease is predicted to affect 60 million Americans, or 18.2% of the total population, by 2020 (Figure 1).

Research shows that physical activity may increase the quality of life of arthritis sufferers. Consequently, these individuals are encouraged to seek the advice of a physician and a physical therapist or athletic trainer to develop a tailored exercise program. The best exercises for arthritis patients emphasize range-of-motion, strengthening, and endurance. Range-of-motion exercises, such as stretching and yoga, help maintain normal joint movement and increase flexibility. Strengthening exercises, such as weight lifting and resistance training, help maintain or increase muscle strength needed to support and protect the joints. Endurance exercises, such as aerobic dancing and brisk walking, help improve cardiovascular fitness and control weight.

Many arthritis patients experience pain when beginning an exercise program. The use of moist heat (hot packs or a warm bath) at the beginning of an exercise session or for 15-20 minutes several times a day may be prescribed to temporarily relieve pain. In addition, the use of ice packs at the end of an exercise session or for several 10-15 minute sessions throughout the day may help alleviate pain as well. Hydrotherapy, such as water aerobics, can be used to decrease pain, pressure on joints, and stiffness. Other pain relief therapies include mobilization therapy (traction or massage), relaxation therapy, or acupuncture. For additional information on the benefits of physical activity for arthritis sufferers, contact the National Institute of Arthritis and Musculoskeletal and Skin Diseases Information Clearinghouse at www.nih.gov/niams. ■

Figure 1. Estimated People with Arthritis,
1990 and Projected 2020



Source: Helmick CG, Lawrence RC, Pollard RA, Lloyd E, Heyse, S. Arthritis and other rheumatic conditions: who is affected now and who will be affected later? *Arthritis Care and Research,* 1995

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PHYSICAL INACTIVITY

Physical activity has been shown to contribute to overall health and wellness. Although benefits include disease risk reduction, increased musculoskeletal strength and function, and increased psychological well-being, over 60% of adults do not engage in the recommended amount of physical activity, and 25% are not active at all. Strenuous physical activity is not required to achieve health-related benefits. Sessions can be as simple as 30 minutes of brisk walking or 15-20 minutes of jogging on most days of the week, depending on the fitness level of the individual. Thus, it is imperative for older adults to consult a medical professional before beginning a new program of physical activity.

LSAH and BRFSS survey participants were asked if they participated in any leisure-time physical activity regardless of frequency, duration, and intensity. Of 52 Astronauts, 266 comparisons, and 71,517 BRFSS participants, the percentage of those reporting physical inactivity is presented in Figure 3 on page 5. The prevalence of LSAH participants who reported participating in *no* leisure-time physical activity tends to decrease with increasing age for each of the populations. All astronauts in the 65-74 stratum reported participation in physical activities. In contrast, BRFSS respondents show significantly higher

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Vision and Aging

Aging causes changes that may weaken your eyes, and affect your vision. Probably the most common aging effect of the eye is presbyopia, which affects more than 60 million Americans. This condition is caused by the loss of lens elasticity, resulting in the loss of the ability to focus on near objects or small print. Other aging-related conditions are less benign and can lead to irreversible blindness when left untreated. These diseases tend to begin painlessly and without symptoms in their earliest stages. Risk factors for these diseases include being over the age of 60, having a family history of the disease, or having the predisposing condition (*e.g.*, diabetes). These eye diseases are described below and tabulated in Table 1.

Cataracts – cloudy areas or opacities in the lens, which may be caused by aging, or trauma. Cataracts, which form slowly and painlessly, may stay small and not interfere with vision. Fortunately, surgical treatment for advanced cataracts has a higher than 90% success rate. Cataracts affect almost 20.5 million people in the U.S. age 40 and older. The corresponding figures for the astronaut and comparison participants are 29 and 37, respectively.

Glaucoma – a buildup of pressure in the eye caused by an imbalance in fluid production and drainage. This increased pressure can damage the optic nerve, retina, or other parts of the eye. In some cases, elevated intraocular pressure is a clue to the condition, but in most instances glaucoma is only detected through a dilated eye examination. Glaucoma is controlled by medication, and surgery if necessary. More than 2.2 million people in the U.S. age 40 and older have glaucoma. Three astronauts and ten comparison participants age 40 and older have been diagnosed with glaucoma.

Retinal Disorders – the two most relevant retinal disorders are age-related macular degeneration (AMD) and diabetic retinopathy. In AMD, vision deteriorates when the macular cells in the retina break down for reasons that are yet unknown. AMD rarely leads to complete blindness; however, it will lead to loss of central vision function, thereby potentially effecting one's ability to perform discriminating tasks such as reading, driving or watching television. Its effects can range from mild to profound. AMD can not be cured, but it may be slowed by laser treatment, or medication and nutritional supplementation with antioxidants. Vision loss can be improved by low-vision aids. More than 1.6 million people in the U.S. age 50 and older have AMD. This condition affects one astronaut and five comparison participants age 50 and older.

In diabetic retinopathy, chronic high glucose levels lead to damage in retinal blood vessels. This condition is the most common vision complication that diabetics suffer, and is the leading cause of new blindness. Controlling the underlying disease, diabetes, is the best prevention. Diabetic retinopathy may be slowed or stopped through surgery, when it is diagnosed in its early stages. This disease affects more than 5.3 million people in the U.S. age 18 and older. No LSAH participant has reported being diagnosed with diabetic retinopathy.

Table 1 presents the prevalence of these diseases in the LSAH participants as compared to that of the general U.S. population, as estimated by the National Eye Institute. In general, both astronauts and comparison participants show lower prevalence of these eye conditions than the U.S. population, which may be a result of the healthy worker effect. For all of the diseases except cataracts, astronauts also have a lower prevalence than comparison participants.

Cataracts, glaucoma, age-related macular degeneration, and diabetic retinopathy have silent onset, and when left untreated can lead to irreversible blindness. Therefore, regular and thorough eye examinations, including dilated pupil examination, every one to two years are essential for early detection and prevention of these diseases. ■

Table 1. Prevalence of age-related eye diseases

Condition	Prevalence		
	US Population (N=281,421,906)	**Astronaut** (N=312)	**Comparison** (N=922)
Cataracts, age 40 and older	0.172	0.113	0.049
Glaucoma, age 40 and older	0.019	0.011	0.013
Age-related Macular Degeneration, age 50 and older	0.021	0.007	0.012
Diabetic Retinopathy, age 18 and older	0.026	0	0

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prevalences of physical inactivity in both age groups. In this category, all LSAH participants surpassed the HP 2010 goal.

SMOKING

Cigarette smoking has been called the single most preventable cause of premature death in the U.S., with over 400,000 attributable deaths per year and a 1998 excess of $75.5 billion in healthcare costs. Though the number of adult cigarette smokers has decreased significantly, a 2000 survey indicated that there are still 46.5 million current smokers. Older adults are particularly at risk of developing a smoking-related disease such as cardiovascular disease, cancer, and respiratory disease, because they generally have smoked longer and are heavier smokers.

The eligible participants for this portion of the surveys are 52 astronauts, 266 comparisons, and 116,690 BRFSS participants. Present smokers, along with those who have smoked at least 100 cigarettes in their lifetime, are classified as *current* smokers. Those who do not currently smoke but have smoked at least 100 cigarettes in their lifetime are classified as *former* smokers. As summarized in Figure 4, smoking history data were collected differently for each of the surveys. The LSQ combined data for both current and former smokers, *i.e.*, as ever smokers, whereas the BRFSS distinguished between the two. Consequently, results for the 3 populations cannot be directly compared as with the other health factors. For the LSAH populations the prevalence of ever smokers increases with increasing age. For BRFSS participants, the prevalence of current smokers decreases with increasing age, while the prevalence of former smokers increases with increasing age.

SUMMARY

In general, LSAH participants are performing as well as or better than the general U.S. population with regards to the four health indicators examined here. Note that the results are based on self-reporting of respondents, which are subject to misreporting and recall bias. This review is also limited by the use of BMI because this weight-to height ratio does not distinguish between fat and muscle weight, so that a physically fit, muscular individual could inappropriately be classified as overweight. Also, this report only includes individuals aged 55 and older. Consequently it is also limited by survivor bias, *i.e.*, survey participants may live healthier lifestyles, which has allowed them to outlive those with less healthy lifestyles.

JSC has several programs available to civil servants, retirees, contractors, and their dependents to assist with maintaining a healthy lifestyle, including the 'Health Related Fitness Program', 'Nutrition for Health', and smoking cessation programs. Onsite employees can use the 'Safety and Total Health' link on the JSC intranet for additional information. Retirees and offsite employees can contact the Physical Fitness Director at (281) 483-0301. Regardless of age, altering poor health behaviors is important in maintaining good health, independence, and a good quality of life. ■

Figure 3. Prevalence of Physically Inactive Individuals by Age Group

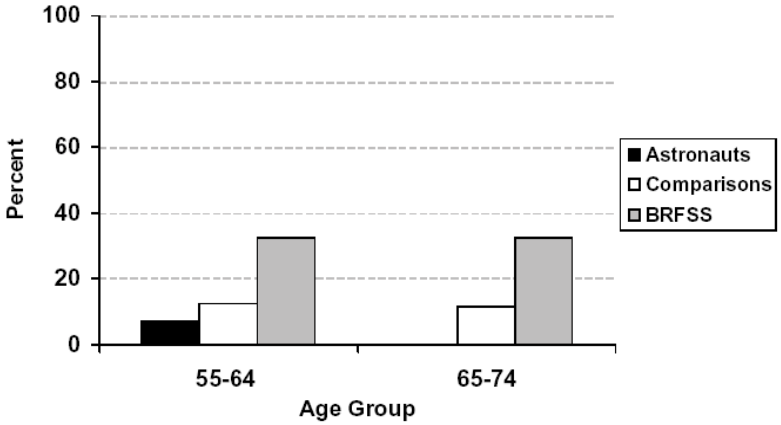
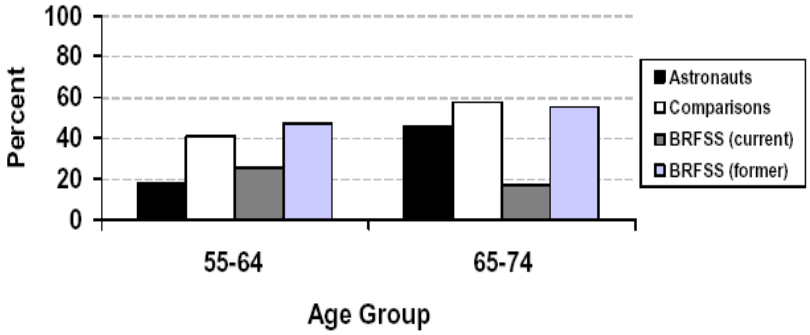


Figure 4. Prevalence of Current and Former Smokers by Age Group*



*The estimate of current smokers and former smokers is combined for astronauts and comparisons. This estimate is separate for BRFSS participants.

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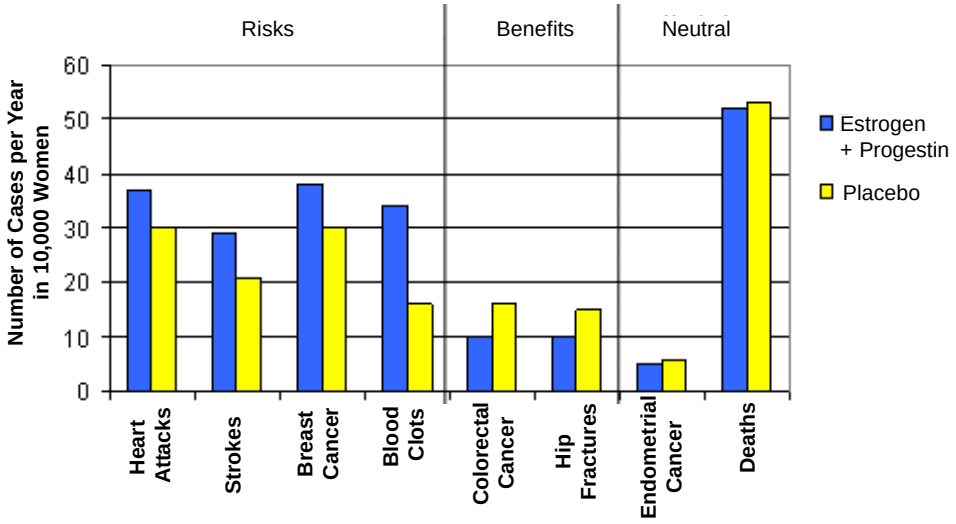
the results from the Women's Health Initiative (WHI), a prevention study that focuses on defining the risks and benefits of strategies that could reduce the incidence of heart disease, breast cancer, and fractures in postmenopausal women. They wanted to examine the long-term effect of the combined hormone treatment on the prevention of heart disease and hip fractures, while monitoring for increases in risk for breast and colon cancer.

Between 1993 and 1998, WHI enrolled 16,608 postmenopausal women aged 50-79 years with an intact uterus at baseline. These women were randomly assigned to receive the estrogen plus progestin treatment or a placebo in order to see if the combined therapy prevents disease without compromising other aspects of their health. There were many outcomes looked at during this study, but the main outcomes were coronary heart disease and invasive breast cancer. The study was planned for 8.5 years but was stopped after 5.2 years because the data and safety monitoring board found that the benefits were not sufficient to compensate for the risks.

What Were the Results of the Study?
There was no difference in overall mortality between those on HRT and the placebo during the study. However, the data indicated that compared to the placebo group, those on HRT had higher incidences of the following diseases per 10,000 women (Figure 1):

- invasive breast cancer – 38 cases for the HRT group compared to 30 cases for those taking the placebo pills;
- coronary heart disease – 37 cases vs. 30 cases
- stroke – 29 cases vs. 21 cases;
- pulmonary embolism (blood clots in the lungs) – 15 vs. 7 cases.

Figure 1. Disease Rates for Women on Estrogen plus Progestin or Placebo



The study noted that although most adverse outcomes began occurring in the first two years, breast cancer did not appear until the third year. Also, the results showed some benefits of HRT through the reduced risk of colon cancer and hip fracture within the population of women on the combined therapy. For every 10,000 women taking estrogen plus progestin pills, 10 had a hip fracture and 10 developed colon cancer compared to 15 and 16 respectively out of 10,000 women on the placebo pill.

What Does This Mean for Women Currently on HRT?
The main conclusions of this study were that combined hormone replacement therapy does not prevent coronary heart disease and that for women on HRT, the risks outweigh the benefits. Therefore, this treatment should not be initiated for the primary prevention of coronary heart disease. Women who are currently on HRT and their physicians should take these findings into consideration when deciding whether to continue or stop the treatment. ■

For your information

If you want a copy of your exam results, please complete and sign a release form while you are visiting the Clinic for your examination. The form is called *Privacy Act Disclosure Authorization and Accounting Record (DAAR)*, or NASA Form 1536.

...and ours

If you have a new address or phone number, please let us know by calling (281) 244-5195 or (281) 483-7999. You may also write us at:

Longitudinal Study of Astronaut Health
Flight Medicine Clinic/SD4
Johnson SpaceCenter/NASA
2101 NASA Road 1
Houston, Texas 77058-3696

or e-mail us at:
mwear@ems.jsc.nasa.gov