

## LSAH saves the day for the “Iron Man”

By **BABY DJOJONEGORO, MS, MPH**

the blood test, they advised me to see an internist right away”

Last December, abnormalities detected in blood tests done as part of the LSAH protocol caused an LSAH participant to seek additional medical consultation. The JSC employee, who dubbed himself the “Iron Man”, was diagnosed with a hereditary disease called hemochromatosis. This early detection enabled him to get proper treatment to prevent further damage to his body. The following includes excerpts of a letter he sent out to members of his family to encourage them to get tested for the disease.

After consulting a gastroenterologist, he learned that he had hemochromatosis, a disease in which the body abnormally accumulates iron in organs such as the liver, heart, pancreas, joints, and skin. The excess iron is harmful because it leads to cell injury and fibrosis, often resulting in liver cirrhosis, pancreatitis, and heart failure. Early symptoms of the disease include severe fatigue, pain in joints, abdominal pain, and impotence.

diagnosis of hereditary hemochromatosis. In the case of “Iron Man”, his second blood test showed a TS value of more than 60%. His hemoglobin and hematocrit levels were in normal range, as is typical for this disease.

Confirmation of the diagnosis is done through DNA testing to detect the mutation in the *HFE* gene which causes the disease. The prevalence in the U.S. population is around 1 in 300 persons, particularly among people of Nordic or Celtic ancestry. Men are affected more than women, with a ratio of almost two to one, and the disease usually appears after age 40 years for men and 50 years for women. Because of the hereditary nature of this disorder, screening is strongly recommended for individuals with a family history of hemochromatosis.

“You may know that I am in a program of annual physicals at NASA that compares us normal folks with the astronauts. This year they added a couple blood tests and found that I have high Ferritin and high Transferrin Saturation levels. After repeating

The blood test leading to this diagnosis is serum iron analysis, or commonly called an iron panel. The relevant indicator is transferrin saturation (TS), which is obtained by dividing the serum iron level by the total iron-binding capacity. TS indicates how much iron is bound in the blood. A TS value of more than 50% for women or more than 60% for men has an 86% predictive value for

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## Fats and Oils: how do they compare?

By **JOCELYN MURRAY, MPH**

The American Dietetic Association has designated March as National Nutrition Month® to promote overall health and well being through nutrition education. Nationwide, heart disease is the leading cause of death for both men and women. Many clinical studies have shown a correlation between nutrition and cardiovascular health. Much of this research has been focused on dietary fats and oils, which can promote either good health or disease depending on their quality and quantity. So choosing

quality fats and oils should help improve personal cardiovascular disease risk and help decrease national cardiovascular disease rates.

Dietary fats and oils are culinary mainstays not only because they are necessary for the body to function but also because they enhance the flavor and texture of foods. In addition, they increase the feeling of fullness after meals and serve as a concentrated source of calories. Fats and oils are composed of combinations of carbon chains with attached hydrogen atoms. The varying

number of hydrogen atoms along the carbon chain creates three major classes of fatty acids: saturated, monounsaturated, and polyunsaturated.

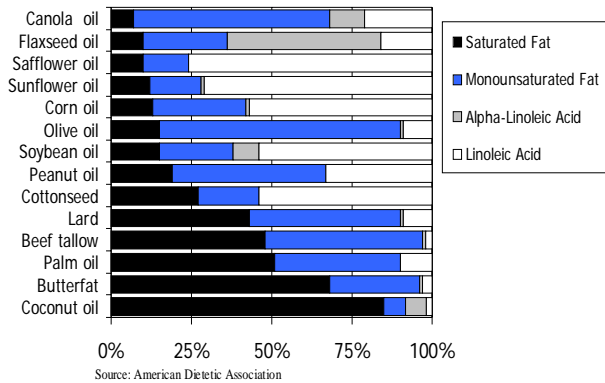
Saturated fatty acids have a hydrogen atom at every available site along the carbon chain. They are solid at room temperature and have high melting points. Excessive consumption of saturated fatty acids is one of the major risk factors for heart disease. Saturated fatty acids are found primarily in fats

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from animal sources such as whole milk and butter, but also in oils from plant sources such as coconut and palm oil (see Figure 1).

**Figure 1. Fats and Oils: How do they compare?**



Monounsaturated fatty acids are missing a pair of hydrogen atoms along the carbon chain, which results in the formation of a double bond between carbon atoms. They are usually in a liquid state at room temperature and have lower melting points than saturated fatty acids. Monounsaturated fatty acids are chiefly found in oils from plant sources such as canola, olive, and peanut oils.

Polyunsaturated fatty acids are missing multiple pairs of hydrogen atoms. This results in multiple double bonds between carbon atoms. Polyunsaturated fatty acids can be further categorized into omega-3 (alpha-linoleic) fatty acids and omega-6 (linoleic) fatty acids based on the location of the first double bond. These fatty acids are often referred to as essential fatty acids because they cannot be produced by the body and must be consumed through food sources. Omega-3 fatty acids can be found in soybean and wheat germ oils, nuts, seeds, and seafood. Omega-6 fatty acids can be found in corn, soybean, sunflower, and sesame oils.

Substituting either monounsaturated or polyunsaturated fatty acids for saturated fatty acids may help lower the blood

cholesterol level and has been shown to have a protective effect on the cardiovascular system. However, many plant-based oils are stabilized and/or solidified by undergoing hydrogenation (adding hydrogen atoms to the fatty acid molecules), which produces trans fatty acids (trans fats). Trans fats consumption has been shown to increase the risk of coronary heart disease. The Food and Drug Administration (FDA) now requires all food manufacturers to list trans fats on Nutrition Facts labels by January 2006. Adding trans fats information, along with

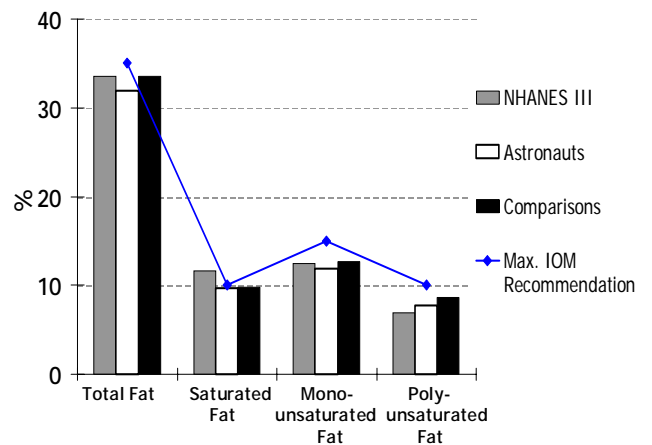
already available information on saturated fats and cholesterol, allows consumers to make heart-healthy food choices.

The Food and Nutrition Board of the Institute of Medicine recommends that total dietary fat be limited to 20%-35% of the total daily energy (calorie) consumption. Furthermore, 7%-10% of total energy should be from saturated fats, 10%-15% from monounsaturated fats, and about 10% from polyunsaturated fats. To see how the LSAH populations fare against the U.S. general population, dietary fat consumption data from the National Health and Nutrition Examination Survey, 1988-94 (NHANES III) were compared with data from the 1998 LSAH Food Frequency Questionnaire (FFQ). According to NHANES data, the average adult consumes approximately 33.6% of total calories from dietary fats, 11.6% from saturated fat, 12.5% from monounsaturated fat, and 6.9% from polyunsaturated fat (see

Figure 2). These data show that Americans are consuming an excessive amount of the most harmful fats and a deficient amount of the most beneficial fats. On average, comparison participants (N = 512) consume the same percentage of dietary fat as the general population, while astronauts (N = 134) reported a slightly lower figure (33.6% and 31.9%, respectively). Both groups show lower saturated fat consumption as compared to the general population, but neither group consumes enough of the beneficial fats. LSAH participants also reported more frequent use of polyunsaturated and monounsaturated fats and oils as compared to saturated fats and oils (see Figure 3, next page).

On the horizon are two new cooking oils that claim to improve overall health and wellness. In Montreal, McGill University researchers have created a new cooking oil which they claim increases metabolism, lowers cholesterol, and leads to weight loss in study participants. Functional oil, the current name of this new product, contains 3% phytosterols, a plant

**Figure 2. Dietary fat consumption of U.S. General Population and LSAH Participants**



extract that has been shown to lower dietary cholesterol. This product is not yet available to consumers. The other product, Enova™ oil, has been marketed in Japan since 1999 as Healthy Econa™.

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“He [the gastroenterologist] ordered a DNA test to check for the presence of the abnormal gene (there are two that are most commonly indicative of the tendency to develop Hemochromatosis) as well as a tumor marker called alpha fetoprotein.”

The abnormally high iron level in the body causes the most severe damage to the liver in the form of cirrhosis or carcinoma. Assessment of this damage, performed through biopsy or tumor marker test, follows the diagnosis when the patient is over the age of 40 years, has liver disease, or has other risk factors (e.g., high serum ferritin, diabetes). This evaluation is the major predictor of the outcome of this disorder.

Now the doctor has me on therapeutic phlebotomies... giving blood on a two week basis until the level drops

down... then donating blood to the blood bank at a typical frequency of every few months should be enough to keep the levels under control.

Fortunately, hemochromatosis treatment is straightforward: excess iron is removed through phlebotomy, or giving blood. Patients can also limit iron intake and absorption by avoiding iron supplements, limiting vitamin C supplements, and applying moderation in red meat and alcohol consumption. Treatment helps to relieve symptoms such as fatigue and abdominal pain, but cannot reverse any damage already done to organs. Therefore, the earlier the treatment is initiated, the better the patient’s chances are of having a normal life expectancy. Sources of more information are:

American Hemochromatosis society  
([www.americanhs.org](http://www.americanhs.org))

Canadian Hemochromatosis society  
([home.istar.ca/~chcts/](http://home.istar.ca/~chcts/))  
Other Hemochromatosis Info  
([members.tripod.com/~hemochromatose/linkseng.html](http://members.tripod.com/~hemochromatose/linkseng.html))

National Institutes of Health  
([digestive.niddk.nih.gov/ddiseases/pubs/hemochromatosis/index/htm](http://digestive.niddk.nih.gov/ddiseases/pubs/hemochromatosis/index/htm))  
Iron Overload Disease Association  
([iod@ironoverload.org](mailto:iod@ironoverload.org))

Thanks to his regular participation in LSAH, “Iron Man” became aware of an important medical condition that not only threatened his life, but those of his family members as well. ■

We would like to hear about similar success stories. If you have one that you want to share with us, please call the LSAH Office or email it to [mary.l.wear1@jsc.nasa.gov](mailto:mary.l.wear1@jsc.nasa.gov)

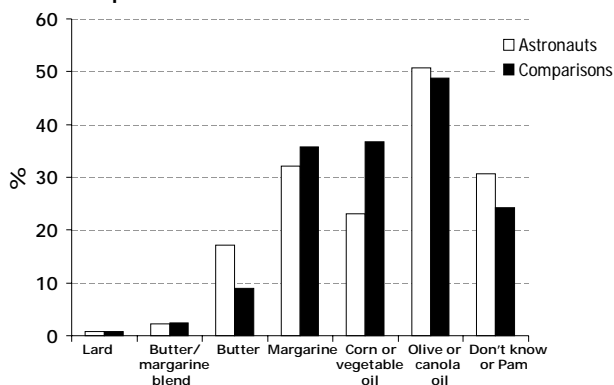
### “Fats” continued from previous page

This new product is a combination of soy and canola oils that has been altered to increase the amount of diacylglycerol, which has been shown to enhance weight loss. Although the FDA has not tested Enova’s nutritional claims, it has given the oil “generally recognized as safe” status so that it can

be sold as cooking oil and as a component of other food dressings such as mayonnaise and salad dressing. Currently, Enova oil can only be purchased either in the Chicago and Atlanta areas or via the Internet. Additional studies are needed to document the health benefits and possible risks of both Functional oil and Enova oil. Here are a few tips courtesy of the American Heart Association on choosing heart-friendly fats and oils:

- Use hydrogenated shortenings

Figure 3. Fats and Oils used in cooking by LSAH Participants



sparingly, and choose those made from vegetable oils.

- Choose from vegetable oils and margarines with no more than 2 grams of saturated fatty acids per tablespoon - canola, corn, olive, safflower, sesame, soybean, sunflower, and walnut.
- Remember to count the “hidden fat” in bakery and snack foods as well as the fats used in cooking and on vegetables and breads. ■

## Overweight and Obesity in the LSAH population

By BABY DOJONEGORO, MS, MPH

The rising prevalence of overweight and obese Americans has been the frequent topic of recent media articles. Various national surveys show that the majority of Americans are overweight. According to data obtained from the National Health and Nutrition Examination Survey (NHANES), the percentage of overweight adults (aged 20-74) in the general population has increased from 45% in 1960-1962, to 64% in 1999-2000. The percentage of obese individuals has increased correspondingly from 13% to

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31% within the same time period. The terms overweight and obesity are defined using the Body Mass Index (BMI), a measure which gives a population estimate of body size. BMI is calculated by dividing weight in kilogram by the squared height in meters. In adults age 20 years and older, overweight is defined as having BMI of 25 kg/m<sup>2</sup> or more, and obesity is defined as having BMI is 30 kg/m<sup>2</sup> or more; healthy weight is defined as having BMI between 18.5 kg/m<sup>2</sup> and 25 kg/m<sup>2</sup>.

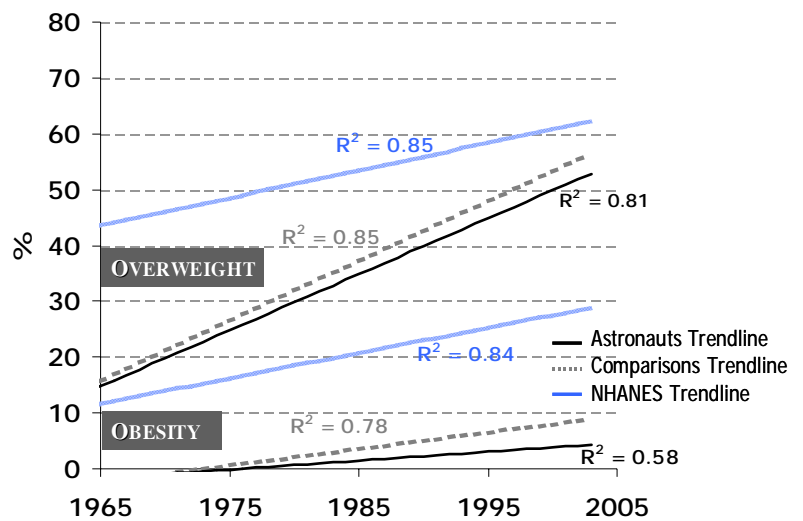
This steady rise of overweight and obesity is a major cause of concern, as these conditions have numerous personal and public health consequences. People who are overweight or obese have an increased risk for conditions which include hypertension, high blood cholesterol, Type 2 (non-insulin dependent) diabetes, coronary heart disease, congestive heart failure, osteoarthritis, and stroke. Obesity is associated with approximately 300,000 deaths annually. Overweight and obesity have been identified as one of the Leading Health Indicators in *Healthy People 2010*, the nation’s health objectives. This guide sets the

goal of 15% obesity in the U.S. population by 2010.

When compared to the general population, LSAH participants show a similar trend of rising overweight and obesity over time. The BMI calculations for LSAH participants use weight and height data obtained from annual physical examinations.

The overweight trendlines in Figure 1 show that both astronauts and comparison participants maintain their lower overweight percentage, as compared to the general population, over time. Astronauts have a slightly lower overweight prevalence compared to comparison participants. However, both participant groups show a steeper rise in the overweight than the general population. Some of this rising trend may be a function of the small sample sizes of LSAH participants, and may reflect their propensity to gain more weight as they age. As indicated by their R<sup>2</sup> value, all trendlines show good

Figure 1. Overweight and Obesity Trends of LSAH Participants and U.S. General Population



representation of their respective data points and their trend over time (compared to an R<sup>2</sup> maximum value of one).

The obesity comparison in the graph shows both astronauts and comparison participants maintaining much lower obesity prevalence as compared to the general population. The trendlines suggest that LSAH participants become obese at a lower rate than the general population, with astronauts maintaining lower obesity than the comparison participants. However, the R<sup>2</sup> values for astronauts’ and comparison

participants’ obesity trendlines indicate a higher variability for their obesity data than their overweight data.

Taken together, these comparisons suggest that although LSAH participants maintain much lower obesity as compared to the general population, their overweight trends show a rapid rise that may result in prevalences similar to that of the general population. Aging is certainly a factor in the rapid rise of their overweight prevalence. However, they may do well to take action to decrease their overweight prevalences for the sake of their health. ■

**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**

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