



MERCURY GEMINI APOLLO APOLLO-SOYUZ SKYLAB
COLUMBIA CHALLENGER DISCOVERY ATLANTIS
ENDEAVOUR NASA-MIR ZARYA-UNITY MERCURY
GEMINI APOLLO APOLLO-SOYUZ SKYLAB COLUMBIA
CHALLENGER DISCOVERY ATLANTIS ENDEAVOUR
NASA-MIR ZARYA-UNITY MERCURY GEMINI
APOLLO APOLLO-SOYUZ SKYLAB COLUMBIA CHALLENGER
DISCOVERY ATLANTIS ENDEAVOUR NASA

THE LONGITUDINAL STUDY OF ASTRONAUT HEALTH

Newsletter

May 2007

Volume 15 • Issue 1

Don't Stop My Heart: Heart Disease Prevention

By DEBRA COLLIER, MPH

We've all heard it: "Heart disease is the leading cause of death for both men and women". You've also heard the stunning statistics about behaviors that increase the risk of developing heart disease: smoking, poor eating habits, and lack of exercise. Yet despite these constant reminders, diseases of the heart have consistently been in the top ten leading causes of death according to the Centers for Disease Control and Prevention.

More than one risk factor may play a significant role in developing various diseases of the heart – those that are modifiable and those that are not. For example, family history of heart disease, post-menopausal status, and ethnicity are considered non-modifiable risk factors. Another example is older age; yet according to the American Heart Association, in 2004 over 147,000 Americans killed by heart disease were under age 65. **Prevention is worth thinking about now, regardless of age.**

Other risk factors such as obesity, smoking, high LDL ("bad" cholesterol) and low HDL ("good" cholesterol), hypertension, and lack of physical activity, are modifiable. Most people are exposed to

more than one risk factor. Since several risk factors play a role in the development of heart disease, a balanced prevention plan is a must. The earlier you start prevention efforts for modifiable risk factors the more likely you are to ensure a healthier future.

In your 20s

Researchers recommend making healthy lifestyle choices, such as not smoking, drinking within moderate limits, exercising daily, and eating a healthy diet. So start now!

- **Quit Smoking:** Smoking is a significant contributor to developing various cardiovascular diseases.
- **Know Your Family Medical History:** You can take an active role in prevention despite having a family history of heart disease.
- **Eat the Right Foods:** Diets high in fiber (e.g., nuts, fruits, and legumes) decrease your risk of heart disease.
- **Exercise:** At least 30 minutes of exercise daily is recommended to decrease your risk of heart disease.

In your 30s

Life is a bit busier compared to when you were in your 20s. Instead of talking about career, marriage, and financial issues with classmates, you're living through them. So

now the stress levels are mounting, which can increase your risk for heart disease. According to the American Council on Exercise, you're more prone to gain weight in your 30s since your metabolism has started to slow down, causing your heart to work harder and thereby increasing your risk for developing heart disease.

- Watch your stress level, and make sure to take time to decompress and meditate.
- Force yourself to exercise now that your life may be busier. Also, make sure to get at least 7 to 8 hours of sleep each night.
- Watch what you eat and balance your diet.

In your 40s

At this point in time, your life is probably leveling off and you're at a stable point. However you shouldn't be complacent in maintaining your health. Most people start to notice that it's harder to get the pounds off, which is why you should take extra care to watch those areas, especially the mid-section. Fat build up in this area increases risk of hypertension, diabetes, and hyperlipidemia.

continued on page 4

Hazardous Air Pollutants

By JAYA PARANILAM, PhD

When most people think about air pollution, they usually think about smog, acid rain, or ozone.

Hazardous air pollutants (HAPs), also known as air toxics, are those pollutants that cause or may cause cancer and other serious health effects, such as reproductive effects or birth defects. The EPA (Environmental Protection Agency) has identified approximately 188 hazardous air pollutants. Common examples include benzene, which is found in gasoline; perchlorethylene, which is emitted from certain dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries.

Risk of Cancer in the Houston Ship Channel

According to the 1997 U.S. Census, Texas ranked among the top three states in the number of chemical and allied products manufacturing facilities, and in the number of petroleum and coal products manufacturing facilities. There are more facilities located in Harris County (Houston) than in any other Texas county. Recent reports have shown that two HAPs, benzene and 1,3-butadiene, are of particular concern for Houston residents due to the large number of petrochemical, synthetic rubber and plastics manufacturer plants in Harris county.

Specifically, preliminary findings released in January from an epidemiological study conducted at the University of Texas Health Science Center indicate that children living within two miles of the Houston Ship Channel are at a 56% higher risk of developing acute lymphocytic leukemia than those children living more than 10 miles away. Furthermore, this study also demonstrated that children living in

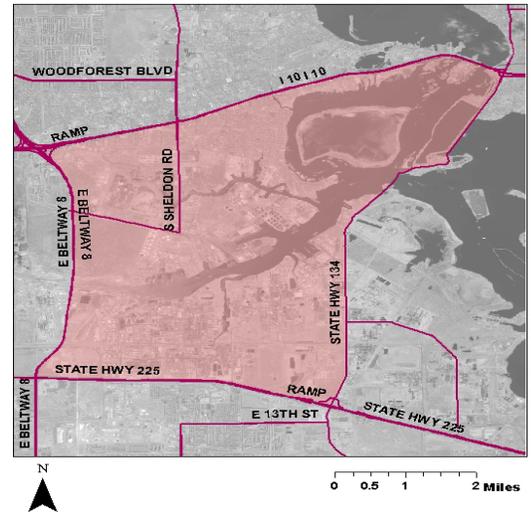
areas of the Houston Ship Channel with the highest levels of 1,3-butadiene had a statistically significant greater risk of developing any type of leukemia, acute lymphocytic leukemia, and acute myeloid leukemia (40%, 38%, and 153%, respectively), as compared to those children living in areas with the lowest 1,3-butadiene levels, as estimated from monitoring data collected by the Texas Commission on Environmental Quality (TCEQ). Among adults, neither proximity to the Houston Ship Channel, nor levels of benzene or 1,3-butadiene was consistently associated with leukemia or lymphoma risk. The shaded areas in the maps on the right are areas with elevated levels of benzene and 1,3-butadiene as reported by TCEQ.

In many cases, children may have greater exposure than adults to airborne pollutants. Infants and children generally breathe more rapidly than adults, which increases their exposure to any pollutants in the air. Also, infants and children often breathe through their mouths, bypassing the filtering effect of the nose and allowing more pollutants to be inhaled. Furthermore, children are often more susceptible to the health effects of air pollution because their immune systems and developing organs are still immature.

The Houston Ship Channel is an excellent example of a cancer cluster. Cancer clusters have received a great deal of attention in the media in recent years. More than 1,000 suspected cancer clusters are reported

continued on next page

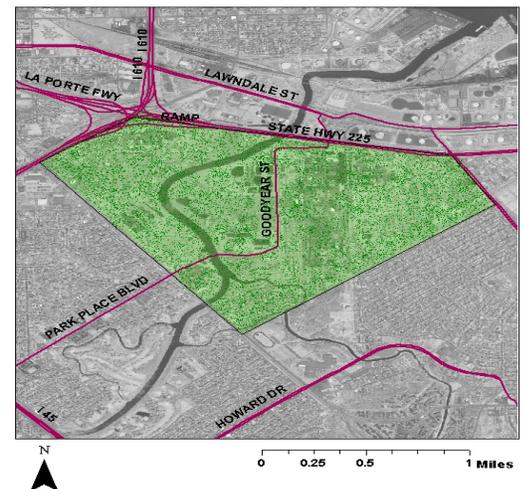
**Benzene Watch Area
Baytown, Harris County, Texas**



Benzene Watch Area:

- East of East Beltway 8
- West of Battleground Rd/Lynchburg Crosby
- North of LaPorte Fwy/Hwy 225
- South of IH-10/Hwy 73

**1,3- Butadiene Watch Area
Houston, Harris County, Texas**



1,3-Butadiene Watch Area:

- East of IH-10 and Galveston Rd
- West of Allen Genoa Rd
- North of Center Ave (extended to Galveston Rd)
- South of Hwy 225

continued from page 2

to state health departments each year. But what exactly is a cancer cluster? The Centers for Disease Control defines a cancer cluster as a greater-than-expected number of cancer cases that occurs within a group of people in a geographic area over a period of time. The sites of cancer most commonly linked with cancer clusters are lung, skin, and bladder. Cancer clusters may occur at the community level, but they are most commonly associated with occupational exposures in the workplace.

What are Benzene and 1,3 Butadiene?

Both benzene and 1,3-butadiene are classified as known human carcinogens by the EPA. The main source of benzene in the atmosphere is the combustion and distribution of petroleum, and the main source of 1,3-butadiene is motor vehicle exhausts. Also, benzene is emitted in a number of industrial processes and 1,3-butadiene is used in the production of synthetic rubber for tires, both of which may contribute to local exposure.

Risk of Cancer and Air Toxics

In February 2006, the EPA released the results of its national-scale assessment of 1999 air toxics emissions. The purpose of the national-scale assessment was to identify and prioritize air toxics, emission source types, and locations which are of greatest potential concern in terms of contributing to population risk. From a national perspective, benzene is the most significant air toxic for which cancer risk could be estimated, contributing 25 percent of the average individual cancer risk identified in this assessment. However, the EPA also projects that onroad and nonroad mobile sources of benzene emissions will decrease by about 60% between 1999 and 2020 as a result of motor vehicle standards, fuel controls,

standards for nonroad engines and equipment, and motor vehicle inspection and maintenance programs.

The EPA also estimates that in the United States people have a lifetime cancer risk between 1 and 25 in a million from air toxics. This means that out of one million people, between 1 and 25 people have an increased likelihood of contracting cancer as a result of breathing air toxics from outdoor sources, if they were exposed to 1999 levels over the course of their lifetime.

Risk of Cancer and Space Travel

Due to the potential for exposure to radiation during space travel, cancer is a significant health concern for the astronaut population. NASA has addressed this concern by implementing numerous measures which carefully monitor exposure to potential carcinogens. Furthermore, during annual physical examinations of both the astronaut and LSAH comparison populations, evaluations are conducted to assess the presence of any physical abnormalities which might indicate a cancerous or precancerous state.

An investigation of the incidence of certain types of cancer was conducted utilizing medical records. Similar to the

Houston Ship Channel Study, only ICD-9-CM codes corresponding to a diagnosis of leukemia, myeloma, non-Hodgkin's lymphoma, and Hodgkin's disease were examined to establish the incidence in the astronaut corps and in the comparison population. Of the 321 astronauts, 3 individuals were identified with a diagnosis of leukemia (1 case), myeloma (1 case), and Hodgkin's disease (1 case). Of the 982 LSAH comparisons, 3 individuals were identified with a diagnosis of leukemia (2) and non-Hodgkin's lymphoma (1). The higher percentage of diagnoses of leukemia, myeloma, non-Hodgkin's lymphoma, and Hodgkin's disease among the astronaut population as compared to the comparison population (0.93%vs.0.30%) may be attributable to the heightened level of medical care received by individuals in the astronaut corps.

Although there is no cure for cancer, there are certain modifiable factors which can reduce our risk for developing certain forms of cancer. What we eat and drink, how we live, and where we work all influence our risk for cancer. Additional information regarding cancer and cancer prevention can be obtained from the American Cancer Society (1-800-ACS-2345). ■

Want to Know More about Hazardous Air Pollutants?

More information can be obtained from the Environmental Protection Agency's Unified Air Toxics website: <http://www.epa.gov/ttn/uatw>.

Statewide and county level air quality assessments can be obtained from the

American Lung Association's State of the Air: 2006 Report. The full report on the state of Texas is found here: <http://lungaction.org/reports/>, while the breakdown by county can accessed on this link: http://lungaction.org/reports/SOTA06_stateozone.html?geo_area_id=48 ■

continued from page 1

- Build your inner circle, medically: Find a physician you can trust and freely talk to about your health concerns.
- Think about your social calendar: become more social to help with stress. Remember to decompress.
- Exercise at least 30 minutes daily.

In your 50s and beyond

As you get older, your risk for heart disease and stroke increase steadily. High blood pressure and high cholesterol can lead to heart attacks and strokes.

- Start monitoring your measurements more regularly; have your blood pressure and cholesterol checked.
- Maintain a healthy diet.
- Exercise regularly.
- Prescription medications may be used if needed, consult your physician.

What tests are used to assess cardiac risk?

Several laboratory tests can be conducted to gauge your risk for developing heart disease. A few standard tests, such as blood pressure and cholesterol, are done routinely, but more specific tests can be done by your doctor. Discuss your lifestyle and family history with your physician to determine if these tests are for you.

- Highly sensitive C - Reactive Protein (hsCRP): A fairly new test, given to apparently healthy patients to determine if they are at risk for a coronary event, even if their lipid levels are normal or borderline elevated.
- C - Reactive Protein (CRP): Marks levels of inflammation, which experts now say may be the most important predictor of heart problems.
- Homocysteine: Excess levels of this amino acid may indicate scarring or thickening of the arterial lining.
- Fibrinogen: Too much of this blood protein, which is essential for clotting, can increase your chances of having a stroke
- Lipoprotein (A): This blood lipid disrupts the body's ability to dissolve clots.

Know how you measure up, get tested regularly:

- Blood Pressure should be below 120/80 mm Hg
- BMI should be between 18.5-24.9
- Cholesterol should be less than 200 mg/dL for total cholesterol, and less than 100 mg/dL for LDL
- Triglycerides should be less than 150 mg/dL
- Fasting Blood Sugar should be below 100 mg/dL

- C-Reactive Protein (CRP) correlates with risk as follows: CRP level less than 1: lowest risk; CRP levels of 1 to 3: intermediate risk; CRP greater than 3: highest risk

A few helpful resources

Determining your cardiac risk:

- 1) National Institutes of Health: <http://hp2010.nhlbi.nih.net/atpiii/calculator.asp?usertype=prof>
- 2) President and Fellows of Harvard College: <http://www.yourdiseaserisk.harvard.edu/hccpquiz.pl?lang=english&func=home&quiz=heart>

Article Sources

- 1) WISQARS Reports of Leading Causes of Death
<http://webappa.cdc.gov/sasweb/ncipc/leadcaus10.html>
- 2) American Council on Exercise
http://www.acefitness.org/fitfacts/fitfacts_display.aspx?itemid=356
- 3) American Heart Association-Cardiovascular Disease Statistics
<http://www.americanheart.org/presenter.jhtml?identifier=4478>
- 4) Lab test standards
<http://www.nlm.nih.gov/medlineplus/ency/article/003492.htm> ■

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/SD13
Johnson Space Center/NASA
2101 NASA Parkway
Houston, Texas 77058-3696
or e-mail us at:
mary.L.wear@nasa.gov*