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CONTACT:
John Peterson
919-541-7860

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List of Cancer-Causing Agents Grows

Research Triangle Park, N.C. – The Department of Health and Human Services released its Eleventh Edition of the Report on Carcinogens today, adding seventeen substances to the growing list of cancer-causing agents, bringing the total to 246. For the first time ever, viruses are listed in the report: hepatitis B virus, hepatitis C virus, and some human papillomaviruses that cause common sexually transmitted diseases. Other new listings include lead and lead compounds, X-rays, compounds found in grilled meats, and a host of substances used in textile dyes, paints and inks.

“Among U.S. residents, 1 in 2 men and 1 in 3 women will develop cancer at some point in their lifetimes. Research shows that environmental factors trigger diseases like cancer, especially when someone has a family history,” said Kenneth Olden, Ph.D., director of the National Institute of Environmental Health Sciences and the National Toxicology Program, which prepared the report for HHS.

The Report on Carcinogens, Eleventh Edition, referred to as the “RoC,” lists cancer-causing agents in two categories — “known to be human carcinogens” and “reasonably anticipated to be human carcinogens.” The report now contains 58 “known” and 188 “reasonably anticipated” listings. Federal law requires the Secretary of the Department of Health and Human Services to publish the report every two years.

Six substances have been added to the “known” category:

Hepatitis B virus (HBV) and hepatitis C virus (HCV) are viruses that cause acute or chronic liver disease. They are listed in the report as “known human carcinogens” because studies in humans show that chronic hepatitis B and hepatitis C infections cause liver cancer. Approximately one million United States residents are chronically infected with HBV, which primarily is transmitted through sexual contact (50%) and intravenous drug use (15%).

HCV is the leading cause of liver disease in the United States with more than three million people infected. The major risk factor for hepatitis C infection is illegal intravenous drug use, which accounts for 60 percent of acute infections in adults. The incidence of both hepatitis B and hepatitis C infections is decreasing among United States residents. A vaccine is available for preventing hepatitis B infection but not hepatitis C infection. Infections can also be prevented by screening blood supplies, and by reducing contact with contaminated fluids in health care settings.

Human papillomaviruses (HPVs) are viruses that are sexually transmitted and can infect genital and mucous membranes. Some of these genital mucosal type HPVs are listed in the report as “known human carcinogens” because studies show they cause cervical cancer in women. Approximately 20 million people in the United States are infected with genital HPVs, and 5.5 million new infections occur each year. Most people infected do not have symptoms, but some develop genital warts or cervical abnormalities.

X-radiation and gamma-radiation are listed in the report as “known human carcinogens” because human studies show that exposure to these kinds of radiation causes many types of cancer including leukemia and cancers of the thyroid, breast and lung. The risk of developing cancers due to these forms of ionizing radiation depends to some extent on age at the time of exposure. Childhood exposure is linked to an increased risk for leukemia and thyroid cancer. Exposure during reproductive years increases the risk for breast cancer, and exposure later in life increases risk for lung cancer. Exposure to X-radiation and gamma radiation has also been shown to cause cancer of the salivary glands, stomach, colon, bladder, ovaries, central nervous system and skin.

Of the total worldwide exposure to X-radiation and gamma-radiation, 55 percent is from low-dose medical diagnosis such as bone, chest and dental X-rays, and 43 percent is from natural sources like radon. Other sources, such as industry, scientific research, military weapons testing, nuclear accidents and nuclear power generation, account for about 2 percent.

Neutrons are also listed in the report as a “known human carcinogen.” They cause genetic damage similar to that of X-radiation and gamma radiation, and thus can cause the same cancers. Neutron radiation is used less than other types of radiation in industry, medicine, and research. The general population is exposed to neutrons primarily from cosmic radiation that penetrates the earth’s atmosphere.

Eleven substances have been added to the “reasonably anticipated” category:

Naphthalene is used as an intermediate in the synthesis of many industrial chemicals, and has been used as an ingredient in some moth repellants and toilet bowl deodorants. Naphthalene is listed in the report as “reasonably anticipated to be a human carcinogen,” based on inhalation studies in animals which showed it causes rare nasal tumors in rats and benign lung tumors in female mice.

MeIQ, MeIQx, and PhIP are heterocyclic amine compounds formed when meats and eggs are cooked or grilled at high temperatures. These compounds are also found in cigarette smoke. They are listed in the report as “reasonably anticipated to be human carcinogens” because oral studies in animals showed they caused cancer in multiple organs including the forestomach, colon, liver, oral cavity,

mammary gland, skin, and cecum. Several human studies suggest there is an increased risk for breast and colorectal cancers related to consumption of broiled or fried foods that may contain these or other similar compounds.

MeIQ is 2-Amino-3, 4-dimethylimidazo [4,5-f]quinoline
MeIQx is 2-Amino-3, 8-dimethylimidazo [4,5-f]quinoxaline
PhIP is 2-Amino-1-methyl-6-phenylimidazo [4,5-b]pyridine

Lead is used to make lead-acid storage batteries, ammunition, and cable coverings. Lead compounds are used in paint, glass and ceramics, fuel additives, and in some ethnic and ceremonial cosmetics. The report lists lead and lead compounds as “reasonably anticipated to be human carcinogens” because exposure to lead or lead compounds is associated with a small increased risk for lung or stomach cancer in humans, and cancer of the kidney, brain or lung in studies with laboratory animals.

Cobalt Sulfate is used in electroplating, as coloring agents for ceramics, and as drying agents in inks and paints. Cobalt sulfate is listed as “reasonably anticipated to be a human carcinogen” based on inhalation studies in laboratory animals that showed it causes adrenal gland and lung tumors.

Diazoaminobenzene is a chemical used as an intermediate in the production of dyes and to promote adhesion of natural rubber to steel. Diazoaminobenzene is listed as “reasonably anticipated to be a human carcinogen” based on evidence that it is metabolized to benzene, a “known human carcinogen,” and because it causes genetic damage in laboratory animals.

Nitrobenzene is a chemical used mainly in the production of other industrial chemicals. It is listed as “reasonably anticipated to be a human carcinogen” because inhalation studies of this compound produced cancer in experimental animals.

1-Amino-2, 4-dibromoanthraquinone is a vat dye that is used in the textile industry. It is listed as “reasonably anticipated to be a human carcinogen” based on evidence that it causes cancer in experimental animals.

4,4’-Thiodianiline has been used as an intermediate in the preparation of several kinds of dyes. It is listed as “reasonably anticipated to be a human carcinogen” based on evidence that it causes cancer in experimental animals.

Nitromethane is used in specialized fuels, explosives, and in the synthesis of pharmaceuticals and agricultural chemicals. It is listed as “reasonably anticipated to be a human carcinogen” based on evidence that it causes cancer in experimental animals.

The Report on Carcinogens, Eleventh Edition, is prepared by the National Toxicology Program, an interagency group coordinated by the U.S. Department of Health and Human Services. The full report is available at the NTP website http://ntp.niehs.nih.gov.

The National Toxicology Program is located at the National Institute of Environmental Health Sciences (NIEHS) in Research Triangle Park, NC. Part of the National Institutes of Health, NIEHS looks at factors in the environment that may be harmful to human health.

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