OCCUPATIONAL CANCER AND RESPONSE TO CANCERS AT WORK

Growing awareness about health and increased concern about exposures to occupational hazards among workers has led to many questions in recent years about occupational cancers. This bulletin provides information about cancer and how the New Jersey Department of Health (NJDOH) responds to reported concerns about cancers at work.

WHAT IS CANCER?

Cancer is a diverse group of more than 100 different diseases in which abnormal cells multiply and spread out of control. Cancer is common; in this country, men have a 1 in 2 chance and women have a 1 in 3 chance of being diagnosed with some form of cancer during their lifetime. The chances of getting cancer increase with age. However, the survival rate for many cancers has improved in recent years due to earlier diagnosis and improved treatment. The most common cancers among men in the United States are those of the prostate, lung, colon and rectum, urinary bladder, and skin. Among women in this country, the most common cancers are those of the breast, lung, colon and rectum, uterus, thyroid, ovary, and skin.

The causes are not known for many cancers, but scientists estimate that most cancers are due to lifestyle factors such as smoking, drinking heavily, and a diet with excess calories, high fat, and low fiber. Other important factors related to cancer are reproductive patterns, sexual behavior, and sunlight exposure. Factors related to work or residence, environment, infections, and heredity are thought to be less common causes of cancer. Ten to thirty years or more may pass between the initial exposure to the cause of cancer and the diagnosis of the cancer.

HOW ARE REPORTS OF CANCERS AT WORK RESPONDED TO BY THE NJDOH?

A concern about cancer at work may be reported to the Cancer Surveillance Unit (CSU) of the NJDOH Environmental and Occupational Health Surveillance Program by a worker, a union representative, or an employer by calling (609) 826-4984. The CSU responds to a report of concerns about cancer at work with the assistance of the person who reported the cancers.

COLLECTING DATA ABOUT CANCER OCCURENCE AND THE WORKING POPULATION

Response to a report of cancer at work begins with the concerned party providing as much information as possible to CSU staff about the types of cancer involved and about affected workers. Information relating to who, what, when, and where is an important part in making a determination of whether or not an occupational exposure or exposures may be linked to the development of reported cancers.

ASSOCIATED HEALTH AND SAFETY CONCERNS

Even if a set of reported cancers cannot be linked to an occupational exposure in the workplace, the person who contacted us often has other health and safety concerns that should be addressed. It is always important that any potential occupational hazards that violate federal or state standards be identified and rectified properly.

The CSU addresses cancer concerns and does not directly address any occupational exposure and workplace safety concerns. There are two agencies that are responsible for the enforcement of occupational health and safety regulations, depending on whether the workplace is public sector or private sector. If concerns involve public employees in New Jersey's municipal, county and State offices, as well as New Jersey's public schools, colleges, universities and hospitals, one may wish to contact the NJDOH Public Employees Occupational Safety and Health (PEOSH) Program for further assistance. Otherwise, if concerns involve private sector employees in private schools, colleges, universities and hospitals, as well as private companies and Federal offices, one may wish to contact the United States Occupational Safety and Health Administration (OSHA) for further assistance.

These respective agencies may be contacted by Internet or telephone, as follows:

- PEOSH – http://www.nj.gov/health/peosh/; (609) 984-1863

- OSHA – http://www.osha.gov; 1-800-321-6742

  OSHA Area Offices in New Jersey and Counties covered:

  Avenel – (732) 750-3270 (Hunterdon, Middlesex, Somerset, Union, and Warren)

  Hasbrouck Heights – (201) 288-1700 (Bergen and Passaic)

  Marlton – (856) 596-5200 (Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Monmouth, Ocean, and Salem)

  Parsippany – (973) 263-1003 (Essex, Hudson, Morris, and Sussex)

WHAT ARE THE KNOWN OCCUPATIONAL AND NON-OCCUPATIONAL CAUSES OF CANCER?

Tables 1 and 2 below, which list the major causes of cancer, are used to help decide the response to reported cancers at work. For more information on cancer, contact the CSU at (609) 826-4984 or visit http://nj.gov/health/eohs/cancer.

TABLE 1

KNOWN OCCUPATIONAL CAUSES OF CANCER[1]

EXPOSURE	CANCER(S)	TYPES OF WORKERS POTENTIALLY EXPOSED
4-Aminobiphenyl	Bladder	Workers in the production of 4-aminobiphenyl
Aristolochic Acids[2]	Bladder, urinary tract, kidney	Workers who handle or transplant *Aristolochia* or *Asarum* plants, such as gardeners, herbalists, landscapers and plant nursery employees
Arsenic (inorganic compounds, e.g., arsenic pentoxide, arsenic trioxide)	Skin, lung, gastro-intestinal, kidney	Workers in mining and in copper and other smelting involving arsenic, in pesticide application, and in wood preservation
Asbestos	Lung, larynx, mesothelioma,[3] gastrointestinal	Workers in mining and milling of asbestos, in manufacture of asbestos products, in ship-building and construction trades, in asbestos insulation, in asbestos abatement, in brake repair, and in building maintenance and demolition
Benzene (and benzene-containing solvents)	Leukemia	Workers in the production of benzene and in the use of products containing benzene; car mechanics; benzene is used extensively as a solvent in the chemical and drug industries and as a gasoline additive
Benzidine and dyes metabolized to benzidine	Bladder	Workers in the production of benzidine and benzidine-based dyes and in the garment, leather, printing, paper and homecraft industries where benzidine-based dyes are used
Beryllium (and beryllium compounds)	Lung	Beryllium miners, alloy makers and fabricators; phosphorus manufacturers; ceramics workers; missile technicians; nuclear reactor workers; electronic equipment workers; jewelers
1,3-Butadiene	Lymphatic system, blood-forming system	Workers in the chemicals and allied products, 1,3-butadiene manufacturing, and rubber industries
Cadmium (and cadmium compounds)	Lung	Workers in zinc and lead ore smelting; producing, processing, & handling cadmium powders; cadmium-coated steel welding; nickel-cadmium battery manufacture
Bis(chloromethyl) ether and technical-grade chloromethyl methyl ether	Lung (mainly small-cell type)	Chemical plant workers, ion exchange resin makers, laboratory workers, polymer makers
Chromium hexavalent compounds	Lung	Workers in stainless steel production and welding and the chromate production, chrome plating, ferrochrome alloys, chrome pigment, and tanning industries

Table 1 – continued

EXPOSURE	CANCER(S)	TYPES OF WORKERS POTENTIALLY EXPOSED
Environmental tobacco smoke	Lung	Workers in restaurants, bars, casinos, and offices where smoking is permitted; workers in airplanes (before smoking was banned)
Erionite (a zeolite[4])	Mesothelioma[3]	Workers in mining and production of other natural zeolites or in the production or use of zeolite-containing products
Ethylene oxide	Lymphatic system, blood-forming system	Workers in manufacture of ethylene oxide and its derivatives; manufacture of products where ethylene oxide is used as a sterilant; hospital/healthcare workers; ethylene oxide is used as a sterilant in the manufacture of medical devices, healthcare products, pharmaceuticals, and spices
Formaldehyde	Leukemia, nasal, pharyngeal	Workers in manufacture of formaldehyde and formaldehyde-based resins, wood-composite and furniture production, plastics production, embalming, foundry operations, fiberglass production, construction, agriculture, garment and paper production, firefighting and biomedical laboratory research
Mustard gas	Respiratory tract	Not manufactured or used in the U.S. at present; to date, workers most likely exposed have been military personnel
2-Naphthylamine	Bladder	Laboratory technicians and scientists who use it in research
Nickel Compounds	Lung, nasal	Workers in mining, smelting, welding, casting, spray painting and grinding, electroplating, production and use of nickel catalysts, polishing of nickel-containing alloys, other jobs where nickel compounds are produced or used
Radon	Lung	Underground uranium miners, other underground workers and certain mineral processing workers
Silica, crystalline (respirable size)	Lung	Workers in quarrying and mining of coal and other minerals; stone cutting and construction; ceramics; foundry work; sandblasting; polishing & grinding; manufacture of abrasives, plastics, rubber and paint; production of cement, scouring soap, tile and clay; boiler scaling; road construction and repair; insulation production and installation

Table 1 - continued

EXPOSURE	CANCER(S)	TYPES OF WORKERS POTENTIALLY EXPOSED
Strong inorganic acid mists containing sulfuric acid	Lung, laryngeal	Workers in the chemical manufacture, building and construction, lead-acid battery, phosphate fertilizers, metal, petroleum and coal products, oil and gas extraction, printing, paper, and tannery industries
2,3,7,8-Tetrachlo-rodibenzo-ρ-dioxin (TCDD or "Dioxin")	Lung, non-Hodgkin lymphoma	Workers in waste incineration; firefighting; chemical research; paper bleaching; herbicide production; and production or use of pentachlorophenol and other chlorinated compounds
Thorium dioxide	Liver	Ceramic makers, incandescent lamp makers, magnesium alloy makers, metal refiners, nuclear reactor workers, chemists, vacuum tube makers, workers in tin, rare-earth metal and phosphate mining and processing industries, workers in formulation, packaging, preparation or administration of thorium dioxide as a pharmaceutical
Vinyl chloride	Liver, brain, lung, lymphatic system, blood-forming system	Workers involved in vinyl chloride polymerization to form other materials, usually PVC resins, and in the piping to storage or transport or maintenance of the finished polymer
Wood dust	Nasal	Workers who use machinery or tools to cut or shape wood, especially sanders in the transportation equipment and wood cabinet industries, press operators in the wood products industry, and lathe operators in the furniture industry
Coke oven emissions	Lung, genitourinary system	Workers in the production of coke from coal or in using coke to extract metals from their ores, in the synthesis of calcium carbide, or in the manufacture of graphite and electrodes
Soots	Lung, skin (particularly of the scrotum)	Chimney sweeps, heating-unit service workers, brick masons and helpers, building demolition workers, insulators, firefighters, metallurgical workers, horticulturalists
Coal tars and coal tar pitches	Skin (including scrotum), lung	Workers in coke production, coal gasification, aluminum production, foundries, and wood preservation and in production or use of pavement tar, roofing tar, coal tar pitch, coal tar paints, coal tar coatings, coal tar enamels, and refractory bricks
Untreated and mildly refined mineral oils	Skin (particularly of the scrotum), lung	Workers in the manufacture of automobiles, airplanes and parts, steel, screws, pipes, precision parts, transformers, in brass products and aluminum production, and in engine repair, copper mining, and newspaper and commercial printing

[1] National Toxicology Program, *U.S.D.H.H.S. Report on Carcinogens, Twelfth Edition,* 2011.

[2] Although occupational exposure to aristolochic acids has not been documented, gardeners, herbalists, landscapers, and plant nursery workers face some exposure risks. Dermal exposure, which could result from handling certain plants, has only been associated with the development of dermatitis, as of 2010. However, ingestion exposure due to a worker's failure to routinely and thoroughly wash hands after such work, particularly before eating or drinking, could pose an appreciably heightened cancer risk.

[3] Cancer of the lining of the lung or abdomen.

[4] Zeolites are minerals, common in the western United States.

TABLE 2

KNOWN NON-OCCUPATIONAL CAUSES OF CANCER[1-9]

CAUSE	CANCER(S)	HOW EXPOSED
Cigarettes	Lung, mouth, pharynx, larynx, esophagus, pancreas, uterine cervix, bladder, kidney, nasal, stomach, liver, myeloid leukemia	Smoking cigarettes
Smokeless tobacco	Oral cancers especially cheek, gum	Use of the plug, leaf, or snuff forms of tobacco, especially dipping snuff
Cigars	Oral, larynx, esophagus	Smoking cigars
Environmental tobacco smoke[10]	Lung	Breathing smoke from other people's cigarettes
Alcohol	Mouth, larynx, throat, esophagus, liver, breast	Heavy drinking of alcoholic beverages
Diet	Colon, rectum, prostate, uterus	Eating foods high in fat, especially red meat
	Stomach, lung, esophagus, colon, rectum	Low intake of fruits and vegetables
Infections		
Helicobacter pylori	Stomach	Person-to-person contact
Hepatitis B	Liver	Contact with infected person's blood, sexual contact, mother-to-child transmission during pregnancy
Hepatitis C Virus	Liver	Contact with infected person's blood, sexual contact, mother-to-child transmission during pregnancy
Human Papilloma Virus (certain strains)	Cervix	Sexual contact

Table 2 -- Continued

CAUSE	CANCER(S)	HOW EXPOSED
Obesity	Colon, rectum, prostate, uterus, breast (among postmenopausal women), kidney, pancreas	Greater caloric intake than energy output
Sunlight[10] (ultraviolet radiation)	Skin (melanoma and non-melanoma)	Outdoor activities in which the skin is not protected, exposure to tanning lamps. Severe sunburns during childhood may greatly increase the risk of melanoma in later life.
Radon[10]	Lung	Radon in the ground, groundwater, or building materials enters homes in the air, decays, and is breathed in.
Reproductive history in women:		Evidence suggests that the longer a woman is exposed to the hormone estrogen (estrogen made by the body, taken as a drug, or delivered by a patch), the more likely she is to develop breast cancer. For example, the risk is somewhat increased among women who began menstruation at an early age (before age 12), experienced menopause late (after age 55), never had children, or took hormone replacement therapy for long periods of time. Each of these factors increases the amount of time a woman's body is exposed to estrogen. Women who are exposed to estrogen for a longer time also have a higher risk for cancer of the uterus.
Young age at first menstruation or older age at menopause	Breast, uterus	
Never bearing children	Breast, uterus, ovary	
Bearing first child after age 30	Breast	
Oral contraceptives	Small <u>increased</u> risk for breast cancer, especially long-term use and among recent or current users <u>Decreased</u> risk for cancers of the ovary and uterus	Women take oral contraceptives for birth control purposes. Oral contraceptives used now contain lower dosages of hormones than in the past.

Table 2 - Continued

CAUSE	CANCER(S)	HOW EXPOSED
Reproductive history in women (continued)		
Peri- and post-menopausal hormonal replacement therapy, especially long-term use	Breast, uterus	Women use hormone replacement therapy to treat the symptoms during and after menopause
Early age at first sexual intercourse, many sexual partners, having sex with a partner who has had many sexual partners	Cervix	Women with these risk factors are at increased risk for infection with human papilloma virus, which may increase the risk for cancer of the cervix.

[1] American Cancer Society. Cancer Facts and Figures - 2017.

[2] Harras A, editor. Cancer Rates and Risks. USDHHS. 1996.

[3] International Agency for Research on Cancer. Scientific review meeting on IARC Handbooks of Cancer Prevention, Volume 8, Fruits and Vegetables, 2003 (Website: http://www.iarc.fr).

[4] IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 59, Hepatitis Viruses, 1994.

[5] IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 61, Schistosomes, Liver Flukes, and Helicobacter pylori, 1994.

[6] IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 64, Human papillomaviruses, 1995.

[7] IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 72, Hormonal Contraception and Post-Menopausal Hormonal Therapy, 1999.

[8] IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 83, Tobacco Smoke and Involuntary Smoking, 2004.

[9] National Cancer Institute. What You Need To Know About Breast Cancer. Information about detection, symptoms, diagnosis, and treatment of breast cancer. NIH Publication No. 09-1556. Revised July 2009, Printed September 2009.

[10] Environmental tobacco smoke, radon, and sunlight can also be occupational hazards.