

Review of Cancer Incidence Data for Hanover, MA

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Presentation Outline

1. Role of MDPH Bureau of Environmental Health in responding to cancer concerns
2. Cancer Facts & Figures
3. Cancer Incidence in Hanover: 2004-2008
4. Evaluation of Thyroid Cancer Incidence in Hanover (MDPH 2007 Report)
5. Conclusions
6. Environmental Health Resources and Contact Information

MDPH Bureau of Environmental Health

Indoor Air Quality Program

Community Sanitation Program

Community Assessment Program

Food Protection Program

Environmental Epidemiology
Program

Radiation Control Program

Environmental Toxicology
Program

Childhood Lead Poisoning
and Prevention

Environmental Health Education
And Outreach Program

Community Assessment Program

- Provide information and education related to environmental health issues
- Respond to concerns about disease clusters including cancer
- Evaluate frequency and pattern of disease in the population
- Investigate possible associations between environmental exposure and disease

Cancer Facts & Figures

- Cancer is a general term which describes a group of diseases characterized by uncontrolled growth and spread of abnormal cells
- Research has shown that there are more than 100 different types of cancer, each with its own risk factors

Cancer Facts & Figures

- According to the American Cancer Society, **1 in 3 women** and **1 in 2 men** will be diagnosed with cancer at some point in their lifetime
- Over the past 40 years, the dramatic rise in the number of cancer cases generally reflects, in part, the increase in the population, particularly in older age groups, and improved diagnostic capabilities to identify cancers at earlier stages

Most Common Types of Cancer In MA and US

Males

Prostate 28%
Lung & Bronchus 14%
Colon/Rectum 10%
Bladder 7%
Other 41%

Females

Breast 29%
Lung & Bronchus 14%
Colon/Rectum 10%
Uterus 6%
Other 41%

Cancer Risk Factors

- Most cancers are likely to be caused by a combination of factors related to genetics and environment (behaviors/ lifestyle as well as environmental and occupational exposures).

Cancer Risk Factors

- Cancer is almost always caused by one or several factors acting over time.
 - Personal risk factors such as smoking, lack of crude fiber in the diet, high fat consumption, alcohol abuse, and reproductive history have been linked to the development of some cancers
 - Heredity, or family history, is an important risk factor for several cancers
 - Occupational exposures (such as contact with asbestos) and environmental contamination have been associated with some types of cancer

Cancer Clusters

- A large number of cases of one type of cancer diagnosed in a relatively short period of time rather than several different types diagnosed over a long period of time
- A rare type of cancer rather than a common type
- An increased number of cases of a certain type of cancer in an age group not usually affected by that type of cancer

Challenges of Environmental Epidemiology

- Number of cases is often small
- Access to relevant exposure data
- Information lacking on important personal risk factors
- Cannot determine the cause of any one individual's cancer
- Complexity of disease (e.g., gene-environment interactions)
- For cancer, long latency or development period

Links to MCR database allow for:

- Analyzing risk factors
- Determining if age, gender, histology, or tobacco history patterns differ from what would be expected
- Evaluating dates of diagnosis to assess temporal (time) clustering
- Evaluating residence at diagnosis to assess spatial distribution (using population density overlays)

Examples of Some Cancers Associated with Environmental Risk

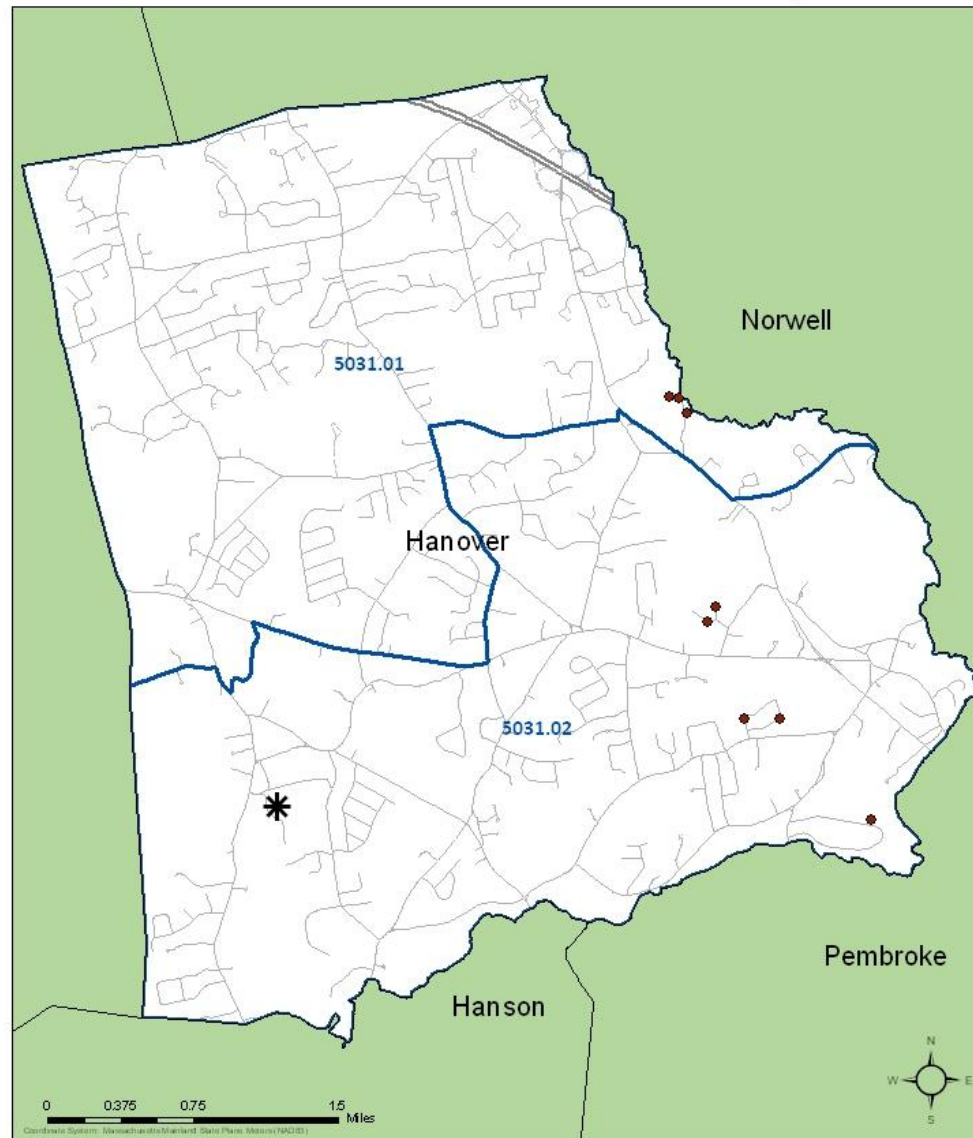
Cancer Type

- Leukemia
- Mesothelioma
- NHL

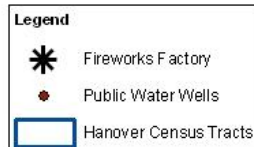
Environmental Factors

- Ionizing radiation, benzene, solvents
- Asbestos
- High –dose radiation, occupational exposures (benzene, PCBs, herbicides, insecticides)

Figure 1:
Census Tracts and the Location of Public Water Wells in Hanover, MA



Geographic data supplied by: Massachusetts Executive Office of Environmental Affairs, MassGIS; Geographic Data Technology, Inc.



Cancer Incidence in Hanover 2004-2008

- For most of the 23 cancer types reported, incidence occurred about as expected in Hanover.
- A statistically significant elevation occurred in one cancer type: ovarian cancer.
- Thyroid cancer in females was elevated (although not statistically significantly elevated).

From: MCR City/Town Supplement for 2004-2008

Risk Factors for Ovarian Cancer

■ Established risk factors:

- Age
- Family history of ovarian cancer
- Certain hereditary conditions and gene mutations
- Reproductive factors
- Previous breast cancer diagnosis

■ Possible risk factors:

- Medical treatments (such as use of certain fertility drugs or estrogen use after menopause)
- Obesity

Ovarian Cancer in Hanover (2004-2008): Risk Factor Analysis

- Age at diagnosis:
 - In the U.S., two-thirds of women are 55 or older at diagnosis.
 - In MA, 71% of females were over age 55 at diagnosis.
 - In Hanover, more than 80% of females were over age 55 at diagnosis.
- With one exception, spatial distribution generally follows population density pattern of Hanover; two individuals lived in close proximity to one another and were diagnosed within a year of each other.
- No long-term trend in Hanover females: 1995-99 (lower than expected incidence) and 2000-2004 (occurred as expected)

Evaluation of Thyroid Cancer Incidence in Hanover, MA

MDPH December 2007 Report

- Conducted to respond to residents' concerns specific to thyroid cancer and possible perchlorate exposure
- Evaluated town-wide and census tract data for 1999-2003
 - Cancer incidence data
 - Risk factor analyses (e.g., age at diagnosis, subtypes of thyroid cancer)
 - Spatial distribution
 - Residential history

Risk Factors for Thyroid Cancer

Established risk factors:

- Age
- Family history (of thyroid cancer or goiters with multiple thyroid nodules)
- Hereditary conditions (such as Gardner Syndrome or familial polyposis)
- Exposure to high-dose ionizing radiation (through nuclear fallout from nuclear plant accidents or radiation treatment for a previous cancer)

Other possible risk factors:

- Diet low in iodine
- Note: According to the National Academy of Sciences, perchlorate can impact thyroid function but is not thought to be a potential cancer-causing substance.

Trends in Thyroid Cancer

- Thyroid cancer rates have been increasing in Massachusetts since 1984, with significant increases since 1997. This follows national trends.
- Increase due in part to earlier detection of small tumors (using fine needle aspiration biopsy and ultrasound imaging) and better clinician awareness (through increase in neck palpations).
- The greater increase in smaller papillary tumors being diagnosed earlier in females and larger tumors being diagnosed later in males indicates that women may be using the health care system more than men.

From: *Data Report on Thyroid Cancer in Massachusetts*, MDPH
Massachusetts Cancer Registry, January 2011 Update.

Findings of MDPH 2007 Report on Thyroid Cancer Incidence

- The incidence of thyroid cancer was elevated town-wide for 1999-2003; the elevation was not statistically significant. Closer examination showed that the elevation was in females (10 diagnoses observed compared to 5 expected based on statewide experience).
- When examined by census tract, a statistically significant elevation did occur in females in the northern census tract (5031.01), with 9 diagnoses observed compared to approximately 2 expected. *Note: The media incorrectly reported elevation in southern census tract.*
- Using residential history information available from Hanover annual street listings, we learned that the majority (8 of 12 individuals) resided at their address at diagnosis for less than 10 years prior to their diagnosis. This is notable because most cancers have long periods of development, between 10 and 40 years.

Findings of MDPH 2007 Report on Thyroid Cancer Incidence

- A review of risk factor information did not indicate an atypical pattern with regard to age at diagnosis or thyroid cancer subtype.
- We evaluated perchlorate* sampling results for the town public water supply wells and found no exceedances of the perchlorate drinking water standard.

Note: According to the National Academy of Sciences, perchlorate can impact thyroid function but is not thought to be a potential cancer-causing substance.

Thyroid Cancer Update (2004-2008)*:

Risk Factor Analysis

- Age at diagnosis:
 - Incidence is highest among individuals between 20 and 55
 - In Hanover, 47% of females were between 20 and 55 at diagnosis. No diagnoses occurred in females under 20. Average age at diagnosis was 56.
 - In MA, 66% of females were between 20 and 55 at diagnosis. Average age at diagnosis was 49.
- Using residential history information available from Hanover annual street listings, we learned that about half (9 of 17 individuals or 53%) resided at their address at diagnosis for less than 10 years before their diagnosis.
- In Hanover, 88% were papillary carcinomas. In MA, 87% were papillary carcinomas.
- Spatial distribution generally follows population density of Hanover.

** Females: 15 diagnoses observed versus 9 expected; not statistically significant.*

Thyroid Cancer Staging

- Reviewed 2001-2008 staging information (for local, regional, and distant stages)
 - Stages at which diagnoses were made were generally similar in Hanover as across the state
 - No distant stage diagnoses in Hanover in either gender

Conclusions

- For 2004-2008, the majority of the 23 cancer types evaluated occurred about as expected.
- Although ovarian cancer was elevated, an examination of risk factors and geographic distribution did not show unusual patterns.

Conclusions, cont.

- The incidence of thyroid cancer in women has been elevated over 1999 through 2008.
 - Over half of the individuals (17 of 29 or 59%) resided in their residence of diagnosis for less than 10 years prior to diagnosis.
 - Based on closer examination of risk factors, no unusual patterns emerged with respect to age or residence at diagnosis or thyroid cancer subtypes.
 - Increased incidence is consistent with statewide and national trends.

Environmental Health Resources

■ MDPH/BEH:

■ Environmental Exposure Topics and Factsheets

(e.g., algae, beaches, water, fish, wildlife, indoor air quality, lead, mercury, and radiation control)

http://www.mass.gov/dph/environmental_health

■ EPHT Portal

<http://matracking.ehs.state.ma.us>

<http://ephtracking.cdc.gov>

Massachusetts Department of Public Health
Bureau of Environmental Health

Phone number:

617-624-5757 or 1-800-240-4266

Website:

http://www.mass.gov/dph/environmental_health