Frederick Maryland Cancer Investigation: 2014 Update

September 29, 2014

Frederick, Maryland

http://phpa.dhmh.maryland.gov

Purpose

- Describe updated results of our investigation into cancer in Frederick County using data from the Maryland Cancer Registry from 1992-2011

Next Steps from 2011

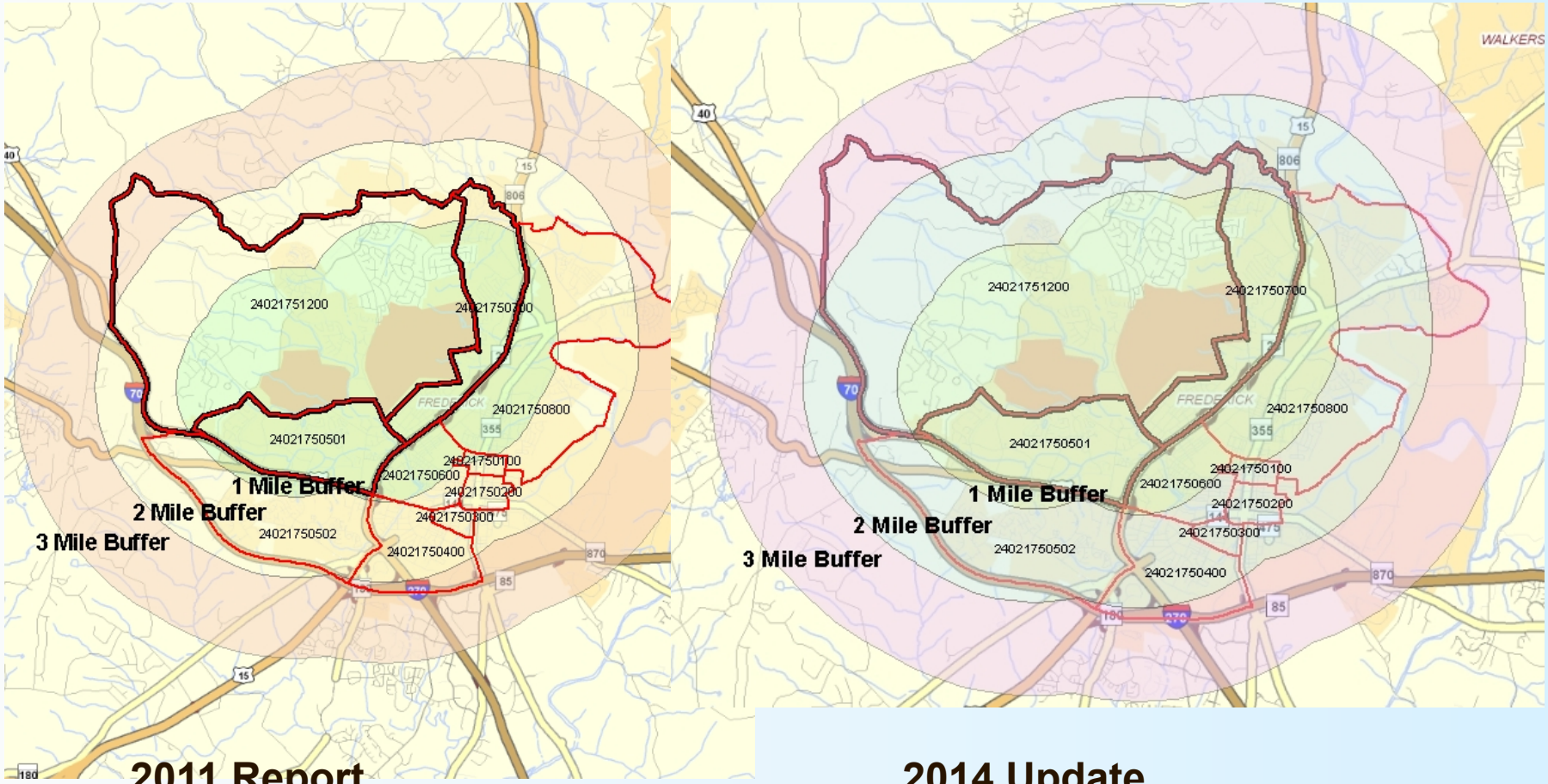
- Continue some spatial/clustering analysis
- Continue to look at Age of Diagnosis, other demographic factors
- ☑ Review of environmental data with MD Dept of Environment, Fort Detrick
- ☑ Preparation of final report

Background

- 7 census tracts immediately around Fort Detrick
- Data: All cancers in the Maryland Cancer Registry from 1992-2011
- Population comparisons for 2010:*
  - Investigation tracts: 33,587
  - Frederick City: 65,239
  - Frederick County: 233,385

*Source: US Census

Map of Census Tracts



Is the Number of Cancers More (Or Less) Than Expected?

- One way to answer this question – the Standardized Incidence Ratio (SIR)
- To figure out how many cancers expected, use a comparison population
- Compare the actual number of cases observed in the designated census tracts with how many you would expect

How Did We Determine the Expected Number of Cancers?

For all cancers and each type of cancer:

- Look at the known age-specific rate of cancer in the comparison population (Maryland, Frederick County)
- Multiply the RATE by the NUMBER of people in that age group in the designated census tracts
- Add up the number in each age group to get the total number of cases expected

Example

- Suppose we have 200 people,100 underage 30, 100 age 30 and over
- If the age-specific rate for people under 30 is 10 cases per hundred per year, we would EXPECT 10 cases in that group
- If the age-specific rate for people 30 and over is 15 cases per hundred per year, we would EXPECT 15 cases in that group
- The TOTAL EXPECTED cases would be 25

Confidence Intervals

- A Confidence Interval allows for some uncertainty, but is our best guess
- For SIRs, if the 95% Confidence Interval includes 1.0, it means that the number observed is within our best guess estimate for the number expected

Results

All Cancers

Observed cases in census tracts	2247
Expected cases based on Frederick County rates	2433
SIR compared to Frederick County	0.92
95% confidence interval	0.89-0.96
Statistically different from Frederick County	Yes (Lower)
Expected cases based on Maryland rates	2350
SIR compared to Maryland	0.96
95% confidence interval	0.92-0.99
Statistically different from Maryland	Yes (Lower)

SeerStat data as of 02/13/2014 was used to calculate expected number of cases using Frederick County and Maryland rates.
CT* Census Tract
SIR** Standard Incidence Ratio= Observed Cases/Expected Cases
^ expected number of cases=(1992-2011 Frederick or Maryland State cancer rates) X (population of 7 CTs*)

Lung & Bronchus

Observed cases in census tracts	322
Expected cases based on Frederick County rates	317
SIR compared to Frederick County	1.02
95% confidence interval	0.91-1.13
Statistically different from Frederick County	No
Expected cases based on Maryland rates	328
SIR compared to Maryland	0.98
95% confidence interval	0.88-1.09
Statistically different from Maryland	No

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Colorectal

Observed cases in census tracts	238
Expected cases based on Frederick County rates	264
SIR compared to Frederick County	0.90
95% confidence interval	0.79-1.02
Statistically different from Frederick County	No
Expected cases based on Maryland rates	243
SIR compared to Maryland	0.98
95% confidence interval	0.86-1.11
Statistically different from Maryland	No

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Female Breast

Observed cases in census tracts	367
Expected cases based on Frederick County Rates	377
SIR compared to Frederick County	0.97
95% confidence interval	0.88 -1.07
Statistically different from Frederick County	No
Expected cases based on Maryland rates	366
SIR compared to Maryland	1.00
95% confidence interval	0.90-1.10
Statistically different from Maryland	No

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Prostate

Observed cases in census tracts	299
Expected cases based on Frederick County rates	329
SIR compared to Frederick County	0.90
95% confidence interval	0.80-1.01
Statistically different from Frederick County	No
Expected cases based on Maryland rates	348
SIR compared to Maryland	0.86
95% confidence interval	0.76-0.96
Statistically different from Maryland	Yes (Lower)

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Brain and CNS

Observed cases in census tracts	31
Expected cases based on Frederick County rates	39
SIR compared to Frederick County	0.79
95% confidence interval	0.53-1.12
Statistically different from Frederick County	No
Expected cases based on Maryland rates	34
SIR compared to Maryland	0.92
95% confidence interval	0.62-1.30
Statistically different from Maryland	No

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Kidney and Bladder

Observed cases in census tracts	164
Expected cases based on Frederick County rates	175
SIR compared to Frederick County	0.93
95% confidence interval	0.80-1.09
Statistically different from Frederick County	No
Expected cases based on Maryland rates	159
SIR compared to Maryland	1.03
95% confidence interval	0.88-1.20
Statistically different from Maryland	No

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Leukemia

Observed cases in census tracts	44
Expected cases based on Frederick County rates	54
SIR compared to Frederick County	0.82
95% confidence interval	0.59-1.09
Statistically different from Frederick County	No
Expected cases based on Maryland rates	52
SIR compared to Maryland	0.84
95% confidence interval	0.61-1.13
Statistically different from Maryland	No

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Lymphoma

Observed cases in census tracts	118
Expected cases based on Frederick County rates	115
SIR compared to Frederick County	1.03
95% confidence interval	0.85-1.23
Statistically different from Frederick County	No
Expected cases based on Maryland rates	102
SIR compared to Maryland	1.16
95% confidence interval	0.95-1.38
Statistically different from Maryland***	No

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^ expected number of cases=(1992-2011 Frederick or Maryland State cancer rates) X (population of 7 CTs*)
***Had been statistically different in 2011 report.

Liver

Observed cases in census tracts	25
Expected cases based on Frederick County rates	20
SIR compared to Frederick County	1.22
95% confidence interval	0.78-1.79
Statistically different from Frederick County	No
Expected cases based on Maryland rates	26
SIR compared to Maryland	0.95
95% confidence interval	0.61-1.40
Statistically different from Maryland	No

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Thyroid

Observed cases in census tracts	54
Expected cases based on Frederick County rates	68
SIR compared to Frederick County	0.80
95% confidence interval	0.63-1.03
Statistically different from Frederick County	No
Expected cases based on Maryland rates	52
SIR compared to Maryland	1.03
95% confidence interval	0.77-1.34
Statistically different from Maryland	No

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CT* Census Tract
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All Cancers

Cancer type	Observed number in census tracts	Expected cases based on Frederick County 1992-2011	SIR** compared to Frederick County	95% CI	Census tracts statistically different from Frederick County	Expected cases based on Maryland 1992-2011	SIR** compared to Maryland	95% CI	Census tracts statistically different from Maryland
All sites	2247	2433	0.92	0.89-0.96	No	2350	0.96	0.92-0.99	No
Lung & Bronchus	322	317	1.02	0.91-1.13	No	328	0.98	0.88-1.09	No
Colo-rectal	238	264	0.90	0.79-1.02	No	243	0.98	0.86-1.11	No
Female Breast	367	377	0.97	0.88-1.07	No	366	1.00	0.90-1.10	No
Prostate	299	329	0.90	0.80-1.01	No	348	0.86	0.76-0.96	No
Brain & CNS	31	39	0.79	0.53-1.12	No	34	0.92	0.62-1.30	No
Kidney & Bladder	164	175	0.93	0.80-1.09	No	159	1.03	0.88-1.20	No
Leukemia	44	54	0.82	0.59-1.09	No	52	0.84	0.61-1.13	No
Lymphoma	118	115	1.03	0.85-1.23	No	102	1.16	0.95-1.38	No
Liver	25	20	1.22	0.78-1.79	No	26	0.95	0.61-1.40	No
Thyroid	54	68	0.80	0.60-1.03	No	52	1.03	0.77-1.34	No

SeerStat data as of 02/13/2014 was used to calculate expected number of cases using Frederick County and Maryland rates.
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Findings

Comparing Standardized Incidence Ratios (SIRs):

- Compared to Frederick County
  - Number of cancers observed in the designated census tracts from 1992-2011 is not statistically different than expected
- Compared to Maryland
  - Number of cancers observed in the designated census tracts from 1992-2011 is not statistically different than expected
  - Previous finding of statistically increased lymphoma incidence compared with State not observed

Mean Age at Diagnosis

- Test hypothesis that exposure might lead to earlier ages of cancer diagnosis
- Used mean age of diagnosis for diagnostic groups
- Diagnostic groups used because of small number of individual cancer types
  - Aggregation increases chances of finding statistical differences

Mean Age at Diagnosis

Cancer Group8	Designated Census Tracts Mean (Std Dev)	Frederick County	Significant Difference?
Bone	38.8 (22.1)	39.9 (24.6)	No
Breast	61.3 (15.2)	59.7 (14.6)	No
Skin	58.7 (17.7)	57.6 (16.3)	No
Endocrine	**43.2 (15.5)**	**47.2 (15.4)**	**Yes**
Gastrointestinal	68.4 (13.6)	67.1 (13.9)	No
Genitourinary	65.6 (17.2)	63.1 (17.1)	No
Gynecologic	59.1 (16.4)	57.4 (16.5)	No
Hematologic	59.7 (19.6)	60.1 (20.0)	No
Liver	62.7 (16.6)	64.5 (14.1)	No
Lung	69.1 (11.9)	68.4 (11.5)	No
Neurologic	49.3 (20.6)	54.4 (21.3)	No
Prostate	68.1 (9.9)	67.9 (10.6)	No

*Includes all invasive and in situ cancer excluding basal and squamous cell carcinoma
Source: Maryland Cancer Registry, Consolidated Data 02/13/2014
^All cancer diagnoses 1992-2011

Findings

- Using the 7 census tracts immediately around Fort Detrick, there was a statistically significant earlier mean age of diagnosis for Endocrine cancers
  - This is not reflected in the SIRs reported earlier
  - May be due to multiple comparisons
  - Could be opportunity for further research in the future
- There were no other significant differences in mean age of diagnosis

Conclusions and Next Steps

- Continue to review cancer incidence data for Frederick County
  - If incidence should rise, then a further investigation will be conducted
- Continue to have active discussions regarding cancer incidence
- General ongoing prevention efforts

Questions