

Understanding Cancer and the Numbers

Camdenton
Community Advisory Team Meeting
May 8, 2018

Missouri Department of Health and Senior Services
Division of Community and Public Health
Office of Epidemiology





Overview

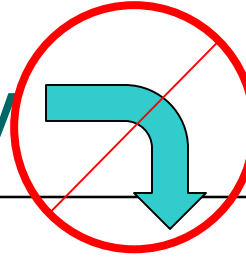
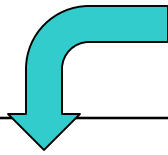
- What is cancer?
- How common is cancer?
- What factors increase our risk?
- Can we do anything to decrease the risk?
- What do the numbers tell us?
- What is Epidemiology?

Epidemiology

- Study of disease or health events in populations
- Determinants of the diseases
- Application of findings to prevent and control health problems



Epidemiology



Groups

- Summary data
- Population groups
- Disease surveillance
- Risks or protective factors for disease
- Community screening

Individual

- Requires special study
- Many factors involved
 - Exposure or contact?
 - For how long?
 - Personal & Family history?
 - Many others...
- Staff resources & expertise
- Very costly

Missouri Cancer Registry

- 1972 MCR established with voluntary hospital reporting
- 1984 bill passed required hospital inpatient cancer reporting (192.650 RSMo)
- 1992 National Program of Cancer Registries (Public Law 102-515) administered by Centers for Disease Control and Prevention
- **1996 NPCR reference year**
- 1999 bill passed expanding reporting to other entities such as physician offices, pathology laboratories, ambulatory surgical centers, residential care facilities, free-standing cancer clinics, etc. (192.650 – 192.657 RSMo)

Missouri Cancer Registry Data

- Demographics at diagnosis
- Date of diagnosis
- Primary tumor location
- Tumor characteristics
- Lymph nodes
- Initial treatment
- Death data
- Risk factors (Mo specific)
- Usual occupation / industry (when available)





MCR Data Limitations

- Prior to 1996 data are in various degrees of completeness
- Captures address at time of diagnosis
- May not be able to account for people who
 - moved away from the area and then were diagnosed with cancer
 - were diagnosed and died prior to 1996
- Limited information on occupation and risk factors



Cancer Inquiry

- Works with individuals or communities to:
 - Explore their cancer concern
 - Provide health education on cancer and lifestyle risk factors
 - Provide epidemiological information
- Most identified cancer excesses are due to normal random variation in cancer occurrences, or to personal behaviors, genetic causes, or unknown factors



Cancer Statistics (Numbers)

Help understand the burden of cancer on society

- How many people are diagnosed each year (incidence)
- Number of people living with cancer (prevalence)
- Number of people who die from cancer (mortality)
- Are there significant differences among certain groups of people (disparities)
- Historic data used to monitor changes over time



Frequently asked questions...

- Why do I know so many people with cancer?
- Why am I burying so many of my friends that were diagnosed with cancer?

Cancer is a common disease...

In 2018, estimated:

- 1.7 million new cases in U.S.
- 35,000 new cases in Missouri
- 600,000 deaths in the U.S. and 13,000 in Missouri

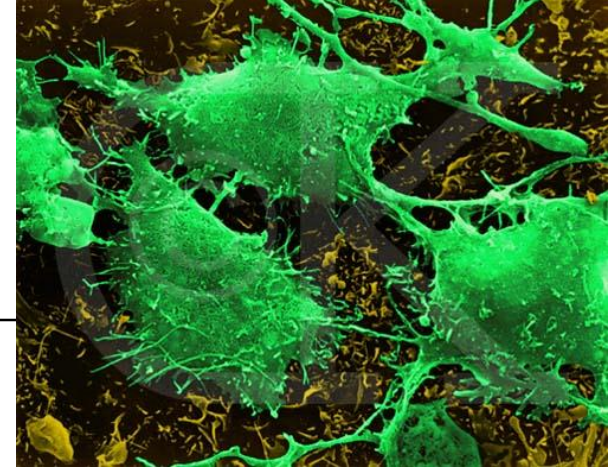
1 in 3 people
will develop cancer
in their lifetime

American Cancer Society, Inc. Cancer Facts & Figures 2018

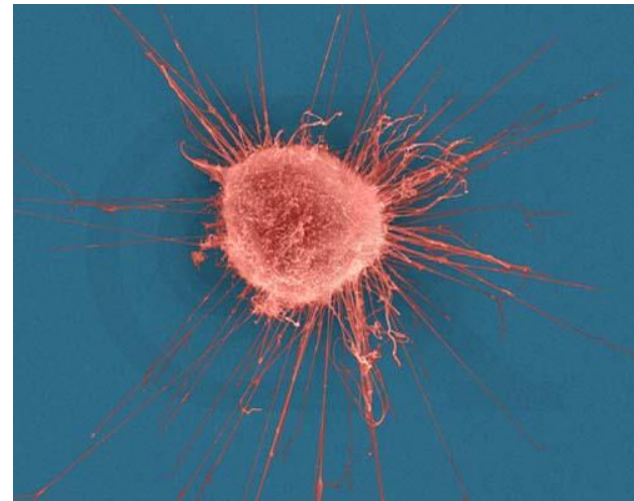
<https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2018/cancer-facts-and-figures-2018.pdf>

Cancer

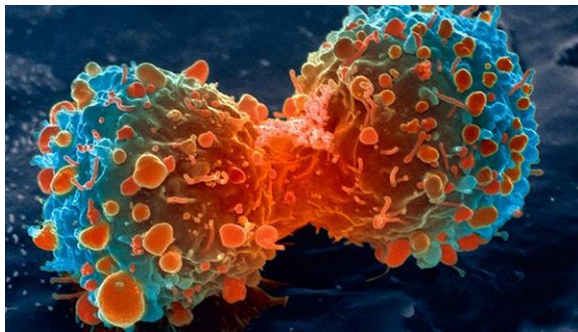
- Group of diseases – more than 100 types
- Named by organ or tissue of origin
- Uncontrolled growth of abnormal cells due to genetic changes / DNA damage
- Occurrence varies by population groups



Brain Cancer Cells

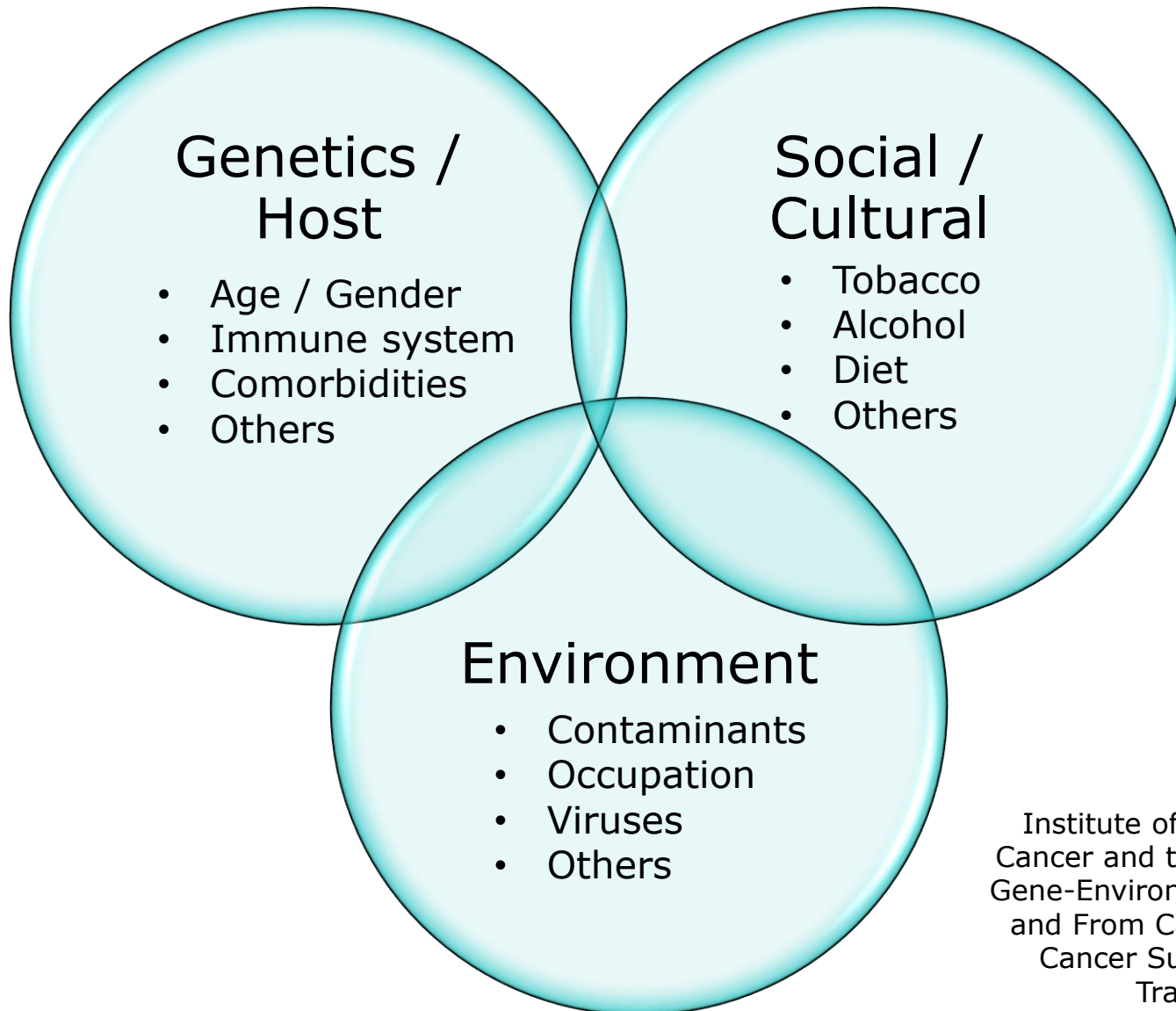


Breast Cancer Cell



Dividing lung cancer cell
National Institutes of Health

Multiple genes can interact with a number of environment and social factors



Institute of Medicine (US)
Cancer and the Environment:
Gene-Environment Interaction
and From Cancer Patient to
Cancer Survivor Lost in
Transition

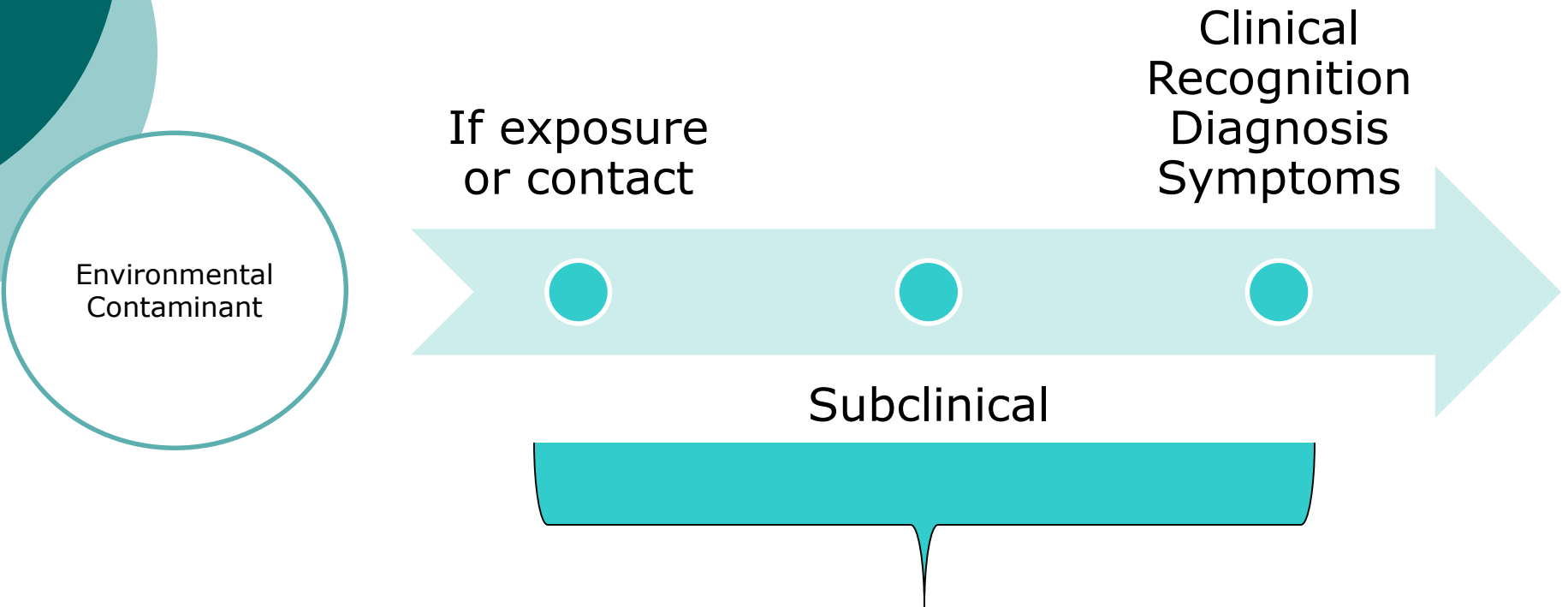
Cancer Risk Factors

- **Tobacco use 30%***
- **Diet 20-35%***
- Physical inactivity 5%
- Excess body weight 7%
- Occupation 4%
- Genetic susceptibility 5-10%
- Alcohol 2-4%
- **Infectious agents 10%***
- **Reproductive factors 7%***
- Environmental pollution 2%
- Low economic status 3%
- Ultraviolet light/Radiation 3%

***Estimated largest contributors to cancer deaths**

Exceeds 100% from combining resources and interrelationship of risk factors.

Latency



The time between exposure and clinical recognition – varies by cancer
May be 10 years, 20 years, or more

Trichloroethylene (TCE)

- Health effects depend on several factors: direct or indirect exposure or contact route, dose, length of exposure, and other factors – gender, age, body size, lifestyle, other exposures and health issues
- Potential increased risk for certain cancers and other non-cancer health effects (central nervous system, immune system, etc.)
- Primary **cancers** sites: kidney with limited evidence for non-Hodgkin lymphoma and liver



Breakdown products of TCE including Vinyl Chloride

- Human carcinogen – liver cancer
- Lengthy latency period
- Occupational exposure - cancers
 - Lung and respiratory tract
 - Lymphatic and blood
 - Brain and central nervous system
- Newer studies did not find significant association with respiratory tract or brain cancers

CITCAT Question...

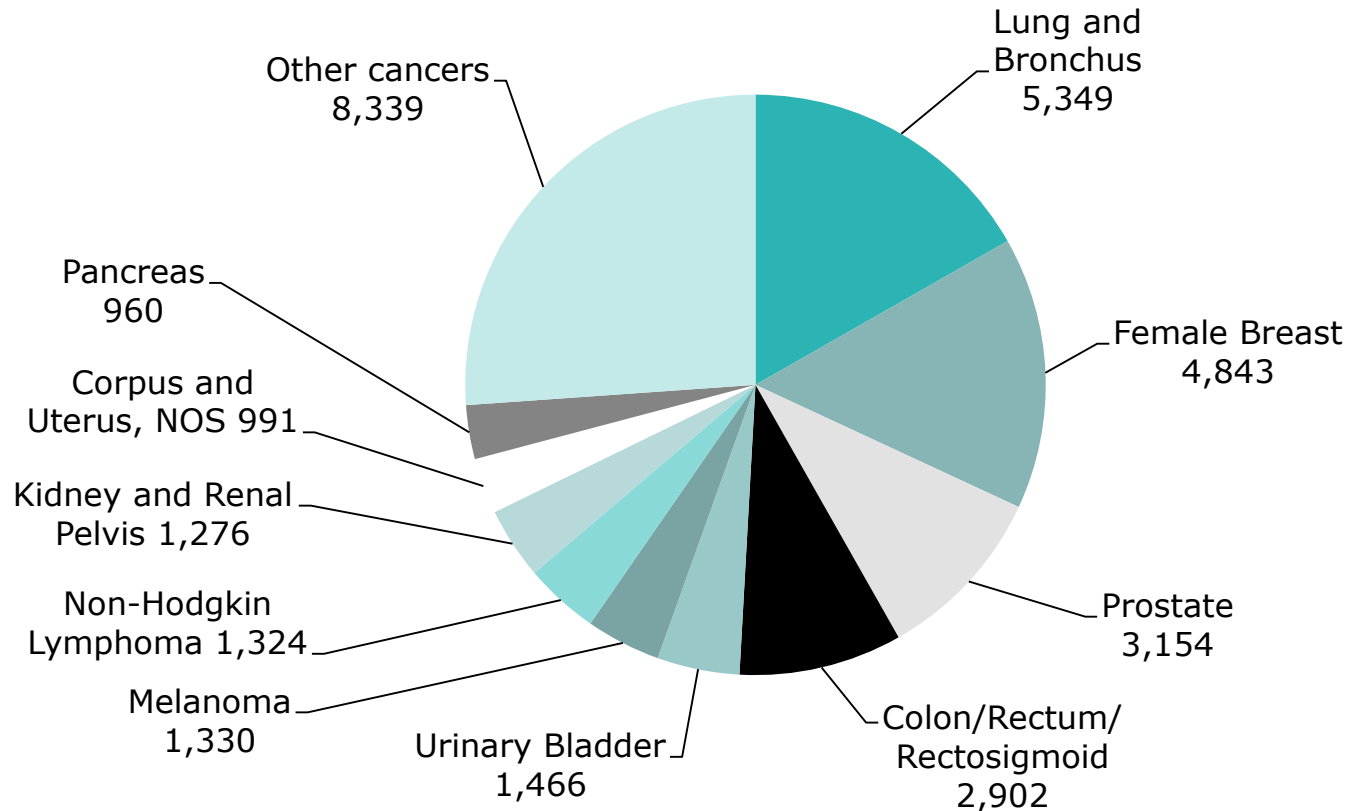
- “What are the different types or routes of exposure?”
 - Inhalation
 - Ingestion
 - Dermal

- Duration of exposure
 - Acute (14 days or less)
 - Intermediate (15 – 364 days)
 - Chronic (365 days or more)

CITCAT Questions...

- “What types of cancer can be caused by TCE and what kind of exposures lead to the types of cancer?”
 - Multisite carcinogen in rats and mice.
 - The EPA concluded that TCE is carcinogenic to humans by all routes of exposure based on convincing evidence of a causal association between TCE exposure in humans and kidney cancer.

Leading Sites of New Invasive Cancer Cases, Missouri, 2014



Missouri Department of Health and Senior Services. Cancer Incidence Missouri Information for Community Assessment (MICA).
<https://webapp01.dhss.mo.gov/MOPHIMS/MICAHome>



Top Ten Cancer Incidence Sites*

Missouri County-level Data (2010-2014)

Camden County

All Sexes	Cancer Site	Percent	Missouri
	Lung and Bronchus	17.81	1
	Female Breast	14.17	2
	Prostate	12.10	3
	Colon and Rectum	9.90	4
	Urinary Bladder	5.50	5
	Non-Hodgkin Lymphoma	4.40	7
	Melanoma of the Skin	4.26	6
	Oral Cavity and Pharynx*	3.44	-
	Kidney and Renal Pelvis	3.30	8
	Pancreas	3.03	10

*Risks: Tobacco use and heavy alcohol (30-fold), human papillomavirus

Cancers Linked to TCE and Breakdown Products

- Lung / bronchus*
- Kidney / renal pelvis*
- Non-Hodgkin lymphoma*
- Leukemia
- Brain / central nervous system
- Liver / intrahepatic bile ducts
- Hodgkin lymphoma
- Female Breast* (community interest)

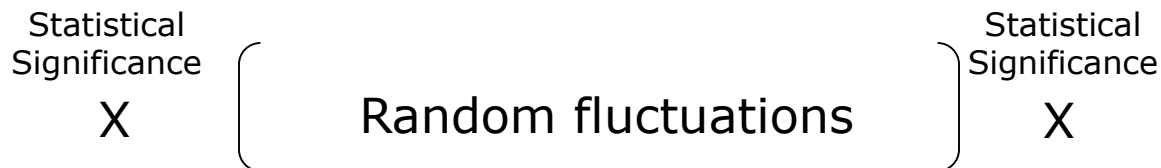


Camden County
compared to Missouri

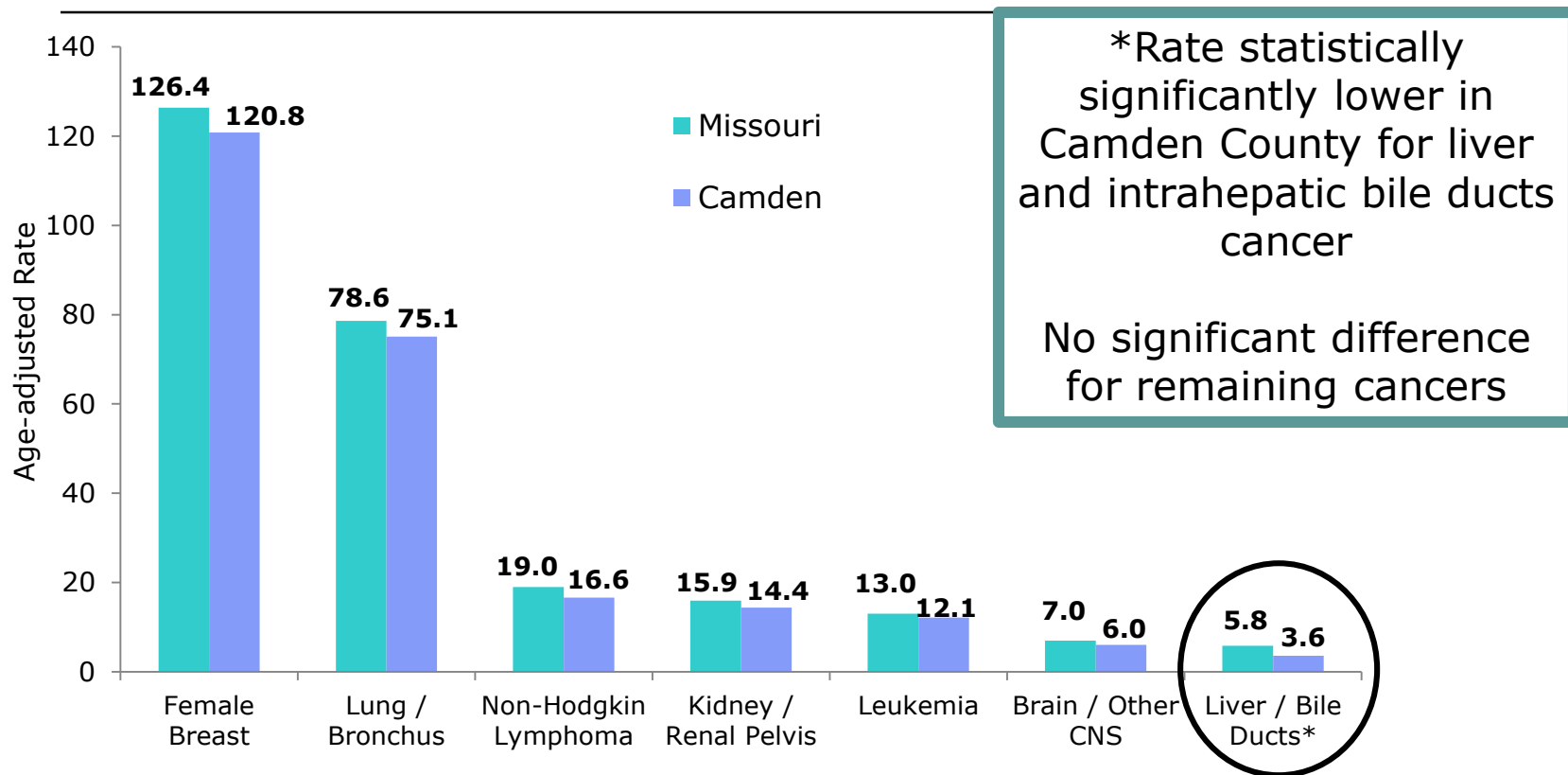
*Included in top 10 cancers

Age-adjusted Rate

- Rate is the number of cases divided by the population
- Age-adjustment is a process applied to rates of disease that allows communities with different age distributions to be compared
- Confidence Intervals a range around a measurement and indicates precision that the true value falls in that range



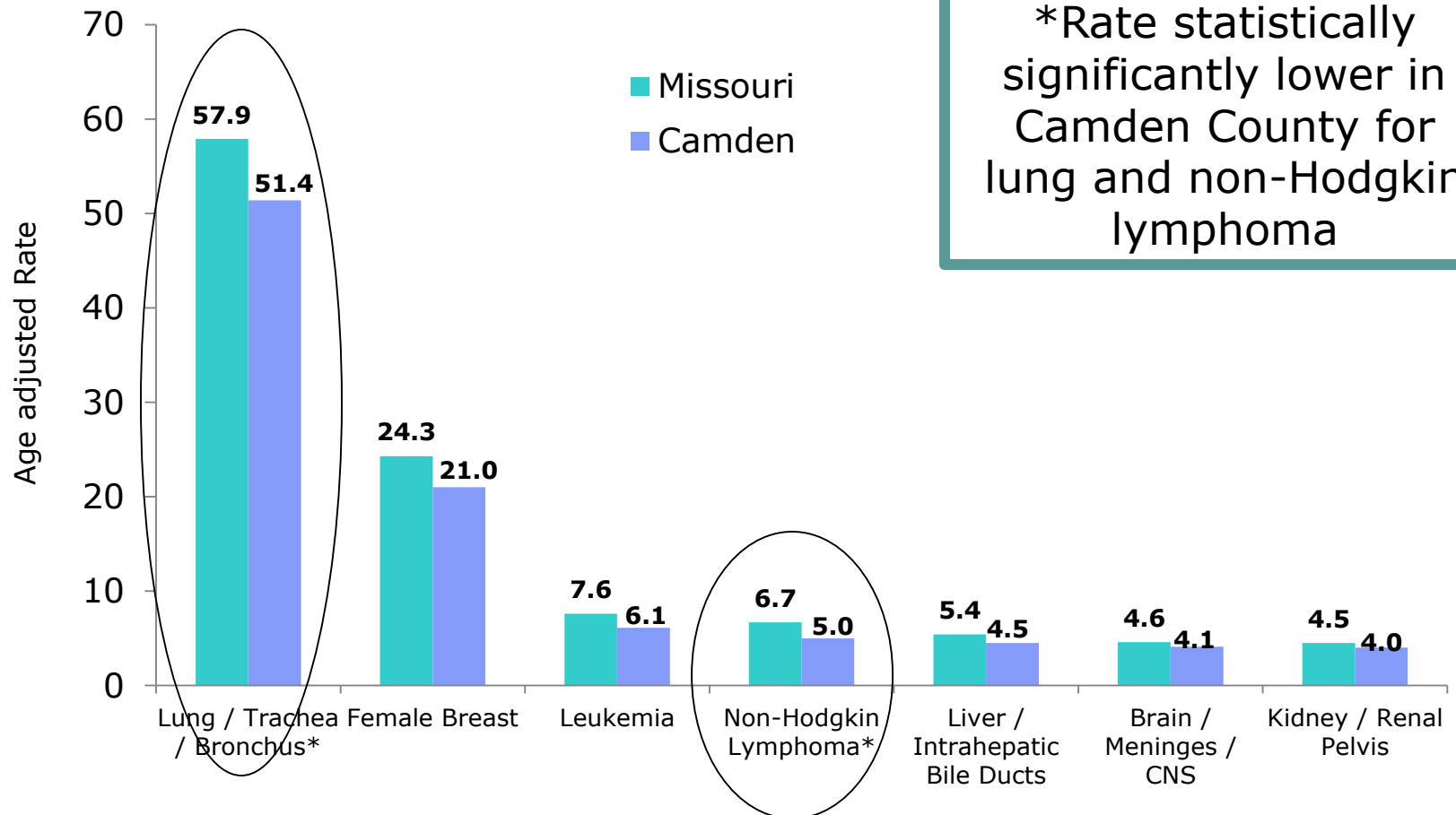
Invasive Cancer Incidence Rates[^] 1996-2014



[^]Age-adjustment uses 2000 US standard population; rate per 100,000 people

CNS = central nervous system

Cancer Death Rates, 1999-2016



*Rate statistically significantly lower in Camden County for lung and non-Hodgkin lymphoma

^Age-adjustment uses 2000 US standard population; rate per 100,000 people

CNS = central nervous system

Percent of Female Breast Cancers by Stage at Diagnosis, Missouri vs Camden County 1996-2014

	In situ	Localized	Regional	Distant	Unknown
Camden	13.3	53.3	25.7	4.4	3.3
Missouri	16.5	50.8	25.1	4.5	3.2

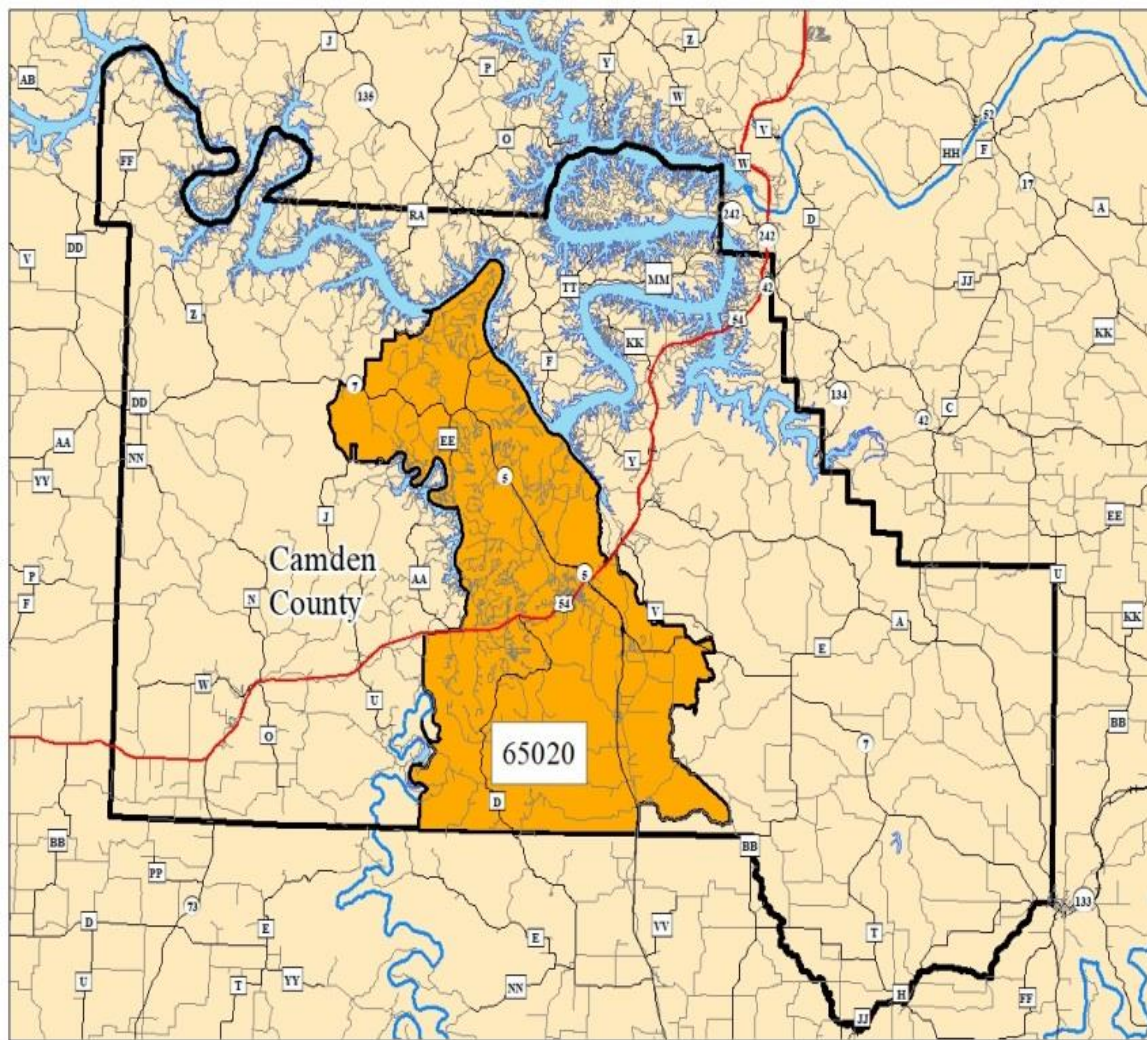
Stage at diagnosis is similar between
Camden County and Missouri

Cancer Incidence

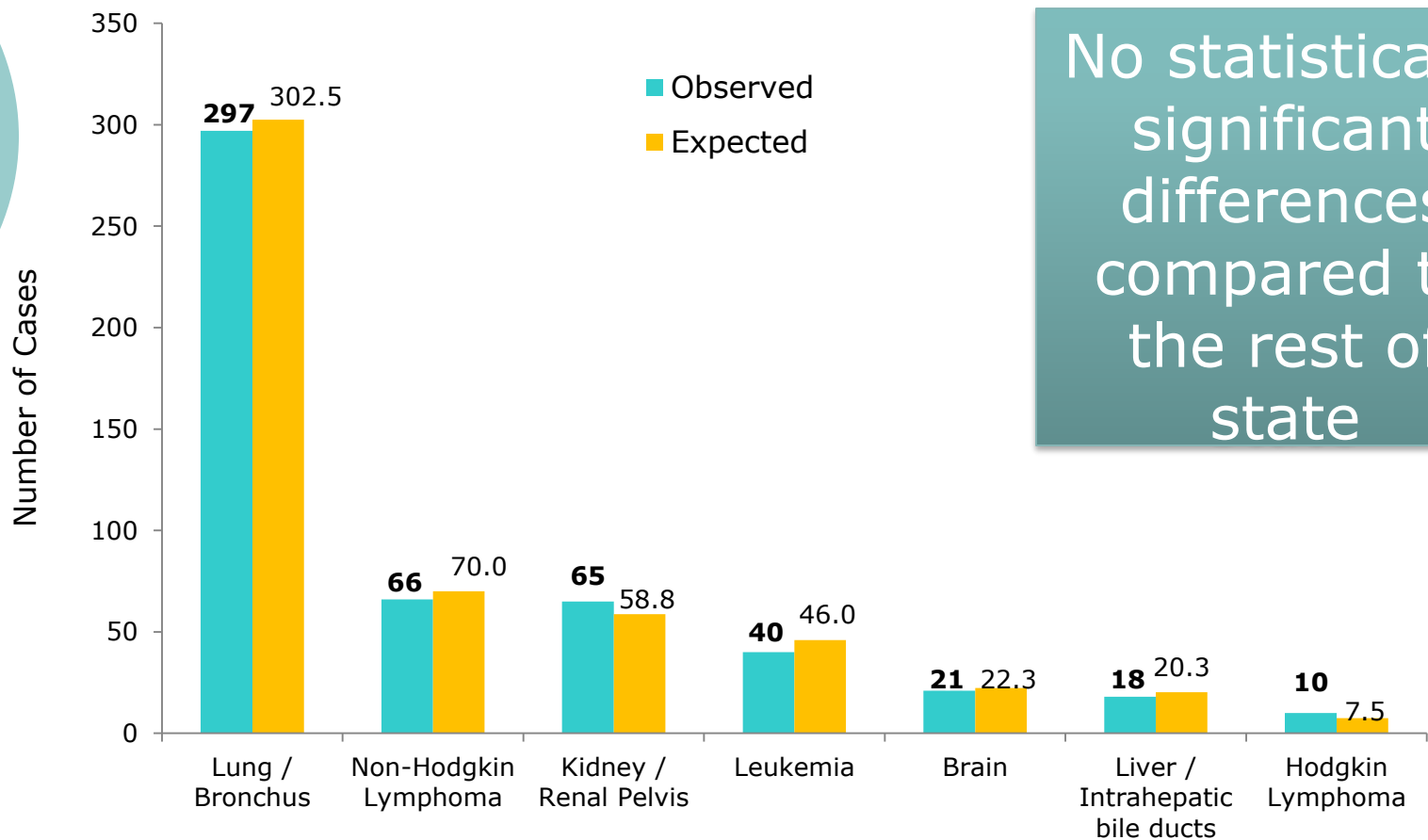
Zip Code 65020
Camdenton

Compared to rest
of Missouri

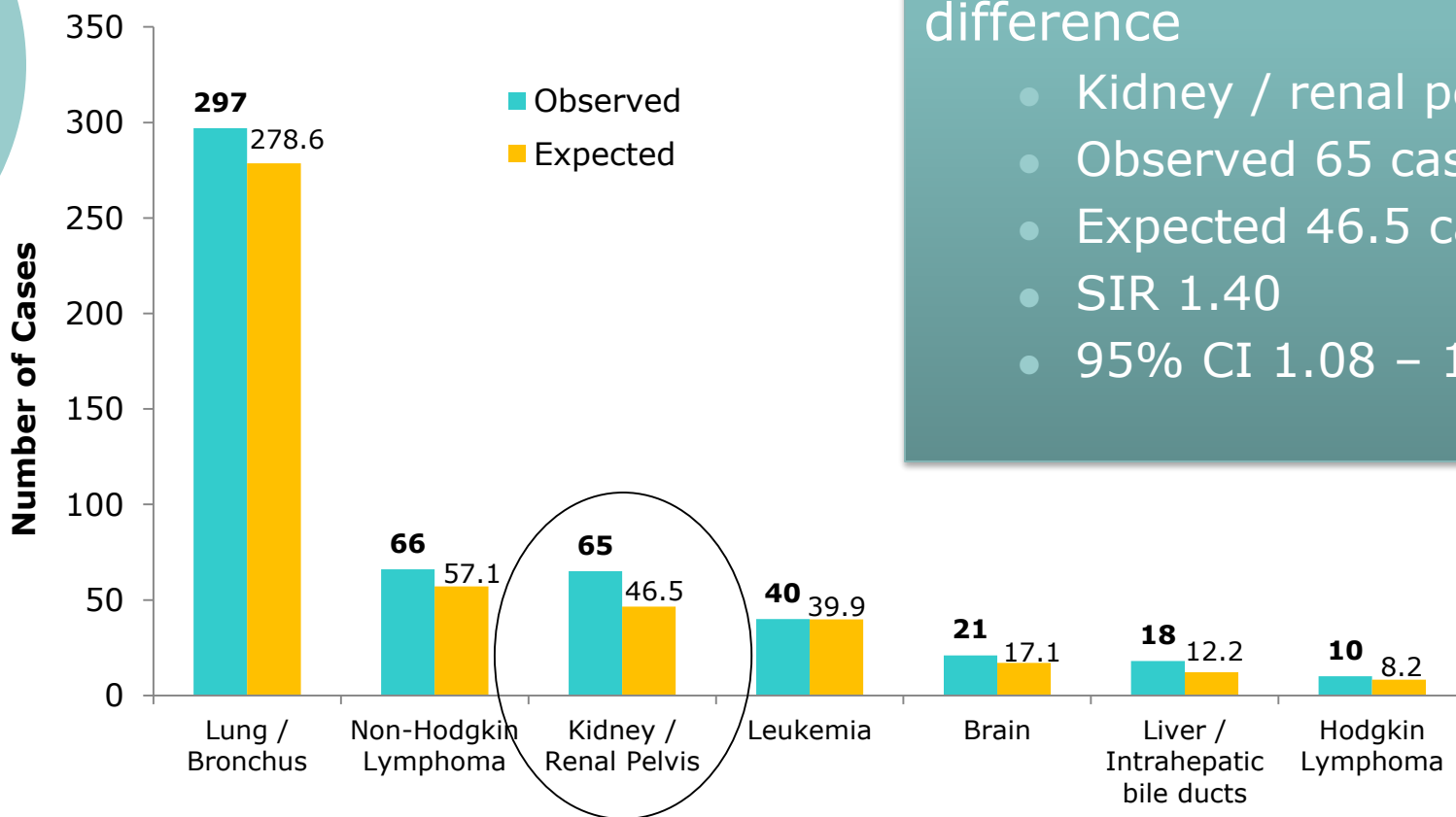
Compared to
remainder of the
County



Observed vs Expected Cases, Zip Code 65020 vs rest of Missouri, 1996-2015



Observed vs Expected Cases, Zip Code 65020 vs rest of Camden County, 1996-2015



One statistically significant difference

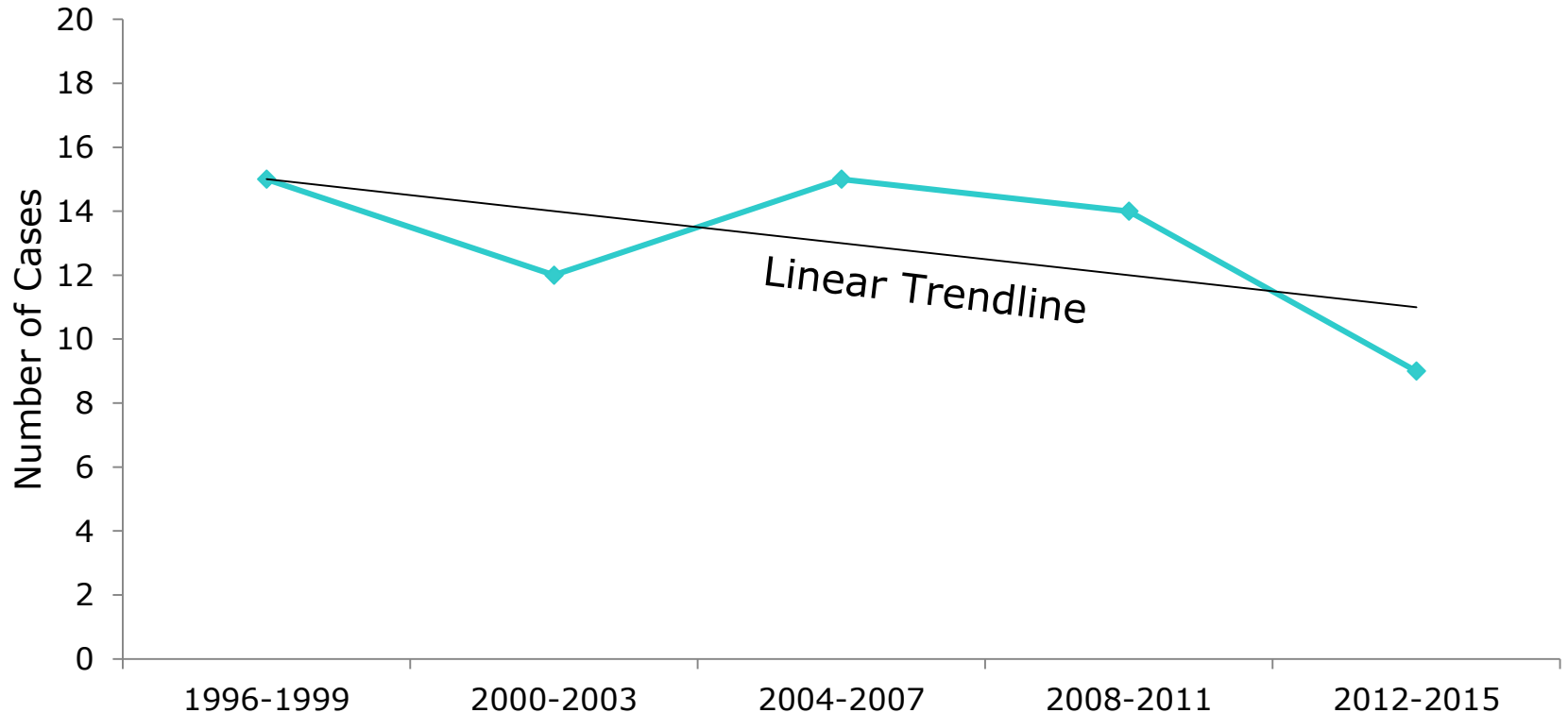
- Kidney / renal pelvis
- Observed 65 cases
- Expected 46.5 cases
- SIR 1.40
- 95% CI 1.08 – 1.78



Kidney Cancer Cases in Zip Code 65020, 1996-2015

- 55% were 65 years of age or older
- 65% were men
- 60% were diagnosed early in a localized stage

Number of Kidney Cancer Cases by 4-Year Groups, Zip Code 65020, 1996-2015



Joinpoint analysis showed an annual percent change -2.1%
Not statistically significant ($p = 0.2$)

Risk Factors for Kidney Cancer

- Smoking
- Obesity
- Family history
- Occupation exposures
- Environmental exposures
- High blood pressure
- Certain medicines
- Gender – males
- Certain genetic conditions
- Others



Summary

Camden County vs Missouri

New cases

- No statistically significant difference for 6 of the 7 cancers of interest and statistically significantly lower for the 7th - liver cancer

Deaths

- Significantly lower for two cancers: lung and non-Hodgkin lymphoma

Breast cancer – no significant differences

Summary

Zip Code 65020

- No statistically significant differences when compared to the rest of Missouri
- One statistically significant difference when compared to the rest of the county (kidney cancer cases higher than expected)
- Most of the kidney cancer cases occurred in at-risk population (men 2x more likely than women to develop)
- Trend in kidney cancer cases may be headed downward

Summary

- **Cancer is not one disease.** Different cancers, like other chronic diseases, have different causes and risk factors
- **Age, family history (genetics) and lifestyle factors** such as smoking and obesity are important risk factors for cancer
- Because **different cancers have different causes and risk factors**, Different cancer types are not usually related to a similar environmental exposure
- **Clustering can still be a random occurrence**, even when statistical tests indicate that cancer cases are higher than expected



Next Steps

- Cancer inquiry recommended and Patient Information Forms distributed by the community to individuals with cancer
- Each person completing a form mails the form directly to the Cancer Inquiry Program
- Would like to have as many forms returned to the CI Program as possible within 6 weeks
- Once the forms are received, case verification is conducted by MCR



Next Steps

- Assessment is completed of the patient information forms
 - Types of primary cancers involved
 - Number of cancer cases
 - Population demographics, geographic area and time period
 - Cases that meet criteria
 - Feasibility and recommendations

For cancer-related questions:

Missouri Department of Health and Senior Services

Office of Epidemiology or Cancer Inquiry Program
(573) 751-6128 (573) 522-2806

Bureau of Environmental Epidemiology
(573) 751-6102 or 1-888-628-9891 (toll-free)
PO Box 570
Jefferson City, MO 65102

Missouri Cancer Registry <http://mcr.umh.edu/>

