# HIGHER CANCER INCIDENCE AND MORTALITY RATES IN CENTRAL REGION OF SOUTHERN VIRGINIA

*AND*

*HOW TO IMPROVE THE CANCER CARE OUTCOME*

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**October 10th, 2015**

## Rationale of study

We research two major subjects:

1. Is it true that Central Region of Southern Virginia has higher cancer incidence and mortality comparing to State of Virginia?
2. Is it true that Central Southern Virginia, tobacco growing region, has higher tobacco related cancer death?

## The study

1. We study the cancer incidence and mortality in the Central Region of Southern Virginia, which includes nine counties and one city of Brunswick, Charlotte, Danville, Dinwiddie, Halifax, Lunenburg, Mecklenburg, Nottoway, Pittsylvania, Prince Edward.
2. The study review the cancer incidence data obtained from Virginia Cancer Registry, Virginia Department of Health from 1996 to 2012.
3. The study also review the cancer mortality data obtained from Center for Health Statistics, Virginia Department of Health from 1996 to 2013.
4. We compare cancer incidence rate of Central Region of Southern Virginia with the incidence rate of State of Virginia.
5. We compare cancer mortality rate of Central Region of Southern Virginia with the mortality rate of State of Virginia.
6. We evaluate each individual county/city cancer incidence rate and comparing to the Central Region of Southern Virginia and State of Virginia.
7. We evaluate each individual county/city cancer mortality rate and comparing to the Central Region of Southern Virginia and State of Virginia.
8. We compare male incidence and mortality rates of Central Region of Southern Virginia with the mortality rate of State of Virginia.
9. We compare female incidence and mortality rates of Central Region of Southern Virginia with the mortality rate of State of Virginia.
10. We also compare cancer incidence and mortality rates of black to white in Central Region of Southern Virginia and State of Virginia.

# The study results

## Cancer Incidence Rates*, 1996-2012

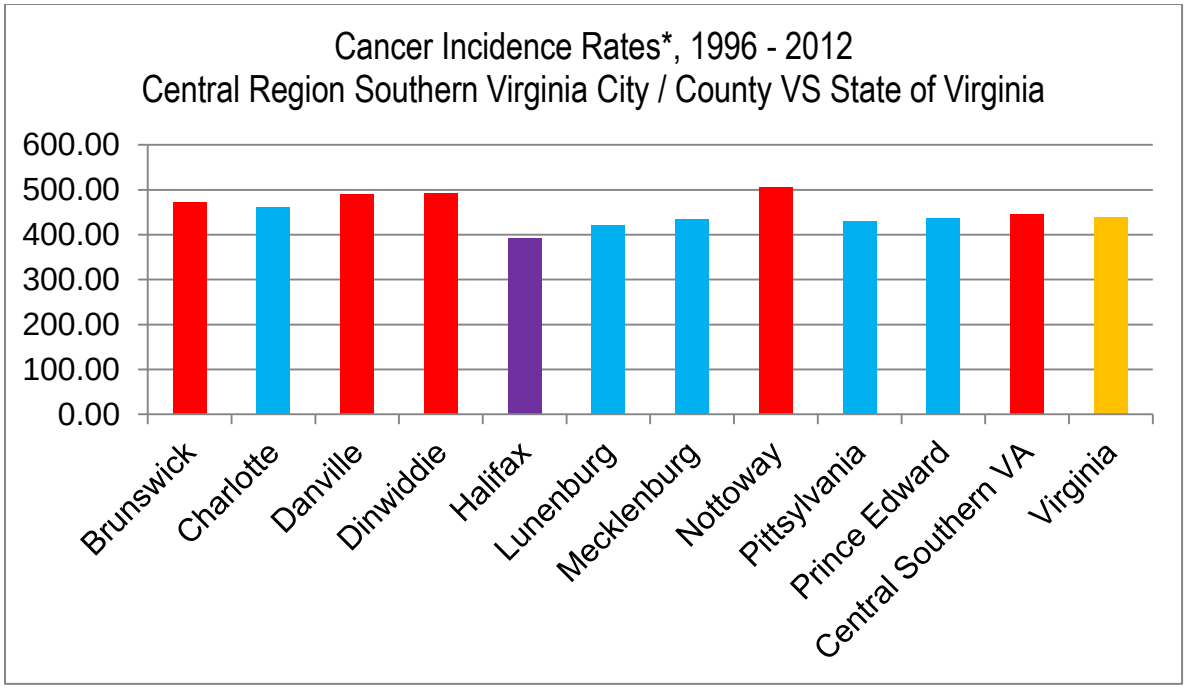
## **Central Region Southern Virginia County/City** VS **State of Virginia**

- Central Region of Southern Virginia, in total, has significant **higher** cancer incidence comparing to State of Virginia
- **Three** counties: Brunswick, Dinwiddie, Nottoway, and **City** of Danville, have significant **higher** cancer incidence comparing to State of Virginia
- **Five** counties: Charlotte, Lunenburg, Mecklenburg, Pittsylvania and Prince Edward, have **similar** cancer incidence comparing to State of Virginia
- **One** county: Halifax has significant **lower** cancer incidence comparing to State of Virginia

Age-Adjusted Malignant* Cancer Incidence Rates and Counts
Central Region of Southern Virginia by City and County of Residence, 1996-2012
* Includes in-situ bladder cancer
Source: Virginia Cancer Registry, October 2015

| Location | Rate | Significance | Count |
|---|---|---|---|
| Brunswick | 472.71 | > | 1,712 |
| Charlotte | 460.73 | ns | 1,296 |
| Danville | 488.87 | > | 5,198 |
| Dinwiddie | 491.19 | > | 2,375 |
| Halifax | 392.73 | < | 3,237 |
| Lunenburg | 421.68 | ns | 1,203 |
| Mecklenburg | 433.40 | ns | 3,335 |
| Nottoway | 504.57 | > | 1,691 |
| Pittsylvania | 429.29 | ns | 5,633 |
| Prince Edward | 435.44 | ns | 1,603 |
| Central Southern VA | 446.56 | > | 27,283 |
| Virginia | 438.41 | | 554,474 |

* Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population




* Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population

■ Significantly higher ■ Significantly lower ■ Not significant

## **Male** Cancer Incidence Rates*, 1996-2012
## **Central Region Southern Virginia County/City** VS **State of Virginia**

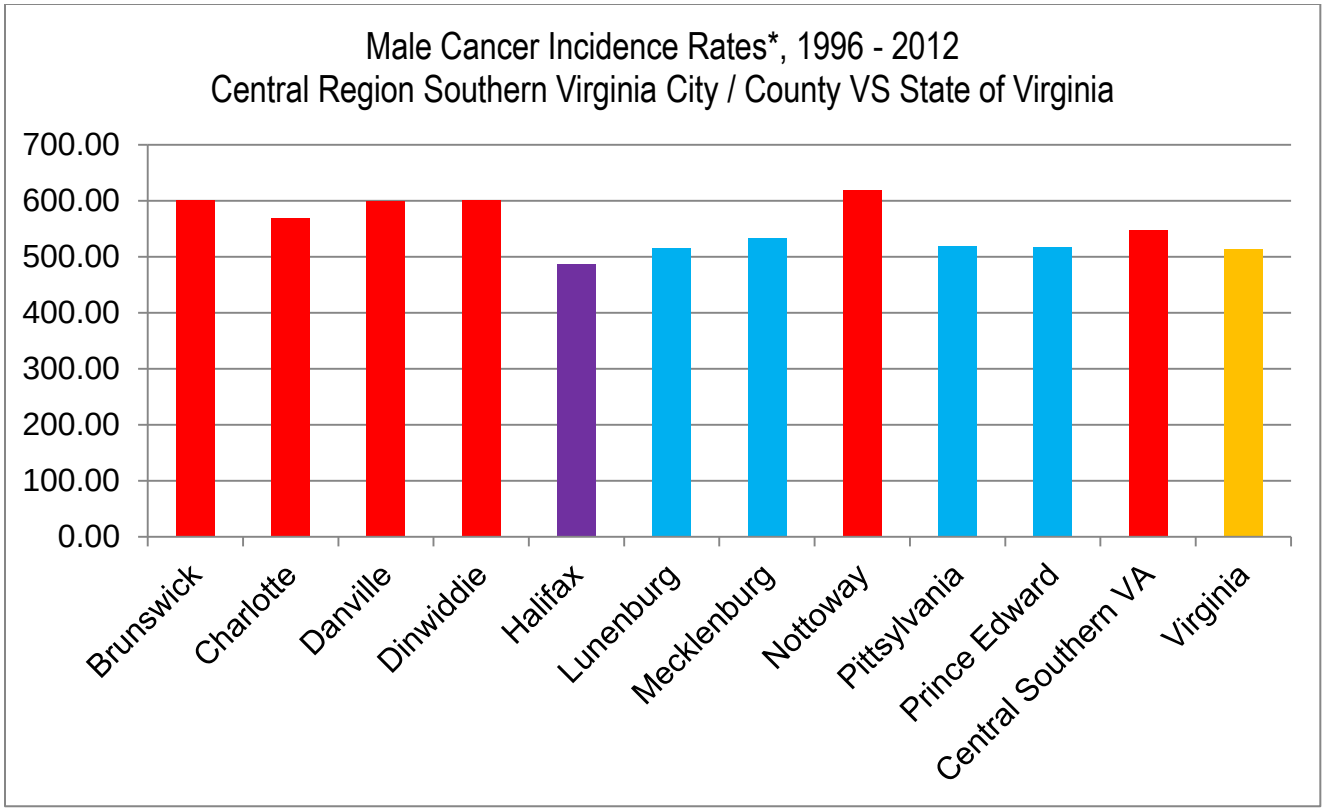
- **Male** Cancer incidence rate is **higher** in Central Region of Southern Virginia comparing to State of Virginia
- Four counties: Brunswick, Charlotte, Dinwiddie, Nottoway, and City of Danville, have **higher male** cancer incidence comparing to State of Virginia
- Four counties: Lunenburg, Mecklenburg, Pittsylvania, and Prince Edward, have **similar male** cancer incidence comparing to State of Virginia
- Halifax has **lower male** cancer incidence comparing to State of Virginia

Central Region of Southern Virginia by Sex and City and County of Residence, 1996-2012

* Includes in-situ bladder cancer

Source: Virginia Cancer Registry, October 2015

| Male<br>Location | Rate | Significance | Count |
|---|---|---|---|
| Brunswick | 601.37 | > | 999 |
| Charlotte | 567.89 | > | 722 |
| Danville | 599.54 | > | 2,570 |
| Dinwiddie | 602.04 | > | 1,336 |
| Halifax | 486.94 | < | 1,761 |
| Lunenburg | 515.12 | ns | 684 |
| Mecklenburg | 533.59 | ns | 1,878 |
| Nottoway | 618.46 | > | 924 |
| Pittsylvania | 519.41 | ns | 3,110 |
| Prince Edward | 516.93 | ns | 854 |
| Central Southern VA | 547.35 | > | 14,838 |
| Virginia | 513.23 | | 285,597 |

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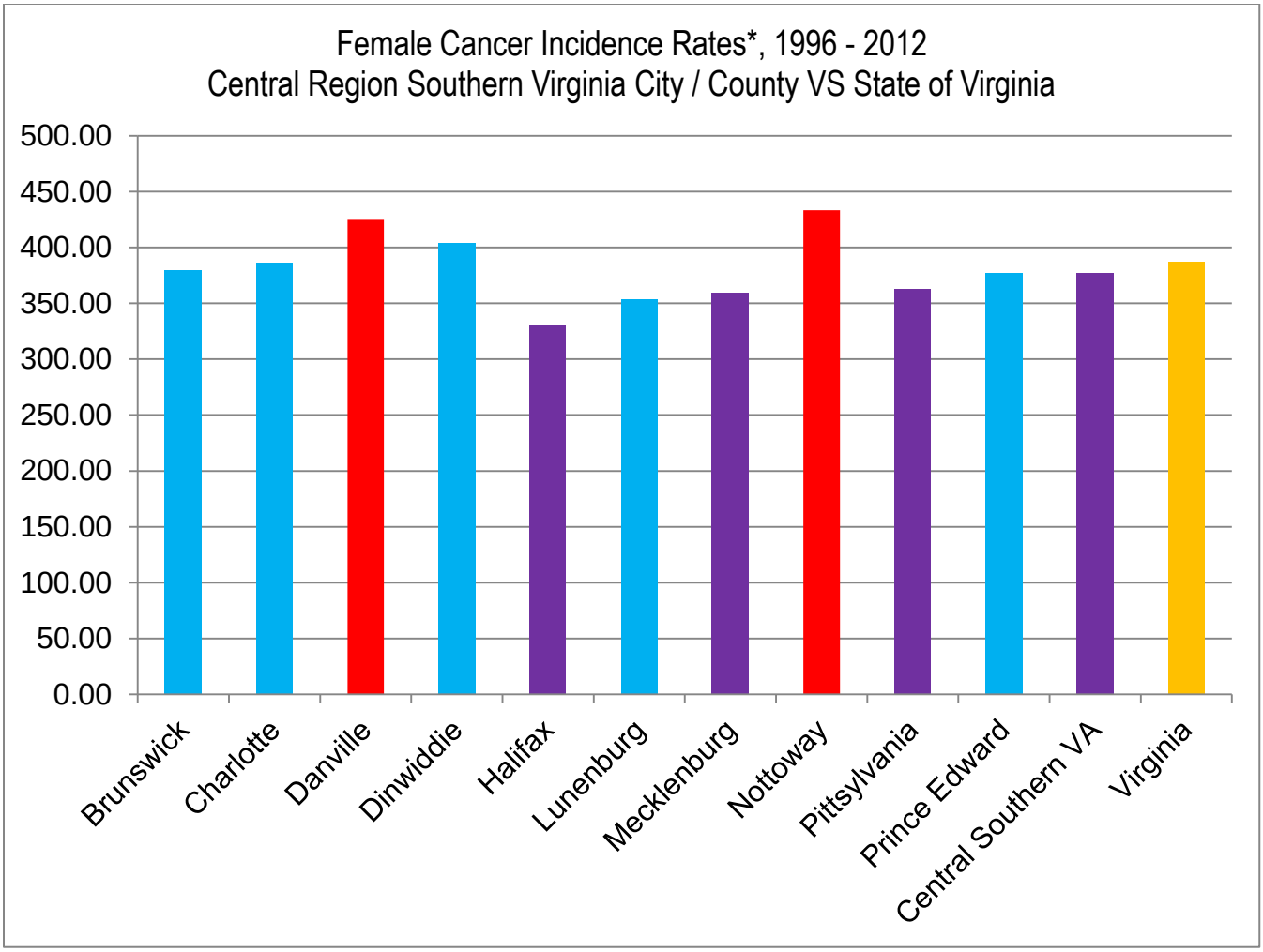
■ Significantly higher ■ Significantly lower ■ Not significant

# **Female** Cancer Incidence Rates*, 1996-2012
# **Central Region Southern Virginia County/City** VS **State of Virginia**

- **Female** cancer incidence in Central Region of Southern Virginia is **significantly lower** to State of Virginia
- **One** county: Nottoway, and **City** of Danville, have **higher female** cancer incidence comparing to State of Virginia
- **Five** counties: Brunswick, Charlotte, Dinwiddie, Lunenburg, and Prince Edward, have **similar female** cancer incidence comparing to State of Virginia
- **Three** counties: Halifax, Mecklenburg, Pittsylvania, have **lower female** cancer incidence comparing to State of Virginia

Age-Adjusted Malignant* Cancer Incidence Rates and Counts
Central Region of Southern Virginia by Sex and City and County of Residence, 1996-2012
* Includes in-situ bladder cancer
Source: Virginia Cancer Registry, October 2015

| Female<br>Location | Rate | Significance | Count |
|---|---|---|---|
| Brunswick | 379.39 | ns | 713 |
| Charlotte | 386.38 | ns | 574 |
| Danville | 424.74 | > | 2,628 |
| Dinwiddie | 404.08 | ns | 1,039 |
| Halifax | 331.05 | < | 1,476 |
| Lunenburg | 353.25 | ns | 519 |
| Mecklenburg | 359.45 | < | 1,457 |
| Nottoway | 433.30 | > | 767 |
| Pittsylvania | 362.48 | < | 2,523 |
| Prince Edward | 376.64 | ns | 749 |
| Central Southern VA | 377.10 | < | 12,445 |
| Virginia | 387.30 | | 268,877 |

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■ Significantly higher ■ Significantly lower ■ Not significant

## **Individual type** of cancer incidence rates in Central Region of Southern Virginia comparing to State of Virginia: (Table)

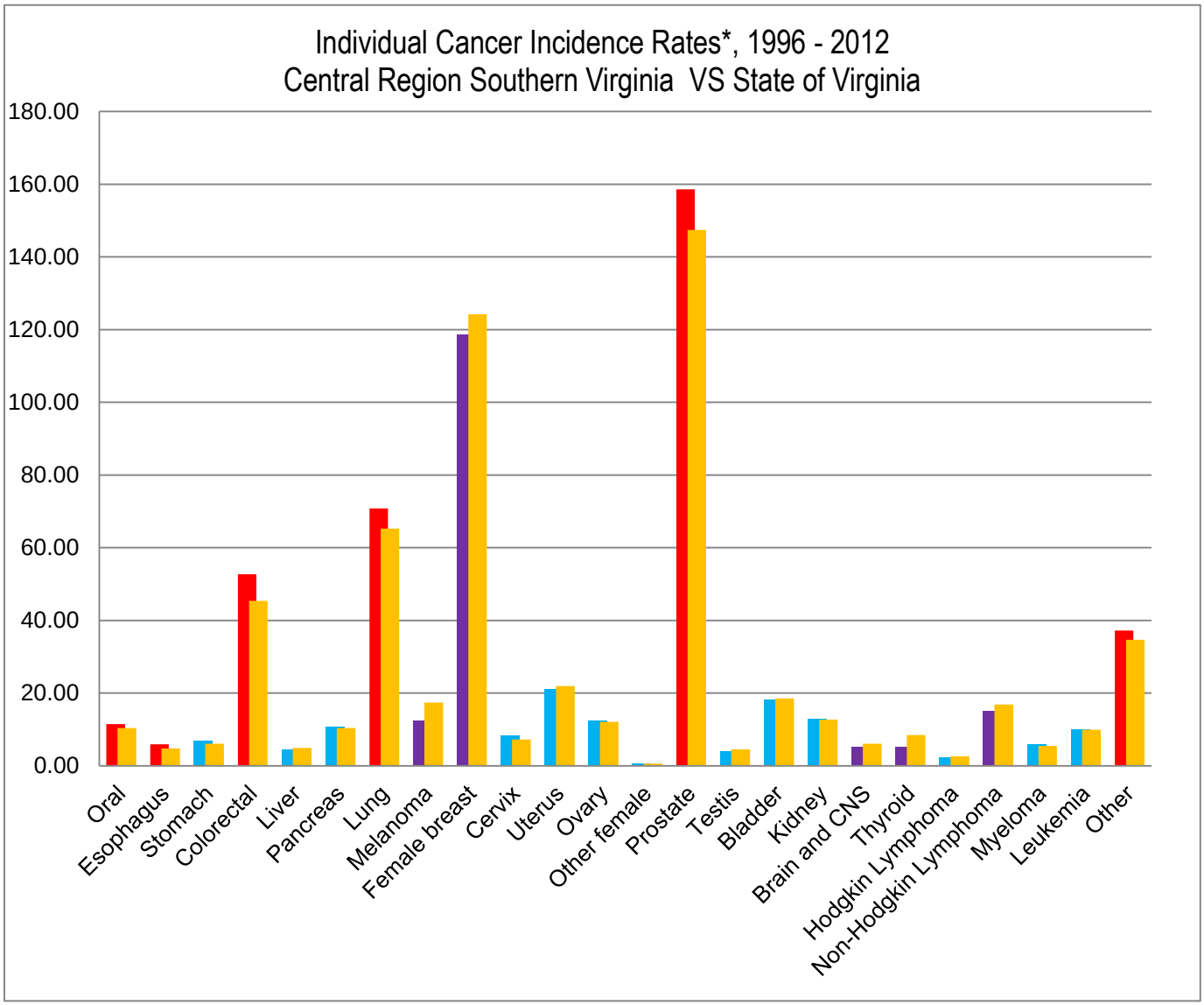
- There are **five** cancers with significant **higher** cancer incidence rates in Central Region of Southern Virginia comparing to State of Virginia: Oral cavity, esophagus, colorectal, lung, and prostate cancers.
- There are **five** cancers with significant **lower** cancer incidence in Central Region of Southern Virginia comparing to State of Virginia: Melanoma of skin, female breast, brain and CNS, thyroid, and non-Hodgkins's lymphoma.

Age-Adjusted Malignant* Cancer Incidence Rates and Counts
Central Region of Southern Virginia by City and County
of Residence and Cancer Site, 1996-2012
* Includes in-situ bladder cancer
Source: Virginia Cancer Registry, October 2015

| Site | Central Southern VA | State VA | Significance |
|---|---|---|---|
| Oral | 11.48 | 10.42 | > |
| Esophagus | 5.94 | 4.74 | > |
| Stomach | 6.84 | 6.11 | ns |
| Colorectal | 52.72 | 45.36 | > |
| Liver | 4.42 | 4.92 | ns |
| Pancreas | 10.78 | 10.39 | ns |
| Lung | 70.80 | 65.27 | > |
| Melanoma | 12.32 | 17.40 | < |
| Female breast | 118.68 | 124.22 | < |
| Cervix | 8.38 | 7.22 | ns |
| Uterus | 21.21 | 21.99 | ns |
| Ovary | 12.45 | 12.11 | ns |
| Other female | 0.53 | 0.62 | ns |
| Prostate | 158.58 | 147.40 | > |
| Testis | 4.06 | 4.54 | ns |
| Bladder | 18.22 | 18.54 | ns |
| Kidney | 12.76 | 12.73 | ns |
| Brain and CNS | 5.14 | 6.07 | < |
| Thyroid | 5.07 | 8.50 | < |
| Hodgkin Lymphoma | 2.38 | 2.62 | ns |
| Non-Hodgkin Lymphoma | 15.08 | 16.88 | < |
| Myeloma | 5.90 | 5.44 | ns |
| Leukemia | 10.08 | 9.95 | ns |
| Other | 37.20 | 34.68 | > |
| **All Sites** | **446.38** | **438.29** | **>** |

## Individual Cancer Incidence Rates*, 1996-2012

## Central Region of Southern Virginia V.S. State of Virginia

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Significantly higher  Significantly lower  Not significant

## **Male** Cancer Incidence Rates*, 1996-2012
## **Central Region of Southern Virginia** V.S. **State of Virginia**

- **Male** Cancer incidence rate is **higher** in Central Region of Southern Virginia comparing to State of Virginia.
- In man, there are **five** cancers with significant **higher** cancer incidence in Central Region of Southern Virginia comparing to State of Virginia: Oral cavity, esophagus, colorectal, lung, prostate cancers.
- In man, there are **three** cancers with significant **lower** cancer incidence in Central Region of Southern Virginia comparing to State of Virginia: Melanoma of skin, thyroid, and Non-Hodgkin's lymphoma.

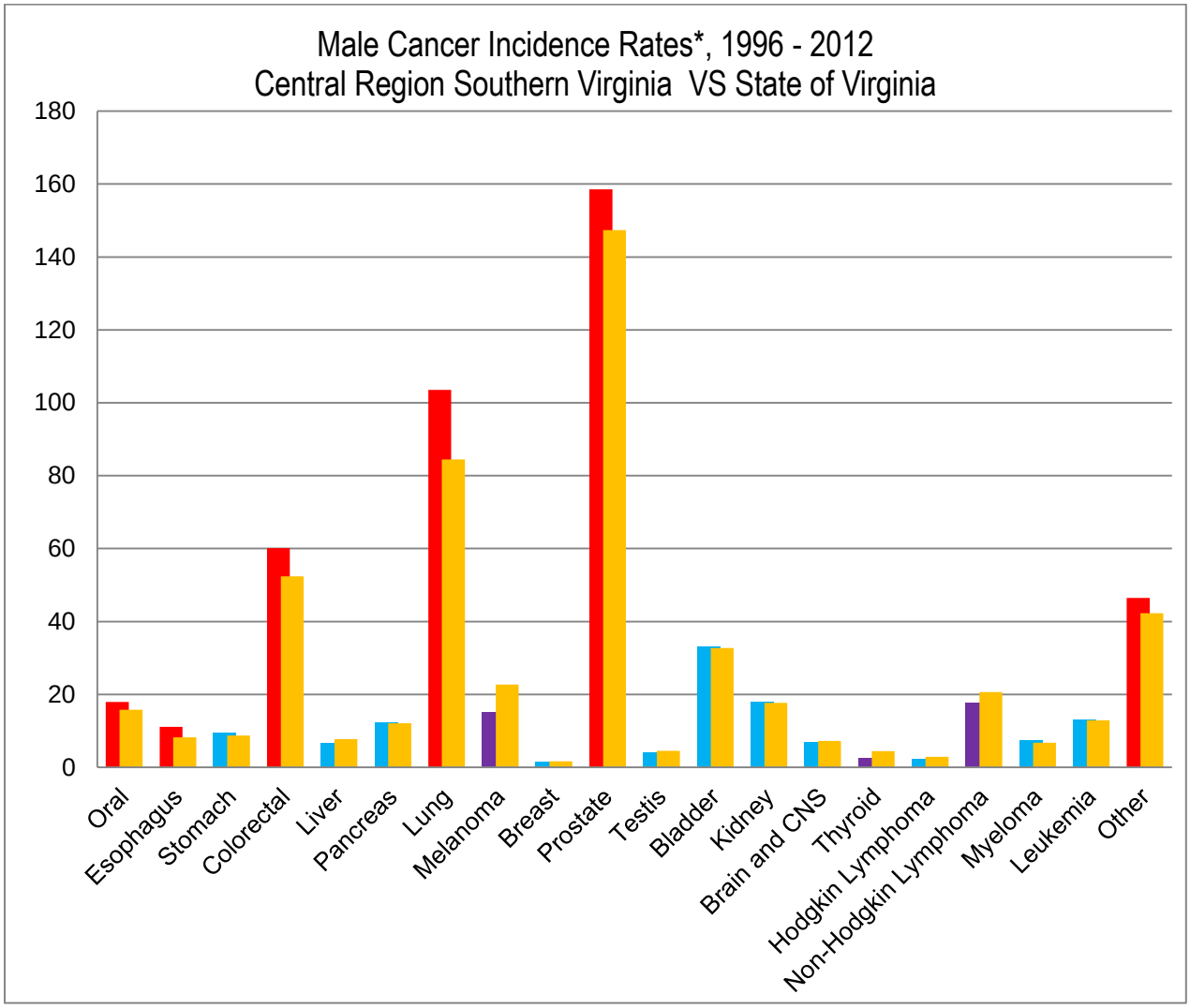
**Male** Cancer Incidence Rates*, 1996 - 2012

**Central Region of Southern Virginia** V.S. **State of Virginia**

| Site | Central Southern VA | Virginia | Significance |
|---|---|---|---|
| Oral | 17.9 | 15.78 | > |
| Esophagus | 11.11 | 8.22 | > |
| Stomach | 9.48 | 8.71 | ns |
| Colorectal | 60.11 | 52.41 | > |
| Liver | 6.66 | 7.73 | ns |
| Pancreas | 12.15 | 12.06 | ns |
| Lung | 103.51 | 84.48 | > |
| Melanoma | 15.05 | 22.69 | < |
| Breast | 1.52 | 1.67 | ns |
| Prostate | 158.58 | 147.40 | > |
| Testis | 4.06 | 4.54 | ns |
| Bladder | 32.94 | 32.72 | ns |
| Kidney | 17.95 | 17.65 | ns |
| Brain and CNS | 6.79 | 7.20 | ns |
| Thyroid | 2.46 | 4.42 | < |
| Hodgkin Lymphoma | 2.3 | 2.89 | ns |
| Non-Hodgkin Lymphoma | 17.67 | 20.64 | < |
| Myeloma | 7.49 | 6.73 | ns |
| Leukemia | 12.96 | 12.90 | ns |
| Other | 46.5 | 42.24 | > |
| All Sites | 547.17 | 513.07 | > |

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

- **Male** cancer incidence rates in Central Region of Southern Virginia comparing to State of Virginia: (Figure)
- The **red bar** shows significance **higher** cancer incidence rates in Central Region of Southern Virginia comparing to State of Virginia
- The **blue bar** shows **similar** rate of cancer incidence rates in Central Region of Southern Virginia comparing to State of Virginia
- The **purple bar** shows significant **lower** rate of cancer incidence rates in Central Region of Southern Virginia comparing to State of Virginia

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# **Female** Cancer Incidence Rates*, 1996-2012
# **Central Region of Southern Virginia** V.S. **State of Virginia**

- **Female** cancer incidence rates in Central Region of Southern Virginia comparing to State of Virginia: (Table)
- There is **one** cancer with significant **higher** cancer incidence rates in Central Region of Southern Virginia comparing to State of Virginia: colorectal cancer.
- There are **five** cancers with significant **lower** cancer incidence rates in Central Region of Southern Virginia comparing to State of Virginia: Pancreas, lung, melanoma of skin, brain and CNS, and thyroid cancers.

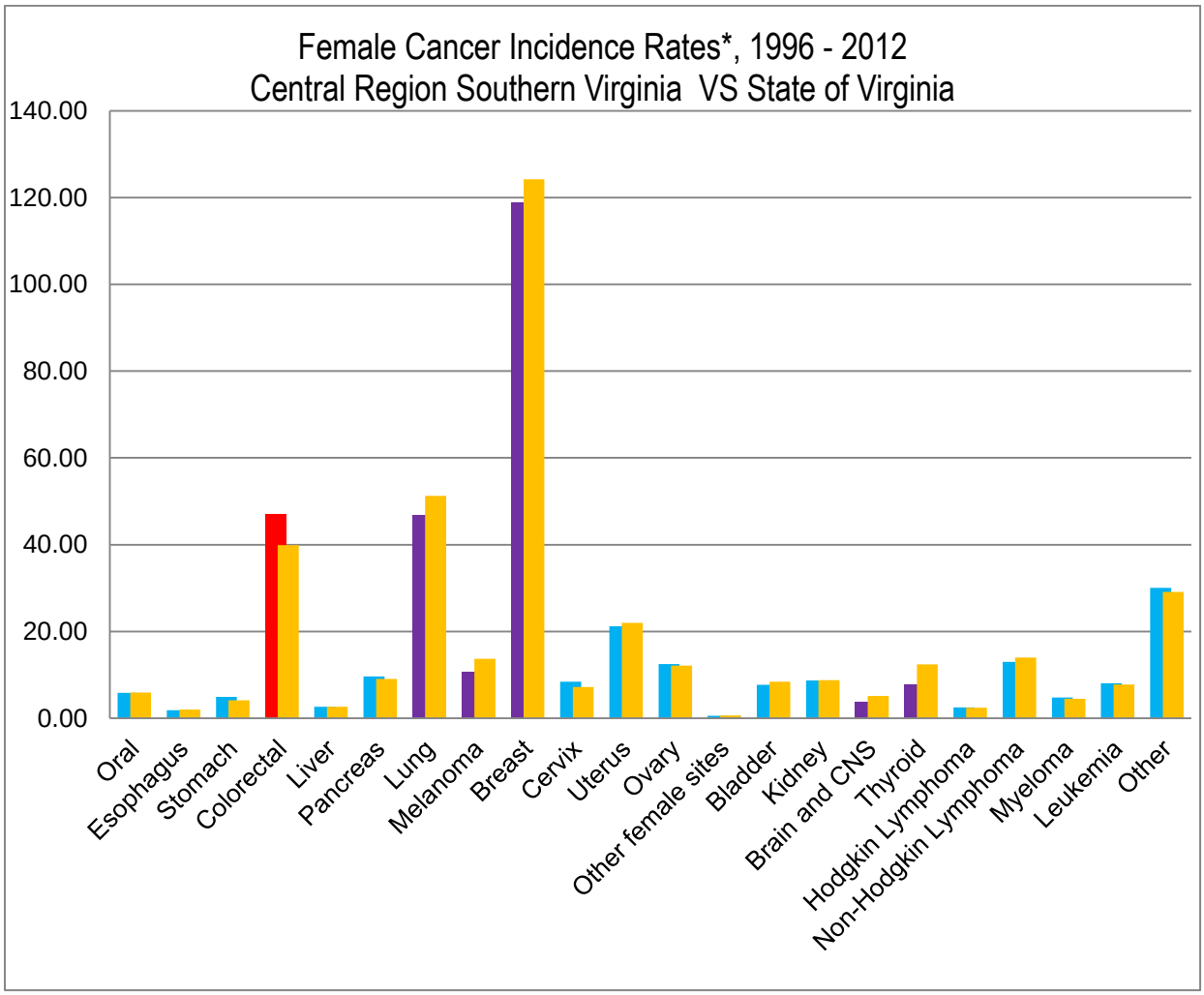
**Female** Cancer Incidence Rates*, 1996 - 2012

**Central Region of Southern Virginia** V.S. **State of Virginia**

| Site | Central Southern VA | Virginia | Significance |
|---|---|---|---|
| Oral | 5.86 | 5.91 | ns |
| Esophagus | 1.84 | 1.96 | ns |
| Stomach | 4.93 | 4.15 | ns |
| Colorectal | 47.03 | 39.89 | > |
| Liver | 2.63 | 2.63 | ns |
| Pancreas | 9.64 | 9.07 | ns |
| Lung | 46.83 | 51.28 | < |
| Melanoma | 10.66 | 13.71 | < |
| Breast | 118.68 | 124.22 | < |
| Cervix | 8.38 | 7.22 | ns |
| Uterus | 21.21 | 21.99 | ns |
| Ovary | 12.45 | 12.11 | ns |
| Other female sites | 0.53 | 0.62 | ns |
| Bladder | 7.72 | 8.39 | ns |
| Kidney | 8.73 | 8.79 | ns |
| Brain and CNS | 3.75 | 5.14 | < |
| Thyroid | 7.69 | 12.43 | < |
| Hodgkin Lymphoma | 2.49 | 2.39 | ns |
| Non-Hodgkin Lymphoma | 13.00 | 13.98 | ns |
| Myeloma | 4.74 | 4.49 | ns |
| Leukemia | 8.05 | 7.74 | ns |
| Other | 30.05 | 29.09 | ns |
| All Sites | 376.89 | 387.20 | < |

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

- **Female** cancer incidence rates in Central Region of Southern Virginia comparing to State of Virginia: (Figure)
- The **red bar** shows significance **higher** cancer incidence in Central Region of Southern Virginia comparing to State of Virginia
- The **blue bar** shows **similar** rate of cancer incidence in Central Region of Southern Virginia comparing to State of Virginia
- The **purple bar** shows significant **lower** rate of cancer incidence in Central Region of Southern Virginia comparing to State of Virginia



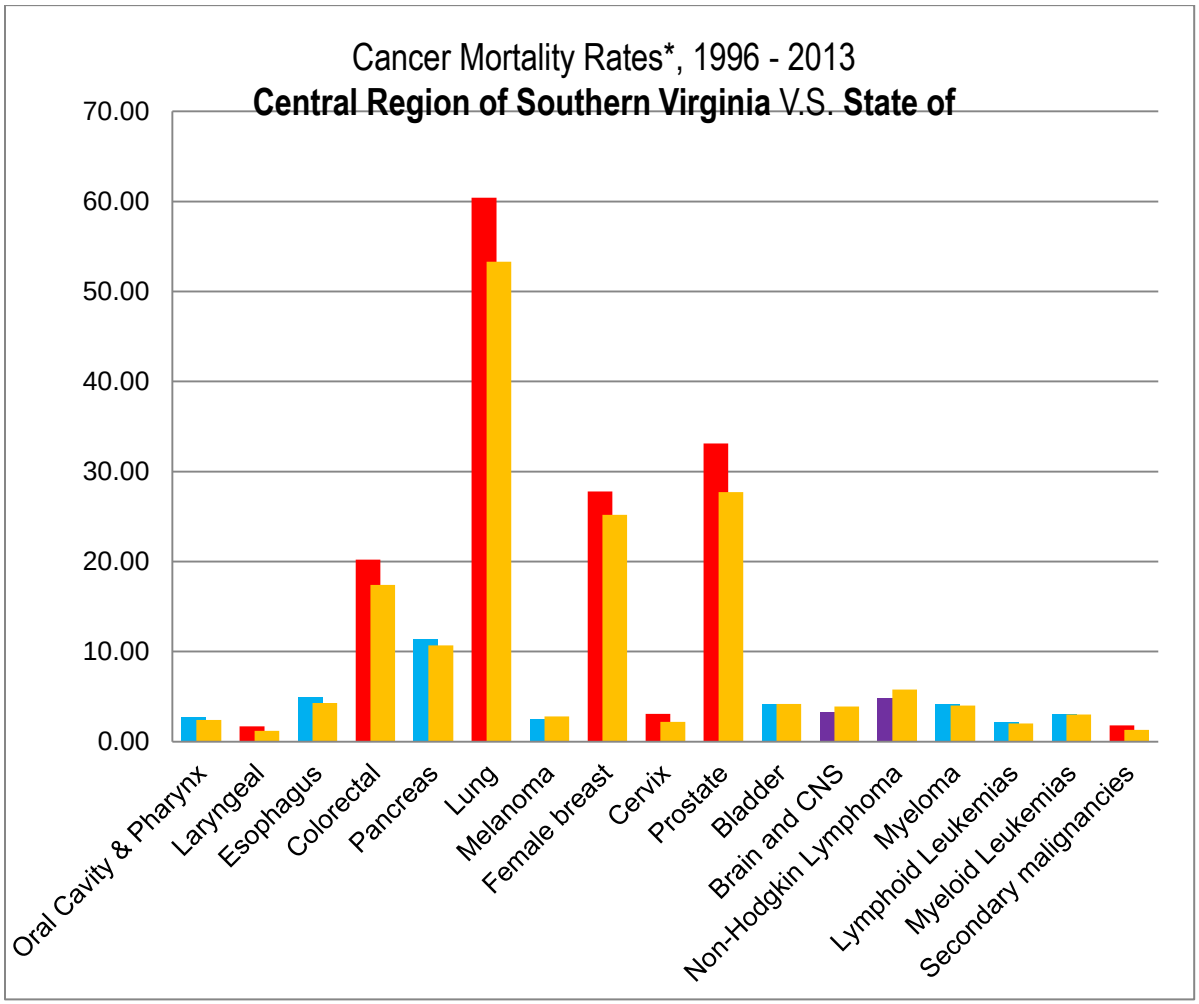

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

**Central Region of Southern Virginia** has significant **higher Cancer mortality rates** comparing to State of Virginia in **major cancers**: **Lung, prostate, breast, colorectal, cervix, and laryngeal cancers.**

| Site | Central Southern VA | State VA | Significance |
|---|---|---|---|
| Oral Cavity & Pharynx | 2.70 | 2.40 | ns |
| Laryngeal | 1.70 | 1.20 | > |
| Esophagus | 4.90 | 4.30 | ns |
| Colorectal | 20.20 | 17.40 | > |
| Pancreas | 11.40 | 10.70 | ns |
| Lung | 60.40 | 53.30 | > |
| Melanoma | 2.50 | 2.80 | ns |
| Female breast | 27.80 | 25.20 | > |
| Cervix | 3.10 | 2.20 | > |
| Prostate | 33.10 | 27.70 | > |
| Bladder | 4.20 | 4.20 | ns |
| Brain and CNS | 3.30 | 3.90 | < |
| Non-Hodgkin Lymphoma | 4.80 | 5.80 | < |
| Myeloma | 4.20 | 4.00 | ns |
| Lymphoid Leukemia | 2.20 | 2.00 | ns |
| Myeloid Leukemia | 3.10 | 3.00 | ns |
| Secondary malignancies | 1.80 | 1.30 | > |

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

- Central Region of Southern Virginia has significant **higher cancer mortality rates** comparing to State of Virginia in **six major cancers**: **Lung and bronchus, prostate, breast, colon and rectum, cervix, and larynx**
- The **red bar** shows significance **higher** cancer mortality in Central Region of Southern Virginia comparing to State of Virginia
- The **blue bar** shows **similar** rate of cancer mortality in Central Region of Southern Virginia comparing to State of Virginia
  The **purple bar** shows significance **lower** cancer mortality in Central Region of Southern Virginia comparing to State of Virginia

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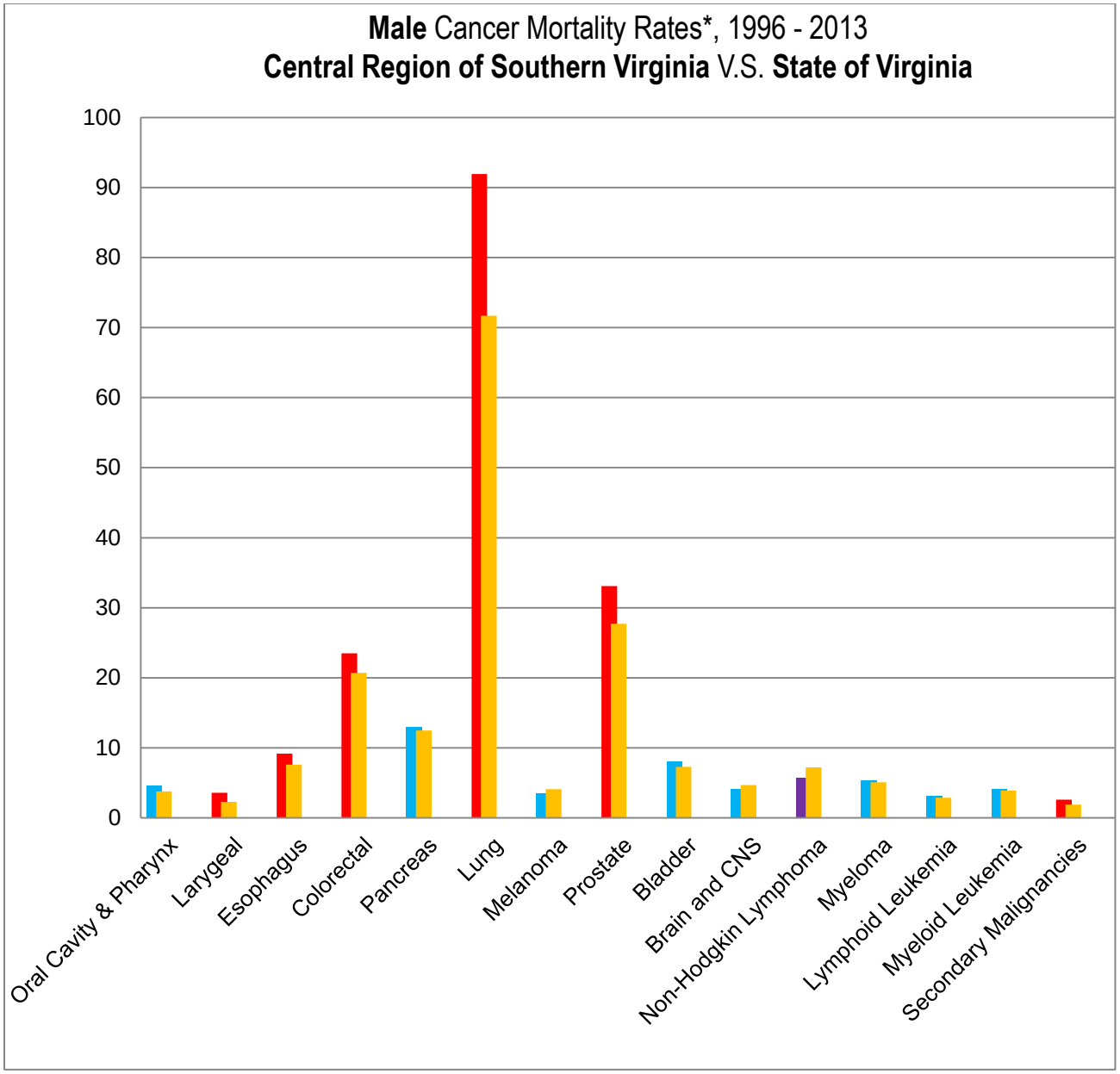
■ Significantly higher ■ Significantly lower ■ Not significant

## **Male** Cancer Mortality Rates*, 1996 - 2013
## **Central Region of Southern Virginia** V.S. **State of Virginia**

| Site | Central Southern VA | Virginia | Significance |
|---|---|---|---|
| Oral Cavity & Pharynx | 4.6 | 3.80 | ns |
| Larygeal | 3.6 | 2.30 | > |
| Esophagus | 9.2 | 7.60 | > |
| Colorectal | 23.5 | 20.70 | > |
| Pancreas | 13 | 12.50 | ns |
| Lung | 91.9 | 71.70 | > |
| Melanoma | 3.5 | 4.10 | ns |
| Prostate | 33.1 | 27.70 | > |
| Bladder | 8.1 | 7.30 | ns |
| Brain and CNS | 4.2 | 4.70 | ns |
| Non-Hodgkin Lymphoma | 5.7 | 7.20 | < |
| Myeloma | 5.4 | 5.10 | ns |
| Lymphoid Leukemia | 3.2 | 2.90 | ns |
| Myeloid Leukemia | 4.2 | 3.90 | ns |
| Secondary Malignancies | 2.6 | 1.90 | > |

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.



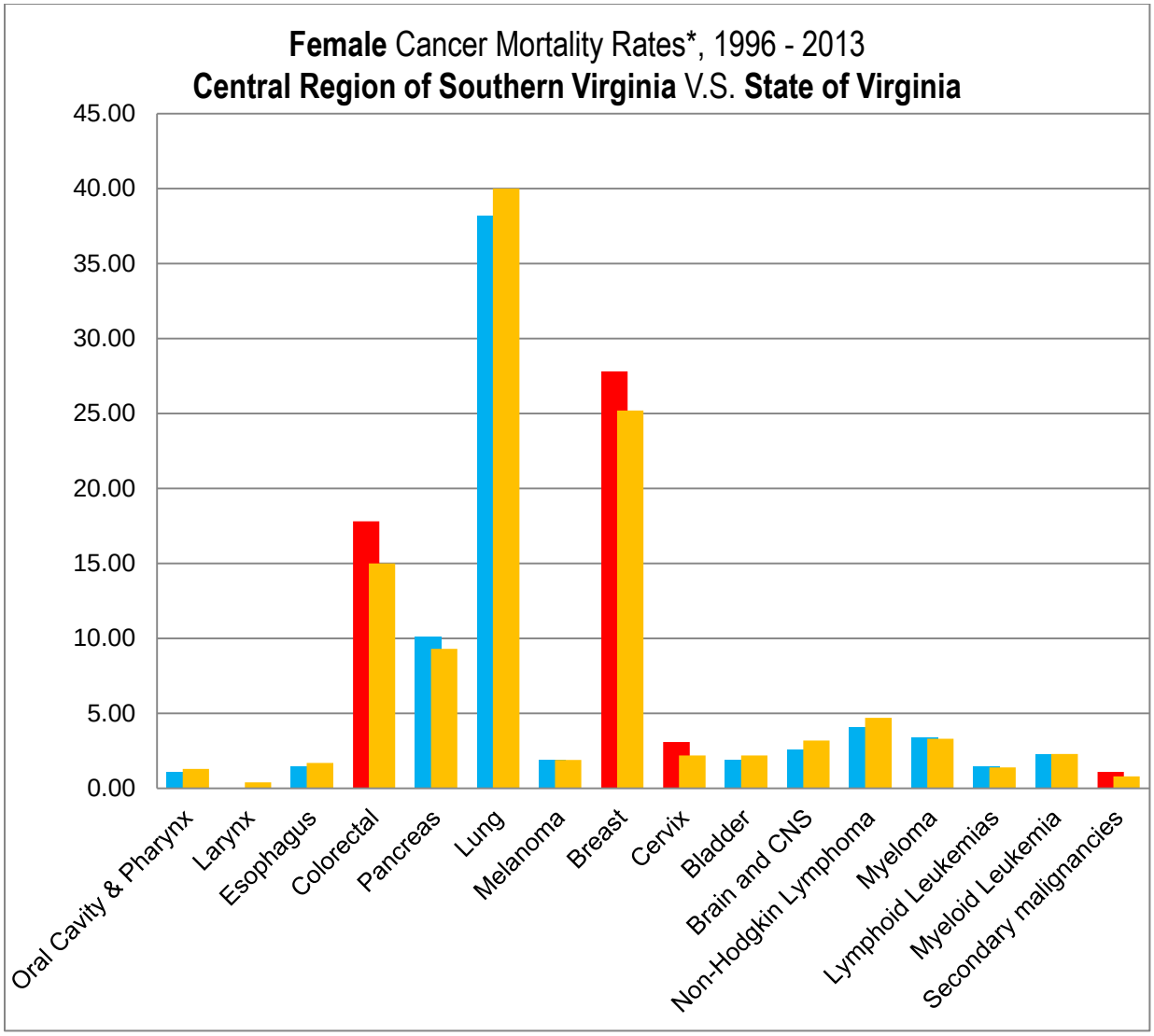

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

■ Significantly higher ■ Significantly lower ■ Not significant

## **Female** Cancer Mortality Rates*, 1996 - 2013
## **Central Region of Southern Virginia** V.S. **State of Virginia**

| Site | Central Southern VA | Virginia | Significance |
|---|---|---|---|
| Oral Cavity & Pharynx | 1.10 | 1.30 | ns |
| Larynx | ~ | 0.40 | ns |
| Esophagus | 1.50 | 1.70 | ns |
| Colorectal | 17.80 | 15.00 | > |
| Pancreas | 10.10 | 9.30 | ns |
| Lung | 38.20 | 40.00 | ns |
| Melanoma | 1.90 | 1.90 | ns |
| Breast | 27.80 | 25.20 | > |
| Cervix | 3.10 | 2.20 | > |
| Bladder | 1.90 | 2.20 | ns |
| Brain and CNS | 2.60 | 3.20 | ns |
| Non-Hodgkin Lymphoma | 4.10 | 4.70 | ns |
| Myeloma | 3.40 | 3.30 | ns |
| Lymphoid Leukemias | 1.50 | 1.40 | ns |
| Myeloid Leukemia | 2.30 | 2.30 | ns |
| Secondary malignancies | 1.10 | 0.80 | > |

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

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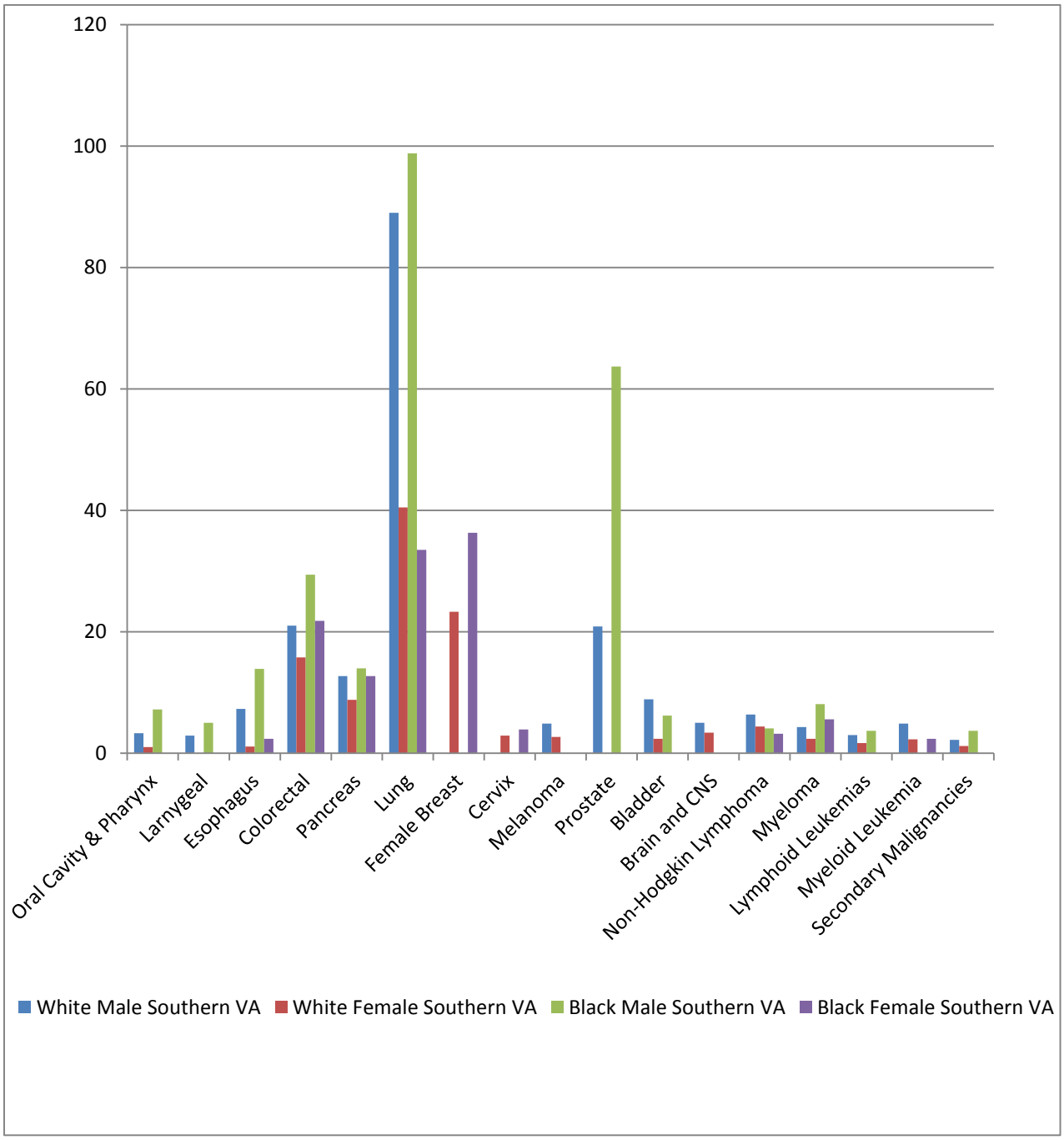
■ Significantly higher ■ Significantly lower ■ Not significant

**White Male & Female and Black Male & Female**
Cancer Mortality Rates*, 1996 - 2013
**In Central Region of Southern Virginia**

| Site | White Male Southern VA | White Female Southern VA | Black Male Southern VA | Black Female Southern VA |
|---|---|---|---|---|
| Oral Cavity & Pharynx | 3.3 | 1 | 7.2 | |
| Larynx | 2.9 | | 5 | |
| Esophagus | 7.3 | 1.1 | 13.9 | 2.4 |
| Colorectal | 21 | 15.8 | 29.4 | 21.8 |
| Pancreas | 12.7 | 8.8 | 14 | 12.7 |
| Lung | 89 | 40.5 | 98.8 | 33.5 |
| Female Breast | | 23.3 | | 36.3 |
| Cervix | | 2.9 | | 3.9 |
| Melanoma | 4.9 | 2.7 | | |
| Prostate | 20.9 | | 63.7 | |
| Bladder | 8.9 | 2.4 | 6.2 | |
| Brain and CNS | 5 | 3.4 | ~ | |
| Non-Hodgkin Lymphoma | 6.4 | 4.4 | 4.1 | 3.2 |
| Myeloma | 4.3 | 2.4 | 8.1 | 5.6 |
| Lymphoid Leukemia | 3 | 1.7 | 3.7 | |
| Myeloid Leukemia | 4.9 | 2.3 | | 2.4 |
| Secondary Malignancies | 2.2 | 1.2 | 3.7 | |

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

**White Male & Female and Black Male & Female**
Cancer Mortality Rates*, 1996 - 2013
**In Central Region of Southern Virginia**

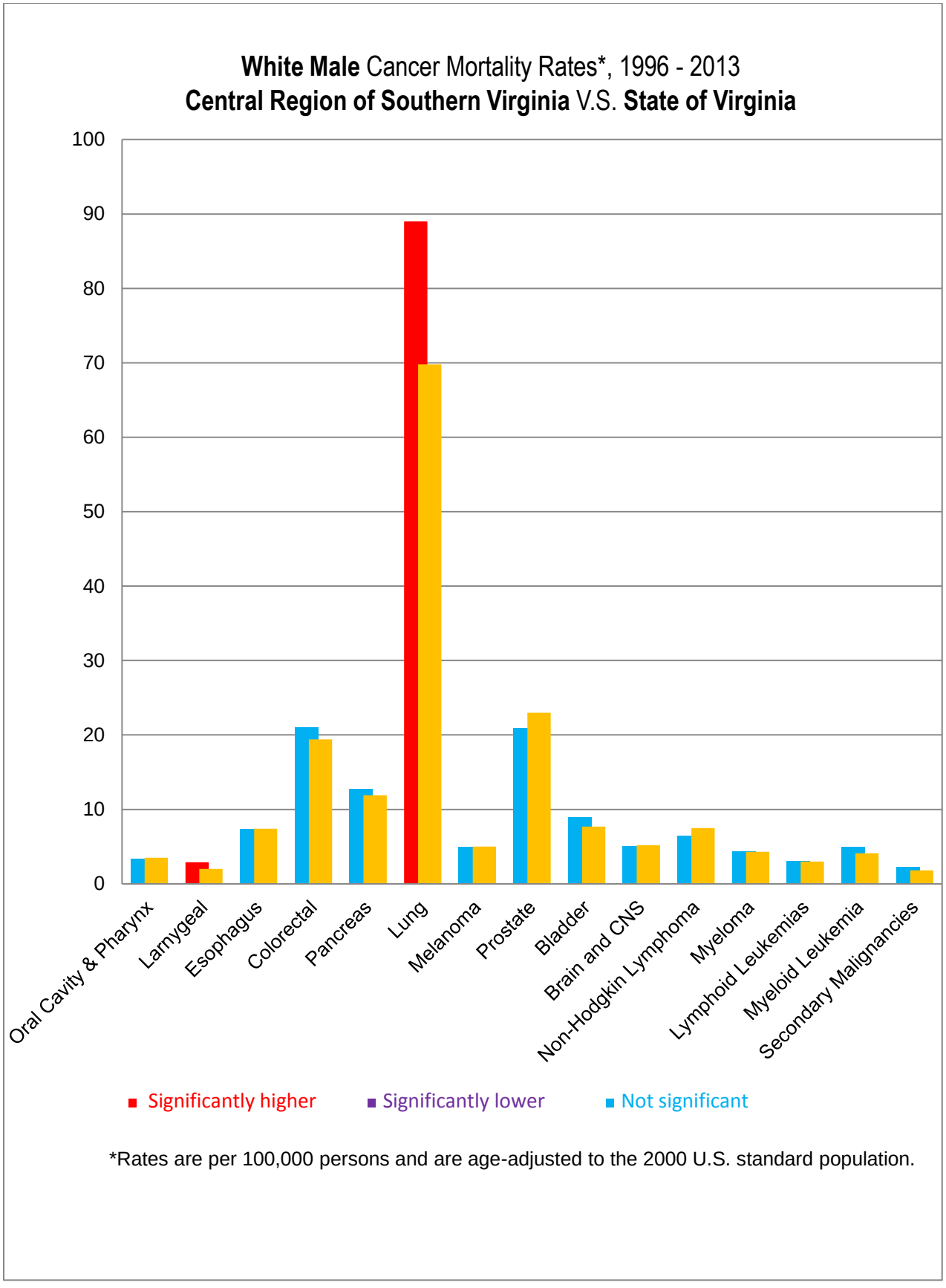



*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

## **White Male** Cancer Mortality Rates*, 1996 - 2013
## **Central Region of Southern Virginia** V.S. **State of Virginia**

| Site | White Male Southern VA | White Male Virginia | Significance |
|---|---|---|---|
| Oral Cavity & Pharynx | 3.3 | 3.5 | ns |
| Larnygeal | 2.9 | 2 | > |
| Esophagus | 7.3 | 7.4 | ns |
| Colorectal | 21 | 19.4 | ns |
| Pancreas | 12.7 | 11.9 | ns |
| Lung | 89 | 69.8 | > |
| Melanoma | 4.9 | 5 | ns |
| Prostate | 20.9 | 23 | ns |
| Bladder | 8.9 | 7.7 | ns |
| Brain and CNS | 5 | 5.2 | ns |
| Non-Hodgkin Lymphoma | 6.4 | 7.5 | ns |
| Myeloma | 4.3 | 4.3 | ns |
| Lymphoid Leukemias | 3 | 3 | ns |
| Myeloid Leukemia | 4.9 | 4.1 | ns |
| Secondary Malignancies | 2.2 | 1.8 | ns |

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.



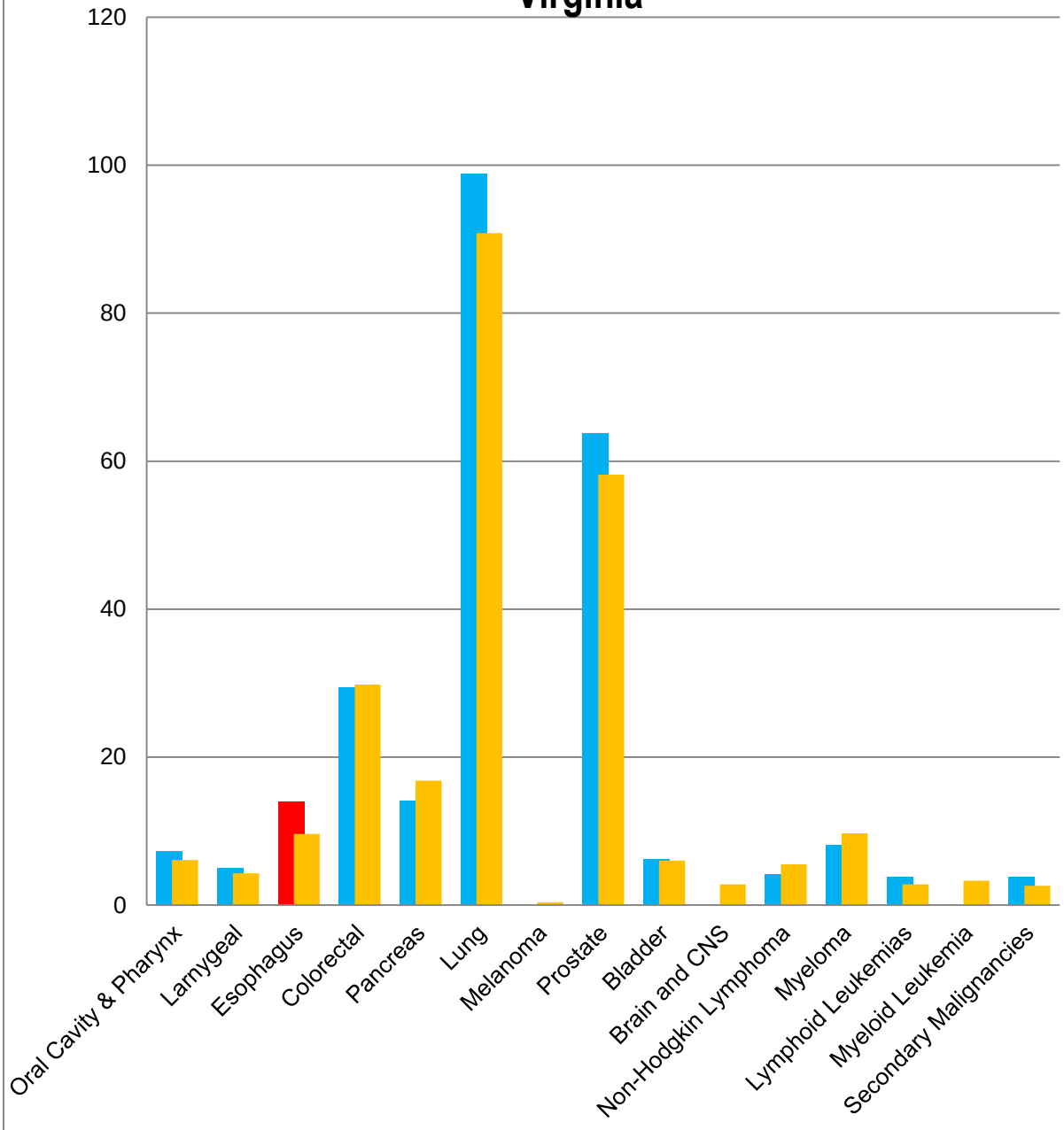

**Black Male** Cancer Mortality Rates*, 1996 - 2013

## **Central Region of Southern Virginia** V.S. **State of Virginia**

| Site | Black Male Southern VA | Black Male Virginia | Significance |
|---|---|---|---|
| Oral Cavity & Pharynx | 7.2 | 6.1 | ns |
| Larynx | 5 | 4.3 | ns |
| Esophagus | 13.9 | 9.6 | > |
| Colorectal | 29.4 | 29.8 | ns |
| Pancreas | 14 | 16.8 | ns |
| Lung | 98.8 | 90.8 | ns |
| Melanoma | | 0.4 | ns |
| Prostate | 63.7 | 58.2 | ns |
| Bladder | 6.2 | 6 | ns |
| Brain and CNS | | 2.8 | ns |
| Non-Hodgkin Lymphoma | 4.1 | 5.5 | ns |
| Myeloma | 8.1 | 9.7 | ns |
| Lymphoid Leukemia | 3.7 | 2.8 | ns |
| Myeloid Leukemia | | 3.3 | ns |
| Secondary Malignancies | 3.7 | 2.6 | ns |

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

## **Black Male** Cancer Mortality Rates*, 1996 - 2013
## **Central Region of Southern Virginia** V.S. **State of Virginia**



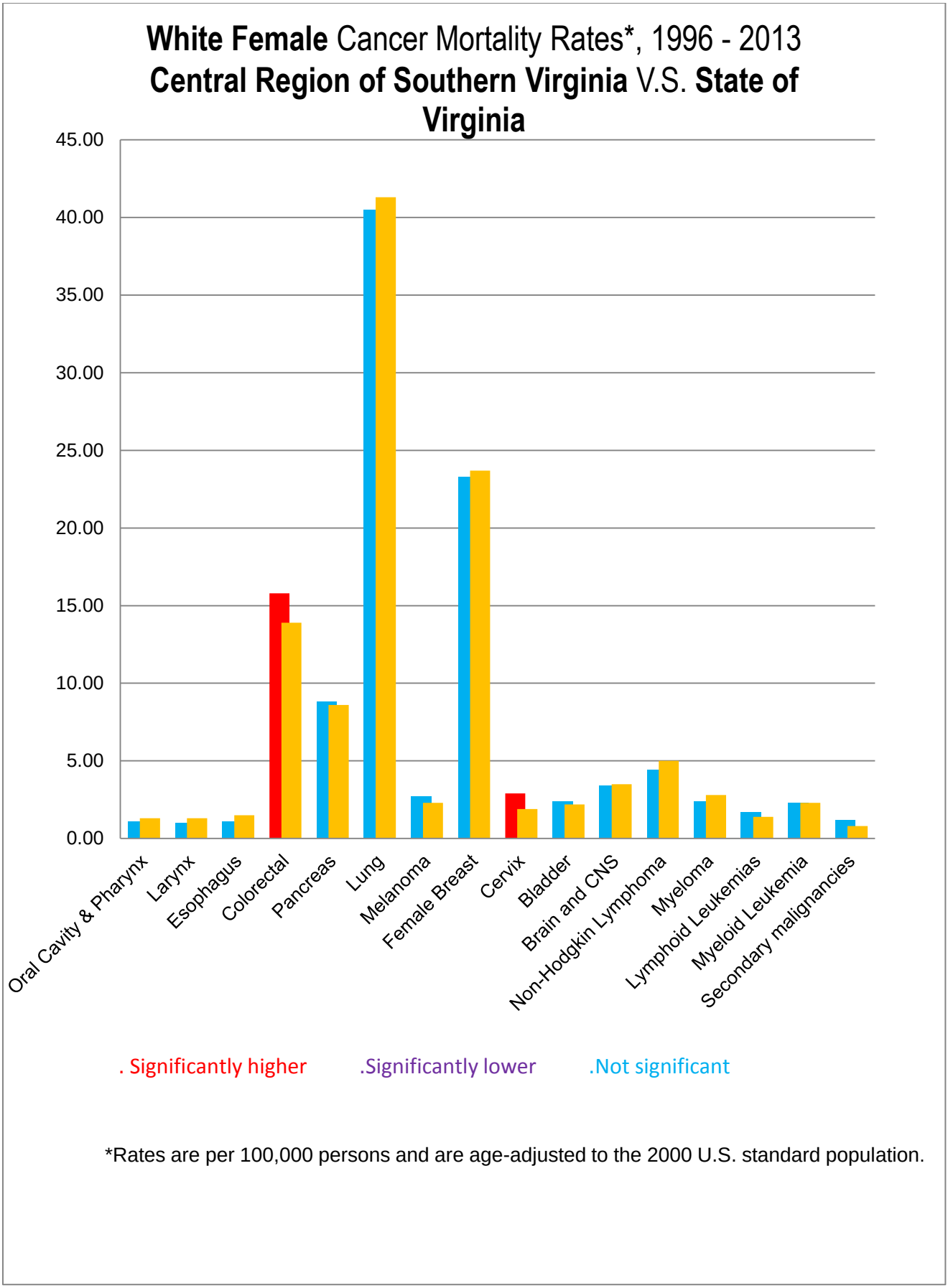

. Significantly higher .Significantly lower .Not significant

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

## **White Female** Cancer Mortality Rates*, 1996 - 2013
## **Central Region of Southern Virginia** V.S. **State of Virginia**

| Site | White Female Southern VA | White Female VA | Significance |
|---|---|---|---|
| Oral Cavity & Pharynx | 1.10 | 1.30 | ns |
| Larynx | 1.00 | 1.30 | ns |
| Esophagus | 1.10 | 1.50 | ns |
| Colorectal | 15.80 | 13.90 | > |
| Pancreas | 8.80 | 8.60 | ns |
| Lung | 40.50 | 41.30 | ns |
| Melanoma | 2.70 | 2.30 | ns |
| Female Breast | 23.30 | 23.70 | ns |
| Cervix | 2.90 | 1.90 | > |
| Bladder | 2.40 | 2.20 | ns |
| Brain and CNS | 3.40 | 3.50 | ns |
| Non-Hodgkin Lymphoma | 4.40 | 5.00 | ns |
| Myeloma | 2.40 | 2.80 | ns |
| Lymphoid Leukemia | 1.70 | 1.40 | ns |
| Myeloid Leukemia | 2.30 | 2.30 | ns |
| Secondary malignancies | 1.20 | 0.80 | ns |

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.



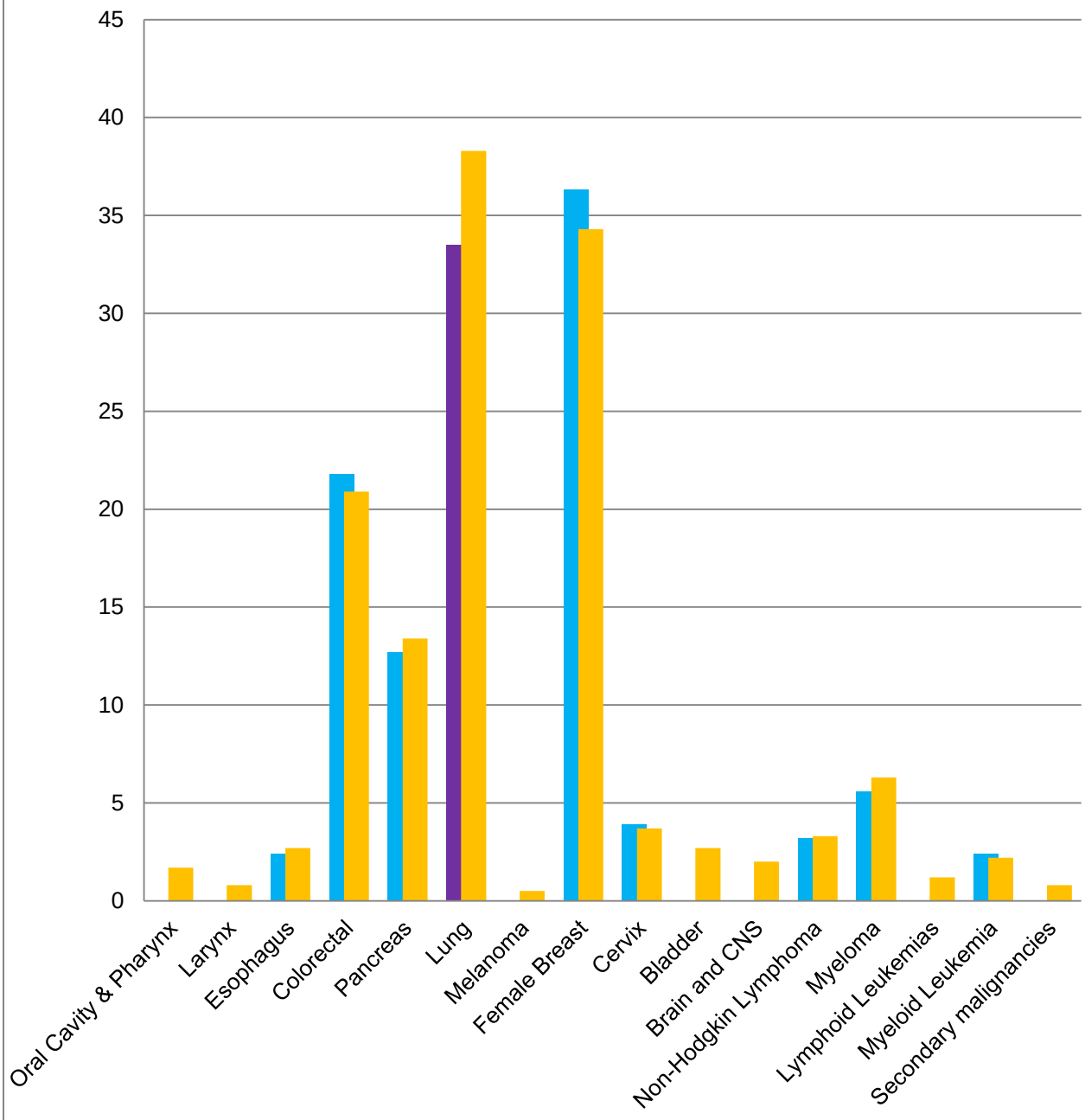

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

## **Black Female** Cancer Mortality Rates*, 1996 - 2013
## **Central Region of Southern Virginia** V.S. **State of Virginia**

| Site | Black Female Southern VA | Black Female VA | Significance |
|---|---|---|---|
| Oral Cavity & Pharynx | | 1.70 | ns |
| Larynx | | 0.80 | ns |
| Esophagus | 2.40 | 2.70 | ns |
| Colorectal | 21.80 | 20.90 | ns |
| Pancreas | 12.70 | 13.40 | ns |
| Lung | 33.50 | 38.30 | < |
| Melanoma | | 0.50 | ns |
| Female Breast | 36.30 | 34.30 | ns |
| Cervix | 3.90 | 3.70 | ns |
| Bladder | | 2.70 | ns |
| Brain and CNS | | 2.00 | ns |
| Non-Hodgkin Lymphoma | 3.20 | 3.30 | ns |
| Myeloma | 5.60 | 6.30 | ns |
| Lymphoid Leukemias | | 1.20 | ns |
| Myeloid Leukemia | 2.40 | 2.20 | ns |
| Secondary malignancies | | 0.80 | ns |

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

## Black Female Cancer Mortality Rates*, 1996 - 2013
## Central Region of Southern Virginia V.S. State of Virginia




. Significantly higher .Significantly lower .Not significant

*Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.

## Improve Outcome

Central Region of Southern Virginia has higher cancer incidence and mortality rates in major cancers comparing to the State of Virginia. There are multiple factors attribute to this less favorable outcome. How to improve the outcome is a major task for cancer health care providers in the region.

1. Educate the public on cancer risk factors, and encourage on healthy life style.
2. Promote on cancer screening and early detection.
3. Identify new symptom, and bring prompt medical attention for early cancer diagnosis.
4. Provide multidiscipline and update treatment.
5. Emphasize on good quality care includes palliative care and long term survival care.

## Causes of cancer

There are two major risk factors on cancer development:

1. Nature: Hereditary genetic background of individual person.
2. Nurture: Acquired risk factors from individual life style.

Cancer, in essence, is a genetic disease. Accumulation of genetic alterations forms the basis of cancer pathogenesis. Cancer development has long latency, which includes the steps of initiation, promotion and progression. It may take 10 years or longer to develop a cancer. Due to the long process, it offers an incredible window of opportunity for the prevention and early detection of cancer.

In current cancer management, we emphasize on the treatment of existing cancers. More commonly, the cancer is diagnosed in advanced stage. Patient lives just a few months. We should shift the focus and pay more attention to educate the public on a healthy life style. Focus more on screening and early detection. It may impact on less cancer incidence and better survival.

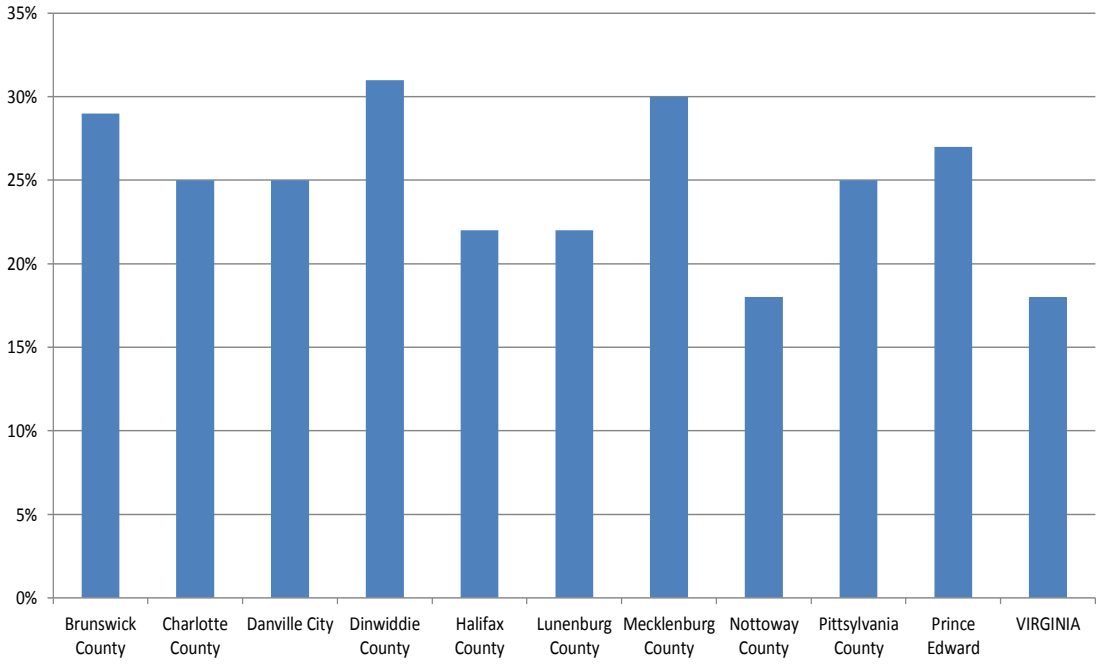
Population as a whole, risk factors of cancer have been well recognized, such as tobacco, alcohol, diet, physical activity, infections, toxin, and radiation. Individual person need to understand on the importance of healthy life style and good habits. Public health education has to emphasize it.

### Cancer prevention

Southern Virginia is a tobacco growing region. Many people start to smoke at teen age. It is fairly common that a patient with a diagnosis of lung cancer has smoked for 40 or 50 years. The prevalence of cigarette smoking in Central Region of Southern Virginia is higher comparing to State of Virginia.

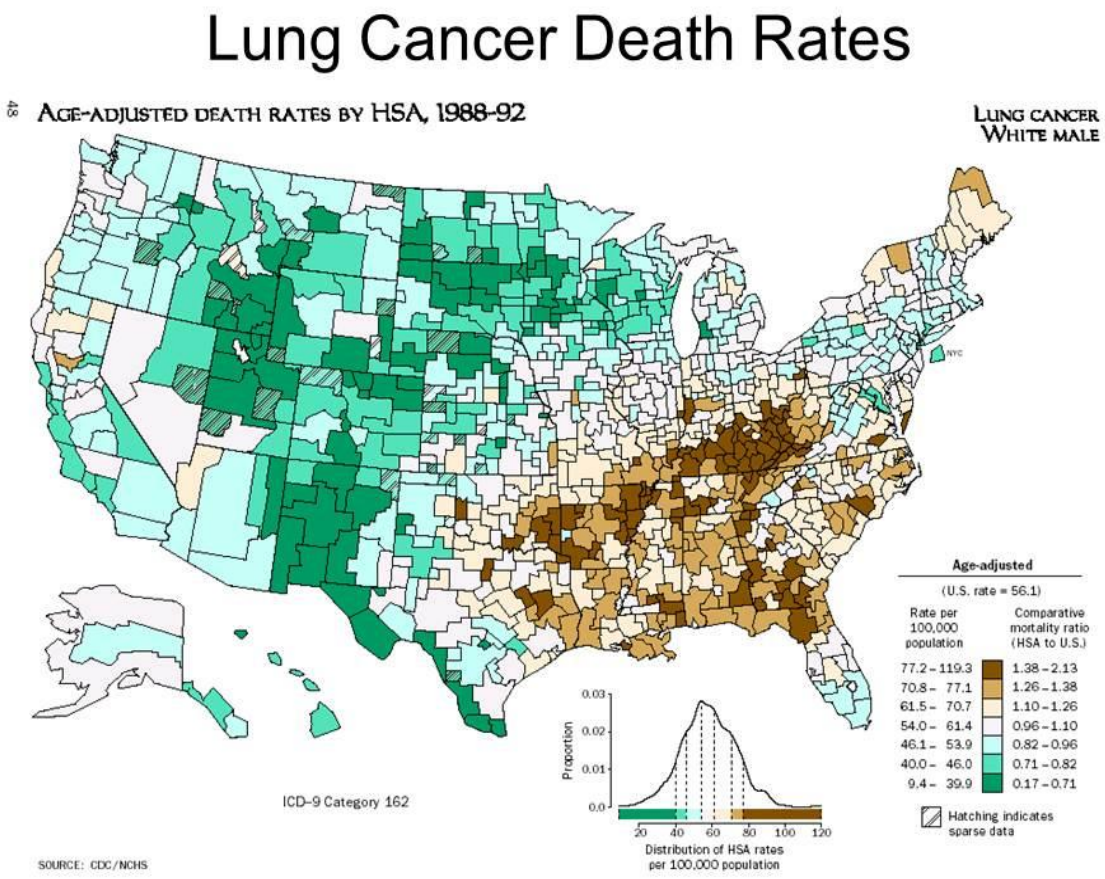
# Cigarette Smoking Rates*

## Central Region of Southern Virginia VS State of Virginia




*Robert Wood Johnson Foundation and Population Health Institute, University of Wisconsin-Madison

Nationwide, lung cancer death rates are highest among tobacco growing regions. Cigarette smoking is one of the most important risk factors of cancer. Lung cancer is the leading cause of cancer death in men and women. Central Region of Southern Virginia is in the region with highest lung cancer death rates.




Presented By Graham Walter Warren, MD, PhD at 2013 ASCO Annual Meeting

**Smoking prevention and cessation**

50 years ago, in 1964, Luther Terry, then Surgeon General of the United States, released the report ***smoking and health***. The report causally related smoking to lung cancer in men. Today, the hazards of tobacco have been well recognized. The overall cancer death rate peaked at 215.1 deaths per 100,000 populations in 1991. This increase was largely driven by rapid increases in lung cancer deaths among men as a consequence of tobacco epidemics. Over the past 2 decades, there has been a steady decline in the cancer death rates to 171.8 in 2010 as a result of advances in prevention, early detection, treatment, and implementation of comprehensive tobacco control.

**Prevention on cigarettes smoking: Awareness of the harms**

Tobacco smoke contains more than 7000 chemical compounds, of which many are known carcinogens. Components of tobacco contribute to carcinogenesis through multiple pathways including DNA binding and mutation, inflammation, oxidative stress, and epigenetic changes. Epigenetic is the alteration of gene expression without genetic code changes. Epidemiological studies have shown causal association between tobacco smoking and at least 14 different types of cancer.

In a cohort study, relative risk of death in lung cancer increases 25 times in long term smokers comparing to never smokes. The increase risk of lung cancer death is identical in women and men. Long term smokers have 22-25 times risk of dying of chronic obstructive lung disease, 2-3 times risk of dying of ischemic heart disease, 2 times risk of dying of stroke.

**Cessation of smoking**

In 1955, 5 years after a historic study of "**Smokers and lung cancer"** was published, 7.7 million American quitted smoke. In 1964, after US Surgeon General report on "**Smoking and health"**, 19.2 million American quitted smoking. By 1975, 32.6 million Americans have stopped smoking. Many of quitters had been very heavy smokers. Smoking cessation research pays little attention on self-quitter. Self-quitters are thought to hold the answer on smoking cessation. However,

**Two major barriers to smoking cessation**

1. **Habit, behavior, and psychological dependent:** Though majority quit smoking un-assisted,
   and minority clearly has psychological dependence especially among mental illness, who require professional assistance.
2. **Nicotine withdraws, physical dependent:** Nicotine on central nervous system is understood, tobacco use is officially labeled as an addition. Nicotine replacement therapies are helping
   the relief of nicotine withdraws.

**Effectiveness of E-cigarettes and controversies**

E-cigarette users treat it as cessation aid, and report that it has been a key to quit smoking. E-cigarette is compared favorably to nicotine replacement therapies in terms of the likelihood of returning to smoking 6 months after a cessation attempt.

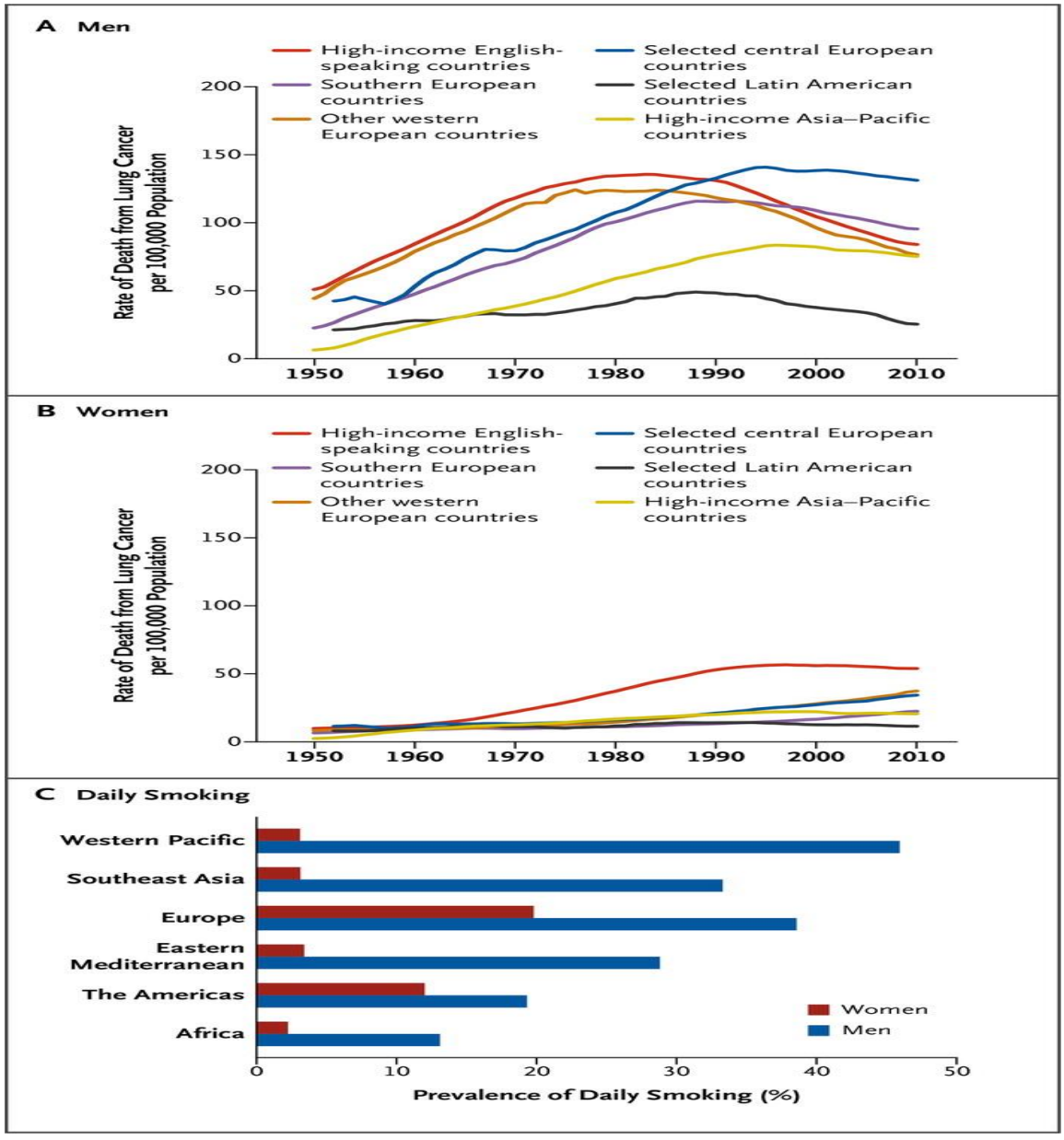
Data from Center for Disease Control and Prevention shows twice as many young people experiment on e-cigarettes in 2012 as in 2011. Some e-cigarette ads are tapping into the cool, rugged masculinity that was famously linked with cigarettes in the past.

FDA has withheld the decision about the health risk of the e-cigarette, and also withheld the ban on marketing tactics to push tobacco free e-cigarettes. Some states and major cities have already started to impose the regulations on e-cigarettes.

## Global perspective and heath care burden[1]

In Western countries, decreasing prevalence of cigarette smoking contributes the decline in mortality from lung cancer. Globally, it continues to be a major health care burden. Tobacco smoking is responsible for about 6.3 million annual deaths worldwide. In 2008, WHO identified six evidence-based tobacco control measures, "**MPOWER**", that are the most effective in reducing tobacco smoking.

1. **M**onitor tobacco use and prevention policy.
2. **P**rotect people from tobacco smoking.
3. **O**ffer help to quit tobacco use.
4. **W**arn people about the danger of tobacco.
5. **E**nforce bans on tobacco advertising, promotion, and sponsorship.
6. **R**aise taxes on tobacco.




[1] World Health Organization, World Cancer Report 2014

## Healthy Life Style

It is estimated 585,000 cancer deaths in US in 2014. One third is caused by exposure to tobacco products, and another one third can be attributed to the diet choice, overweight, and physical activity. Although genetic susceptibility influences the risk of cancer, most of variations in cancer risks across population and among individuals are due to the lifestyle.
Obesity and cancer relationship is well established and broadly accepted. Growing number of large, well conducted prospective investigations regarding obesity and cancer, molecular epidemiology studies have helped to demonstrate the biologic plausibility. For example, in breast cancer, the evidence links the higher recurrence and higher mortality with overweight and obesity.

**American Cancer Society recommends on individual healthy lifestyle:**

1. Achieve and maintain a healthy weight throughout life. Be as lean as possible without being under-weight. A healthy weight depends on a person's height, often expressed in term of a body mass index (BMI).

2. Adopt a physically active lifestyle. Adult should engage in at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity activity per week. Children and adolescents should engage at least one hour of moderate or vigorous intensity activity each day.

3. Consider a healthy diet, with emphasis on plant foods. Choose food and beverages in amounts that help in maintain healthy weight. Limit consumption of processed meat and red meat. Eat at least 2.5 cups of vegetables and fruits each day. Choose whole grains instead of refined grains.

4. Limit alcohol consumption, no more than one drink per day for women, two drinks per day for men.

In advanced stage of cancer, some patients have experienced weight loss at initial diagnosis of cancer. During the cancer treatment, nausea or vomiting can lead further weight loss. Maintaining on healthy weight and nutrition is important. Healthy diet and physical activity as tolerated can maintain a sense of well-being and enhance quality of life.

American Cancer Society also recommends the nutrition and physical activity for cancer survivals. Patients, who recovers after treatment and lives on long term disease free condition, are recommended to achieve healthy weight, to engage in regular physical activity, and to diet on high in vegetables, fruits and grains. Increasing evidence indicates that being overweight increase the risk of cancer recurrence, and reduces the likelihood of disease free and overall survival.

Some nutrition caveats were investigated. Antioxidant, including vitamin C, vitamin E, beta-carotene (precursor of vitamin A), helps cellular differentiation and protects tissue damage. Studies suggest that people eat more vegetables and fruits, rich in antioxidants, may have lower risk of some types of cancer. In contrast, antioxidant supplements have not demonstrated a reduction in cancer risk. High dose of beta-carotene, in an attempt to prevent lung cancer; the supplement was found to increase the risk of lung cancer in cigarette smokers.

## Disparity in Health Care and Social Economic Status[2]

County health ranking and measurements are based on health behaviors, clinical cares, social and economic factor, and physical environment.

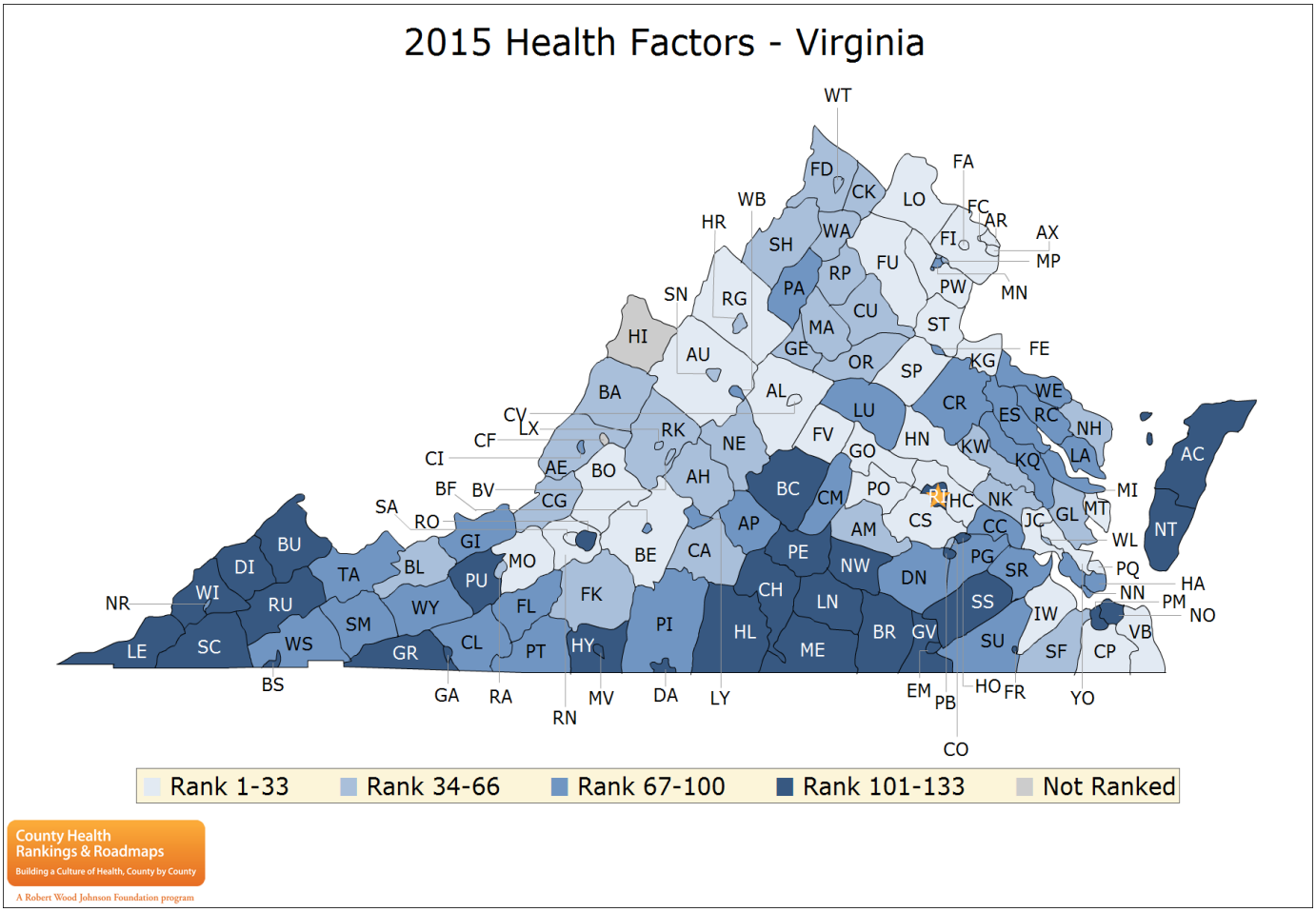
### County Health Rankings and Measurements*

- **Health factors (100%)**
  - **Health behaviors (30%)**
    - **Tobacco use**
      - **Adult smoking**
    - **Diet & exercise**
      - **Adult obesity and physical inactivity**
    - **Alcohol use**
      - **Excessive drinking**
      - **Motor vehicle crush death rate**
    - **Sexual activity**
      - **Sexually transmitted infections**
      - **Teen birth rate**
  - **Clinical care (20%)**
    - **Access to care**
      - **Uninsured**
      - **Primary care physicians**
      - **Dentists**
    - **Quality of care**
      - **Preventable hospital stays**
      - **Diabetic screening**
      - **Mammography screening**
  - **Social and economic factors (40%)**
    - **Education**
      - **High school graduation**
      - **Some college**
    - **Employment**
      - **Unemployment**
    - **Income**
      - **Children in poverty**
    - **Family and social support**
      - **Inadequate social support**
      - **Children in single-parent households**
    - **Community safety**
      - **Violent crime rate**
  - **Physical environment (10%)**
    - **Environmental quality**
      - **Daily fine particulate matter**
      - **Drinking water safety**
    - **Built environment**
      - **Access to recreational facilities**
      - **Limited access to healthy foods**
      - **Fast food restaurants**

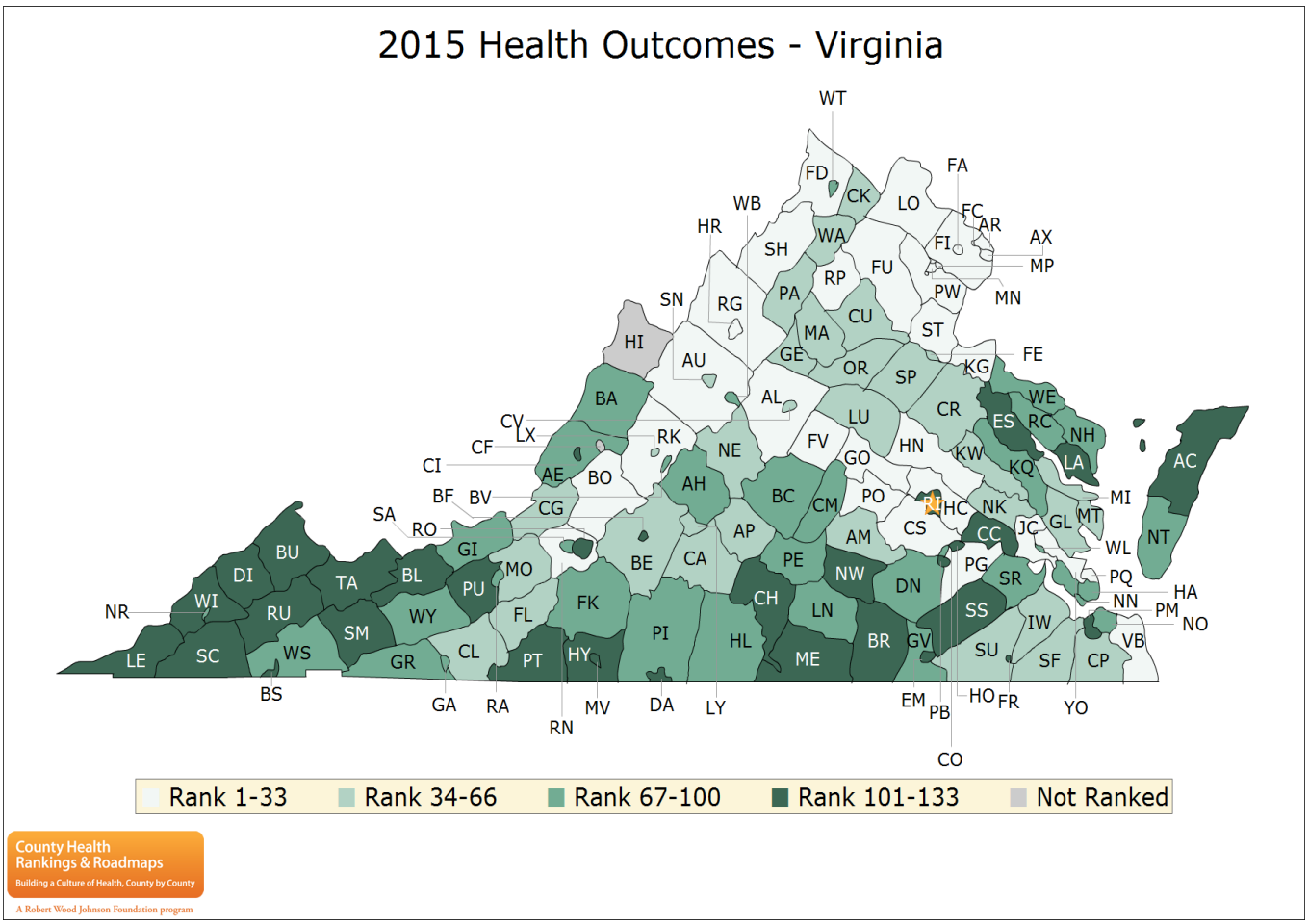
***Robert Wood Johnson Foundation and Population Health Institute, University of Wisconsin-Madison**

[2] Robert Wood Johnson Foundation and Population Health Institute, University of Wisconsin-Madison

**Health Factors of Central Region of Southern Virginia is ranked the poor quartile among State of Virginia**



**Health outcome of Central Region of Southern Virginia is also ranked in the poor quartile among State of Virginia**



## Cancer Screening and Early Detection

Screening for cervical, breast and colorectal cancers has shown decreasing mortalities. Traditionally, cancer screening was considered as a simple recommendation: “Early detection of cancer can increase higher chance of cure”.
Multiple factors and developments have contributed the complexities of cancer screening and recommendation:

1. Better understanding of genetic background and family history in hereditary cancers, such as breast cancer with BRCA 1 or 2 gene carrier, who will start the breast cancer screening in earlier age and use the additional screening test on top of screening mammogram.
2. Tobacco smoking is an acquired risk factor for lung cancer in long term smokers. Lung cancer screening has been targeted for the high risk with 30 pack-year history of smoking.
3. The over-diagnosis and over-treatment have been an important concern on cancer screening, such as prostate cancer. Many older men, who may not be diagnosed or die of the prostate cancer, the early diagnosis and treatment can cause more harms then benefits.
4. Newer screening tests or procedures may improve the sensitivity and specificity of the screening results. All these new approaches require the randomized comparison trials to the old standards before confirmation as the new recommendation. It may take years and large population to be tested.
5. Age, life expectancy, and co-mobility of individual person, are important factors on cancer screening. The age alone is not necessary the only decision to start or stop the screening.
6. Ethnic, geographic, socioeconomic may influence the screening results. The screening efficacy and benefit are not affected.

Multiple medical societies, including primary care physicians and specialties, policy driven organization, and American Cancer Society, all makes the cancer screening recommendations. Some similar, some are not agreed and controversial. Although the recommendations on screening are all evidenced based, the discrepancy again are based on different outcome measurements.

From the physician or health provider stand point, the individual patient outcome is important. From the policy stand point, the cost effectiveness, benefit and harm, disease specific and overall mortality in the population, as a whole is important.

So, the most important message on the cancer screening recommendation is “individual basis”. Patient or general population understands the limitation of the screening test, potential benefit and harm on the screening. It can be fully discussed with health providers before making the decision.

Currently, cervical, breast, and colorectal cancer screening have been well accepted in US and worldwide. The prostate cancer screening should be more individualized. Lung cancer screening is targeted on the high risk group. There are other types of cancer screening which is under investigation: such as gastric cancer and liver cancer in endemic countries, head and neck cancer and urinary bladder cancer in smokers, skin cancer in fair skin population.

## American Cancer Society Cancer Screening Recommendation[3]

**Breast** Women ages ≥20 y Breast self-examination (BSE) It is acceptable for women to choose not to do BSE or to do BSE regularly (monthly) or irregularly; beginning in their early 20s, women should be told about the benefits and limitations of BSE; whether or not a woman ever performs BSE, the importance of prompt reporting of any new breast symptoms to a health professional should be emphasized; women who choose to do BSE should receive instruction and have their technique reviewed on the occasion of a periodic health examination

Clinical breast examination (CBE) For women in their 20s and 30s, it is recommended that CBEs be part of a periodic health examination, preferably at least every 3 years; asymptomatic women aged ≥40 y should continue to receive a CBE as part of a periodic health examination, preferably annually

Mammography Begin annual mammography at age 40 y

**Cervix** Women, ages 21-65 y Pap test and HPV DNA test Cervical cancer screening should begin at age 21 y; for women ages 21-29 y, screening should be done every 3 y with conventional or liquid-based Pap tests; for women ages 30-65 y, screening should be done every 5 y with both the HPV test and the Pap test (preferred) or every 3 y with the Pap test alone (acceptable); women aged >65 y who have had ≥3 consecutive negative Pap tests or ≥2 consecutive negative HPV and Pap tests within the last 10 y, with the most recent test occurring in the last 5 y, and women who have had a total hysterectomy (for a benign condition) should stop cervical cancer screening; women at any age should not be screened annually by any screening method

**Colorectal** Men and women, ages ≥50 y Guaiac-based fecal occult blood test (gFOBT) with at least 50% test sensitivity for cancer, or fecal immunochemical test (FIT) with at least 50% test sensitivity for cancer, or Annual starting at age 50 y; testing at home with adherence to manufacturer's recommendation for collection techniques and number of samples is recommended; FOBT with the single stool sample collected on the clinician's fingertip during a digital rectal examination in the health care setting is not recommended; guaiac-based toilet bowl FOBT tests also are not recommended; compared with guaiac-based tests for the detection of occult blood, immunochemical tests are more patient-friendly and are likely to have equal or better sensitivity and specificity; there is no justification for repeating FOBT in response to an initial positive finding

Stool DNA test, or Every 3 y, starting at age 50 y

Flexible sigmoidoscopy (FSIG), or Every 5 y, starting at age 50 y; FSIG can be performed alone, or consideration can be given to combining FSIG performed every 5 y with a highly sensitive gFOBT or FIT performed annually Double-contrast barium enema, or Every 5 y, starting at age 50 y
Colonoscopy, or Every 10 y, starting at age 50 y
CT colonography Every 5 y, starting at age 50 y

**Endometrial** Women, at menopause At the time of menopause, women at average risk should be informed about risks and symptoms of endometrial cancer and strongly encouraged to report any unexpected bleeding or spotting to their physicians

**Lung** Current or former smokers (quit within past 15 y) ages 55-74 y in good health with at least a 30 pack-year history Low-dose helical CT (LDCT) Clinicians with access to high-volume, high-quality lung cancer screening and treatment centers should initiate a discussion about annual lung cancer screening with apparently healthy patients ages 55-74 y who have at least a 30 pack-year smoking history and who currently smoke or have quit within the past 15 y; a process of informed and shared decision making with a clinician related to the potential benefits, limitations, and harms associated with screening for lung cancer with LDCT should occur before any decision is made to initiate annual lung cancer screening; smoking-cessation counseling remains a high priority for clinical attention in discussions with current smokers, who should be informed of their continuing risk of lung cancer; screening should not be viewed as an alternative to smoking cessation

[3] Smith R, et al., Cancer Screening in the United States, 2015. CA Cancer J Clin 2015; 65: 30-54

| | | | |
|---|---|---|---|
| **Prostate** | Men, ages ≥50 y | Digital rectal examination and prostate-specific antigen test | Men who have at least a 10-y life expectancy should have an opportunity to make an informed decision with their health care provider about whether to be screened for prostate cancer after receiving information about the potential benefits, risks, and uncertainties associated with prostate cancer screening; prostate cancer screening should not occur without an informed decision-making process |

There are major concerns of prostate cancer screening creating the problems of over-diagnosis and over-treatment in prostate cancer:

**American Urology Association Prostate Cancer Screening Recommendation**[4]

GUIDELINE

1. Men under age 40 years: no evidence demonstrating benefit of screening and likely harms of screening
2. Men between ages 40 to 54 years at average risk: not recommend routine screening
3. Men younger than age 55 years at higher risk (e.g. positive family history or African American race), decisions regarding prostate cancer screening should be individualized
4. Men ages 55 to 69 years: PSA screening involves weighing the benefits (preventing prostate cancer mortality in 1 man for every 1,000 men screened over a decade) against the harms with screening and treatment. Strongly recommends shared decision-making based on a man's values and preferences (The greatest benefit of screening appears to be in men ages 55 to 69 years)
5. Screening intervals of two years preserve the majority of the benefits and reduce over-diagnosis and false positives (Additionally, intervals for rescreening can be individualized by a baseline PSA level)
6. Men age 70+ years or any man with less than a 10 to 15 year life expectancy: not recommend routine PSA screening (Some men age 70+ years, who are in excellent health may benefit from prostate cancer screening)

**Screening for lung cancer**

Lung cancer is the third most common cancer and the leading cause of cancer-related deaths in the United States. Attention to lung cancer is especially relevant for the Medicare population, because the median age at diagnosis is 70 years. A suitable screening test has long been sought to accurately detect lung cancer at earlier stages, when treatments are more effective and survival is more likely. Currently, more than half of cases are diagnosed after the cancer has metastasized.

Although low-dose computed tomography (CT) has been studied in several screening trials, the National Lung Screening Trial (NLST), sponsored by the National Cancer Institute, is the only trial to date that has shown that screening with low-dose CT reduces lung-cancer mortality.

CMS (Centers for Medicare & Medicaid Services) approves low dose CT lung cancer screening on February 5, 2015 for high risk patients, who are defined as individuals between the ages of 55

[4] Carter HB, et al., EARLY DETECTION OF PROSTATE CANCER: AUA GUIDELINE: American Urological Association (AUA) Guideline, 2013

and 77, smoked at least one pack of cigarettes every day for 30 years or ceased tobacco use within the last 15 years.

Key Discussion Points for the Process of Shared Decision Making Related to Screening for Early Lung Cancer Detection with Low-Dose Helical Computed Tomography[5]

Benefits, limitations, and harms

- **Benefit:** Screening with LDCT has been shown to substantially reduce the risk of dying from lung cancer
- **Limitations:** LDCT will not detect all lung cancers or all lung cancers early, and not all patients who have a lung cancer detected by LDCT will avoid death from lung cancer
- **Harms:** There is a significant chance of a false-positive result, which will require additional periodic testing and, in some instances, an invasive procedure to determine whether or not an abnormality is lung cancer or some non-lung-related, incidental finding; less than one in 1000 patients with a false-positive result experience a major complication resulting from a diagnostic workup; death within 60 days of a diagnostic evaluation has been documented but is rare and most often occurs in patients with lung cancer

Helping individuals clarify their personal values can facilitate effective decision making

- Individuals who value the opportunity to reduce their risk of dying from lung cancer and who are willing to accept the risks and costs associated with having an LDCT and the relatively high likelihood of the need for further tests, even tests that have the rare but real risk of complications and death, may opt to be screened with LDCT every year
- Individuals who place greater value on avoiding testing that carries a high risk of false-positives and a small risk of complications and who understand and accept that they are at a much higher risk for death from lung cancer than from screening complications may opt not to be screened with LDCT

The NLST provided the initial evidence to support lung-cancer screening with low-dose CT. The next step is to address the challenges ahead to ensure that population screening confers similar benefits over time and minimizes risk. By creating a new preventive benefit with specific evidence-based coverage criteria, CMS has established a mechanism to provide responsible access to high-quality lung-cancer screening with low-dose CT in the Medicare population while trials continue in Europe and data on long-term screening outcomes in the United States are collected to inform decisions about screening frequency and duration. However, the primary responsibility for ensuring appropriate integrated screening in which benefits outweigh harms ultimately rests with practicing physicians, informed patients, and the multidisciplinary stakeholders involved in screening efforts.[6]

[5] Smith R, et al., Cancer Screening in the United States, 2015. CA Cancer J Clin 2015; 65: 30-54

[6] Joseph Chin, M.D., Tamara Syrek Jensen, J.D., Lori Ashby, M.A., Jamie Hermansen, M.P.P., Joseph D. Hutter, M.D., and Patrick H. Conway, M.D. N Engl J Med 2015; 372:2083-2085May 28, 2015

## Cancer Program and Service

Cancer care is multi-disciplined approach. It includes diagnosis, treatment, and supportive care.

Diagnosis includes:
Primary health physicians and providers

Specialists

Images: Upgrade CT scan and MRI scan, and new service of PET-CT

Pathology and Laboratory

Specialty test in molecular genetic testing

Treatment is program directed in collaboration with VCU Massey Cancer Center

- Central nervous system (Brain) cancer program
- Head and neck cancer program
- Breast cancer program
- Thoracic cancer program
- Gastrointestinal cancer program
- Gynecologic cancer program
- Genitourinary cancer program
- Bone and soft tissue cancer program
- Skin cancer program
- Hematologic malignancy program

Three major treatment modalities

- Surgery service with the access of the specialists
  - Neurosurgeon
  - Head and neck surgeon
  - Thoracic surgeon
  - Breast surgeon
  - Gastrointestinal surgeon
  - Urologist
- Gynecology surgeon
- Radiation oncologist
- Medical oncologist

## Supportive and Quality Care[7]

### Navigation on active treatment plan

Patient navigation in cancer care refers to individualized assistance offered to patients, families, and caregivers to help overcome health care system barriers and facilitate timely access to quality medical and psychosocial care and can occur from prior to a cancer diagnosis through all phases of the cancer experience. The navigation services implemented will depend upon the particular type, severity, and/or complexity of the identified barriers.

### Palliative care and the end of life

In 2014, it is estimated 1,665,000 new cancers diagnosed, and 585,000 cancer deaths in US. Many cancer survivors live with symptoms and disability as results of disease or treatments. End of life cancer patients , more than one thirds, report to have severe symptoms such as pain, nausea, anxiety, depression, short of breath, drowsiness, loss of appetite, fatigue. Palliative care focuses on effective management of symptoms, and incorporating psychosocial, spiritual care.

1. Structure and processes of care Interdisciplinary team, comprehensive interdisciplinary assessment, education and training; relationship with hospice program
2. Physical aspects of care Pain and other symptoms are managed with the use of best practices
3. Psychological and psychiatric aspects of care Psychological and psychiatric issues are assessed and managed; grief and bereavement program is available to patients and families
4. Social aspects of care Interdisciplinary social assessment with appropriate care plan; referral to appropriate services
5. Spiritual, religious, and existential aspects of care Spiritual concerns are assessed and addressed; linkages to community and spiritual or religious resources are provided as appropriate
6. Cultural aspects of care Culture-specific needs of patients and families are assessed and addressed; recruitment and hiring practices reflect the cultural diversity of the community
7. Care of the imminently dying patient Signs and symptoms of impending death are recognized and communicated; hospice referral is recommended when patient is eligible
8. Ethical and legal aspects of care Patient's goals, preferences, and choices form basis for plan of care; the team is knowledgeable about relevant federal and state statutes and regulations[8]

### Survivorship and Long Term follow up

[7] Commission on Cancer: Cancer Program Standards 2012: Ensuring Patient-Centered Care

[8] Adapted from the National Consensus Project for Quality Palliative Care

There is a “booming” population of cancer survivors in the United States largely as a result of advances in early cancer detection and improved cancer therapy as well as the general aging of our society. An estimated 13.7 million Americans with a history of cancer were alive on January 1, 2012, and by January 1, 2022, that number will increase to nearly 18 million. The 3 most prevalent cancers among males are prostate (43%), colorectal (9%), and melanoma of the skin (7%), and those among females are breast (41%), uterine corpus (8%), and colorectal (8%).

The transition of care from active treatment to long term follow up, there are several essential components for lifelong proactive and anticipatory survivorship care:

1. Prevention of recurrent and new cancers.
2. Surveillance of recurrent and second cancers.
3. Assessment of medical and psychosocial late effects.
4. Interventions for consequences of cancer and its treatment, including medical and psychosocial problems.
5. Coordination between specialists and primary care providers to ensure survivor’s health needs.

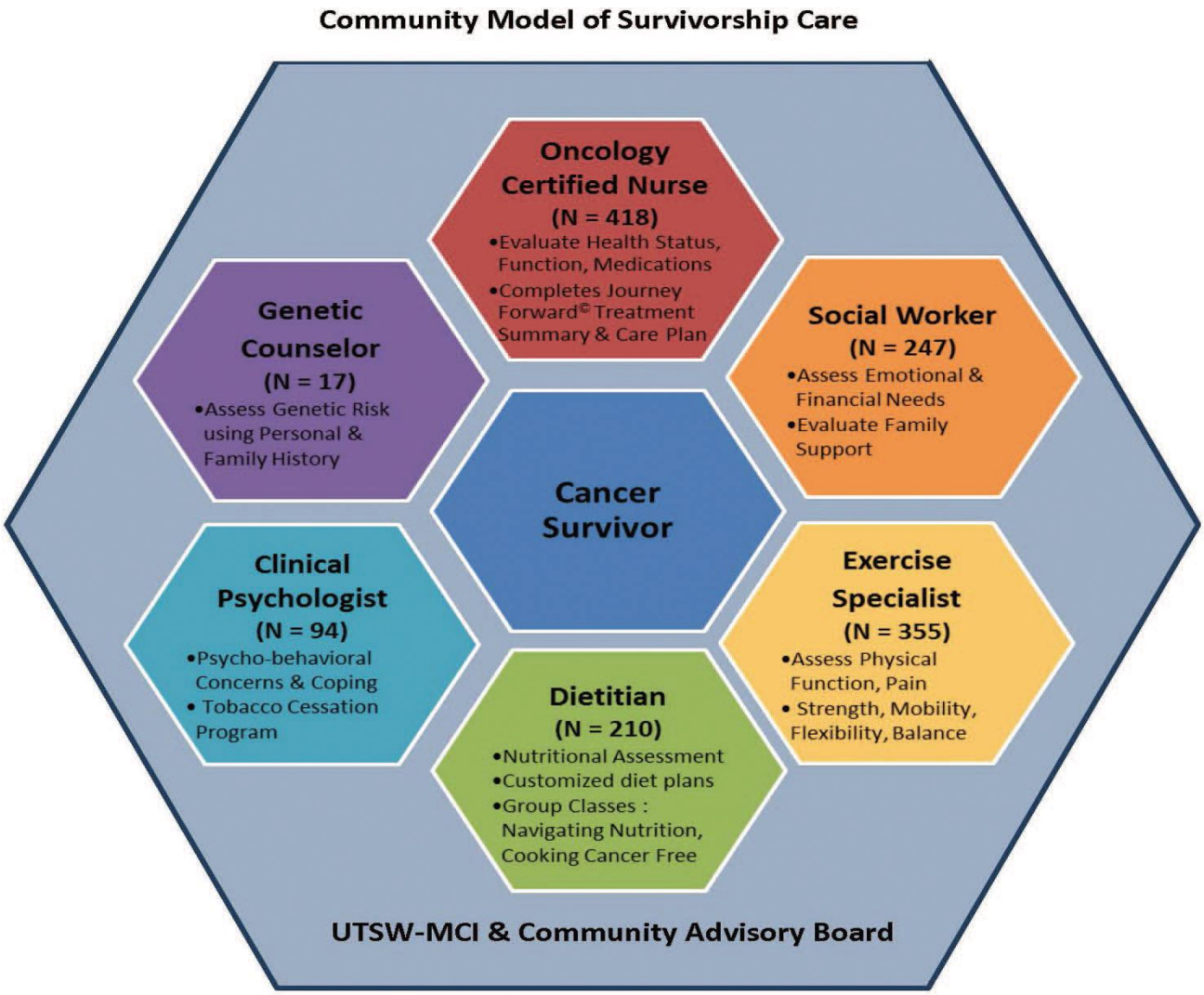
A comprehensive treatment summary will provide a foundation for future survivorship plan. The summary includes:

1. type of cancer, stage, and date of diagnosis
2. Specific treatment and dates (e.g., names of surgical procedures, chemotherapy drug names and dosages, radiation dosages, etc.)
3. Complications (side effects of treatment, hospitalizations, etc.)
4. Supplemental therapy (e.g., physical therapy, adjuvant therapy, such as tamoxifen, etc.)
5. The survivorship care plan should be tailored to address each individual’s specific needs.

In addition to the treatment summary, the survivorship plan may include:

1. A schedule of follow-up medical visits, tests, and cancer screenings, including who will perform them and where
2. Symptoms that may be a sign of cancer recurrence
3. Potential long-term treatment effects and their symptoms
4. Behavior recommendations to promote a healthy recovery
5. Community resources

There are models of survivorship care either in academic center or community setting. The academic center operates either a consultative or longitudinal models. Risk stratified will help on the timing and transition of the care from oncologist care, transition to shared care, then back to the community provider’s care.




**Supportive group of Cancer Survivals**

There are cancer supportive groups members meeting regularly, who are cancer survivors have been treated at Cancer Center and Specialty Care at VCU Community Memorial Hospital.

VCU Massey will train peer to peer support volunteers. The veteran cancer survivors have completed the cancer treatment, who will share their personal experiences on the cancer treatment side effects, mental stress, concerning on the recurrence of cancer, and personal coping skills. The supportive group volunteers will provide the first hand personal experience, and answering the most pertinent concerns for the newly diagnosed patients. The supportive group members will help each other, sharing new treatment information, pursuing healthier life style.

**Access to health care**

Health education and prevention
Screening
Diagnosis and treatment
Medication access
Participation on clinical trials
Compliance
Psychosocial support

## Genetic Counseling and Testing

Hereditary cancer syndromes may account for up to 5-10% of new onset new adult cancers. In children, it may explain about 30% in children malignancies. Recent advances in molecular pathways and genetic testing, it translates the clinical information into early diagnosis, screening, detection, prevention, risk reduction, and prophylactic treatment.

Genetic counselor consultation is available for patient and family at VCU/Massey Cancer Center. It requires the expertise on risk and benefit assessment, evaluating the family pedigree, and guidance on the test results.

## Accreditation by "Commission on Cancer" of American College of Surgeons[9]

The commission on Cancer dedicates the new cancer program standards to those individuals who trust their care to providers at Commission on Cancer accredited facilities.

Cancer Center at VCU Community Memorial Hospital is accredited as Commission on Cancer community Cancer program in July 2014.

Commission on Cancer has set the goals for the accredited programs:

- Establishes standards to ensure quality, multidisciplinary, and comprehensive cancer care delivery.
- Conducts surveys to assess compliance with standards.
- Collects standardized, high quality data from Commission on Cancer accredited health care settings.
- Use data to measure cancer care quality and to monitor treatment patterns and outcomes.
- Supports and enhances cancer control.
- Monitors clinical surveillance activities.
- Develops effective educational interventions to improve cancer prevention, early detection, care delivery, and outcomes.

[9] Commission on Cancer: Cancer Program Standards 2012: Ensuring Patient-Centered Care

## Clinical Trials in the Community Hospital Setting in Central Region of Southern Virginia

VCU Community Memorial Hospital Hendrick Cancer and Specialty Care Center participates the clinical trials through the community outreach oncology network of VCU/Massey Cancer Center. The clinical trials are approved by Institute Review Board (IRB) at Massey Cancer Center. Monthly teleconference review and update the development of new clinical trial protocols, progress of patient enrollments to protocols.

VCU Community Memorial Hospital cancer program has more than ten clinical trials opening for eligible patients. The clinical trial protocols cover the most common cancers diagnosed and treated in the Central Region of Southern Virginia. The clinical trials are testing the newest diagnostic tools or investigating the most innovative treatment options, in order to bring the options and hopes for the patients.

## Reforming the Community Research Program, National Cancer Institute (NCI) Initiatives[10]

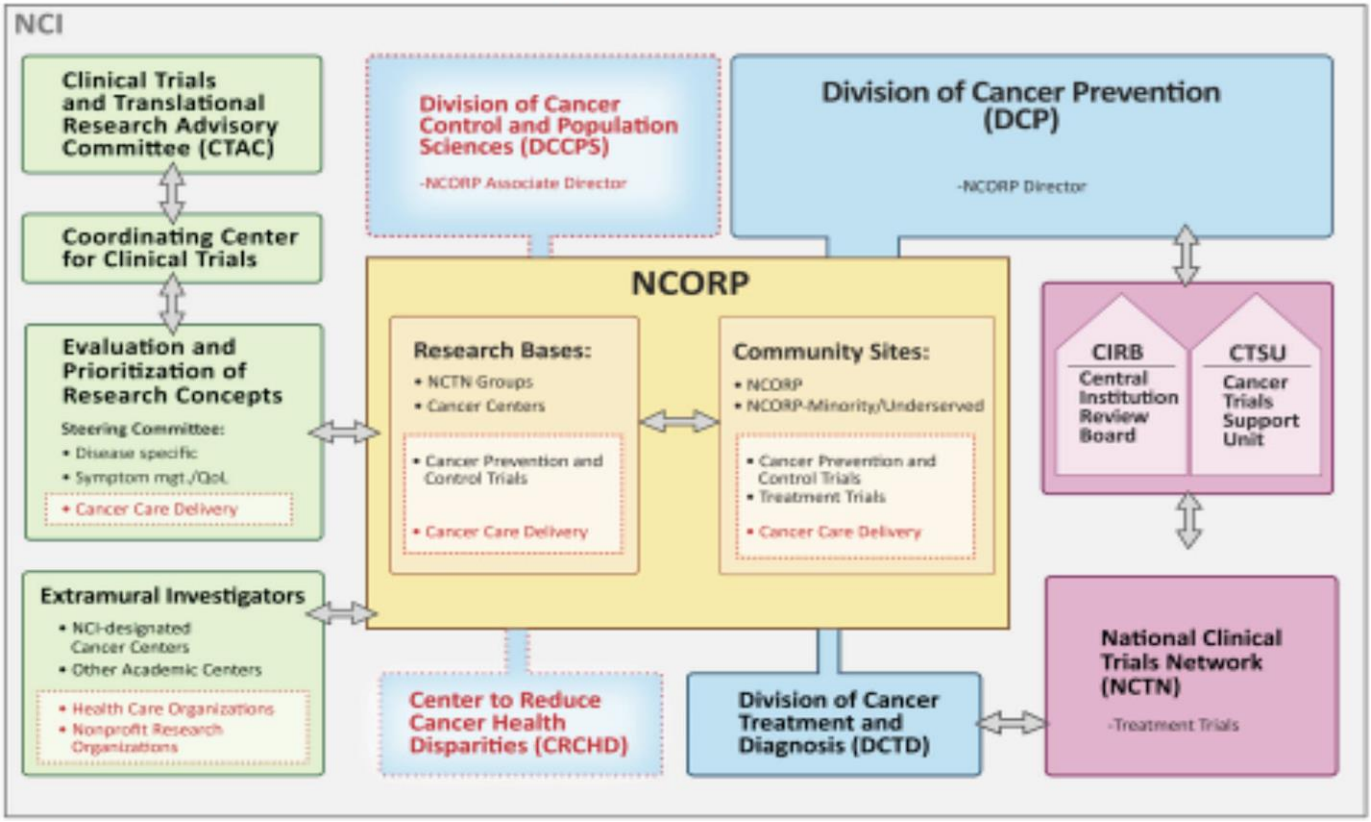
Modernization and improving the efficiencies of the national clinical trial system, National Cancer Institute initiates the NCI Community Oncology Research Group (NCORP). VCU/Massey along with the outreach community cancer centers is applying the grant. A NCORP approved cancer program will enhance the access and resource to bring the current investigation trials into the community. Cancer patients may have additional hopes fighting the challenge disease.

Key principles to community clinical oncology program success:

1. Building the infrastructure
2. Funding to empower local physicians
3. Collaboration between academics and community investigators strengthens research and practice
4. Flexibility in operations and organization

[10] NCI Community Oncology Research Program (NCORP) Gets Underway August 1, 2014

## NCORP Organizational Structure




## New developments in cancer care

National Cancer Institute, in response the recommendation from Institute of Medicine, is transforming its longstanding Cooperative Group Program into the new National Clinical Trial Network (NCTN).

The advancement of cancer research in genomes has enabled the development of targeted therapies. It has fundamentally changed our approach to cancer treatment. The molecular signature of an individual's tumor must be diagnosed with sophisticated genetic techniques, in order to effectively treat cancer with targeted therapies. It requires the screening of large numbers of patients to identify the distinct molecular targets of therapies.

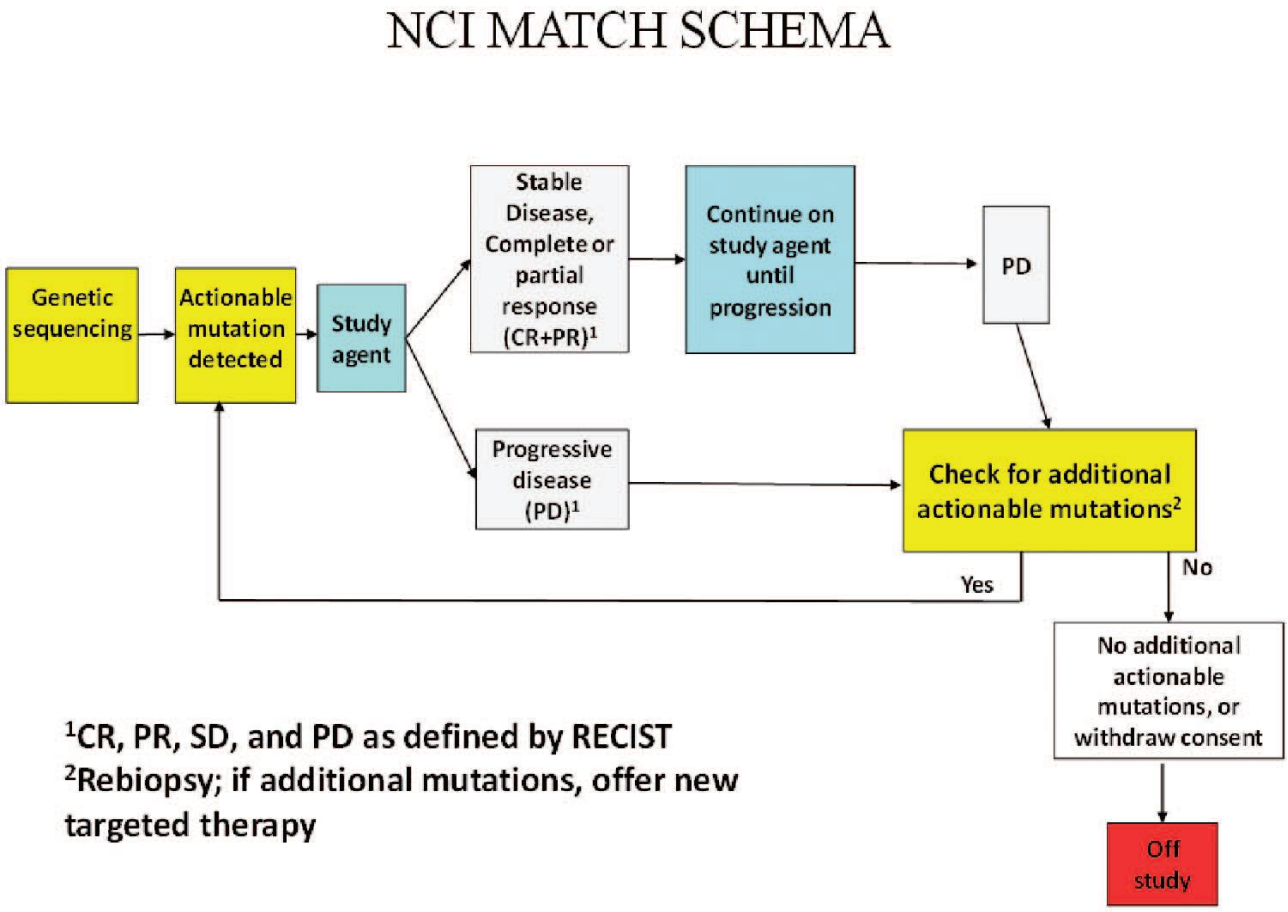
## Precision Medicine, defined by National Cancer Institute

Genes code for information that allows normal growth and development. In cancer, these processes work abnormally, leading to abnormal growth and spread of cancerous disease. Even cancers that are thought of as similar (e.g. lung cancer) have been found to consist of cancers with different molecular make up, and different rates of progress and response to treatment. Each patient may share a molecular defect with only a few other patients among all patients with the same cancer. Genetic information about a particular person's cancer can be used to diagnose or treat their particular disease. Understanding the genetic changes in cancer cells can lead to precise treatments that target the specific changes in a person's tumor. Precision Medicine uses genetic information from a person's cancer to determine a patient's treatment with a treatment targeted to that particular genetic abnormality. The NCI is currently testing a new precision

medicine strategy that includes both "genotype to phenotype" and "phenotype to genotype" initiatives. "Genotype to Phenotype" refers to clinical trials that screen for molecular features that may predict response to a drug with a given mechanism of action. "Phenotype to Genotype" is the retrospective genomic analysis of a patient's tumor to determine if molecular factors may explain why a patient responded particularly well to a particular treatment.

## Personalized Medicine

The future model of genetic matching and targeted therapies:




Carcinogenesis is a multistep process, and the development of fully malignant cancers requires many independent events. Although the specific mutations that cause human cancer vary greatly between types of cancers and individuals, the broad consequences of these mutations are abnormal phenotypes that are shared by most cancers. Weingerg and Hanahan have proposed "Hallmarks of Cancer" that define the distinct and complementary capabilities enable the tumor to grow and metastasis.

**Cancer hallmarks and future direction of the investigations:**[11]

1. Sustaining proliferative signaling
2. Evading growth suppressors
3. Resisting cell death
4. Enabling replicative immortality
5. Inducing angiogenesis
6. Activating invasion and metastasis
7. Reprogramming energy metabolism
8. Evading immune destruction
9. Genomic instability and mutation
10. Tumor promoting inflammation

The hallmarks of cancer demonstrate the enormous complexity of cancer pathogenesis. Development on therapeutic agents target ting hallmarks of cancer may yield more effective treatments. It is a long and challenging process.

## Future Prospects and Goals of Community Cancer Care

1. From a community cancer center standing point:
   Hendrick Cancer and Specialty Care Center and Solari Radiation Center at VCU Community Memorial Hospital is a Commission on Cancer accredited community-based cancer program. It will emphasize on:
   a. Cancer prevention with community education in healthy life style.
   b. Cancer screening, early detection, prompt diagnosis, and treatment planning.
   c. Adapt quality improvement measurement and be compliant on evidence based practice.
   d. Monitoring the wellness of patients, imminent quality of life and long tern survivorship.

2. From an academic cancer center standing point:
   VCU Community Memorial Hospital Cancer Program is a VCU Massey Cancer Center community outreach cancer program. It incorporates Massey Cancer Center standard of care. It collaborates closely with Massey Cancer Center cancer specialists and facilitates the special needs of patients:
   a. Participate in clinical trials through VCU Massey Cancer Center's NCI Community Oncology Research Group (NCORP).
   b. Adapt the most updated, patient oriented cancer diagnosis and treatment.
   c. Provide genetic counseling for high risk patients.
   d. Integrate fully with Massey Cancer Center's mission and resource on improvement of cancer outcome in the region.

[11] Hanahan D, Weinberg RA: Chapter 2, Cancer Principles & Practice of Oncology, 10th Edition