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## Cancer mortality among persons with Human Immunodeficiency Virus Infection, New York City, 2001-2015

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# Financial disclosures

- No financial disclosures to report

# HIV in New York City

- New York City (NYC) has one of the largest HIV epidemics in the US
- Since the start of epidemic, ~240,000 people have been diagnosed with HIV/AIDS and reported to NYCDOHMH
- ~117,000 are known to have died as of the end of 2015\*
- HIV was still the leading cause of death (31%) in 2015, followed by cancer (21%) and Cardiovascular diseases (17%)

# Background

- With HAART, people with HIV (PWH) live longer
- Aging HIV population
- Cancer burden increases with aging
- Cancer is the leading cause of death after HIV
- Studying cancer mortality can inform and guide screening and prevention strategies for cancer among PWH

# Objective

- Our aims were to
  - ▣ Examine age-specific and age-standardized mortality rates from cancer among PWH
  - ▣ Compare time trends of deaths due to HIV-related cancer to deaths from non-HIV-related cancer among PWH

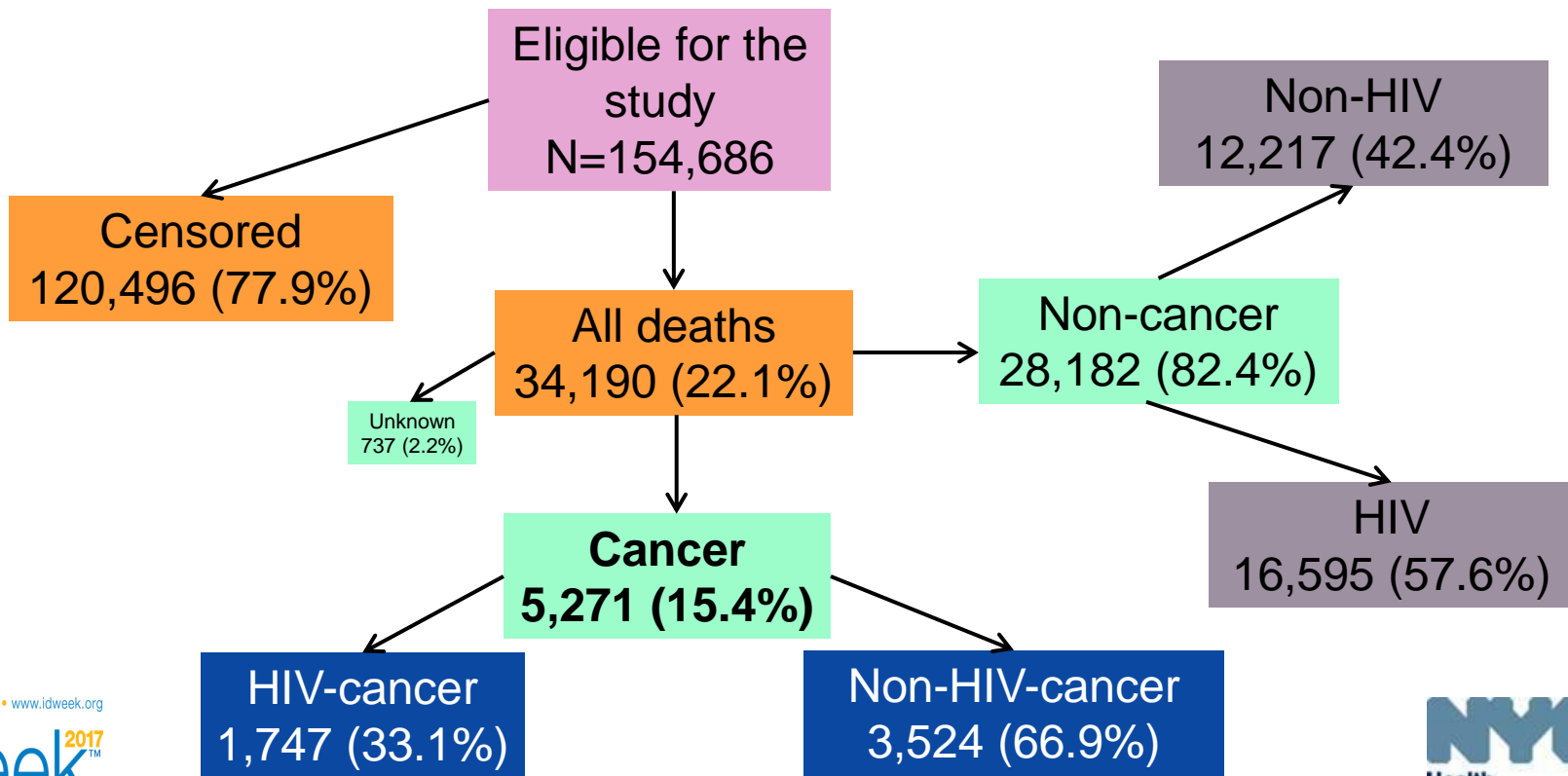
# Methods

- ❑ **Data** from the NYC HIV Surveillance Registry (HSR)
- ❑ **Underlying cause of death** from NYC's Vital Statistics Registry (VSR) and National Death Index (NDI)
- ❑ HSR & VSR quarterly linkage
- ❑ HSR & NDI bi-annual linkage
- ❑ Age-specific and age-standardized cancer mortality rates
- ❑ Time-trend comparisons of HIV & non-HIV cancer deaths

# Selection criteria

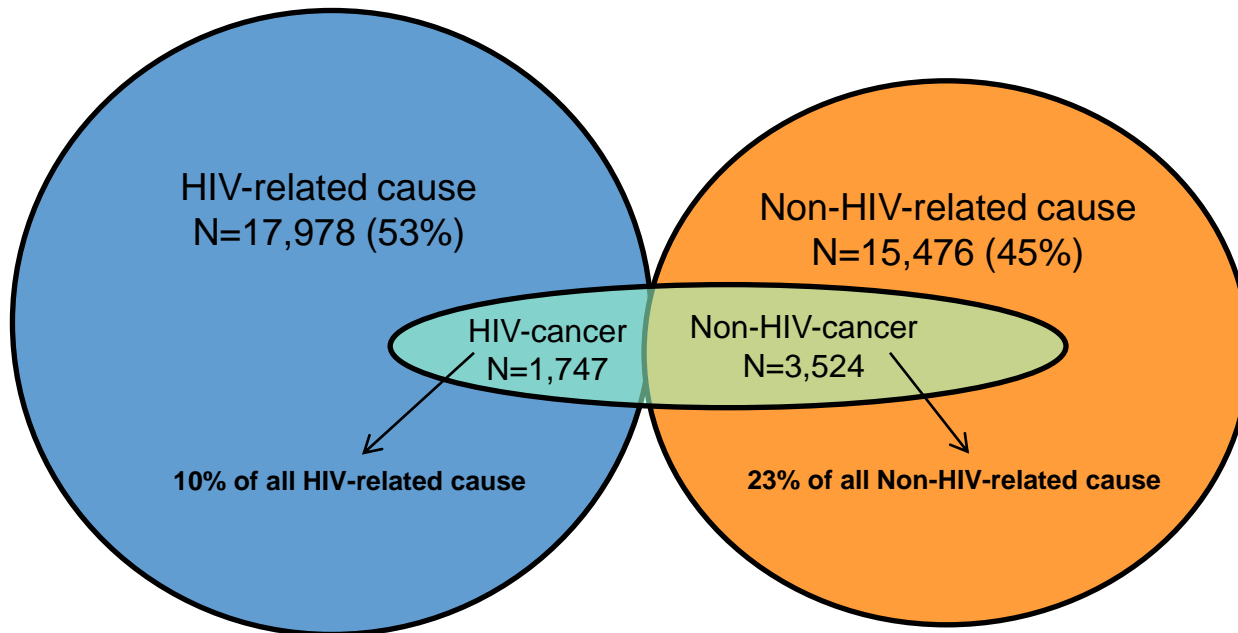
- ❑ 13+ years old, diagnosed with HIV and reported to the NYC HIV Surveillance Registry and alive at any point during 2001-2015
- ❑ We calculated person-years living with HIV for the denominator in order to calculate cancer mortality rate
- ❑ Start of person-time was the later of January 1<sup>st</sup>, 2001 or HIV diagnosis date
- ❑ End of person-time was the earlier of the date of death or December 31<sup>st</sup>, 2015

# Study participants





# Causes of death among PWHA



# Characteristics of study population by sex

	All		Male		Female	
	N	%	N	%	N	%
<b>Total</b>	<b>152,883</b>	<b>100.0</b>	<b>110,245</b>	<b>100.0</b>	<b>42,638</b>	<b>100.0</b>
<b>Sex</b>						
Male	110,245	72.1	110,245	100.0	--	--
Female	42,638	27.9	--	--	42,638	100.0
<b>Race/ethnicity</b>						
Black	69,217	45.3	44,351	40.2	24,866	58.3
Hispanic	50,021	32.7	36,209	32.8	13,812	32.4
White	29,920	19.6	26,655	24.2	3,265	7.7
Other/unknown	3,725	2.4	3,030	2.8	695	1.6
<b>Transmission risk</b>						
MSM	53,376	34.9	53,376	48.4	--	--
IDU	31,746	20.8	22,690	20.6	9,056	21.2
Heterosexual	64,826	42.4	32,729	29.7	32,097	75.3
Other	2,935	1.9	1,450	1.3	1,485	3.5

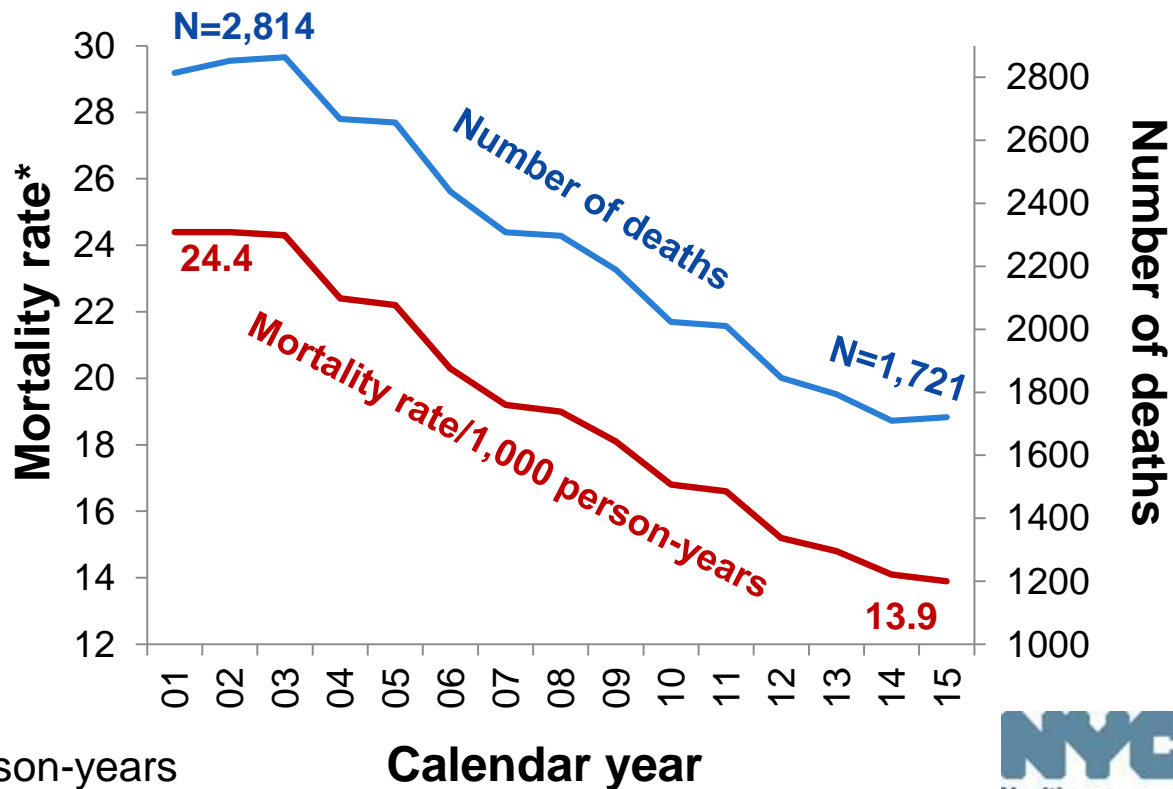
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# Characteristics of study population by sex (2)

	All		Male		Female	
	N	%	N	%	N	%
<b>Total</b>	<b>152,883</b>	<b>100.0</b>	<b>110,245</b>	<b>100.0</b>	<b>42,638</b>	<b>100.0</b>
<b>Entry age</b>						
13-64	150,142	98.2	108,270	98.2	41,872	98.2
65+	2,741	1.8	1,975	1.8	766	1.8
<b>Last CD4 count</b>						
0-499	70,331	46.0	50,754	46.0	19,577	45.9
500+	59,877	39.2	42,554	38.6	17,323	40.6
Missing	22,675	14.8	16,937	15.4	5,738	13.5
<b>Last Viral load</b>						
<b>Count</b>						
Suppressed	90,943	59.5	66,257	60.1	24,686	57.9
Unsuppressed	39,619	25.9	27,348	24.8	36,957	28.8
Missing	22,321	14.6	16,640	15.1	42,638	13.3

# Number & rate of all-cause mortality, 2001-2015

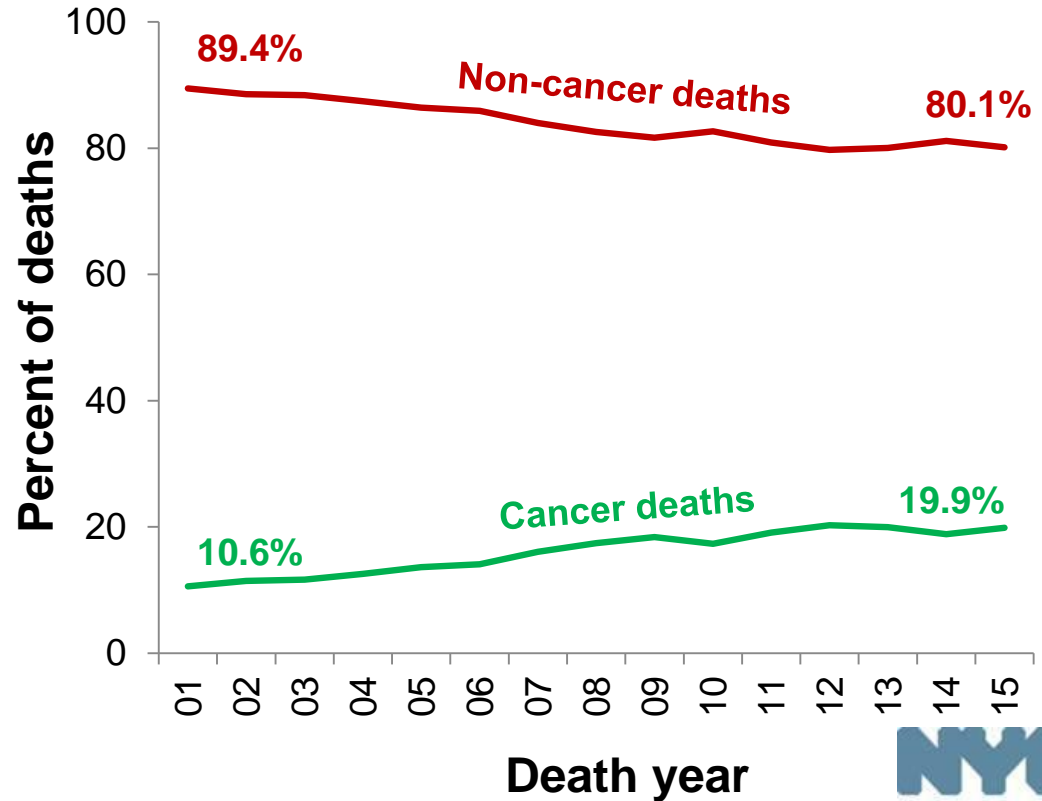
- The number of deaths from all-cause has been decreasing over time from 2001 through 2015
- The mortality rate from all-cause also has been decreasing over time



# Proportion of deaths attributable to Cancer vs Non-Cancer, 2001-2015

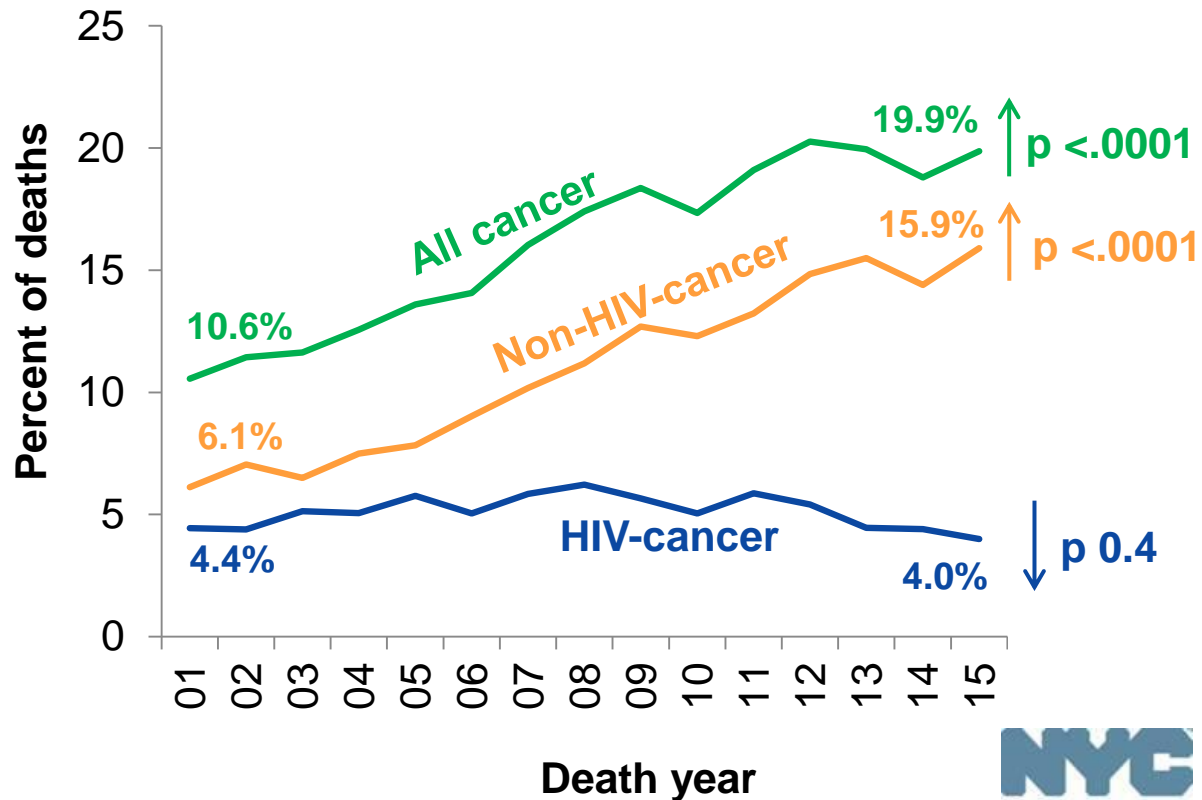
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- The decrease in the number of deaths & mortality rate from all-causes is driven by a decrease in the proportion of non-cancer deaths
- However, the proportion of cancer deaths was increasing since 2001 through 2015



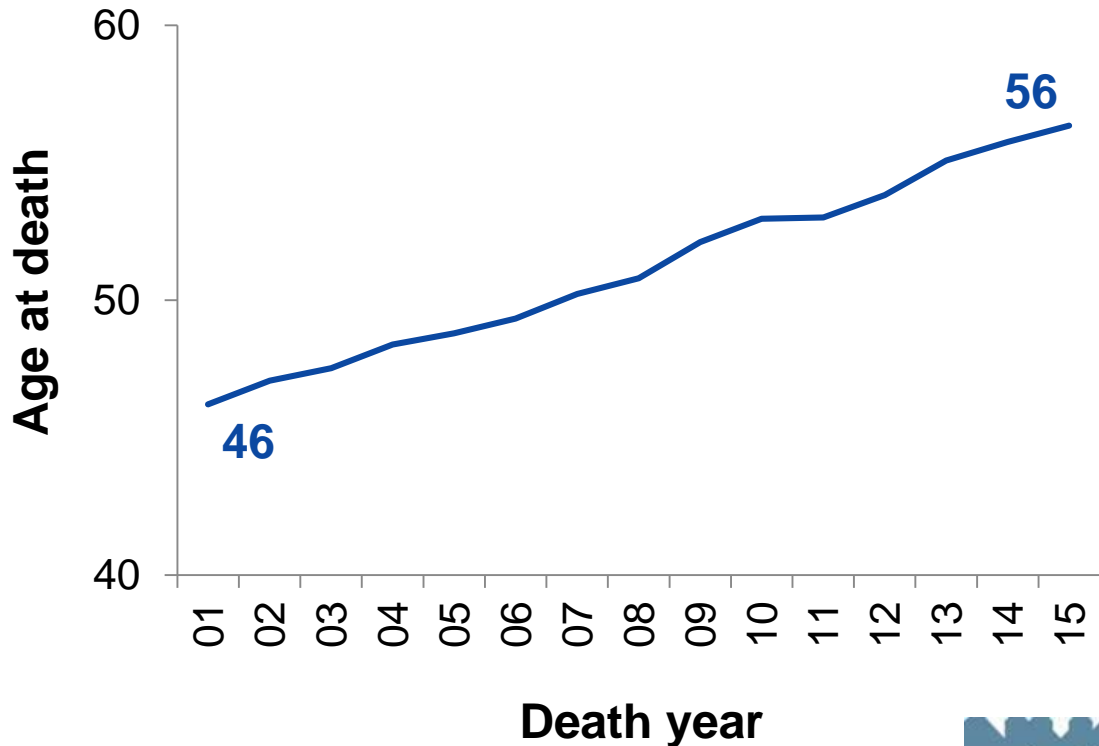
# Proportion of deaths by cancer type, 2001-15

- The proportion of all cancer deaths was increasing since 2001 through 2015
- This increase was driven by the increase in proportion of non-HIV-cancer mortality
- The proportion of HIV-cancer deaths remained stable

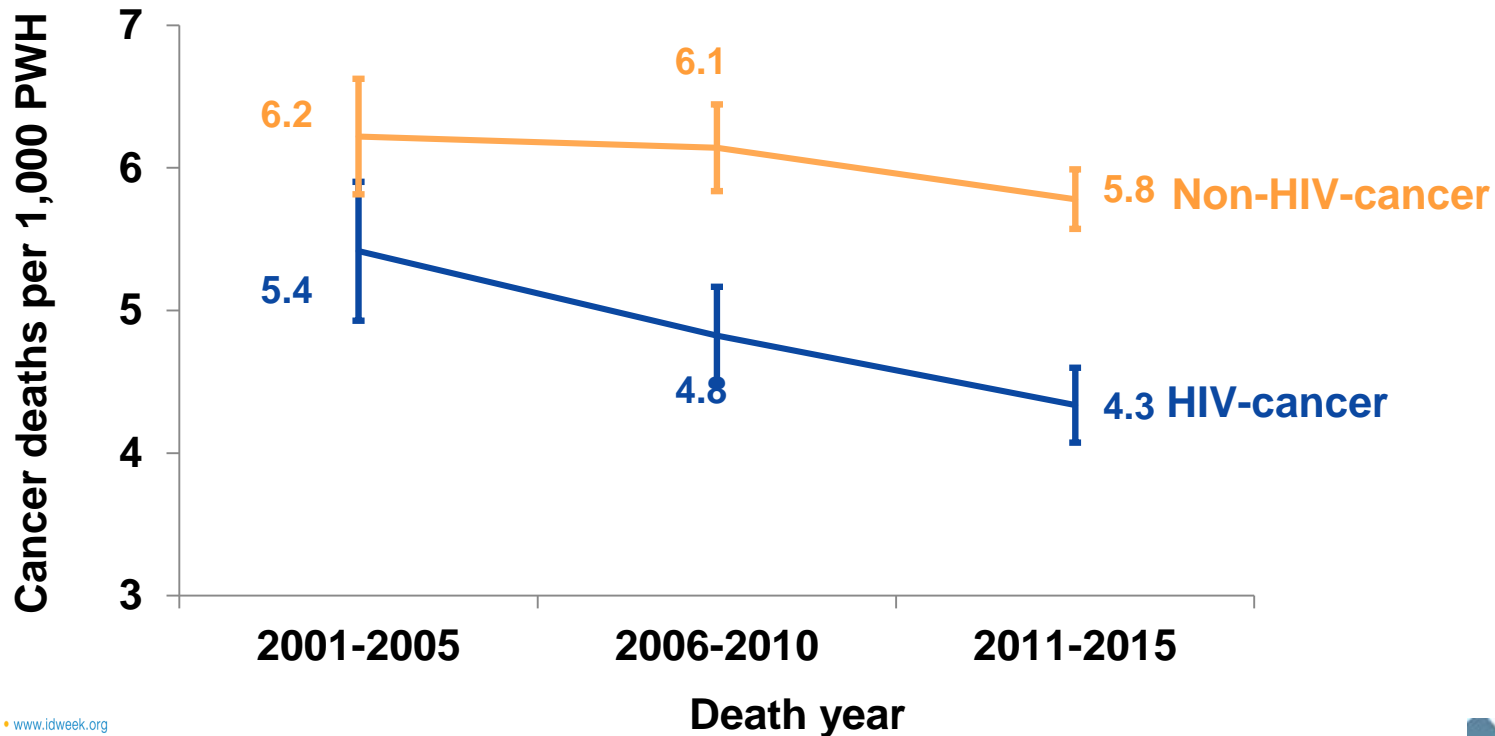


# Mean age at death by year of death

- Mean age at death has increased over time from 2001 through 2015
  - This increase may suggest that this is due to a cohort effect



# Age-standardized cancer mortality rates by cancer type

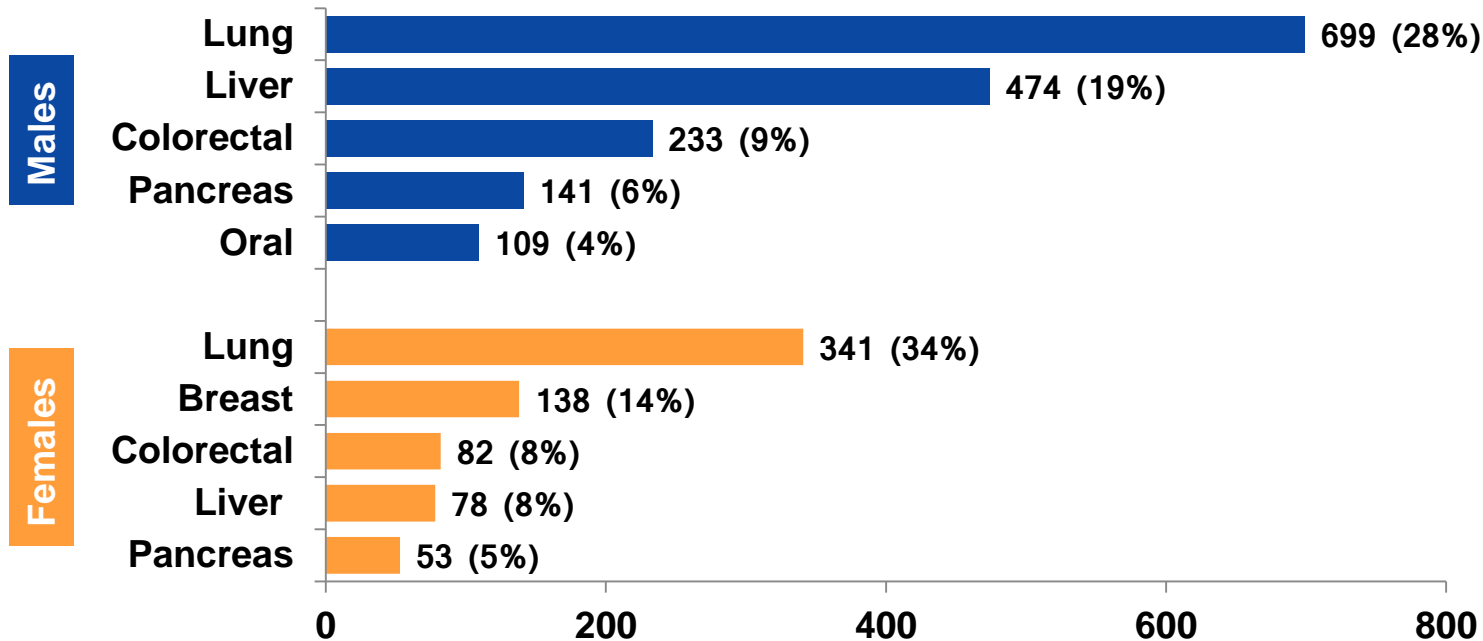


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\* Adjusted to US 2000 standard population

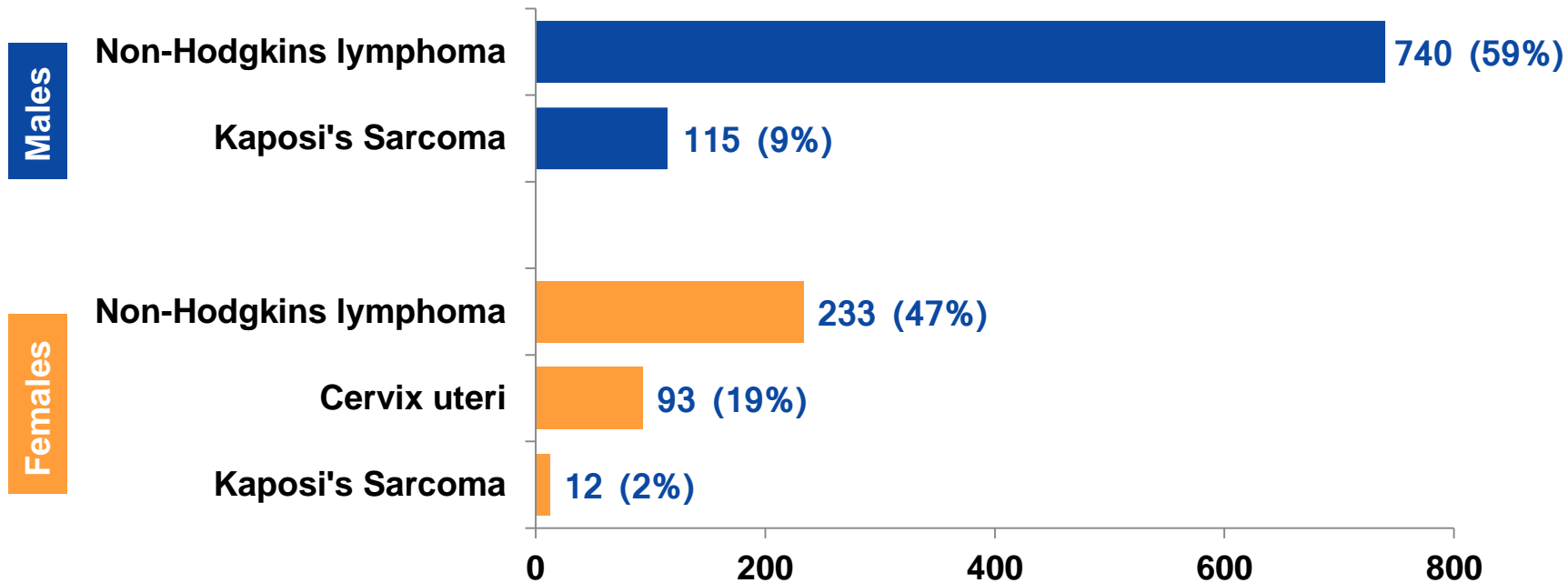


# Top causes of death: Non-HIV cancers by sex



Number of people with HIV

# Top causes of death: HIV-cancers by sex



Number of people with HIV

# Risk factors for non-HIV-cancer deaths

	Study population		HR (95% CI)	P-value		Study population		HR (95% CI)	P-value
	N	%				N	%		
Total	152,883	100.0	--		Total	152,883	100.0	--	
<b>Sex</b>					<b>Transmission risk</b>				
Male	110,245	72.1	Ref	Ref	MSM	53,376	34.9	0.9 (0.9-1.1)	0.4937
Female	42,638	27.9	1.2 (1.1-1.3)	<.0001	IDU	<b>31,746</b>	<b>20.8</b>	<b>1.5 (1.4-1.7)</b>	<b>&lt;.0001</b>
<b>Entry age</b>					Heterosexual	64,826	42.4	Ref	Ref
13-24	16,312	10.7	0.0 (0.0-0.0)	<.0001	Other	2,935	1.9	0.8 (0.5-1.6)	0.5831
25-34	34,663	22.7	0.1 (0.0-0.1)	<.0001	<b>Last CD4 count</b>				
35-44	54,445	35.6	0.2 (0.1-0.2)	<.0001	0-199	<b>28,221</b>	<b>18.5</b>	<b>9.3 (8.3-10.5)</b>	<b>&lt;.0001</b>
45-54	34,689	22.7	0.4 (0.4-0.5)	<.0001	200-349	<b>19,106</b>	<b>12.5</b>	<b>5.3 (4.7-6.0)</b>	<b>&lt;.0001</b>
55-64	10,033	6.6	0.7 (0.6-0.9)	0.0007	350-499	<b>23,004</b>	<b>15.1</b>	<b>2.8 (2.5-3.2)</b>	<b>&lt;.0001</b>
65+	2,741	1.8	Ref	Ref	500+	59,877	39.2	Ref	Ref
<b>Race/ethnicity</b>					Missing	22,675	14.8	2.3 (1.9-2.7)	<.0001
Black	69,217	45.3	0.9 (0.9-1.0)	0.2505	<b>Last Viral load count</b>				
Hispanic	50,021	32.7	0.7 (0.7-0.8)	<.0001	Suppressed	90,943	59.5	Ref.	Ref.
White	29,920	19.6	Ref	Ref	Unsuppressed	39,619	25.9	1.1 (1.1-1.2)	0.0007
Other/unknown	3,725	2.4	0.7 (0.5-0.9)	0.0203	Missing	22,321	14.6	1.2 (1.1-1.2)	0.0145

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# Summary

- The number and mortality rate of deaths from all causes among people with HIV are decreasing.
  - ▣ This decrease was driven by a decrease in the proportion of **non-cancer** deaths.
- However, the proportion of deaths due to cancer is increasing.
  - ▣ This increase was driven by **non-HIV-cancer** deaths
- The increase in the proportion of non-HIV-cancer deaths may be driven by aging HIV population

# Conclusion

- Evaluating guidelines for routine screening for PWH for certain cancers such as
  - liver and colon cancer for both men and women
  - breast cancer and cervical cancer for women
- Smoking cessation support for men and women with HIV

# Limitations

- Those who were diagnosed before 2001 and in the study cohort have person-time that is not accounted for.
- Comparison with cancer mortality among HIV-negative people needed for developing appropriate screening guidelines for PWH.
  - ▣ PWH develop cancers at an earlier age than HIV negative people due to inflammation and immunosuppression from HIV accelerating non-HIV-related diseases/conditions and therefore, may need to be screened at an earlier age.

# Acknowledgements

- Co-authors Emily Westheimer and Dr. Sarah Braunstein
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# Thank you!

## Questions?

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