

Cancer in AYAs

Epidemiology, Mortality, Survival - USA

Policy Implications
Institute of Medicine
Washington, DC

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Cancer in AYAs

Epidemiology, Mortality, Survival - USA

- Incidence Trends
- Cancer Invasive and “Non-Invasive”
- Death Trends
- Survival Trends
- Affordable Care Act Effect

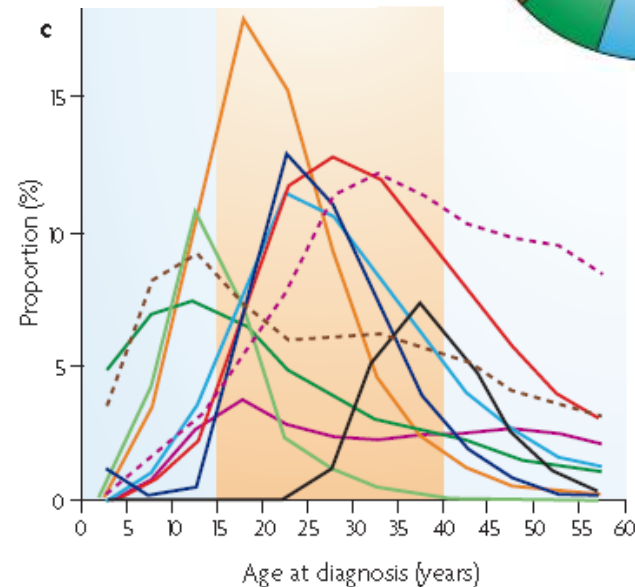
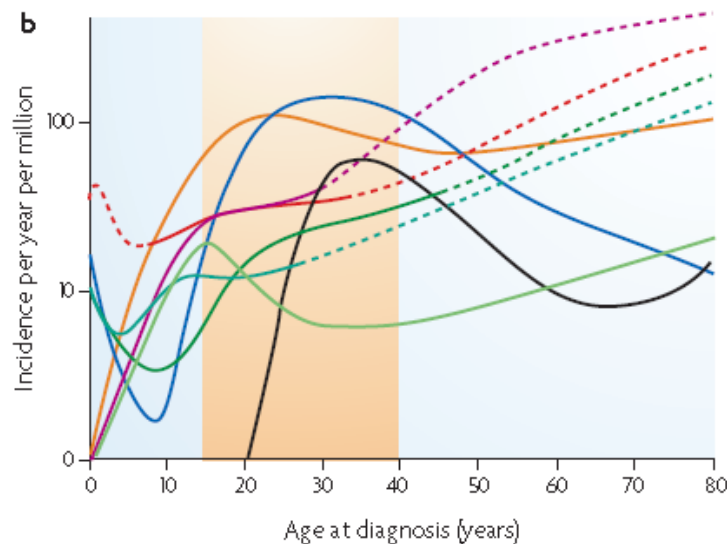
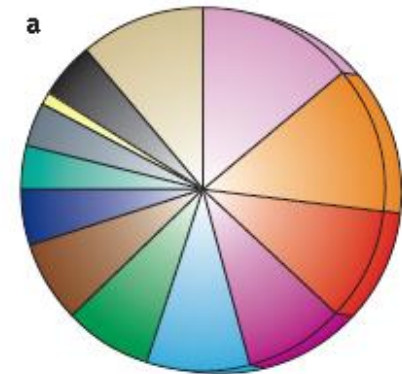
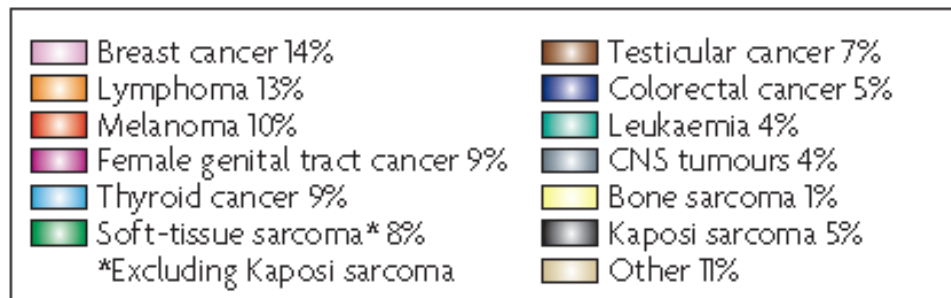
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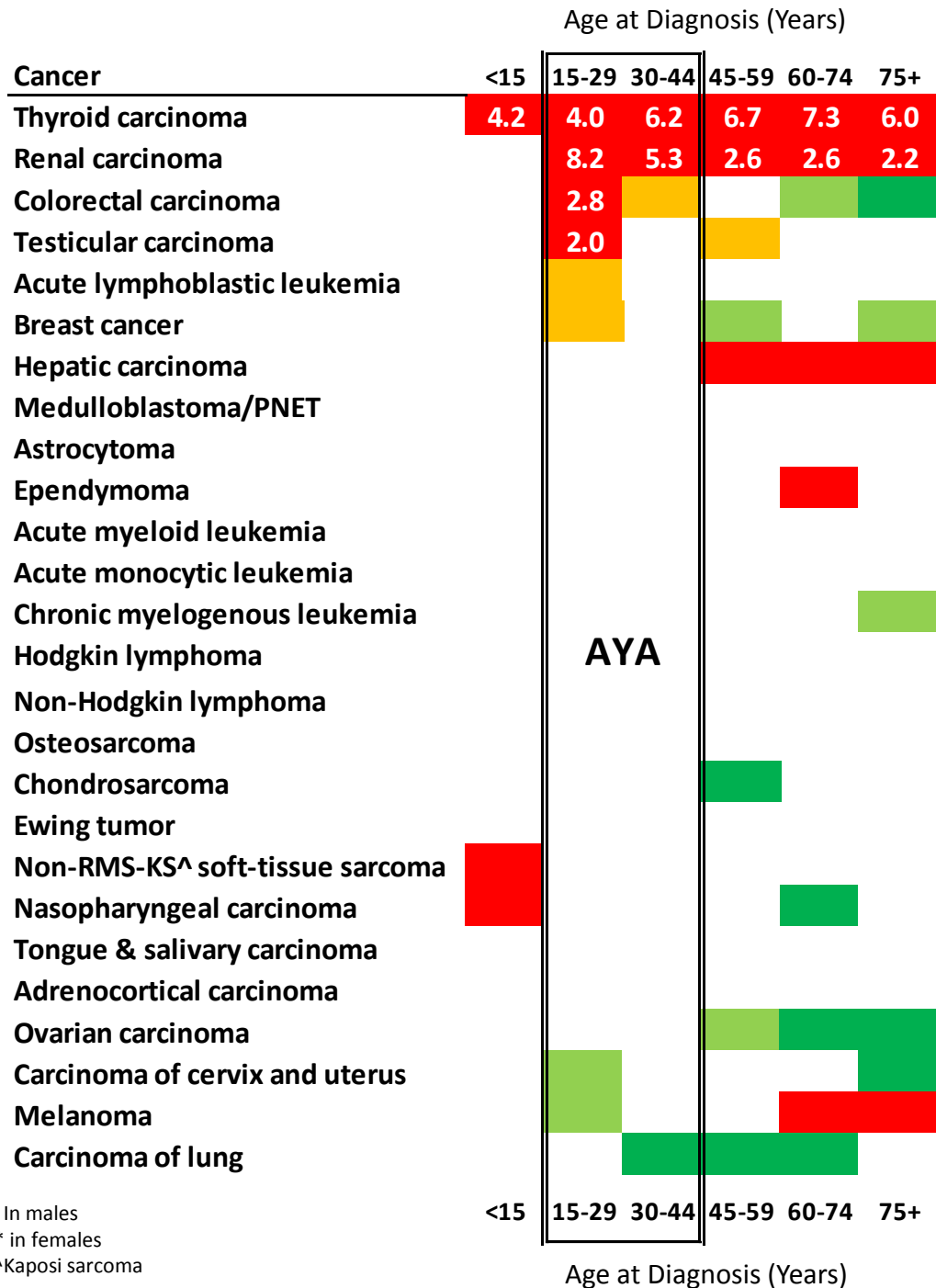
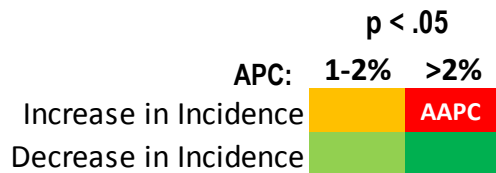
- Incidence Trends

The distinctive biology of cancer in adolescents and young adults

Archie Bleyer^{*†}, Ronald Barr[§], Brandon Hayes-Lattin^{||}, David Thomas[¶],
Chad Ellis[#] and Barry Anderson^{**}, on behalf of the Biology and Clinical Trials
Subgroups of the US National Cancer Institute Progress Review Group in
Adolescent and Young Adult Oncology *Nature Reviews Cancer* 8(4):288-298, 2008.



Average Annual % Change (AAPC) in Incidence of Cancers in AYAs by Age at Diagnosis 2000-2010 SEER18 (28% of U.S.)



* In males
 ** in females
 ^Kaposi sarcoma

Age at Diagnosis (Years)

Incidence Trends: Summary

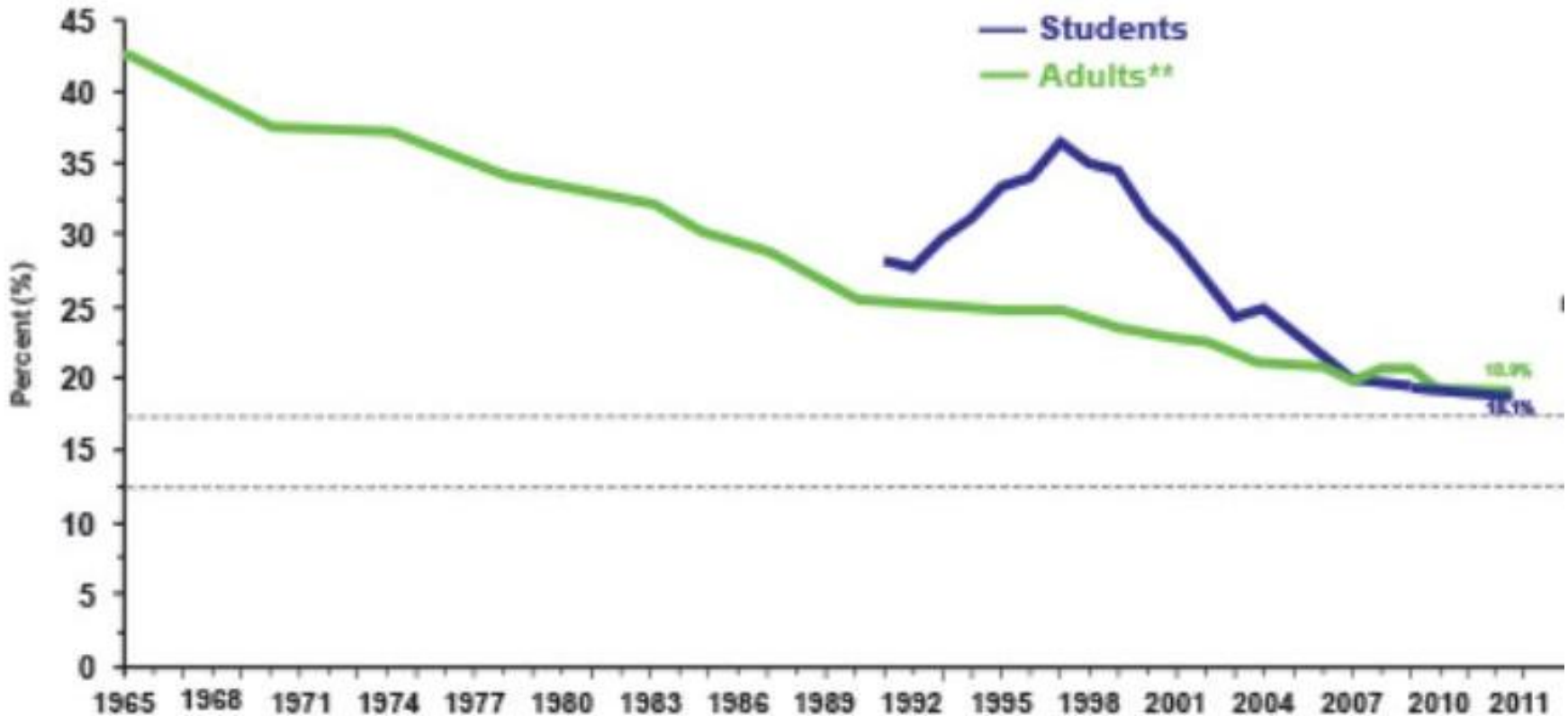
- **Thyroid and kidney carcinoma are dramatically increasing in AYAs and older adults**
 - **Thyroid cancer is also increasing in children**
- **Colorectal and testis carcinoma is increasing in young AYAs but not as rapidly as thyroid and kidney cancer.**
- **ALL was increasing in and only in AYAs, but the trend may have reverse after 2008 (data not shown).**
- **Breast cancer may be increasing in young AYAs during the past decade.**
- **Lung cancer declined in older AYAs as did melanoma and carcinoma of the cervix in young AYAs.**

Incidence Trends: Explanations?

- **The good news for melanoma and lung cancer may have resulted from successful skin cancer prevention campaigns and the inclusion of the whole state of California in SEER18 and its statewide anti-tobacco initiatives.**
- **The dramatic increase in thyroid and kidney cancer is likely due increased ease of detection due to advances in diagnostic imaging (ultrasound, etc.).***
- **The increase in colorectal carcinoma incidence may be due to an increase in HPV-associated rectal cancer and increased detection (colonoscopy).**

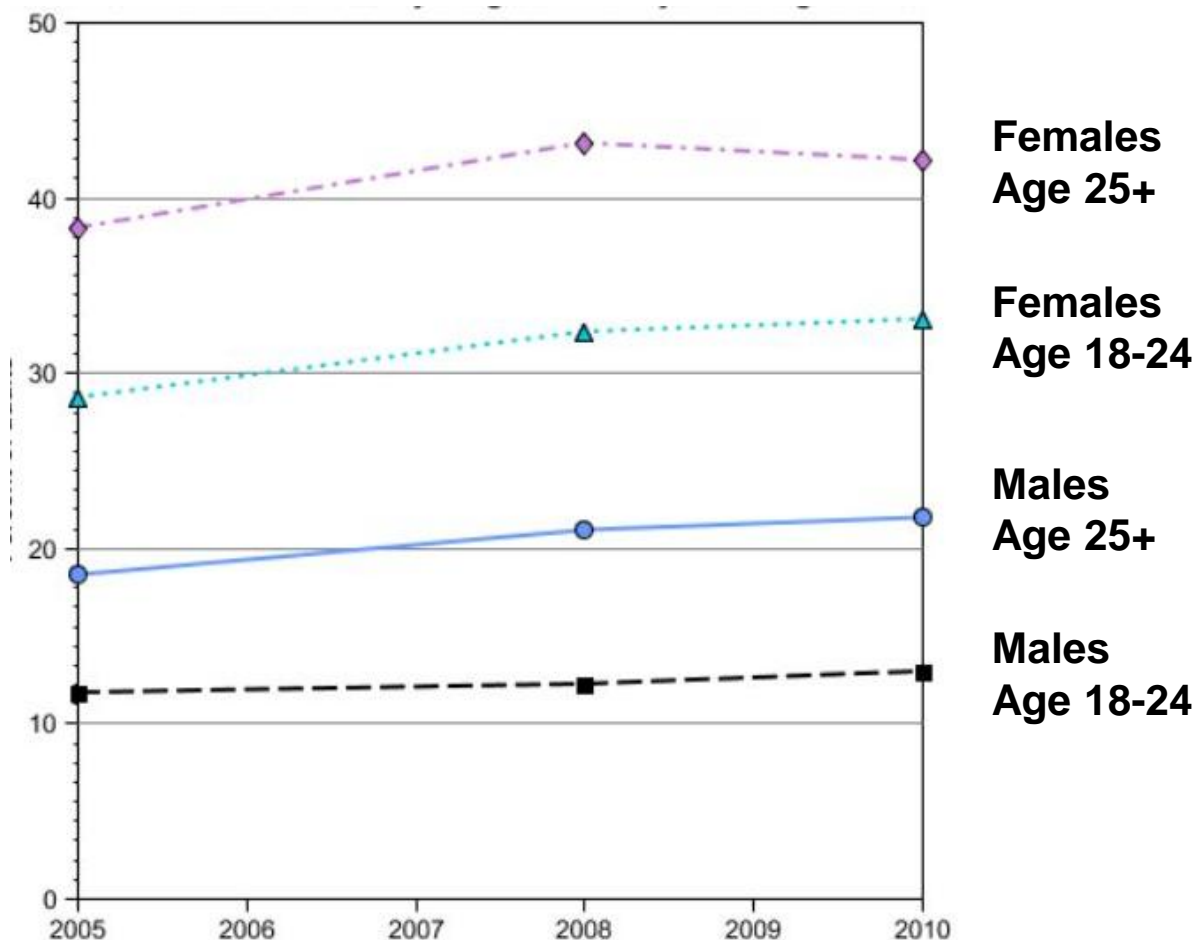
*This raises the question of overdiagnosis and unnecessary therapy, primarily radio-iodine for thyroid cancer and surgery for renal cancer.

Cigarette Smoking Trend in U.S. High School Students and Adults, 1965-2011



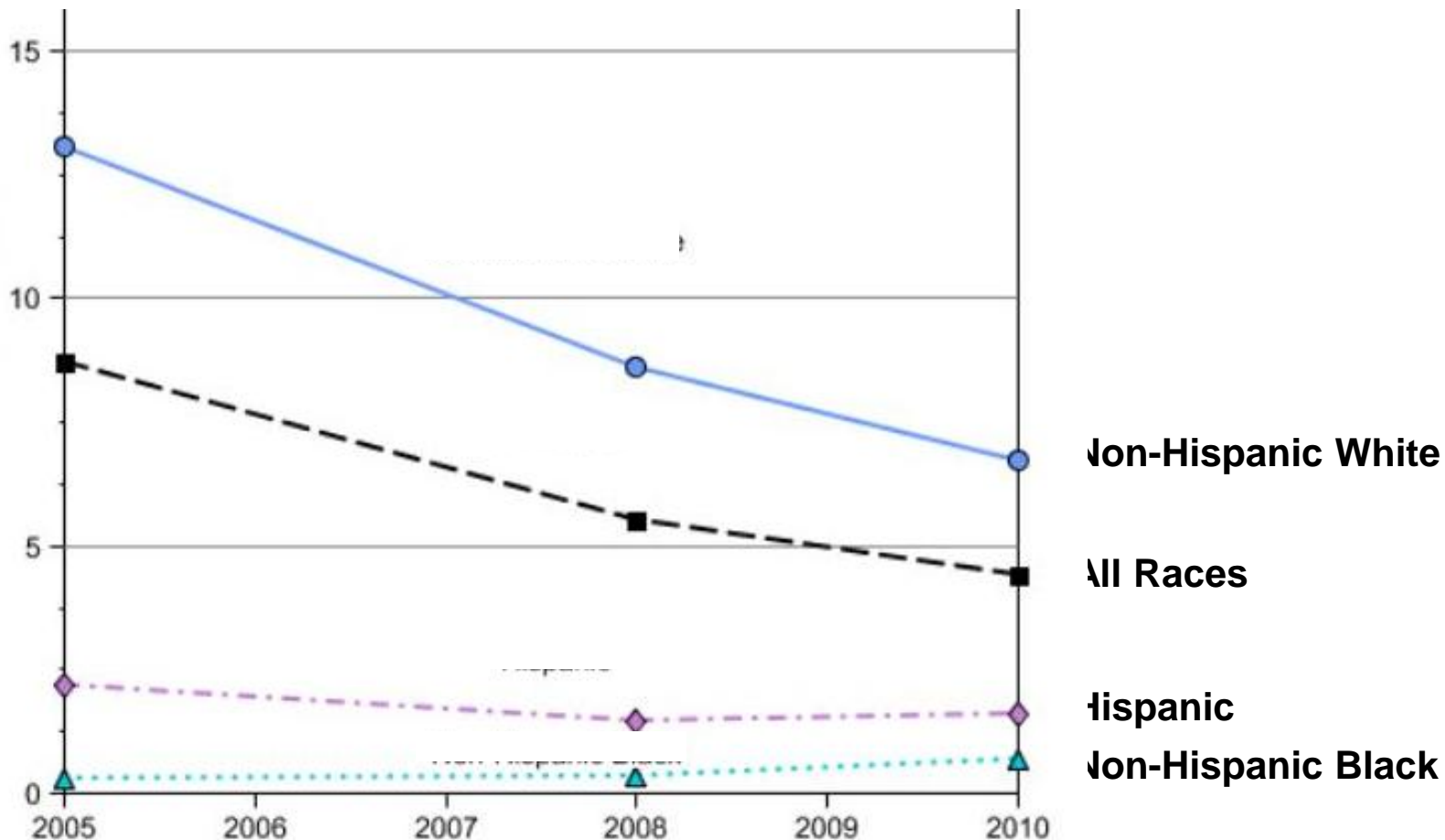
Smoking & Tobacco Use. http://www.cdc.gov/tobacco/data_statistics/tables/trends/cig_smoking/index.htm. Accessed May 25, 2013.

Sunscreen Use Trend in U.S. AYAs and Older Persons, 2005-2010



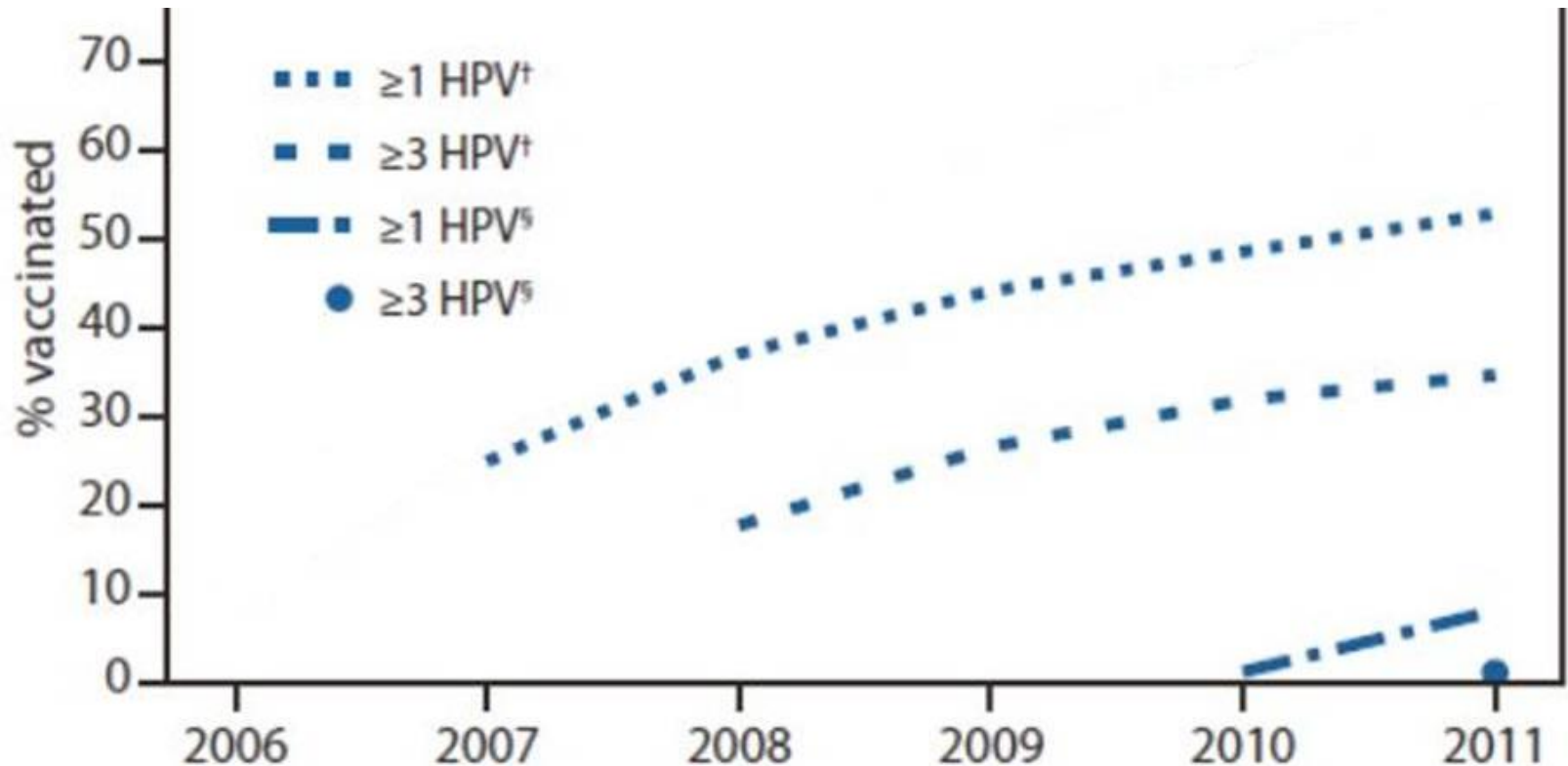
Cancer Trends Progress Report - Sun Protection. http://progressreport.cancer.gov/doc_detail.asp?pid=1&did=2009&chid=91&coid=911. Accessed May 25, 2013

Indoor Tanning Device Use Trend in U.S. Teens* by Race/Ethnicity, 2005-2010



Cancer Trends Progress Report - Sun Protection. http://progressreport.cancer.gov/doc_detail.asp?pid=1&did=2009&chid=91&coid=911. Accessed May 25, 2013

HPV Vaccination Trend in U.S. Adolescents, 2006-2011



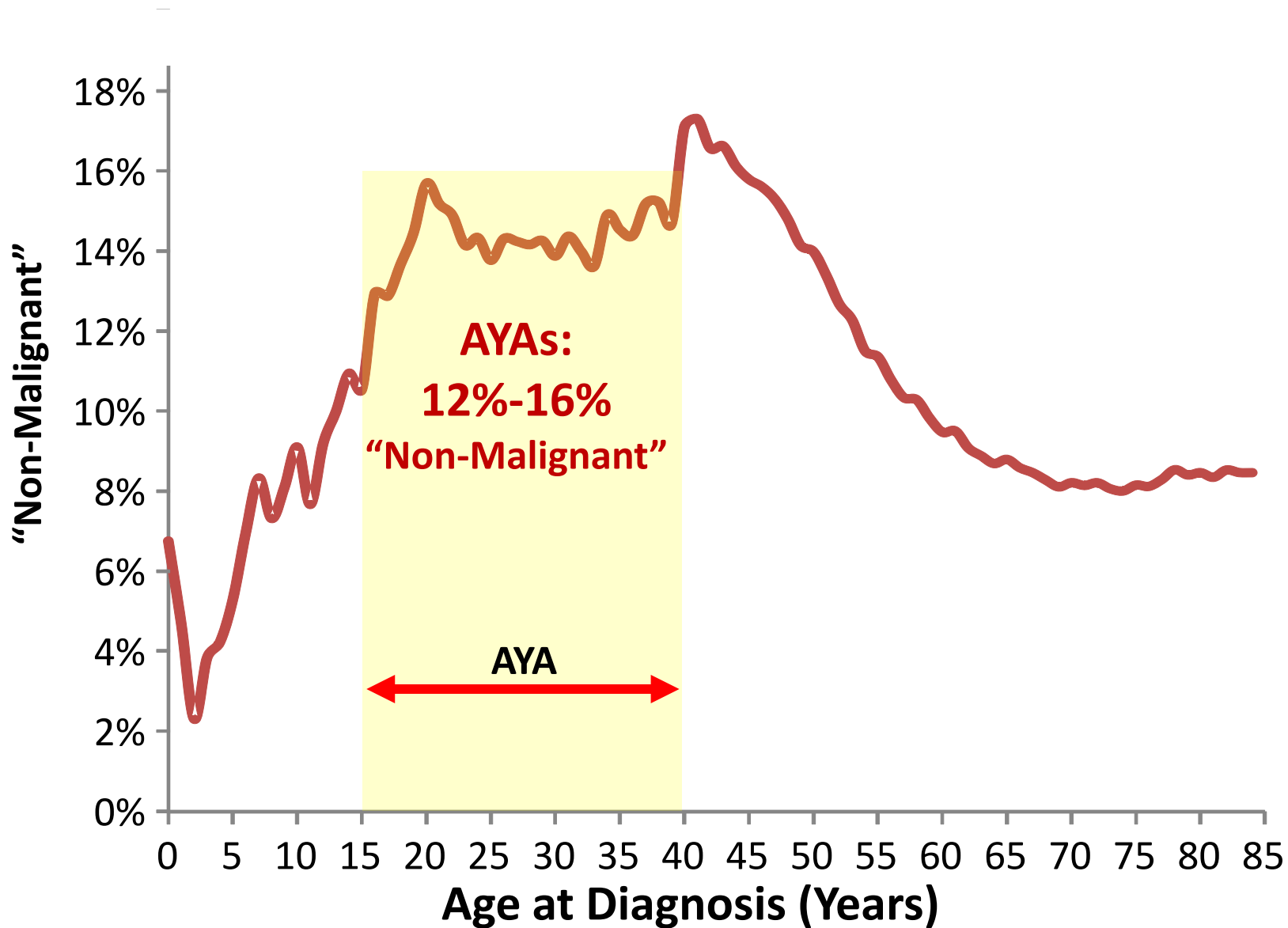
National and State Vaccination Coverage Among Adolescents Aged 13–17 Years — United States, 2011. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6134a3.htm?s_cid=mm6134a3_e%0d%0a. Accessed May 25, 2013.

Cancer in AYAs

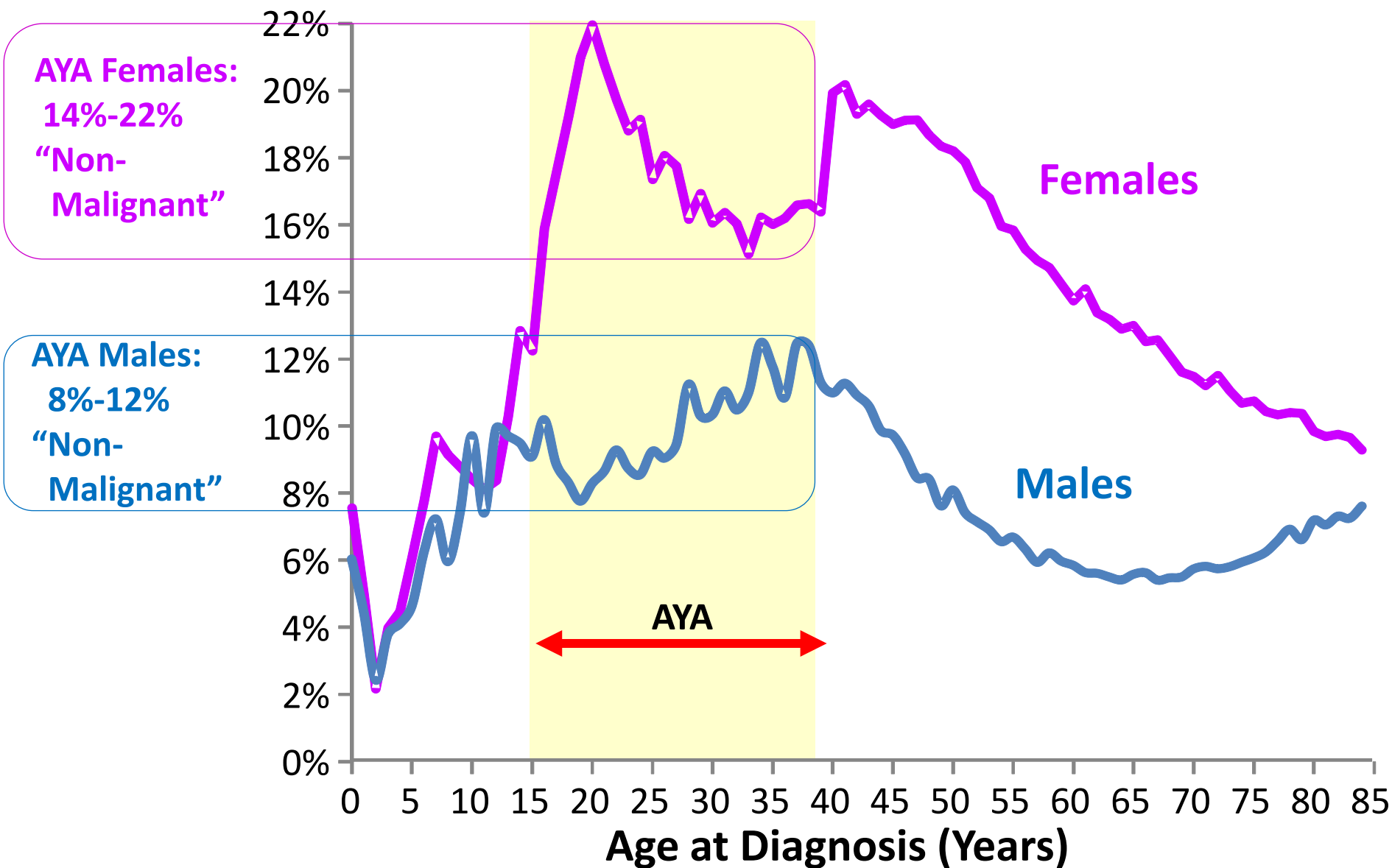
Epidemiology, Mortality, Survival - USA

- Incidence Trends
- Cancer Invasive and "Non-Invasive"

Proportion of All Cancer that is not Reported as Malignant, by Individual Year at Diagnosis, SEER18, 2000-2009



Proportion of All Cancer that is not Reported as Malignant, by Individual Year at Diagnosis and Sex, SEER18, 2000-2009



Cancer Reported as Non-Malignant

- **Benign** brain tumors
 - Gliomas
 - Craniopharyngioma
 - Meningioma
- **In situ** cervix and breast cancer
- Lymphohemangiomas
- Hamartomas

Cancer in AYAs

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- Incidence Trends
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- **Death Trends**
 - #2 Disease Killer**
 - #1 Natural Disease Killer**

Top 10 Causes of Deaths

Age 15-19 years

2008

Male		per 100,000	Female		per 100,000
1	Accidents	35.5	Accidents	15.2	
2	Homicide	16.5	Suicide	3.0	
3	Suicide	11.6	Neoplasms	2.7	
4	Neoplasms	4.0	Homicide	2.7	
5	Heart Disease	2.2	Heart Disease	1.1	
6	Congenital Anomalies	1.3	Congenital Anomalies	0.8	
7	Cerebrovasc Disease	0.4	Cerebrovasc Disease	0.3	
8	COPD	0.4	Pneumonia, Influenza	0.3	
9	Septicemia	0.3	COPD	0.3	
10	Other Infections	0.3	Pregnancy, Childbirth	0.3	

Top 10 Causes of Deaths

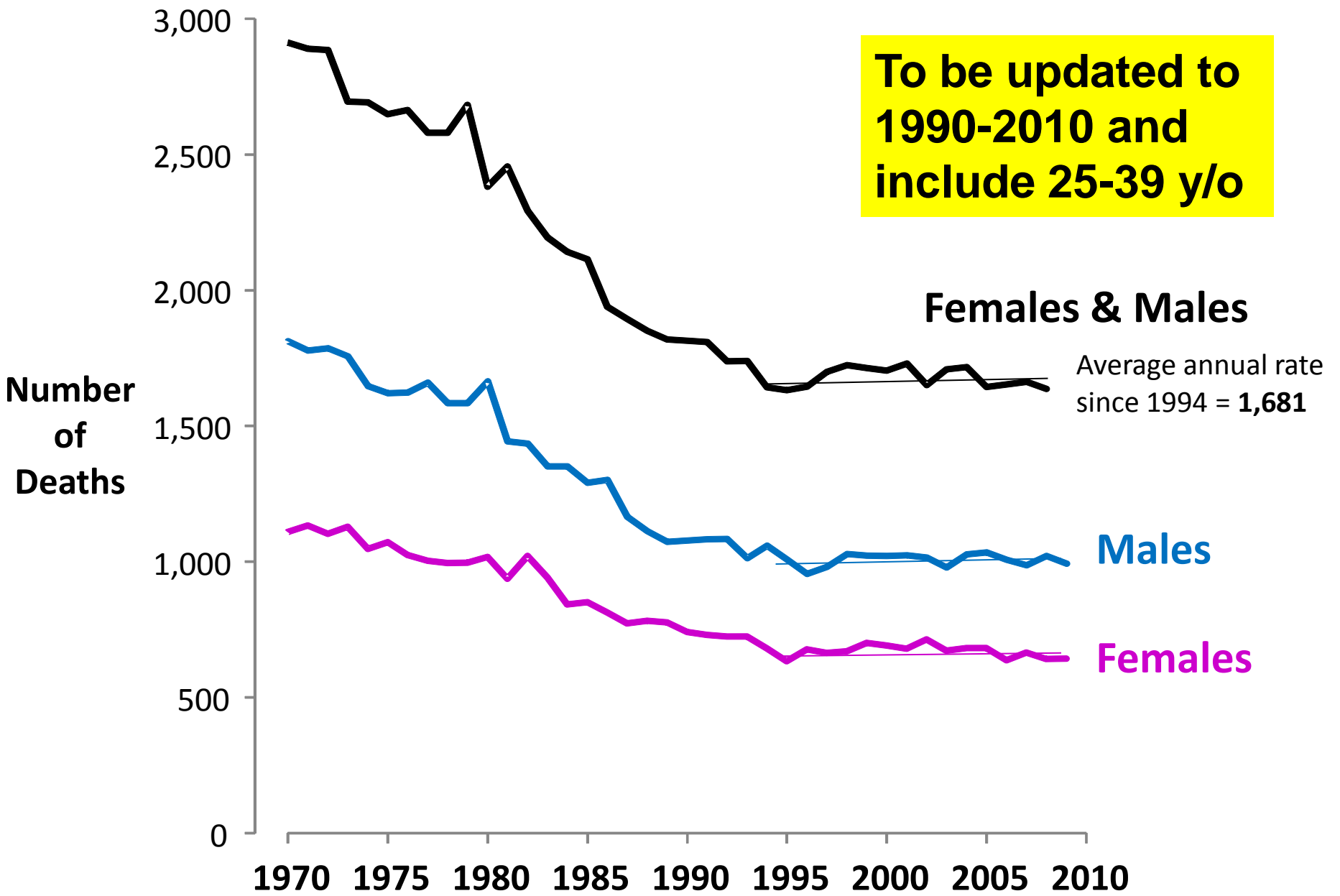
Age 20-24 years

Add 25-39 y/o

2008

Male		per 100,000	Female		per 100,000
1	Accidents	60.8	Accidents	18.0	
2	Homicide	25.7	Suicide	4.0	
3	Suicide	20.7	Homicide	4.0	
4	Neoplasms	5.8	Neoplasms	3.8	
5	Heart Disease	4.5	Heart Disease	2.0	
6	Congenital Anomalies	1.3	Pregnancy, Childbirth	1.0	
7	Diabetes	0.9	Congenital Anomalies	0.9	
8	Pneumonia, Influenza	0.8	HIV	0.6	
9	HIV	0.7	Septicemia	0.5	
10	Cerebrovasc Disease	0.6	Diabetes	0.5	

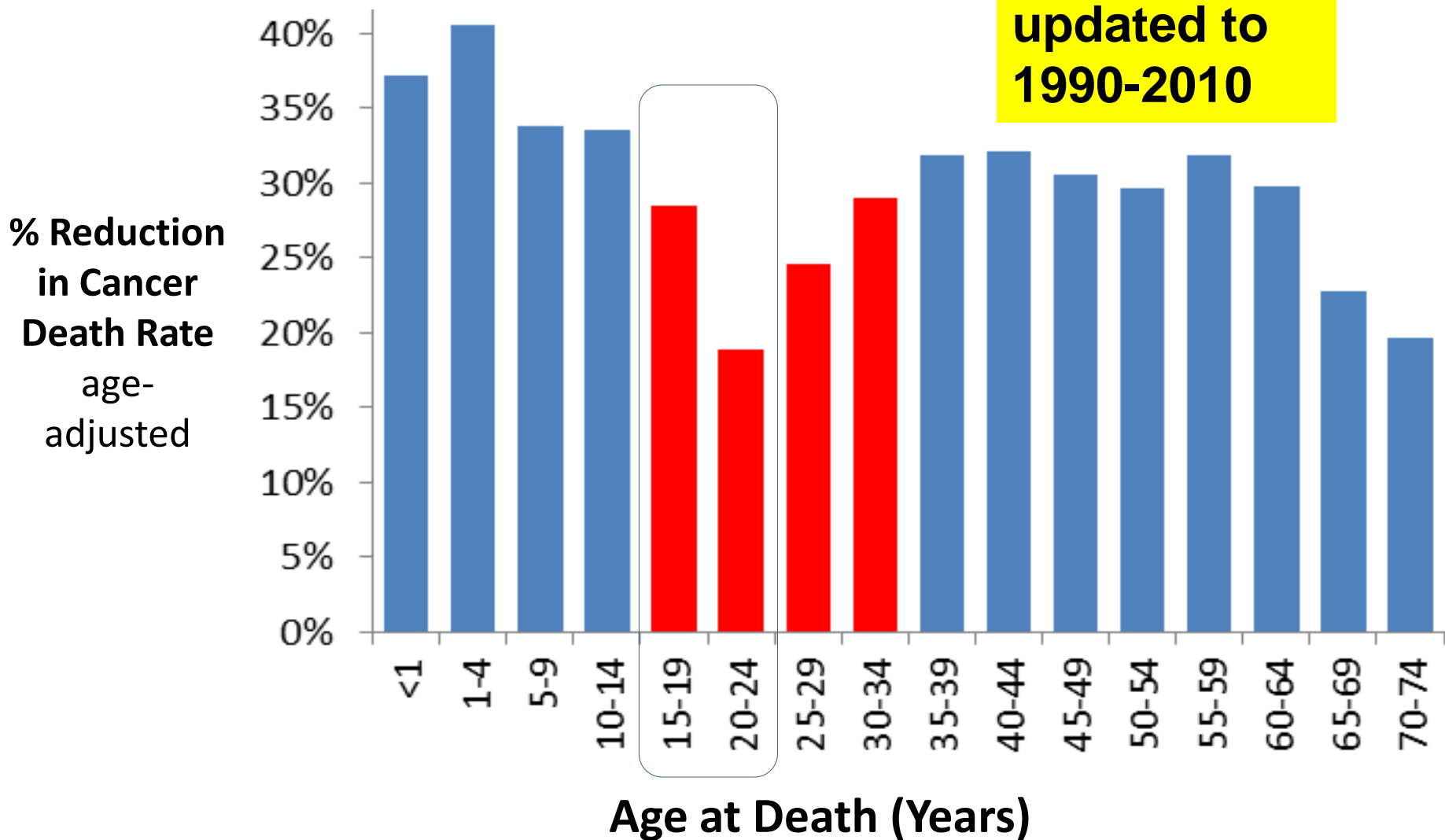
Annual Cancer Deaths, Age 15-24, U.S., 1970-2009



Reduction in National Cancer Death Rate by Age at Death During Past 2 Decades, as of 2010 (most recent year of available data)

1989 → 2009

To be
updated to
1990-2010



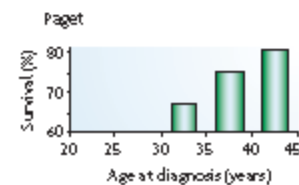
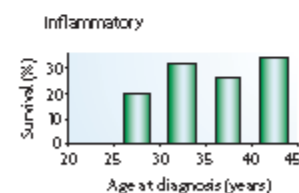
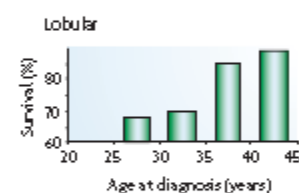
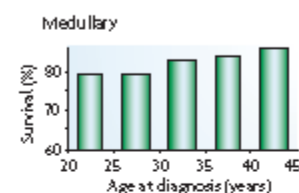
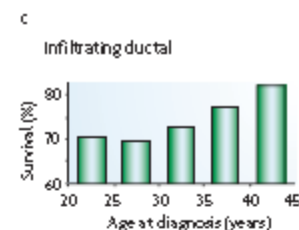
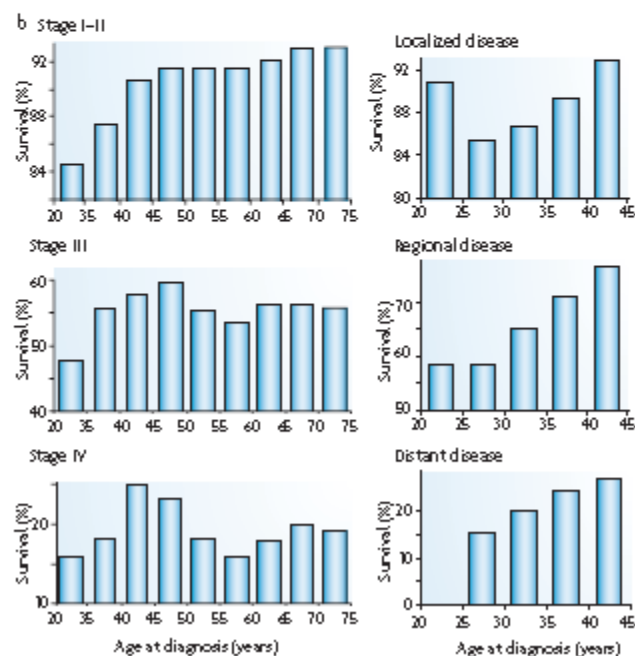
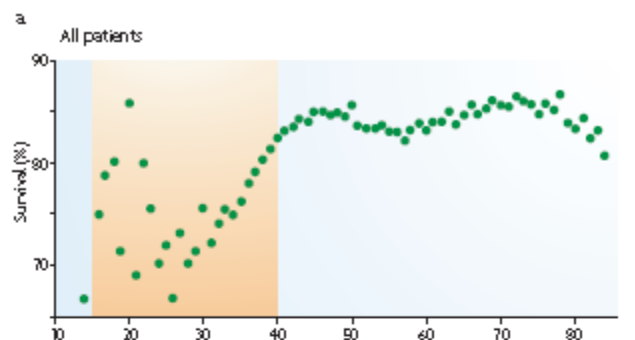
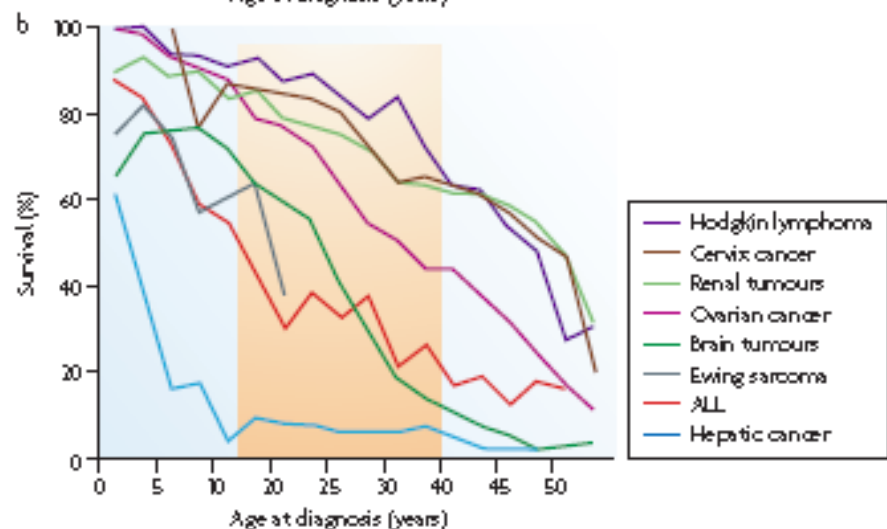
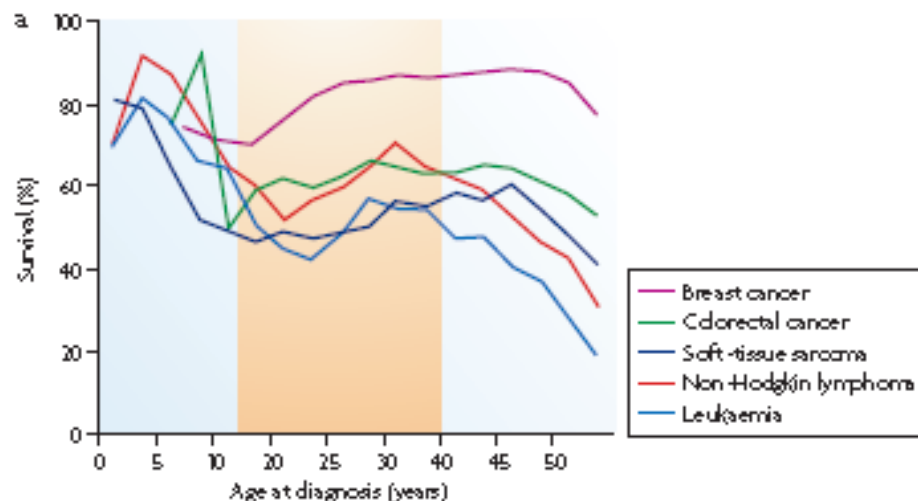
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- **Survival Trends**

The distinctive biology of cancer in adolescents and young adults

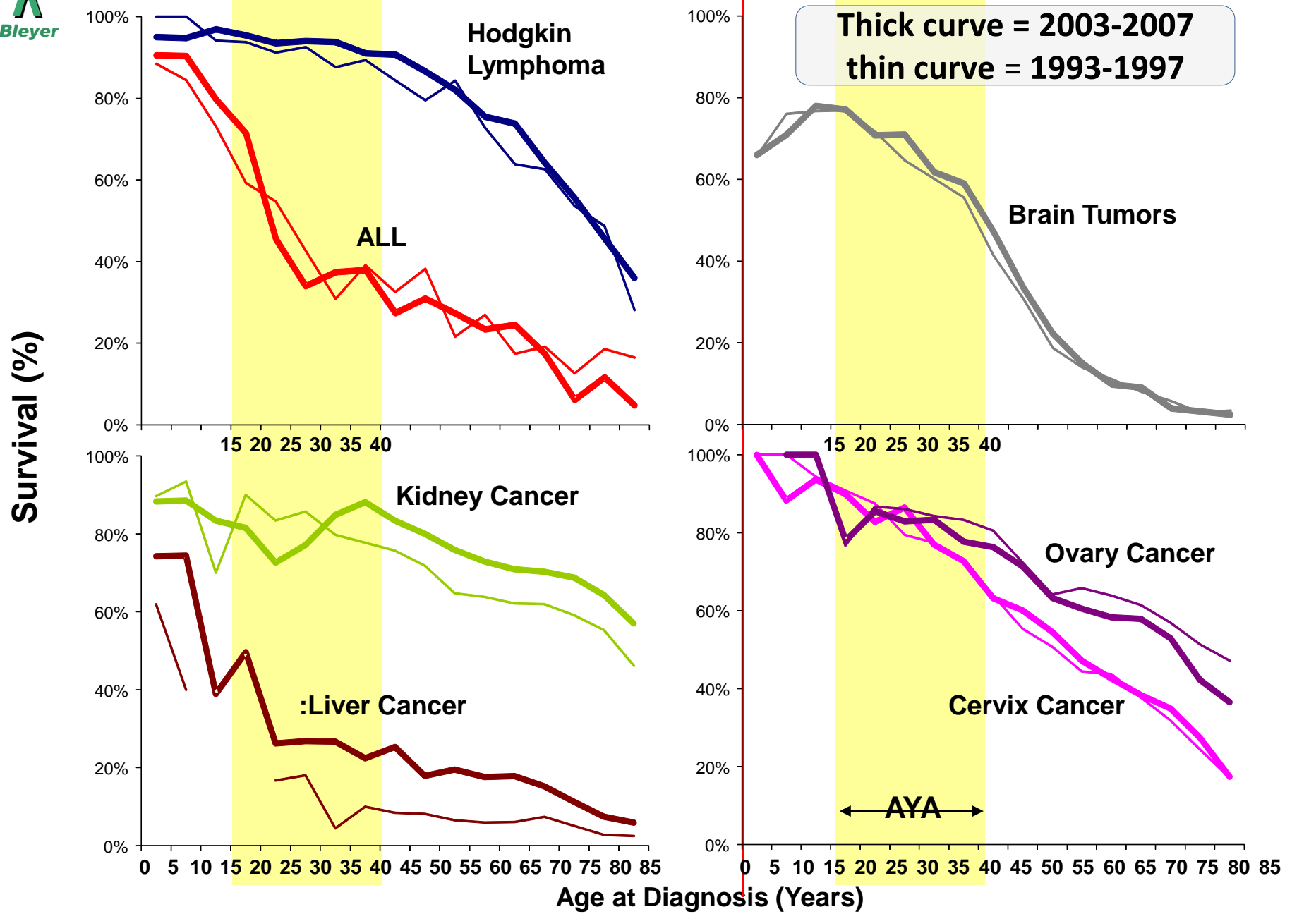
Archie Bleyer^{*†}, Ronald Barr[§], Brandon Hayes-Lattin^{||}, David Thomas[¶]





5-Year Relative Survival Rate: 2003-2007 (thick) vs. 1993-1997 (thin)

Cancers with *worse survival in AYAs* than in younger persons

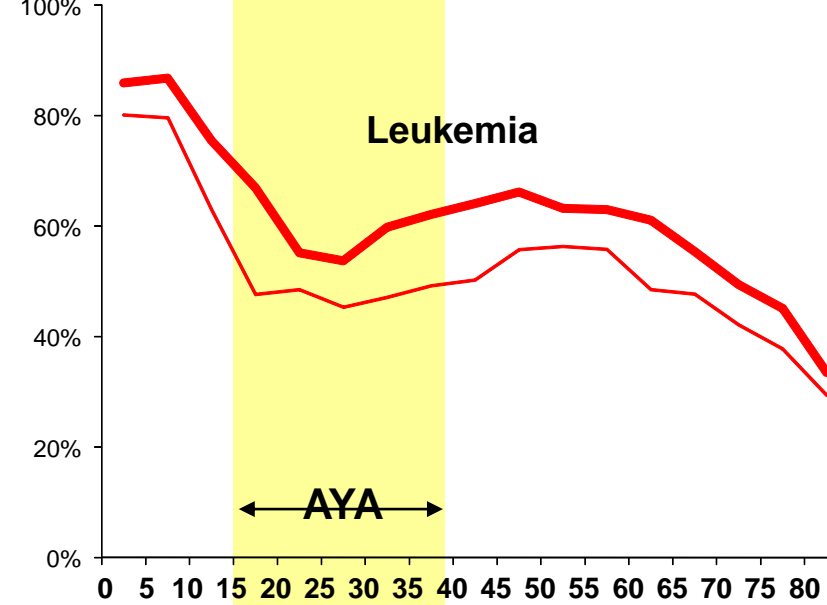
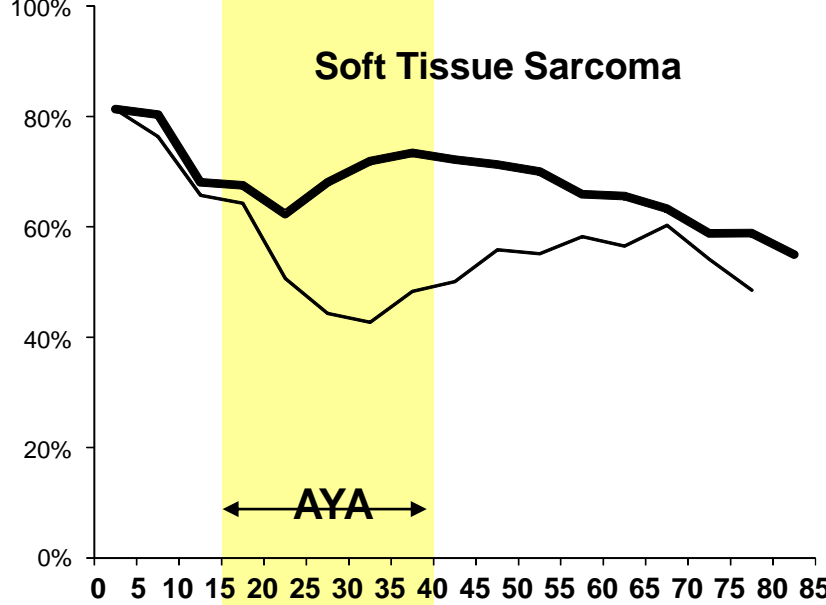
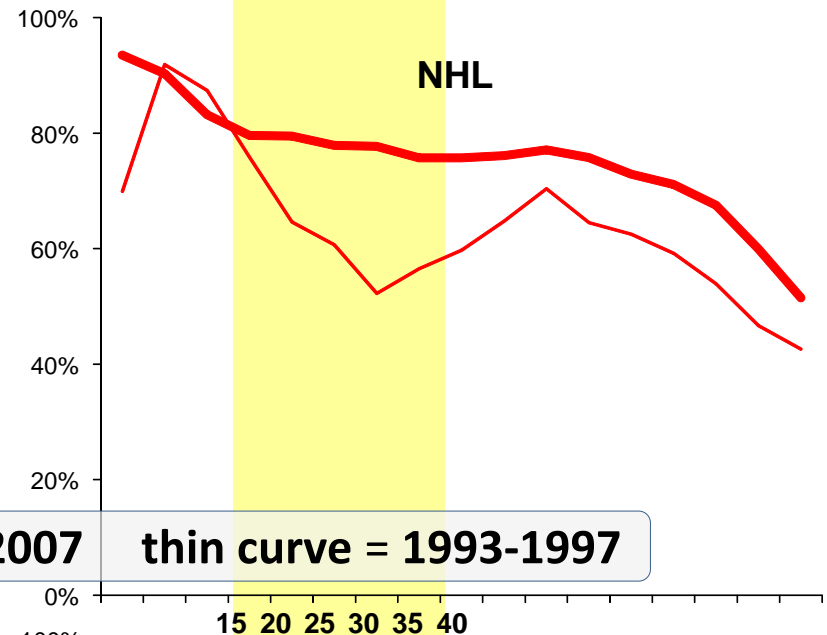
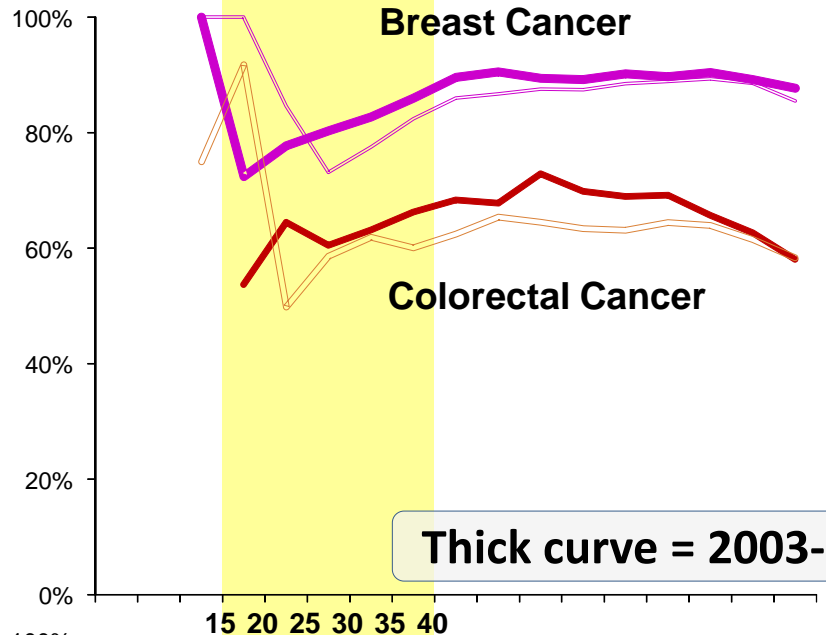




5-Year Relative Survival Rate: 2003-2007 (thick) vs. 1993-1997 (thin)

Cancers with **worse survival in AYAs** than in younger or older persons

Survival (%)



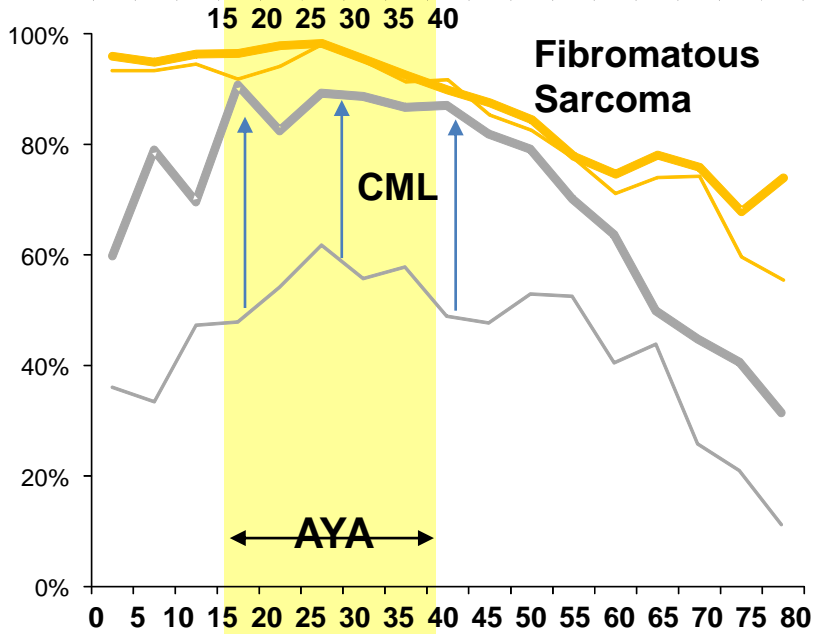
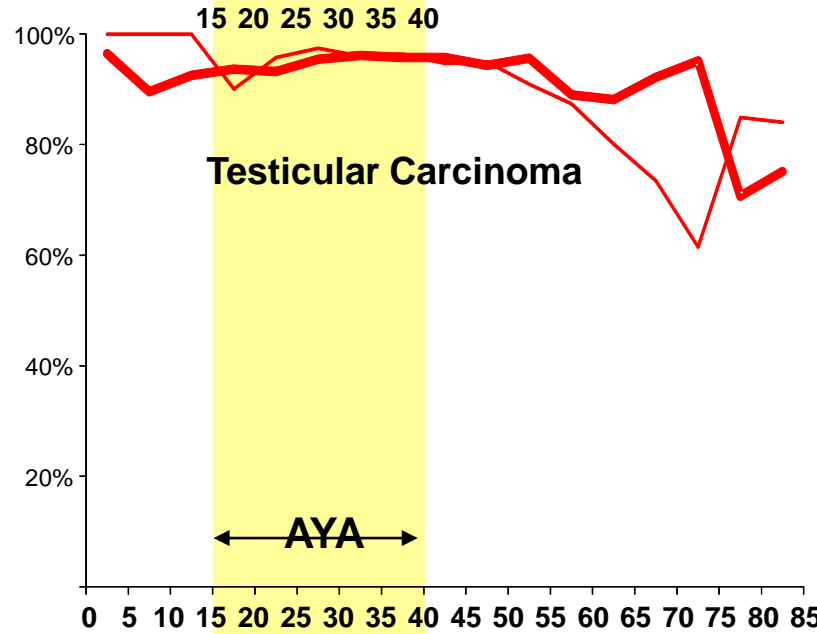
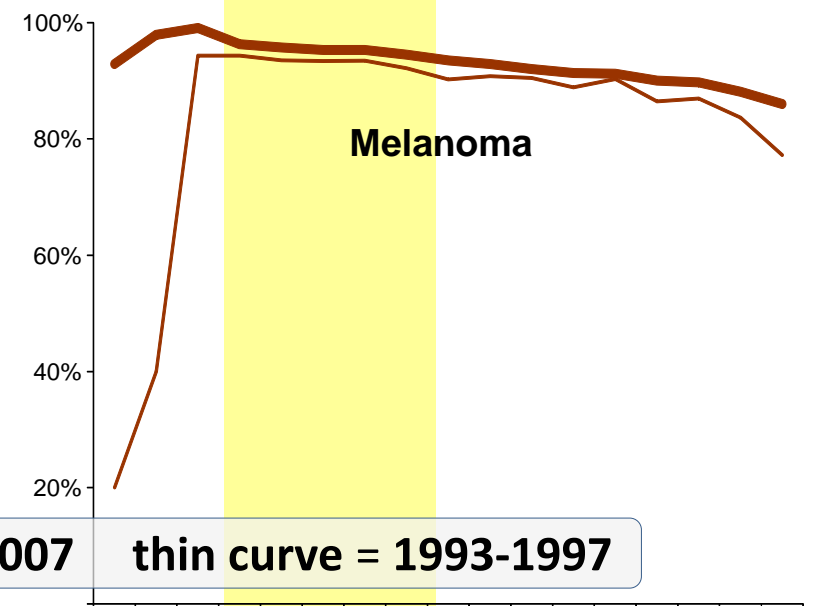
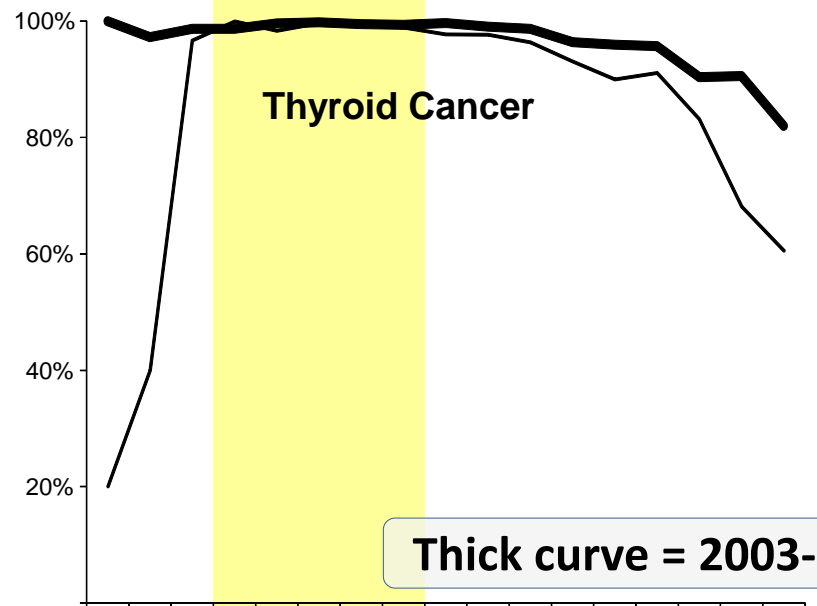
Age at Diagnosis (Years)



5-Year Relative Survival Rate: 2003-2007 (thick) vs. 1993-1997 (thin)

Cancers with *better survival in AYAs* than in younger or older persons

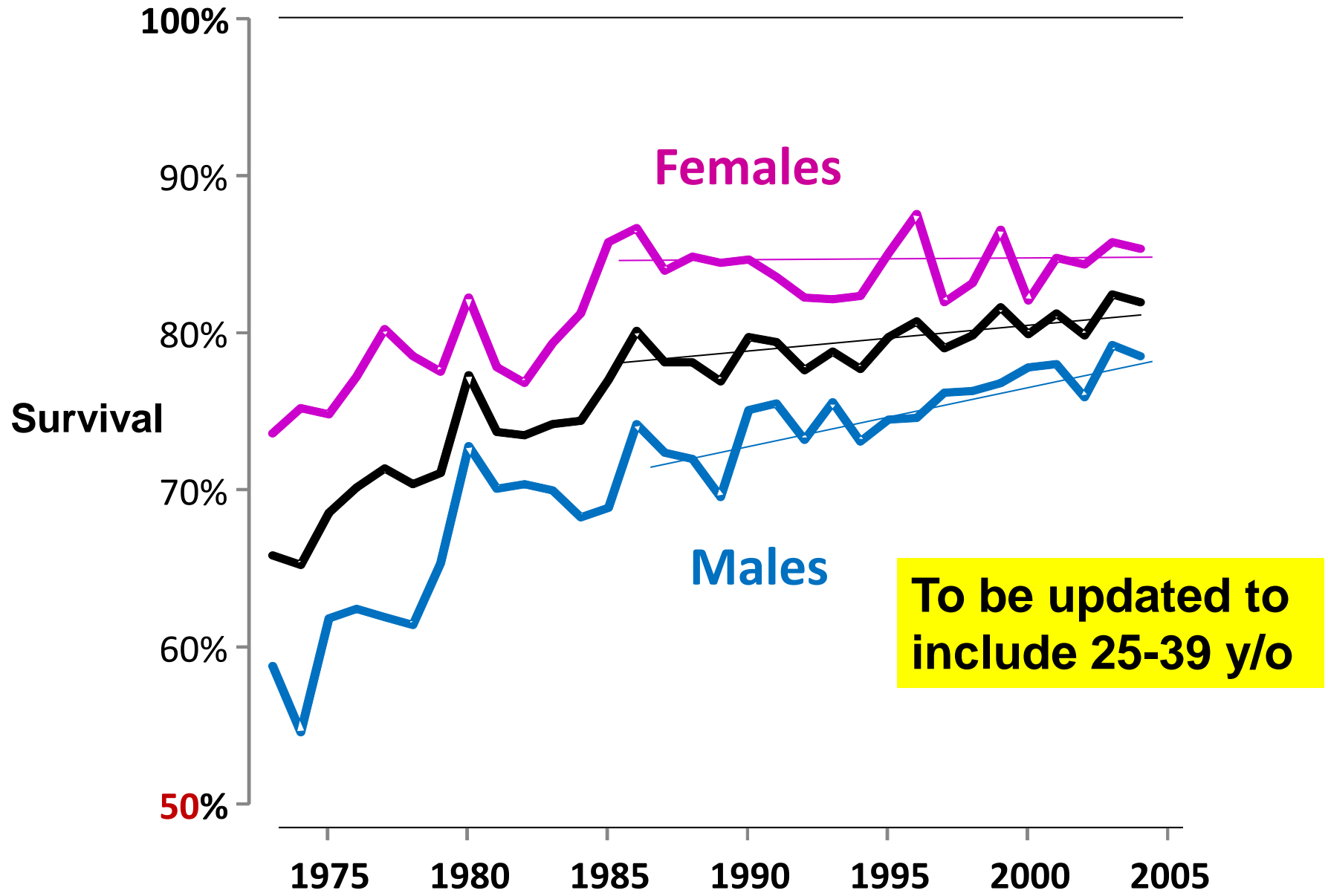
Survival (%)



Age at Diagnosis (Years)

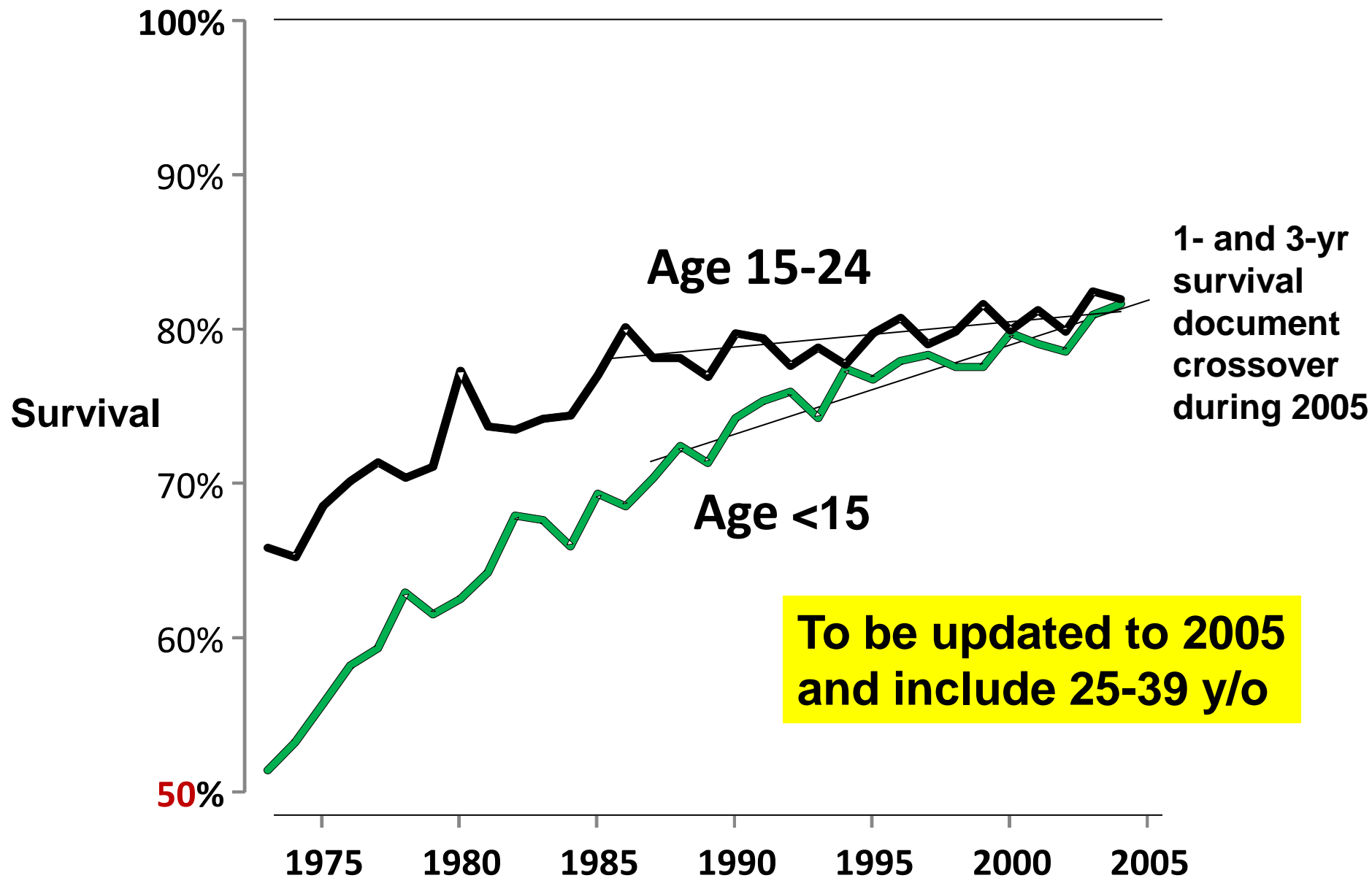
5-Year Survival, Cancer, SEER9|13|18

Age 15-24 at Diagnosis



5-Year Survival, Cancer, SEER9|13|17

Females and Males



Cancer in AYAs

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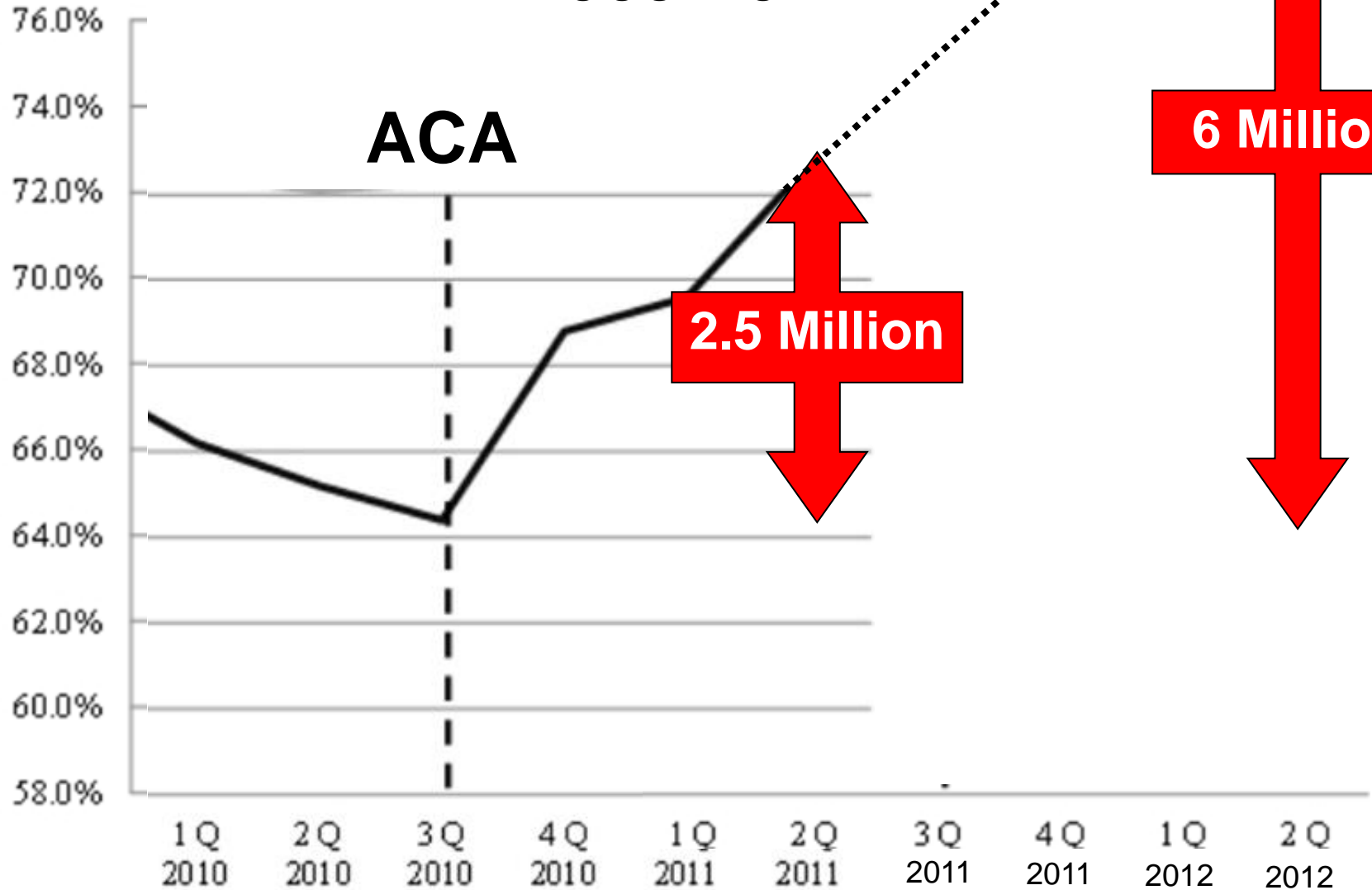
- Incidence Trends
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- Death Trends
- Survival Trends
- **Affordable Care Act Effect**

New Cases of Invasive Cancer in Newly Insured 19-25 Year-Olds Within 15 Months of ACA Passage on September 23, 2010

Age (Years)	Newly Insured 15 months after ACA	Diagnosed with Invasive Cancer							Total
		2011	2012	2013	2014	2015	2016	2017	
19	378,382	95	-	-	-	-	-	-	95
20	362,494	134	138	-	-	-	-	-	273
21	349,084	114	116	118	-	-	-	-	348
22	344,525	133	136	137	137	-	-	-	543
23	344,525	137	139	141	140	138	-	-	695
24	361,158	155	158	159	158	156	152	-	937
25	359,830	175	180	183	184	183	179	181	1,264
Total	2,500,000	942	867	738	620	477	331	181	4,155

Bleyer A, Ulrich C, Martin S: Cancer online Jun 26, 2012

19-25 Year-Old Americans with Health Insurance 2009-2012



New Cases of Invasive Cancer in

Newly Insured 19-25 Year-Olds Within

~~15~~ Months of ACA Passage on September 23, 2010

21

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24	361,158	155	158	159	158	156	152	-	937
25	359,830	175	180	183	184	183	179	181	1,294
Total	6,000,000	942	867	738	620	477	331	181	4,155

A year ago

9,972



How IOM can Help

- Increase awareness of favorable incidence trends
- *Ditto re:* unfavorable trends
- Promote clinical trial participation
- Plug favorable impact on AYAs of *Affordable Care Act (ACA)*
- Advocate for an ACA amendment that raises the age of *aging out*
- *Ditto re:* fertility preservation

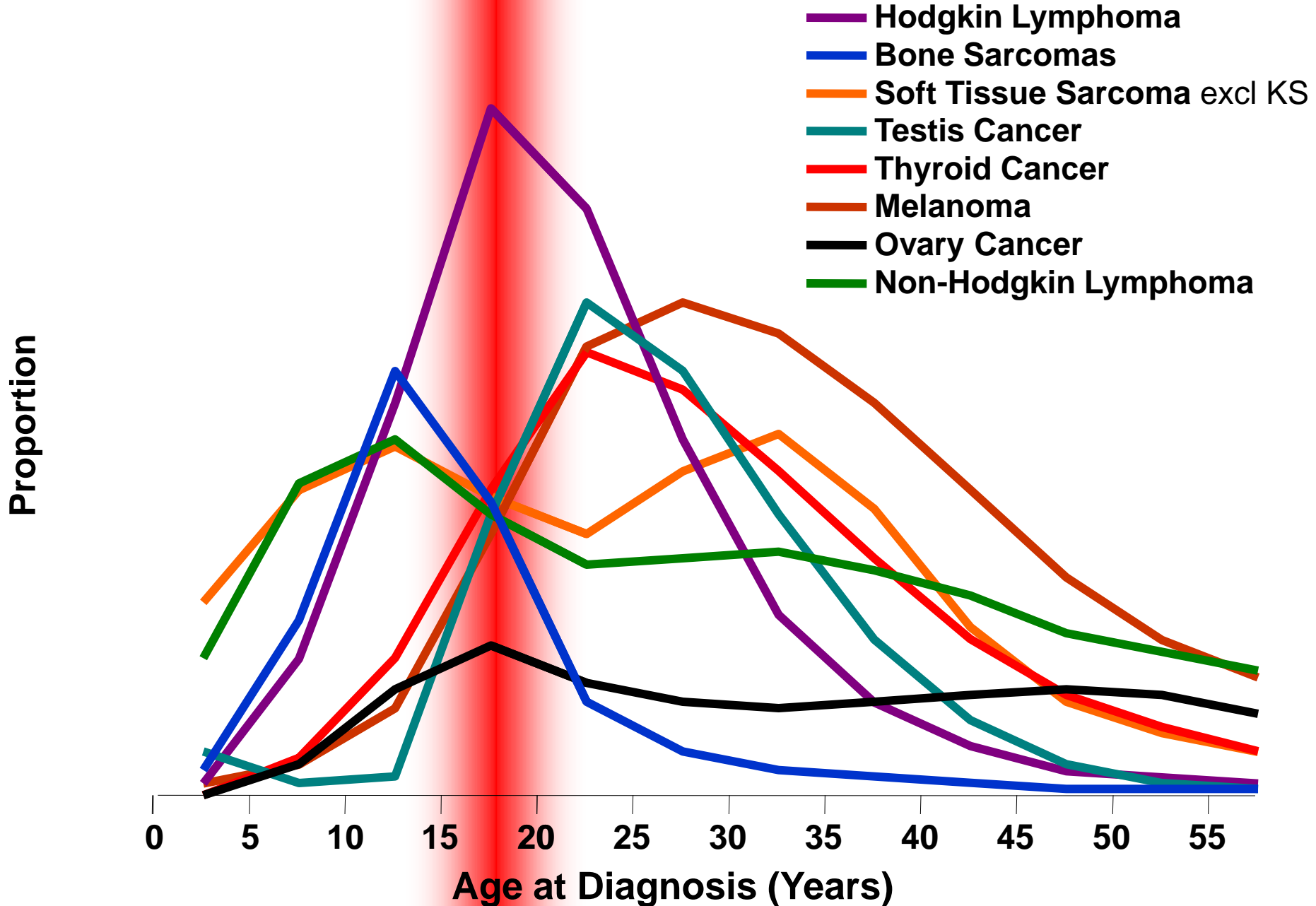
Conclusion



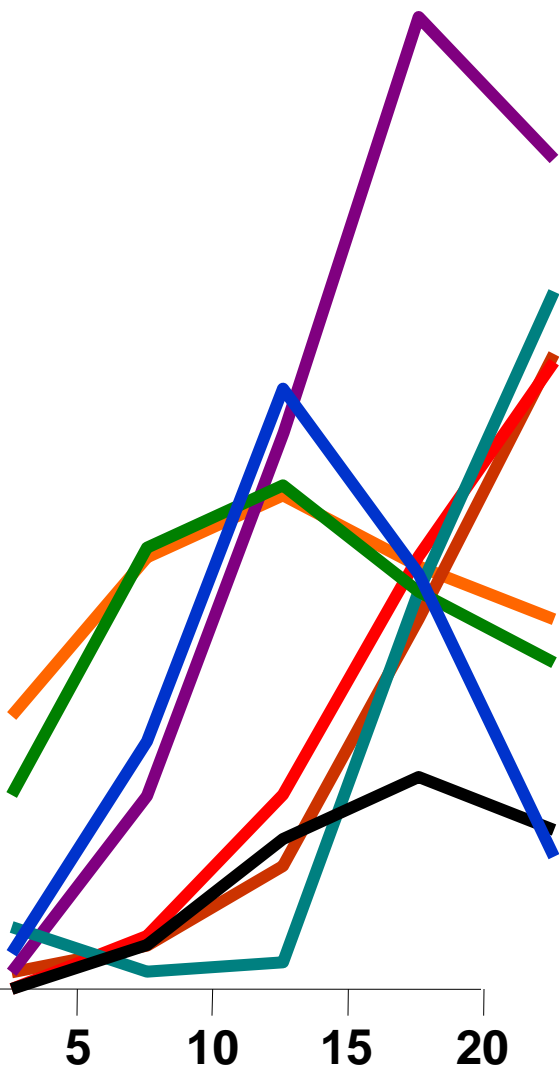
Mend the Gap

NCI AYAO Sept 2013

Proportion of All Invasive Cancer



Democrats



Republicans

