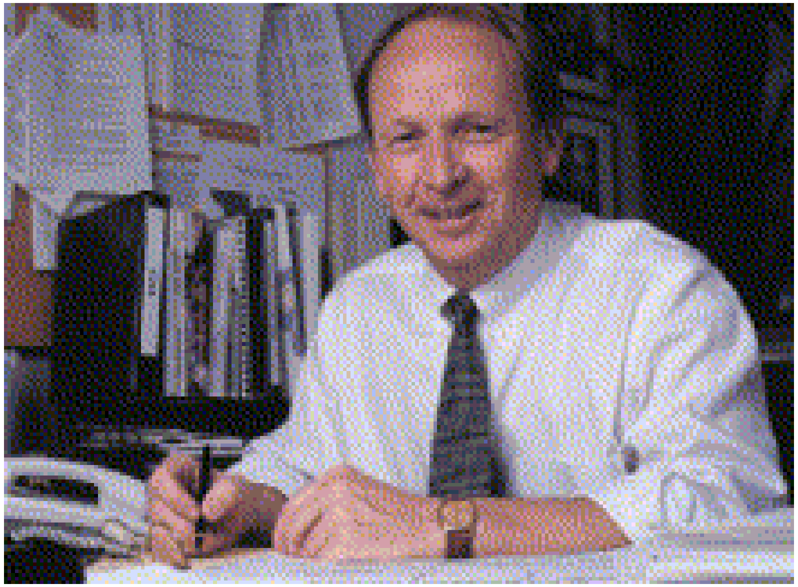
1995

- CCSS had 0 publication
- Internet access by Dial-up
- Amazon.com sold its 1st book online
- I was a new PhD & got the great opportunity to work with CCSS founders



2001

- CCSS had published 5 papers
- Amazon.com turned its first profit

Norm Breslow

A CCSS founder who, with John Potter, recruited me to work on CCSS in **1995**

"He really did lay the foundation for all modern statistical methods in epidemiology and public health," said Ron Brookmeyer, a UCLA biostatistics professor.

Second Malignant Neoplasms in Five-Year Survivors of Childhood Cancer: Childhood Cancer Survivor Study

Joseph P. Neglia, Debra L. Friedman, Yutaka Yasui, Ann C. Mertens, Sue Hammond, Marilyn Stovall, Sarah S. Donaldson, Anna T. Meadows, Leslie L. Robison

If I am the reviewer, I would reject this paper.

Working Group => Gate of entry to CCSS

PLEASE CONTACT ME IF YOU HAVE <u>ANY INTEREST OR IDEA</u> ON POTENTIAL EPI/BIOSTAT PROJECTS

Yutaka.Yasui@stjude.org

Epidemiology/Biostatistics Working Group Report

CCSS Investigators Meeting
June, 2017

Epidemiology/Biostatistics Working Group

1. Scope of your Working Group
2. Publications since the 2015 mtg
3. Ongoing work
4. Future focus

1. **Scope of your Working Group**
2. Publications since the 2015 mtg
3. Ongoing work
4. Future focus

- **Methodological and "other" studies**
- **Analysis of CCSS mortality data**
- **Integrity/innovation of popultion-science methodology (with Wendy, Ann, Les, …), working with other WGs**

1. Scope of your Working Group
2. **Publications since the 2015 mtg**
3. Ongoing work
4. Future focus

Publications 264

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Reduction in Late Mortality among 5-Year Survivors of Childhood Cancer

Gregory T. Armstrong, M.D., M.S.C.E., Yan Chen, M.M., Yutaka Yasui, Ph.D., Wendy Leisenring, Sc.D., Todd M. Gibson, Ph.D., Ann C. Mertens, Ph.D., Marilyn Stovall, Ph.D., Kevin C. Oeffinger, M.D., Smita Bhatia, M.D., M.P.H., Kevin R. Krull, Ph.D., Paul C. Nathan, M.D., Joseph P. Neglia, M.D., M.P.H., Daniel M. Green, M.D., Melissa M. Hudson, M.D., and Leslie L. Robison, Ph.D.

ASSOCIATED PRESENTATION

Meeting: **2015 ASCO Annual Meeting**
Presenter: **Gregory T. Armstrong**

View Video

Childhood Cancer Survivor Study
Epidemiology/Biostatistics Working Group

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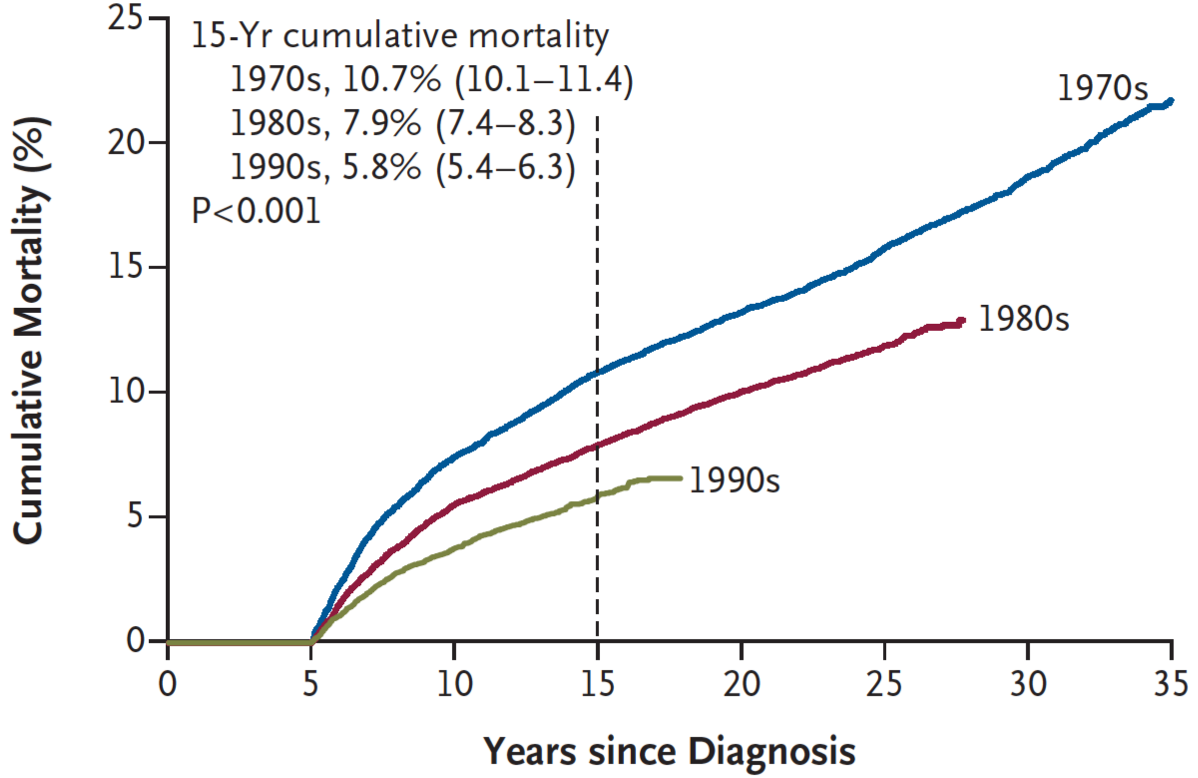
A Death from Any Cause

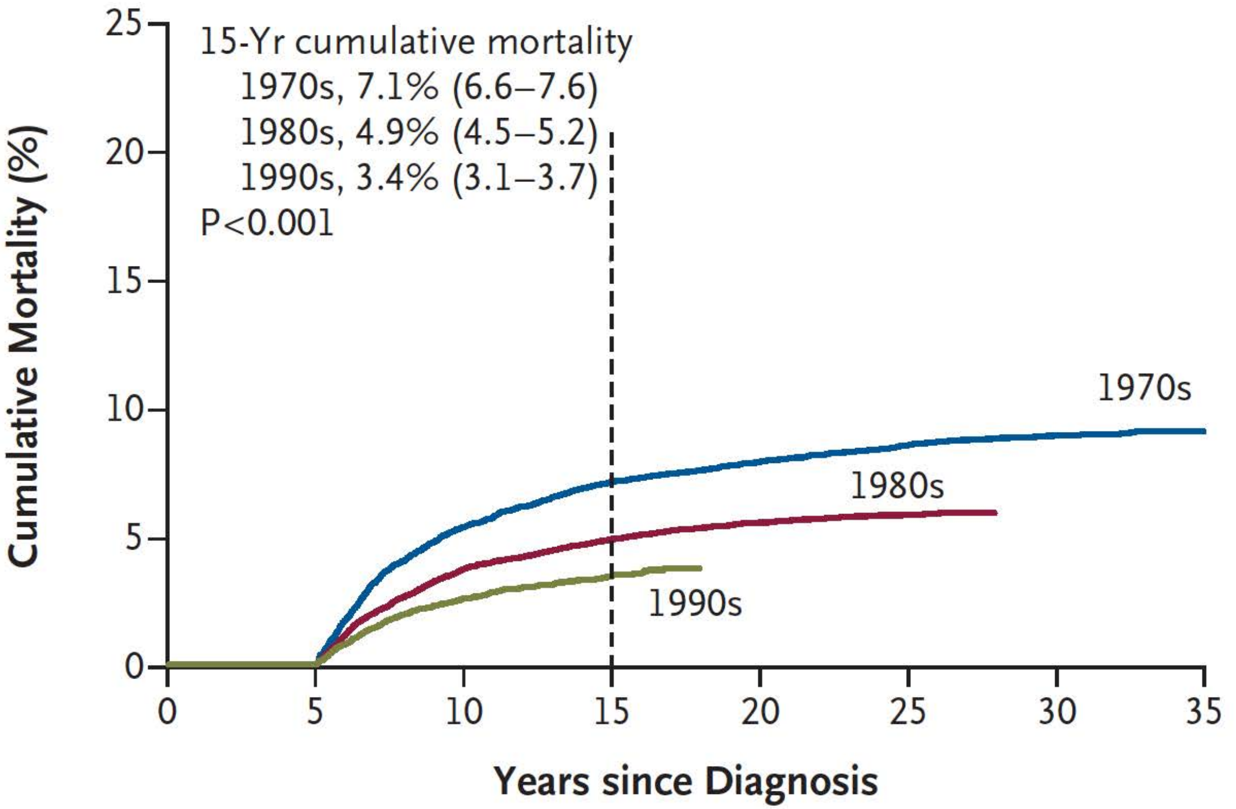


No. at Risk

1970s	9,416	8,722	8,406	8,182	7942	5556	1506
1980s	13,181	13,443	13,105	10,389	3583		
1990s	11,436	11,411	3,924				

Childhood Cancer Survivor Study
Epidemiology/Biostatistics Working Group

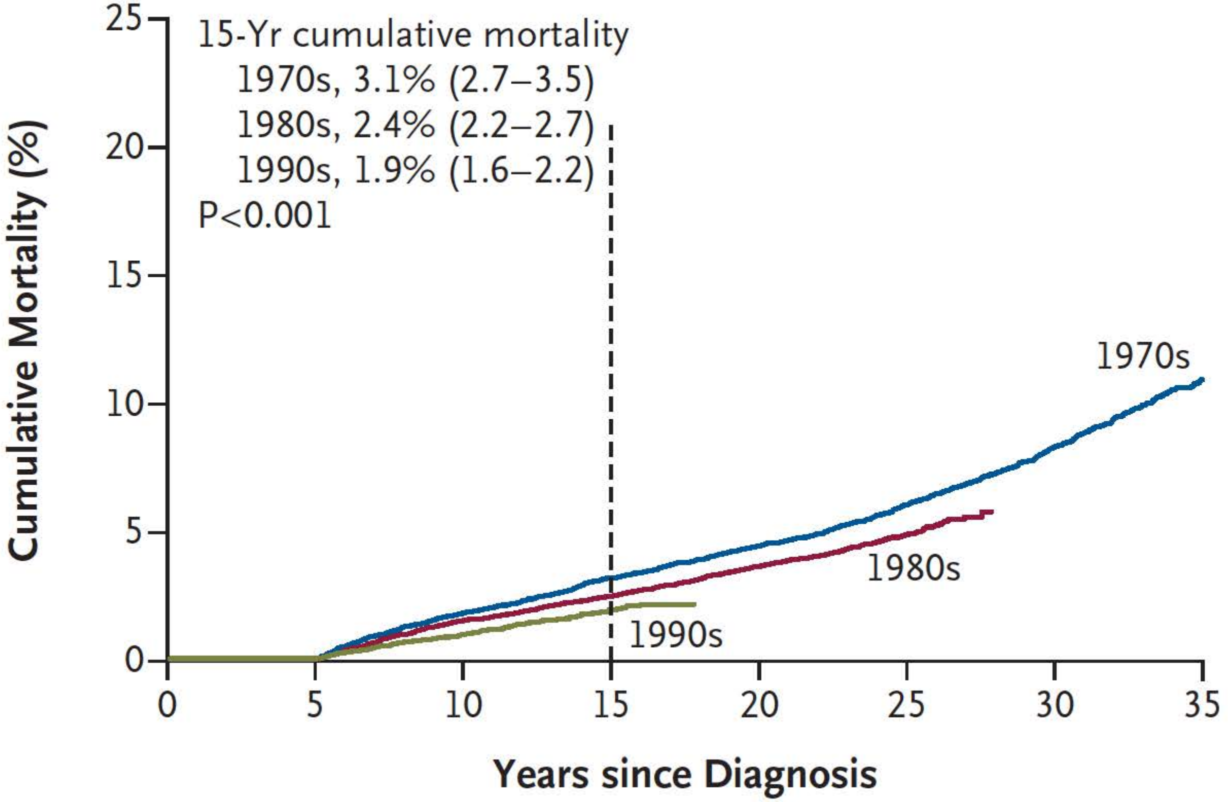
B Death from Recurrence or Progression



No. at Risk

1970s	9,416	8,722	8,406	8,182	7942	5556	1506
1980s	13,181	13,443	13,105	10,389	3583		
1990s	11,436	11,411	3,924				

C Death from Health-Related Cause



No. at Risk

1970s	9,416	8,722	8,406	8,182	7942	5556	1506
1980s	13,181	13,443	13,105	10,389	3583		
1990s	11,436	11,411	3,924				

- **Temporal trends papers (Armstrong *et al.* NEJM 2016, Turcotte *et al.* JAMA 2017, Ness *et al.* Ann Intern Med 2017)**
- **Show trends in the outcome of interest**
- **Show trends in relevant treatment**
- **"Is it really the therapy changes that led to the outcome changes?"**

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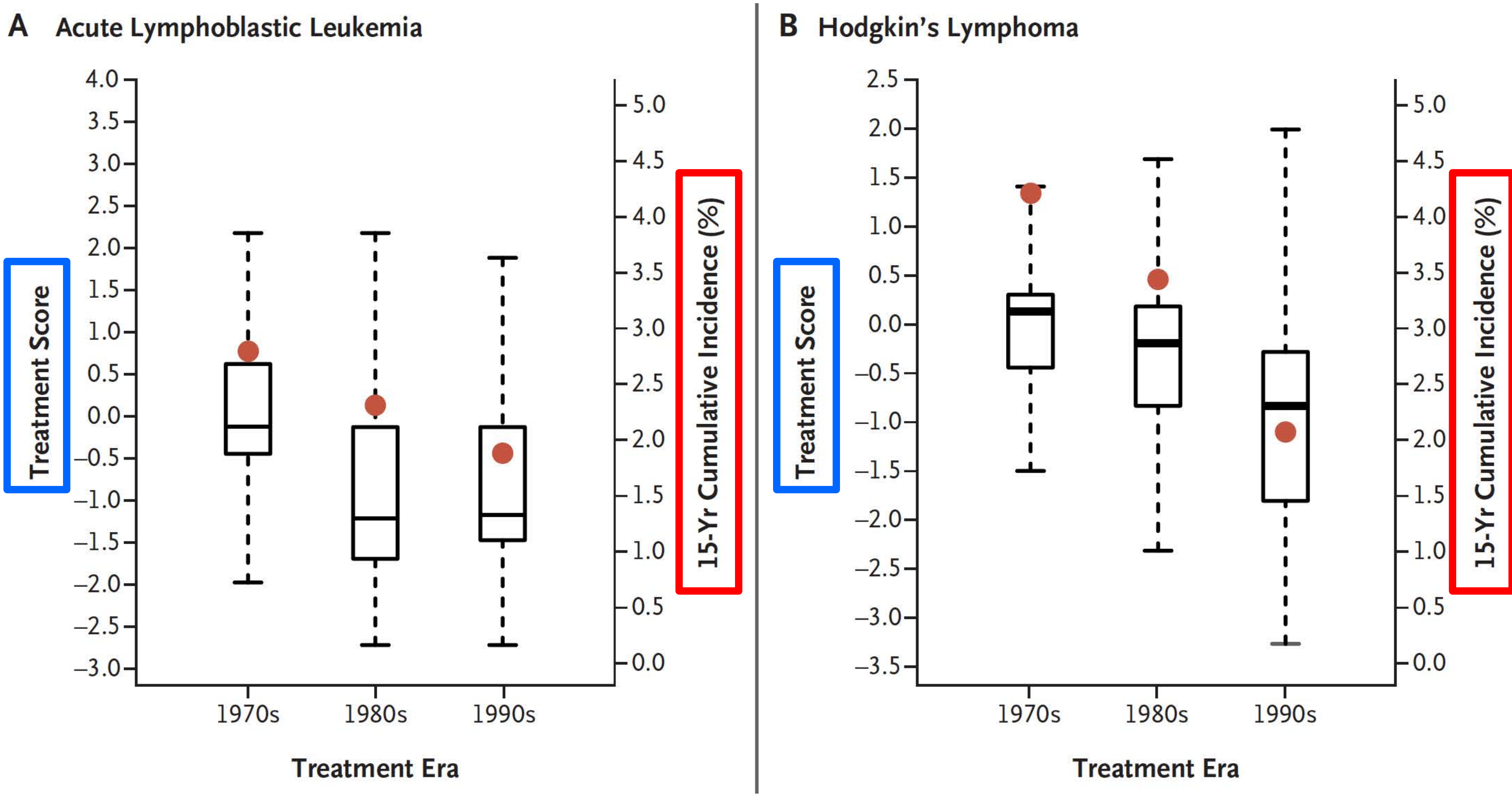
Childhood Cancer Survivor Study
Epidemiology/Biostatistics Working Group



Childhood Cancer Survivor Study
Epidemiology/Biostatistics Working Group

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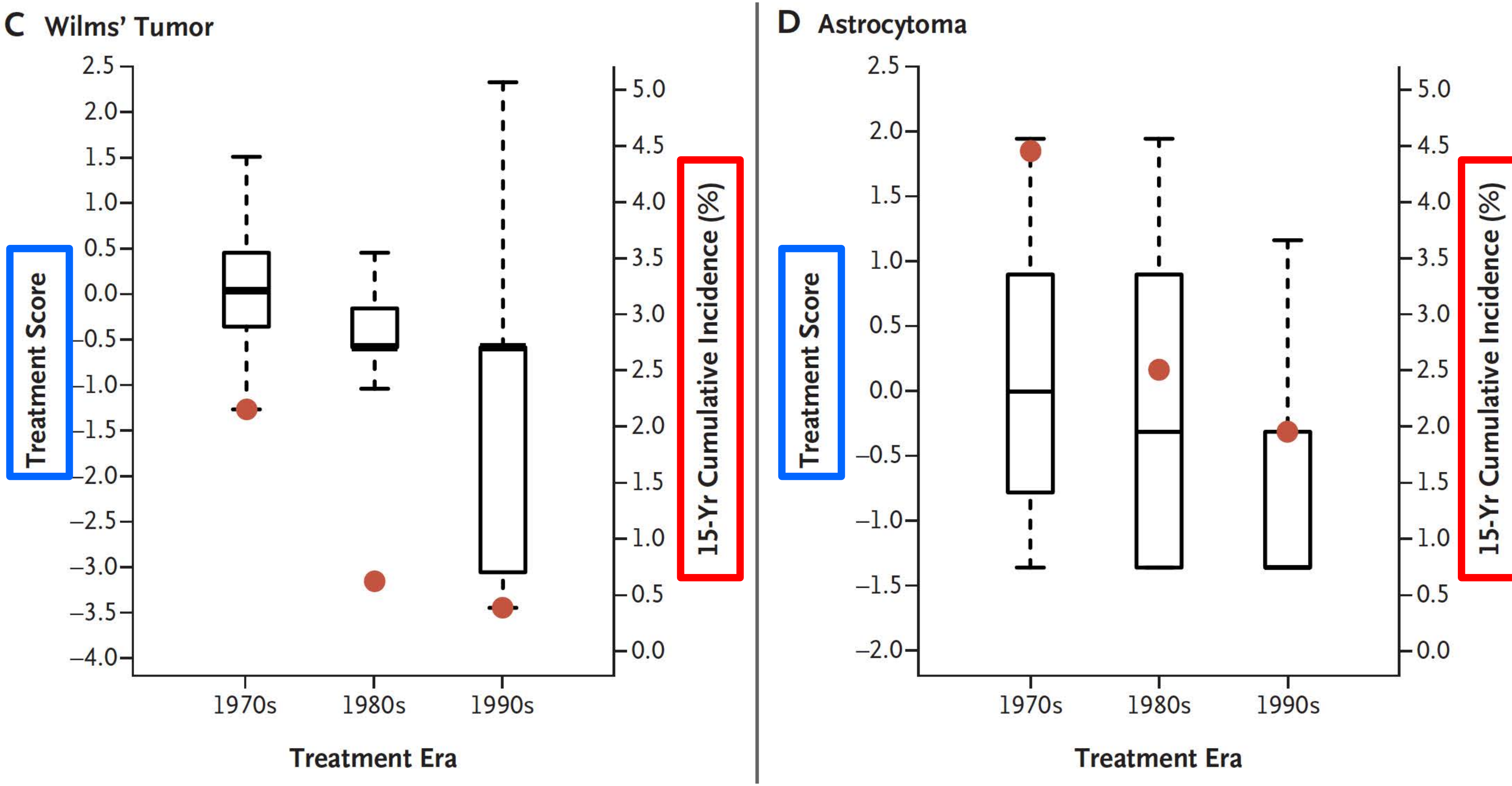

	Acute Lymphoblastic Leukemia
	Relative rate of mortality
No adjustment for therapy	0.88 (0.81– 0.95)

Every 5 years of treatment era:
12% lower mortality rate

	Acute Lymphoblastic Leukemia
No adjustment for therapy	0.88 (0.81– 0.95)
Adjustment for therapy	1.02 (0.83–1.24)†

† Data were adjusted for cranial radiotherapy dose, anthracycline dose, and exposure to epipodophyllotoxins and glucocorticoids.

Publications 274

Communication

Childhood Cancer Survivorship Research in Minority Populations: A Position Paper From the Childhood Cancer Survivor Study

Smita Bhatia, MD, MPH[1]; Todd M. Gibson, PhD[2]; Kirsten K. Ness, PhD[2]; Qi Liu, MS[3]; Kevin C. Oeffinger, MD[4,5]; Kevin R. Krull, PhD[2]; Paul C. Nathan, MD, MSc[6]; Joseph P. Neglia, MD, MPH[7]; Wendy Leisenring, ScD[8]; Yutaka Yasui, PhD[2,3]; Leslie L. Robison, PhD[2]; and Gregory T. Armstrong, MD, MSCE[2]

Publications 268

VOLUME 34 · NUMBER 14 · MAY 10, 2016

JOURNAL OF CLINICAL ONCOLOGY

ORIGINAL REPORT

Racial/Ethnic Differences in Adverse Outcomes Among Childhood Cancer Survivors: The Childhood Cancer Survivor Study

Qi Liu, Wendy M. Leisenring, Kirsten K. Ness, Leslie L. Robison, Gregory T. Armstrong, Yutaka Yasui, and Smita Bhatia

	Hispanic vs. NHW	African American vs. NHW
Socioeconomic status		
Annual household income <20,000		3.5 (3.1–3.9); *P*<.001
Education <high school		1.5 (1.3–1.7); *P*<.001
With health insurance		0.7 (0.6- 0.8); *P*<.001
		0.5 (0.5–0.6); *P*<.001
		0.5 (0.5–0.6); *P* = .001
		1.6 (1.3–2.0); *P*<.001

	Hispanic vs. NHW	African American vs. NHW
Socioeconomic status		
Annual household income <20,000	1.6 (1.5–1.8); *P*<.001	3.5 (3.1–3.9); *P*<.001
Education <high school	1.3 (1.1–1.5); *P*<.001	1.5 (1.3–1.7); *P*<.001
With health insurance	0.5 (0.5–0.6); *P* <.001	0.7 (0.6- 0.8); *P*<.001
Risky health behaviors		
Current smokers	0.6 (0.6–0.8); *P*<.001	0.5 (0.5–0.6); *P*<.001
Alcohol consumption (binge drinking)	1.1 (1.0–1.2); *P* = .07	0.5 (0.5–0.6); *P* = .001
Physically inactive[b]	1.0 (0.8–1.2); *P* = .8	1.6 (1.3–2.0); *P*<.001

	Hispanic vs. NHW	African American vs. NHW
Socioeconomic status		
Annual household income <20,000	1.6 (1.5–1.8); *P*<.001	3.5 (3.1–3.9); *P*<.001
Education <high school	1.3 (1.1–1.5); *P*<.001	1.5 (1.3–1.7); *P*<.001
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Physically inactive[b]	1.0 (0.8–1.2); *P* = .8	1.6 (1.3–2.0); *P*<.001
Obesity	1.6 (1.4–1.7); *P*<.001	1.6 (1.4–1.8); *P*p<.001
Hypertension	1.1 (0.9–1.2); *P* = .3	1.3 (1.2–1.5); *P*<.001
Diabetes	1.7 (1.4–2.1); *P*<.001	2.3 (1.9–2.9); *P*<.001
	1.4 (1.1–1.8); *P* = .003	1.9 (1.5–2.3); *P*<.001
	0.9 (0.6–1.3); *P* = .6	1.9 (1.4–2.5); *P*<.01
	0.8 (0.5–1.1); *P* = .2	1.5 (1.1–2.0); *P* = .01

	Hispanic vs. NHW	African American vs. NHW
Socioeconomic status		
Annual household income <20,000	1.6 (1.5–1.8); *P*<.001	3.5 (3.1–3.9); *P*<.001
Education <high school	1.3 (1.1–1.5); *P*<.001	1.5 (1.3–1.7); *P*<.001
With health insurance	0.5 (0.5–0.6); *P* <.001	0.7 (0.6- 0.8); *P*<.001
Risky health behaviors		
Current smokers	0.6 (0.6–0.8); *P*<.001	0.5 (0.5–0.6); *P*<.001
Alcohol consumption (binge drinking)	1.1 (1.0–1.2); *P* = .07	0.5 (0.5–0.6); *P* = .001
Physically inactive[b]	1.0 (0.8–1.2); *P* = .8	1.6 (1.3–2.0); *P*<.001
Obesity	1.6 (1.4–1.7); *P*<.001	1.6 (1.4–1.8); *P*p<.001
Hypertension	1.1 (0.9–1.2); *P* = .3	1.3 (1.2–1.5); *P*<.001
Diabetes	1.7 (1.4–2.1); *P*<.001	2.3 (1.9–2.9); *P*<.001
Diabetes[c]	1.4 (1.1–1.8); *P* = .003	1.9 (1.5–2.3); *P*<.001
	0.9 (0.6–1.3); *P* = .6	1.9 (1.4–2.5); *P*<.01
	0.8 (0.5–1.1); *P* = .2	1.5 (1.1–2.0); *P* = .01

	Hispanic vs. NHW	African American vs. NHW
Socioeconomic status		
Annual household income <20,000	1.6 (1.5–1.8); *P*<.001	3.5 (3.1–3.9); *P*<.001
Education <high school	1.3 (1.1–1.5); *P*<.001	1.5 (1.3–1.7); *P*<.001
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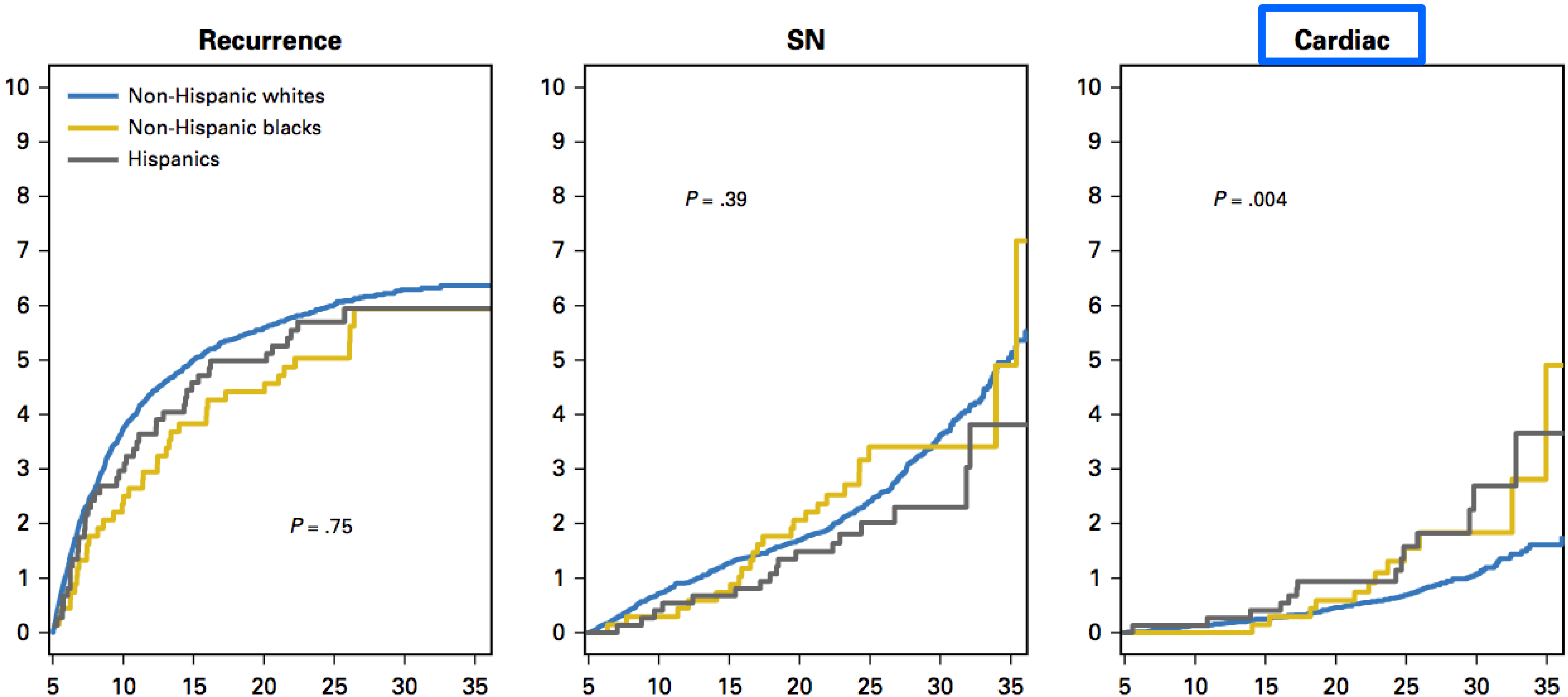
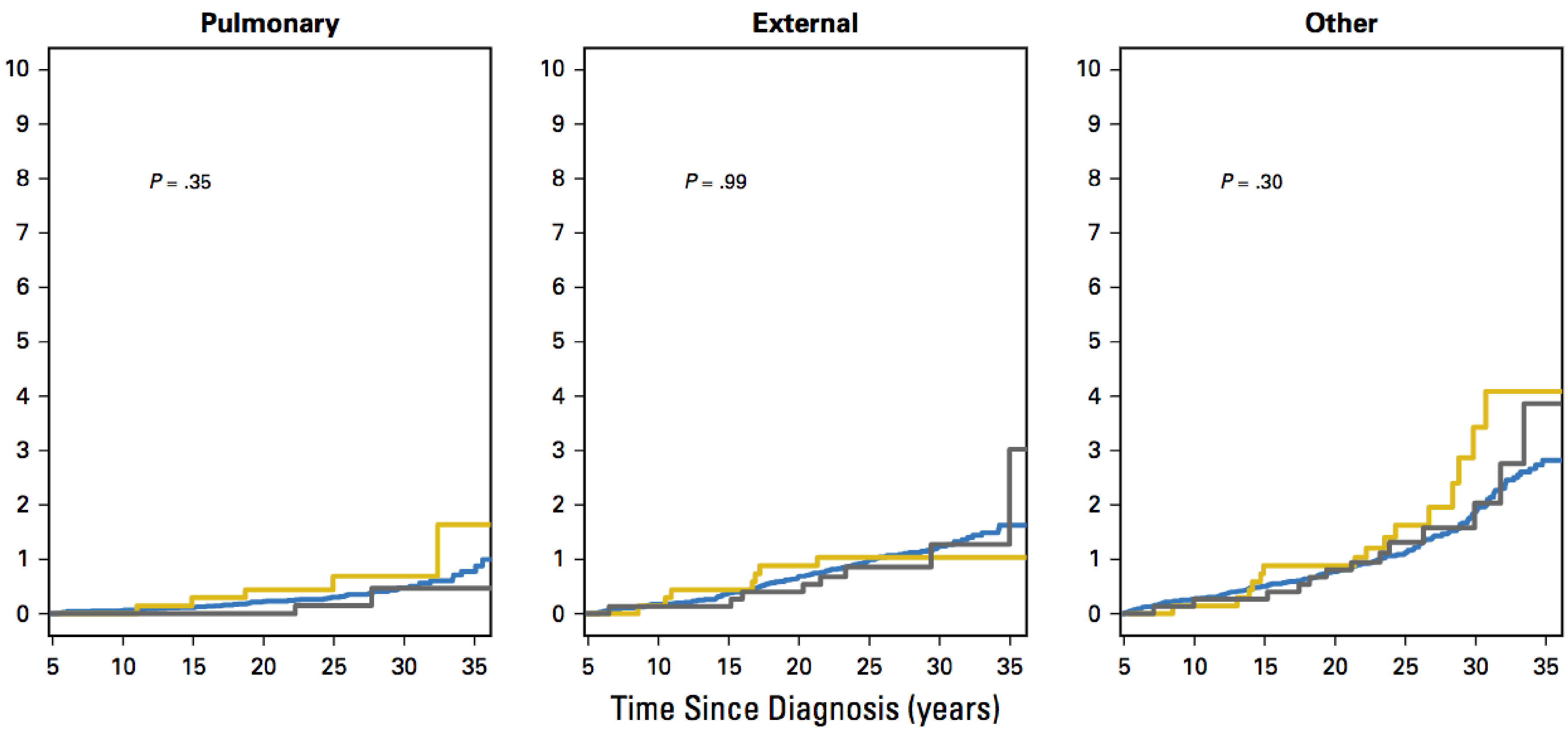
Physically inactive[b]	1.0 (0.8–1.2); *P* = .8	1.6 (1.3–2.0); *P*<.001
Obesity	1.6 (1.4–1.7); *P*<.001	1.6 (1.4–1.8); *P*p<.001
Hypertension	1.1 (0.9–1.2); *P* = .3	1.3 (1.2–1.5); *P*<.001
Diabetes	1.7 (1.4–2.1); *P*<.001	2.3 (1.9–2.9); *P*<.001
Diabetes[c]	1.4 (1.1–1.8); *P* = .003	1.9 (1.5–2.3); *P*<.001
Stroke	0.9 (0.6–1.3); *P* = .6	1.9 (1.4–2.5); *P*<.01
Stroke[c]	0.8 (0.5–1.1); *P* = .2	1.5 (1.1–2.0); *P* = .01

Cumulative cause-specific mortality



Cumulative cause-specific mortality



RR of Mortality	All-Cause RR (95% CI)	*P*
Adjusted for clinical/demographic variables†		

- **By and large, comparable burden of morbidity and mortality**

- **A few differences in risk were explained by differences in socioeconomic status**

clinical/demographic variables, treatment, and SES§		
NHW	Ref	
NHB	1.0 (0.8 to 1.4)	.88
Hispanic	0.9 (0.7 to 1.2)	.46

	Hispanic vs. NHW
Health care use, adjusted for education, income, and insurance	
General physical examination	1.1 (1.0–1.2); $P = .1$
Cancer-related care	1.0 (0.9–1.1); $P = .8$
Surveillance for long-term toxicities, adjusted for education, income, and insurance	
Mammography in women treated with chest irradiation	0.9 (0.5–1.4); $P = .6$
Echocardiogram in anthracycline-exposed survivors	1.0 (0.8–1.1); $P = .6$

	Hispanic vs. NHW	African American vs. NHW
Health care use, adjusted for education, income, and insurance		
General physical examination	1.1 (1.0–1.2); *P* = .1	1.2 (1.0–1.4); *P* = .02
Cancer-related care	1.0 (0.9–1.1); *P* = .8	0.7 (0.6–0.8); *P* <.001
Surveillance for long-term toxicities, adjusted for education, income, and insurance		
Mammography in women treated with chest irradiation	0.9 (0.5–1.4); *P* = .6	0.6 (0.3–1.1); *P* = .09
Echocardiogram in anthracycline-exposed survivors	1.0 (0.8–1.1); *P* = .6	0.8 (0.6–0.9); *P* = .01

CCSS
An NCI funded Resource

Childhood Cancer Survivor Study

Epidemiology/Biostatistics Working Group

Publications 254

VOLUME 33 · NUMBER 32 · NOVEMBER 10 2015

JOURNAL OF CLINICAL ONCOLOGY

ORIGINAL REPORT

Equivalence Ratio for Daunorubicin to Doxorubicin in Relation to Late Heart Failure in Survivors of Childhood Cancer

Elizabeth A.M. Feijen, Wendy M. Leisenring, Kayla L. Stratton, Kirsten K. Ness, Helena J.H. van der Pal, Huib N. Caron, Gregory T. Armstrong, Daniel M. Green, Melissa M. Hudson, Kevin C. Oeffinger, Leslie L. Robison, Marilyn Stovall, Leontien C.M. Kremer, and Eric J. Chow

Table 3. HRs for Heart Failure Based on Doxorubicin and Daunorubicin Dose Categories

Model and Dose Category	Daunorubicin			
	Dose, mg/m²			
	Median	IQR	HR*	95% CI
Primary model*				
None			Reference	
≤ 0.1 to < 200 mg/m²	100	75-118	1.09	0.57 to 2.08
≤ 200 to < 300 mg/m²	246	221-270	3.16	1.16 to 8.61
≤ 300 to < 400 mg/m²	350	328-371	4.33	1.73 to 10.84
≤ 400 mg/m²	480	432-545	10.72	5.13 to 22.42
Secondary model†				
None			Reference	
≤ 0.1 to < 150 mg/m²	99	51-103	1.35	0.18 to 10.42
≤ 150 to < 300 mg/m²	213	183-251	2.83	0.37 to 21.57
≤ 300 mg/m²	379	346-449	20.17	8.83 to 46.06

Abbreviations: HR, hazard ratio; IQR, interquartile range.
*Model was adjusted for sex; age at diagnosis; chest radiotherapy dose; and exposure to another anthracycline besides doxorubicin or daunorubicin, such as epirubicin, idarubicin, or mitoxantrone. It was also stratified by cohort.
†Model was adjusted for sex and age at diagnosis and was also stratified by cohort.
‡The CIs of the ratios are the 2.5th and 97.5th percentiles of the bootstraps.

CCSS
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Childhood Cancer Survivor Study

Epidemiology/Biostatistics Working Group

Table 3. HRs for Heart Failure Based on Doxorubicin and Daunorubicin Dose Categories

Model and Dose Category	Daunorubicin Dose, mg/m^2 Median	Daunorubicin Dose, mg/m^2 IQR	Daunorubicin HR*	Daunorubicin 95% CI	Doxorubicin Dose, mg/m^2 Median	Doxorubicin Dose, mg/m^2 IQR	Doxorubicin HR	Doxorubicin 95% CI
Primary model*								
None			Reference				Reference	
≤ 0.1 to < 200 mg/m^2	100	75-118	1.09	0.57 to 2.08	122	80-169	2.80	1.75 to 4.49
≤ 200 to < 300 mg/m^2	246	221-270	3.16	1.16 to 8.61	253	226-278	6.31	4.11 to 9.69
≤ 300 to < 400 mg/m^2	350	328-371	4.33	1.73 to 10.84	347	318-370	13.19	9.04 to 19.25
≤ 400 mg/m^2	480	432-545	10.72	5.13 to 22.42	459	430-505	18.43	12.82 to 26.50
Secondary model†								
None			Reference				Reference	
≤ 0.1 to < 150 mg/m^2	99	51-103	1.35	0.18 to 10.42	102	71-122	3.97	1.14 to 13.76
≤ 150 to < 300 mg/m^2	213	183-251	2.83	0.37 to 21.57	211	180-258	9.29	4.58 to 18.86
≤ 300 mg/m^2	379	346-449	20.17	8.83 to 46.06	391	345-455	34.74	19.24 to 62.73

Abbreviations: HR, hazard ratio; IQR, interquartile range.
*Model was adjusted for sex; age at diagnosis; chest radiotherapy dose; and exposure to another anthracycline besides doxorubicin or daunorubicin, such as epirubicin, idarubicin, or mitoxantrone. It was also stratified by cohort.
†Model was adjusted for sex and age at diagnosis and was also stratified by cohort.
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Table 3. HRs for Heart Failure Based on Doxorubicin and Daunorubicin Dose Categories

Model and Dose Category	Daunorubicin Dose, mg/m² Median	IQR	HR*	95% CI	Doxorubicin Dose, mg/m² Median	IQR	HR	95% CI	Daunorubicin-to-Doxorubicin Ratio	95% CI	Mean	95% CI
Primary model*											0.45	0.23 to 0.73
None			Reference				Reference		—			
≤ 0.1 to < 200 mg/m²	100	75-118	1.09	0.57 to 2.08	122	80-169	2.80	1.75 to 4.49	0.39	0.04 to 0.78		
≤ 200 to < 300 mg/m²	246	221-270	3.16	1.16 to 8.61	253	226-278	6.31	4.11 to 9.69	0.50	0.00 to 1.12		
≤ 300 to < 400 mg/m²	350	328-371	4.33	1.73 to 10.84	347	318-370	13.19	9.04 to 19.25	0.33	0.03 to 0.62		
≤ 400 mg/m²	480	432-545	10.72	5.13 to 22.42	459	430-505	18.43	12.82 to 26.50	0.58	0.09 to 1.12		
Secondary model†											0.41	0.29 to 1.28‡
None			Reference				Reference		—			
≤ 0.1 to < 150 mg/m²	99	51-103	1.35	0.18 to 10.42	102	71-122	3.97	1.14 to 13.76	0.34	0.14 to 2.60‡		
≤												
≤												

Abb
*Mo ... ch as
epiru
†Mc
‡The

Daunorubicin was less cardiotoxic than doxorubicin; the daunorubicin-to-doxorubicin cardiotoxicity equivalence ratio was between 0.4 and 0.5.

Childhood Cancer Survivor Study

Epidemiology/Biostatistics Working Group

CCSS
An NCI funded Resource

Publications 293

Research Article

Statistics in Medicine

Received 22 January 2016, Accepted 12 December 2016 Published online 18 January 2017 in Wiley Online Library

(wileyonlinelibrary.com) DOI: 10.1002/sim.7217

Regression analysis of mixed panel count data with dependent terminal events

Guanglei Yu,[a] Liang Zhu,[b] Yang Li,[c] Jianguo Sun[a*†] and Leslie L. Robison[d]

$$\hat{\mu}_0(t;\beta,\hat{\boldsymbol{\omega}}(t)) = \frac{\sum_{i=1}^n r_i(t)\hat{\omega}_i(t)\tilde{N}_i(t)}{n\tilde{S}_r^{(0)}(t;\beta,\hat{\boldsymbol{\omega}}(t))}$$

and

$$\hat{\mu}_0(t;\beta,\hat{\boldsymbol{\omega}}(t))\, d\hat{\Gamma}_0(t;\beta,\hat{\boldsymbol{\omega}}(t)) = \frac{\sum_{i=1}^n (1-r_i(t))\tilde{N}_i(t)d\tilde{O}_i(t)}{n\tilde{S}_p^{(0)}(t;\beta,\hat{\boldsymbol{\omega}}(t))},$$

where

$$\tilde{S}_r^{(d)}(t;\beta,\hat{\boldsymbol{\omega}}(t)) = \frac{1}{n}\sum_{i=1}^n r_i(t)\hat{\omega}_i(t)\exp\{\beta^T Z_i\} Z_i^{\bigotimes d},$$

$$\tilde{S}_p^{(d)}(t;\beta,\hat{\boldsymbol{\omega}}(t)) = \frac{1}{n}\sum_{i=1}^n (1-r_i(t))\hat{\omega}_i(t)\exp\{\beta^T Z_i\} Z_i^{\bigotimes d},\ d=0,1,2,$$

$\mathbf{a}^{\bigotimes 0} = 1, \mathbf{a}^{\bigotimes 1} = \mathbf{a}, \mathbf{a}^{\bigotimes 2} = \mathbf{a}\mathbf{a}'$, and $\boldsymbol{\omega}(t) = (\omega_1(t),\ldots,\omega_n(t))'$. By plugging the two estimators earlier into Equation (5), we obtain

$$U(\beta) = \sum_{i=1}^n \int_0^\tau r_i(t)\hat{\omega}_i(t)(Z_i - \bar{Z}_r(t;\beta,\hat{\boldsymbol{\omega}}(t)))\tilde{N}_i(t)dH(t) + (1-r_i(t))(Z_i - \bar{Z}_p(t;\beta,\hat{\boldsymbol{\omega}}(t)))\tilde{N}_i(t)d\tilde{O}_i(t) = 0, \tag{6}$$

where $\bar{Z}_r(t;\beta,\hat{\boldsymbol{\omega}}(t)) = \tilde{S}_r^{(1)}(t;\beta,\hat{\boldsymbol{\omega}}(t))/\tilde{S}_r^{(0)}(t;\beta,\hat{\boldsymbol{\omega}}(t))$ and $\bar{Z}_p(t;\beta,\hat{\boldsymbol{\omega}}(t)) = \tilde{S}_p^{(1)}(t;\beta,\hat{\boldsymbol{\omega}}(t))/\tilde{S}_p^{(0)}(t;\beta,\hat{\boldsymbol{\omega}}(t))$.

Let $\hat{\beta}$ denote the estimator of β_0 given by solving Equation (6). To establish the asymptotic properties of $\hat{\beta}$, define $N_i^d(t) = I(D_i \leqslant t, D_i \leqslant C_i)$,

$$M_i^d(t;\delta) = N_i^d(t) - \int_0^t I(T_i^* \geqslant s)\exp\{\delta^T Z_i\}d\Delta_0(s),$$

and $\bar{Z}_d(t;\hat{\delta}) = \tilde{S}_d^{(1)}(t;\hat{\delta})/\tilde{S}_d^{(0)}(t;\hat{\delta})$, where $\Delta_0(t) = \int_0^t \lambda_0^d(s)ds$ and

$$\tilde{S}_d^{(d)}(t;\delta) = \frac{1}{n}\sum_{i=1}^n I(T_i^* \geqslant t)\exp\{\delta^T Z_i\} Z_i^{\bigotimes d},\ d=0,1,2.$$

Publications 293

- Regression analysis methodology
- Recurrent event data (e.g., BCC, pregnancy)

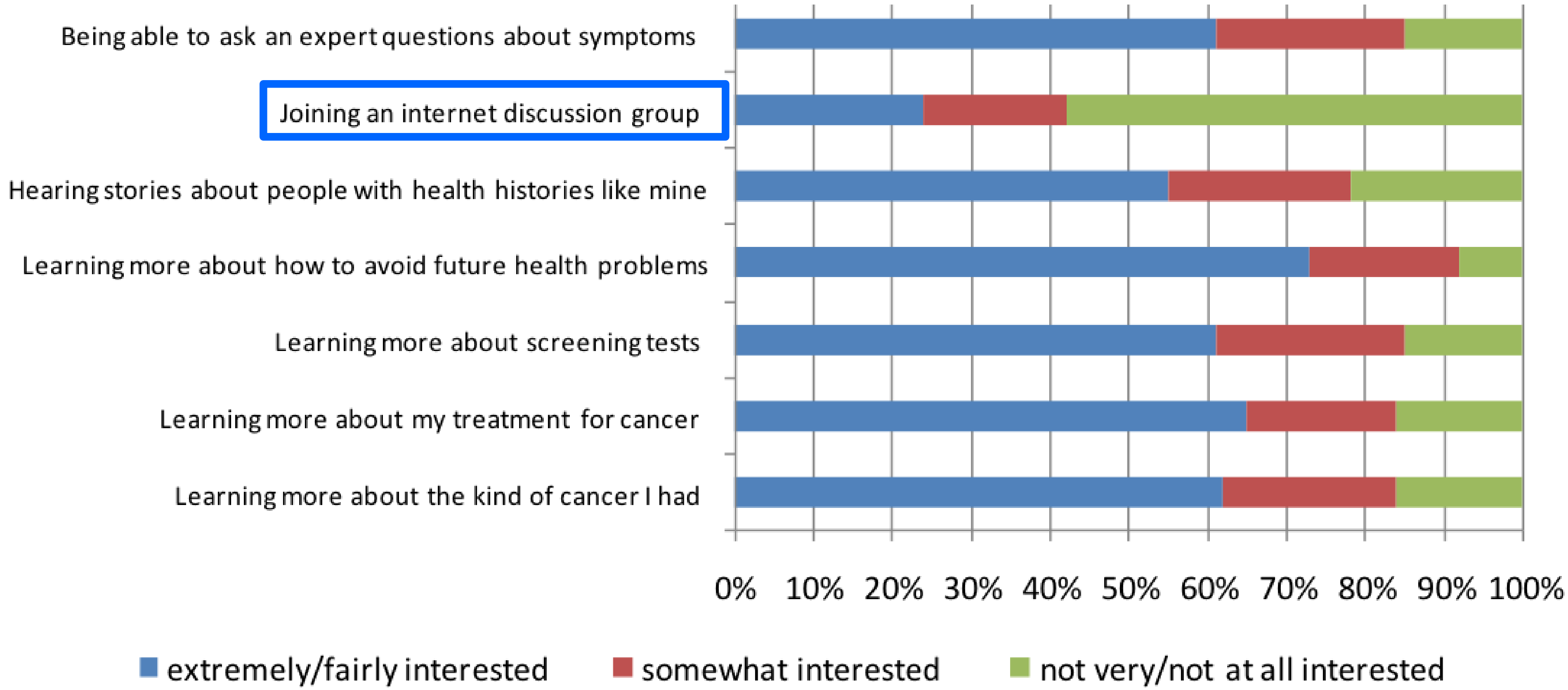
+

- Panel count data: observed at discrete time points

Submitted manuscript 1

Where, When, and Why Adult Survivors of Childhood Cancer Seek Internet-based Health Information

Mechelle D Claridy[1], Melissa M Hudson[2, 3], Jeanne Steele[4], Lee Caplan[1], Pauline A Mitby[5], Wendy Leisenring[6], Selina A Smith[7], Leslie L Robison[2], Ann C Mertens[8]


Being able to ask an expert questions about symptoms
Joining an internet discussion group
Hearing stories about people with health histories like mine
Learning more about how to avoid future health problems
Learning more about screening tests
Learning more about my treatment for cancer
Learning more about the kind of cancer I had
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
extremely/fairly interested
somewhat interested
not very/not at all interested

In the past 12 months, have you looked for health or medical information for yourself while using the internet?	CCSS (n=1386) OR (95% CI)	HINTS (n=2385) OR (95% CI)
Overall	**2.76 (2.40-3.19)**	1.0

How much do you trust information about health or medical topics from sources listed below?	Doctor or Healthcare Professional		
	CCSS **Mean (SD)**	HINTS **Mean (SD)**	***p-value**
Total	3.77 (0.50)	3.63 (0.62)	< 0.01

Submitted manuscript 2

Yuan Y, Zhou QM, Li B, Cai H, Chow EJ, Armstrong GT.

A Threshold-free Prospective Prediction Accuracy Measure for Censored Time to Event Data

(invited for revision by Statistics in Medicine)

1. Scope of your Working Group
2. Publications since the 2015 mtg
3. **Ongoing work**
4. Future focus

CCSS
An NCI funded Resource

Di / Wendy Inverse Prob Weighting

- **Address bias concern due to non-participation (FU Survey 5)**
- **Inverse Probability Weighting (IPW)** to boost contribution for survivors with characteristics of low participation
- Methodological paper that describes the application of IPW in CCSS

Epidemiology/Biostatistics Working Group

- **Tiled study design: using temporal overlap as a method to extend longitudinal follow-up among carefully selected time-limited cohorts (Chow)**
- **Use of an incentive to increase biologic sample (Oragene) return rate (McDonald)**
- **Radiation dose reconstruction methods for intensity modulated radiation therapy (Howell)**
- **Handling Missing Data due to No Consent for Medical Record Abstraction by Multiple Imputation (Martin/Liu)**

Funded Ancillary Projects

Principal Investigator: Liang Zhu (St. Jude Children's Research Hospi
Title: New Methods to Address Dilemmas in Mixed Recurrent-event and
Dates of Funding: 7/16 - 6/18
Funding Source: National Institutes of Health (R21)
Award: $501,312
Study Aims: To develop semi-parametric methods for regression analys
event and compare them with alternative methods by simulation studies

Principal Investigator: Yan Yuan (University of Alberta)
Title: Risk Prediction Model of Premature Menopause in Childhood Cance
Dates of Funding: 7/16 - 12/18
Funding Source: Canadian Institutes of Health Research
Award: $179,858
Study Aims: To develop a prediction model for early menopause

Childhood Cancer Survivor Study

Epidemiology/Biostatistics Working Group

CCSS
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Principal Investigator: Lennie Wong (City of Hope)
Title: Cost effectiveness of breast cancer screening guidelines for female sur
Dates of Funding: 7/17 - 6/20
Funding Source: American Cancer Society
Award: $527,000
Study Aims: 1) Examine the cost-effectiveness of 1) annual clinical breast e
vs. MRI as adjunct to mammography.

Principal Investigator: Yutaka Yasui, Jinghui Zhang (St. Jude Children's Resea
Title: Late Effects Prediction using Clinical Phenotypes and Whole Genome Seq
Dates of Funding: 4/17 - 3/22
Funding Source: National Institutes of Health, RO1
Award: $3,457,455
Study Aims: 1) Build individual risk prediction models with the SJLIFE cohort for
basal cell carcinoma, and multiple subsequent neoplasms, 2) Validate the risk pre
higher SN counts (CCSS)

Submitted Ancillary Projects

Principal Investigator: Liang Zhu (University of Texas MD Anderson)
Title: Statistical Analysis for Mixed Outcome Measures in Recurrent Event
Proposed Funding Source: American Cancer Society
Study Aims: Develop a likelihood-based semiparametric estimation metho
and panel-count data.
Status: Submitted October 2016, scored 20, awaiting funding decision

1. Scope of your Working Group

2. Publications since the 2015 mtg

3. Ongoing work

4. **Future focus**

- Temporal trends
- Prediction modeling and model evaluation
- Cost-effectiveness analysis
- GWAS analysis
    - G x Tx interaction / Tx-stratified analysis
    - Alternative analytic methodologies

Working Group => Your entry to CCSS

PLEASE CONTACT ME IF YOU HAVE ANY INTEREST OR IDEA ON POTENTIAL EPI/BIOSTAT PROJECTS

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