

INTRODUCTION

- Previous research has demonstrated that **Hodgkin's Lymphoma (HL) is curable in up to 80% of patients** due to advances in chemotherapy and radiation therapy.¹
- **One retrospective study based on 1983-2011 data found that radiation therapy improved the overall survival of patients with HL and old age, male, extranodal disease, African American race, and non-Hispanic ethnicity were associated with worse survival rates.**
- This study aims to **assess if radiation therapy (RT) remains beneficial and to identify prognostic factors** in a more recent patient cohort.

METHODS

- We used the **SEER Research PLUS data** to identify patients diagnosed with **stage I-IV HL in 2004-2020 who received radiation therapy** and survived at least **6 months**.
- **Age at diagnosis, sex, race/ethnicity, year of diagnosis, median income, presence of extra-nodal sites, usage of chemotherapy and radiation, and staging** were analyzed as covariates.
- **Multivariable Cox hazard proportional regression analysis and Kaplan-Meier (KM)** were employed.

DATA

Table 1. Patients characteristics of Hodgkin's Lymphoma: SEER 2004-2020

Radiation	No (N=19497)		Yes (N=8838)		Total	
	N	%	N	%	N	%
Age at diagnosis						
0-24	4865	62.0	2982	38.0	7847	27.7
25-44	7540	69.1	3377	30.9	10917	38.5
45-64	4592	72.4	1755	27.7	6347	22.4
65+	2500	77.5	724	22.5	3224	11.4
Sex						
Female	8857	68.6	4046	31.4	12903	45.5
Male	10640	69.0	4792	31.1	15432	54.5
Race and Ethnicity						
Non-Hispanic White	12499	68.2	5839	31.8	18338	64.7
Non-Hispanic Black	2426	71.7	957	28.3	3383	11.9
Non-Hispanic Asian or Pacific Islander	991	62.1	604	37.9	1595	5.6
Hispanic (All Races)	3581	71.4	1438	28.7	5019	17.7
Diagnosis Year						
2004-2009	6740	63.5	3881	36.5	10621	37.5
2010-2020	12757	72.0	4957	28.0	17714	62.5
AJCC stage						
I	2553	56.5	1965	43.5	4518	15.9
II	7203	58.8	5050	41.2	12253	43.2
III	5024	83.6	987	16.4	6011	21.2
IV	4717	85.0	836	15.1	5553	19.6
Median income (county level)						
0-75k	11452	70.1	4897	30.0	16349	57.7
75+k	8045	67.1	3941	32.9	11986	42.3
Site						
Hodgkin - Extranodal	372	66.1	191	33.9	563	2.0
Hodgkin - Nodal	19125	68.9	8647	31.1	27772	98.0
Adjuvant Chemotherapy						
No/Unknown	2332	72.3	895	27.7	3227	11.4
Yes	17165	68.4	7943	31.6	25108	88.6
All	19497	68.8	8838	31.2	28335	100.0

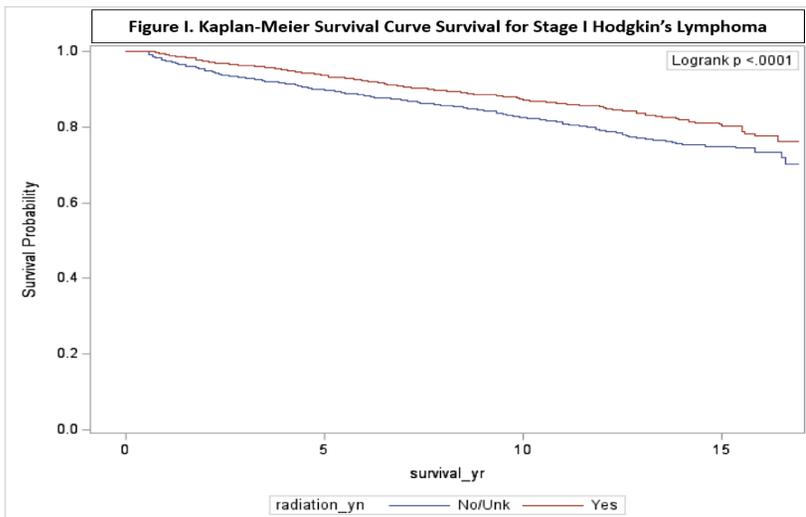
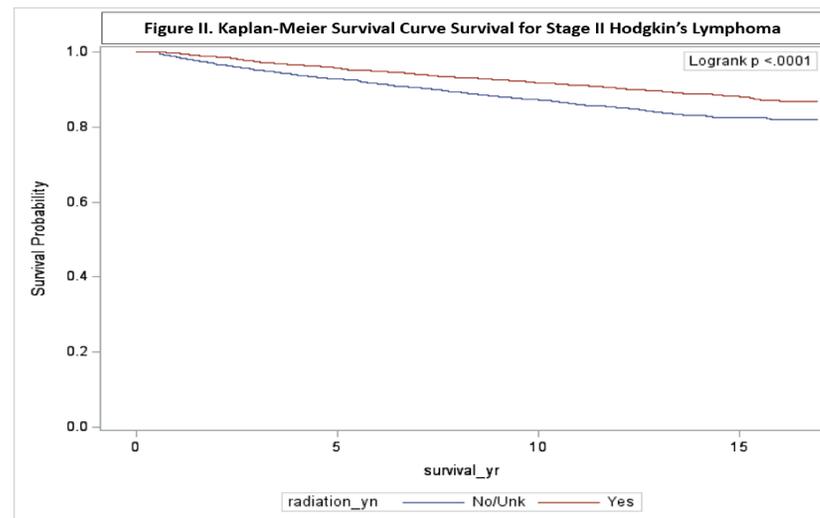


Table 2. Multivariate COX Model Estimate.

Parameter	estimate	Adjusted Hazard Ratio		p-value
		95% Lower Confidence Limits	95% Upper Confidence Limits	
Age at diagnosis				
0-24	1			
25-44	1.518	1.344	1.715	<.0001
45-64	3.92	3.487	4.406	<.0001
65+	14.507	12.925	16.284	<.0001
Sex				
Female	1			
Male	1.224	1.148	1.306	<.0001
Race & ethnicity				
Non-Hispanic White	1			
Non-Hispanic Black	1.409	1.281	1.549	<.0001
Non-Hispanic Asian or Pacific Islander	1.052	0.896	1.235	0.5367
Hispanic (All Races)	1.146	1.049	1.252	0.0026
Diagnosis Year				
2004-2009	1			
2010+	0.695	0.649	0.744	<.0001
Median income				
0-75k	1			
75+k	0.784	0.734	0.838	<.0001
Site Recoded				
Hodgkin - Extranodal	1			
Hodgkin - Nodal	0.892	0.744	1.07	0.2187
Adjuvant Chemotherapy				
No/Unknown	1			
Yes	0.856	0.782	0.936	0.0006
Radiation Yes vs. No/Unk, at stage=1				
	0.645	0.549	0.758	<.0001
Radiation Yes vs. No/Unk, at stage=2				
	0.699	0.619	0.79	<.0001
Radiation Yes vs. No/Unk, at stage=3				
	0.901	0.746	1.088	0.2772
Radiation Yes vs. No/Unk, at stage=4				
	0.834	0.679	1.023	0.0817



SELECTED REFERENCES

1. Witkowska M, Majchrzak A, Smolewski P. The role of radiotherapy in Hodgkin's lymphoma: what has been achieved during the last 50 years? *Biomed Res Int.* 2015;2015:485071. doi: 10.1155/2015/485071. Epub 2015 Feb 1. PMID: 25705661; PMCID: PMC4331316.
2. Master S, Koshy N, Wilkinson B, et al. Effect of Radiation Therapy on Survival in Hodgkin's Lymphoma: A SEER Data Analysis. *Anticancer Res.* 2017;37(6):3035-3043. doi:10.21873/anticancer.11658

RESULTS

- Of the 28,335 eligible HL patients, young age, female, Asian and non-Hispanic white, recent diagnosis year, early-stage patients were more likely to receive RT (Table 1)
- The risk of overall death was **lower** for patients receiving RT than those without RT for **stage I** (AHR: 0.645; CI: 0.549-0.758) and **stage II** (AHR: 0.712; CI: 0.699-0.619) HL in the adjusted model. (Table 2)
- The KM curve further suggested that **RT increased 15-year overall survival (p<0.05).** (Figures 1-2)
- **RT did not significantly reduce the OS for stage III-IV HL patients in the adjusted model (Table 2).**
- Those with **higher income (> \$75,000), recent diagnosis years (2010-2020 vs. 2004-2009), receipt of chemotherapy, non-black race, and female sex** had a **lower risk** of overall deaths than their counterparts. (Table 2)

CONCLUSION

- **Stage I and II HL patients** receiving RT have a **lower risk** of overall death and **higher long-term survival** than those without RT.
- **Social demographic factors** also affect the outcome of HL patients.
- **Further studies** can examine why the same increased survivability was not seen in patients with stage III or IV.

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