Chemotherapy and Radiation Versus Chemotherapy Alone for Elderly Patients With N3 Stage IIIB NSCLC

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Abstract

We conducted a retrospective analysis in patients who received chemotherapy and radiation and chemotherapy alone for stage N3 IIIB non–small-cell lung cancer with a focus on those ≥70 years of age. We found that there was a survival benefit of bimodality therapy irrespective of age and comorbidities; they should not be routinely used to exclude patients from aggressive treatment.

Background: Standard treatment for stage III non–small-cell lung cancer (NSCLC) is concurrent chemotherapy and radiation (chemo-RT). However, N3 stage IIIB disease portends a worse prognosis and the tolerability of chemo-RT in patients ≥70 years old is a concern. In this analysis, we evaluate the survival of patients with N3 stage IIIB NSCLC who were treated with chemo-RT or chemotherapy alone with a focus on elderly patients. **Patients and Methods:** We retrospectively analyzed patients diagnosed with N3 stage IIIB NSCLC between 2010 and 2013 using the National Cancer Database. We compared overall survival (OS) between patients who underwent chemo-RT versus chemotherapy alone. The Kaplan–Meier method was used for median OS with log rank tests. Multivariable Cox models were used for multivariable and subgroup analyses. **Results:** We included 9769 patients in our analysis, 7770 of whom received chemo-RT and 1999 who received chemotherapy alone. The median OS for patients who received chemo-RT was 16.4 months versus 12.7 months with chemotherapy alone ($P < .0001$). The median OS for patients ≥70 years old who received chemo-RT was 15.0 months versus 12.4 months with chemotherapy alone ($P < .0001$). In multivariable analyses, the benefit of chemo-RT was similar regardless of age. Subgroup analyses in patients ≥70 years indicated a benefit of chemo-RT (hazard ratio, <1.0) across all patient and disease strata. **Conclusion:** Survival was improved in elderly patients who received chemo-RT versus chemotherapy alone for N3 stage IIIB NSCLC. Our findings suggest that age and comorbidities should not preclude clinicians from recommending chemo-RT to these patients.

Clinical Lung Cancer, Vol. 20, No. 4, e495-503
Keywords: Advanced age, Bimodality treatment, Chemo-RT, Non–small-cell lung cancer, Stage III

Introduction

Approximately 30% of patients diagnosed with non–small-cell lung cancer (NSCLC) have stage III disease at presentation.[1] Concurrent chemotherapy and radiation (chemo-RT) is the standard of care for patients with adequate performance status and is considered potentially curative. However, the 5-year overall survival (OS) for stage IIIB NSCLC remains poor at <10%.[2] This dismal OS is partially because of the inclusion of patients with incurable malignant pleural effusions, considered IIIB disease on the basis of older American Joint Committee on Cancer (AJCC) staging schema.

Before the adoption of the AJCC seventh edition, stage IIIB NSCLC was a heterogeneous group of patients and included T4Nx and TxN3 disease. The seventh edition was adopted in 2010 and IIIB NSCLC was reclassified to include only TxN3 and T4N2 disease. Although current guidelines recommend chemo-RT for TxN3 stage IIIB disease,[3] clinical trials have often combined non-operable stage IIIB disease with stage IV disease or assigned exceptionally fit stage IIIB patients to trimodality therapy.[4] To our knowledge, the optimal treatment strategy as well as survival in N3 Stage IIIB NSCLC have not been previously examined. Patients with TxN3M0 disease have a poor prognosis[5,6] and it is not clear if chemo-RT can improve survival over chemotherapy alone.

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Submitted: Jan 23, 2019; Revised: Mar 6, 2019; Accepted: Apr 12, 2019; Epub: Apr 19, 2019

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1525-7304/$ - see frontmatter
https://doi.org/10.1016/j.cllc.2019.04.003

There is a special interest in elderly patients (age ≥70 years) because the median age at diagnosis in the United States is 70 years and these patients are often not adequately represented in clinical trials. A recent analysis of 16 clinical trials using various radiation and chemotherapy regimens for stage III NSCLC showed that only 23% of patients enrolled were ≥70 years of age. Patients older than the age of 70 years with stage IIIB disease accounted for only 11% of all clinical trial participants. In this analysis, elderly patients had a worse OS and experienced more toxicities compared with younger patients.[7]

We therefore analyzed the National Cancer Database (NCDB) to study the survival of patients with N3 IIIB NSCLC according to the AJCC seventh edition staging system and compared chemo-RT versus chemotherapy alone. We risk-stratified survival on the basis of clinical characteristics such as sex, race, Charlson/Deyo comorbidity score (CDCS), with a focus on patients ≥70 years of age.

Patients and Methods

Using the NCDB

We conducted a retrospective analysis using the NCDB, which is a joint project of the Commission on Cancer (CoC) of the American College of Surgeons and the American Cancer Society that began in 1989. It is a clinical oncology database constructed from the data in hospital registries of >1500 CoC-accredited facilities. The data collected represents >70% of newly diagnosed cancers in the United States and is the largest clinical cancer registry in the world.[8] Reporting is standardized, using the same, well defined elements and definitions. The data used in the study are derived from a deidentified NCDB file. Variables captured in the NCDB include patient demographic characteristics, tumor histology, and treatment rendered including surgery, systemic therapy (chemotherapy, immunotherapy, and hormone therapy), and radiation and the sequence rendered, as well as follow-up. The exact systemic treatment and dosage are not reported. Furthermore, the NCDB only captures a patient's first course of treatment in each modality. Patient comorbidities are captured by the CDCS, with reporting of scores as 0, 1, and 2+. The American College of Surgeons and the CoC have not verified and are not responsible for the analytic or statistical methodology used, or the conclusions drawn from these data by the investigators.

Patient Selection

We obtained records from all patients diagnosed with NSCLC between 2010 and 2013 from the 2014 NCDB participant user file (PUF). We chose these years intentionally because the AJCC seventh edition was instituted in 2010 and we needed survival data, which was only complete for patients up to 2013. Detailed inclusion and exclusion criteria are summarized in Table 1. We included patients with established NSCLC histologies and who were diagnosed appropriately, excluding in situ diagnoses. Patients must have had clinical stage IIIB disease with clinical N3 staging, and patients with other than M0 disease and who did not have diagnostic confirmation were excluded. The NCDB does not provide data on whether positron emission tomography (PET) scans were used in the staging of patients. However, PET imaging became standard of care several years before our patient cohort and it is reasonable to conclude that most of these patients underwent PET/computed tomography imaging as part of the staging workup. Only patients who were known to have chemotherapy and/or radiation were included in the final analysis. The NCDB does not specifically denote that chemotherapy and radiation were given together versus sequentially. However, it was possible to exclude patients who did not receive radiation as a first course of treatment plan and those who received radiation palliatively. We did not include patients who received surgery or immunotherapy.

Table 1 Exclusion Criteria for Patient Selection

Criteria	n, After That Criterion Is Applied
Diagnosed Within 2010 to 2013 Time Period	489,341
Sequence Value Is Within Accepted Subset	485,178
Histology Value Is Within Accepted Subset	458,096
Clinical Stage 3B Only	29,474
Clinical Stage M0 Only	27,298
Clinical Stage N3 Only	14,802
Removed TIS and Patients Without Acceptable Diagnostic Confirmation	14,697
Remove Unknown From the Following Treatment Codes:	13,094
1. Location of Radiation Therapy	
2. Surgery Other Site at Any CoC Facility	
3. Regional Lymph Node Surgery at Any CoC Facility	
4. Surgical Approach at Facility	
5. Chemotherapy at Any CoC Facility (Both Chemotherapy Recommended, Unknown If Administered and Unknown If Recommended or Administered)	
6. Chemotherapy at This Facility	
7. Received Treatment or Active Surveillance	
Keep Only the Group For "None" in the Following Treatment Groups:	
1. Hormone Therapy at Any CoC Facility	
2. Hormone Therapy at This Facility	
3. Hematologic Transplantation and Endocrine Procedures at Any CoC Facility	
Patients Who Received Chemotherapy and Did Not Receive Surgery	9784
Patients With Missing End Points	9769

Abbreviations: CoC = American College of Surgeons Commission on Cancer; TIS = tumor in situ.

Statistical Analysis

Patient characteristics according to treatment received are reported with counts and proportions. Differences in these characteristics between treatment groups were tested using Mantel–Haenszel χ^2 for ordinal and Pearson χ^2 for nonordinal categorical characteristics.

Overall survival curves and associated estimates with 95% confidence interval are reported using Kaplan–Meier methods and the log-rank test was used to compare treatment groups. Cox models were used to compare treatment of chemo-RT versus chemotherapy only in subsets of patients defined according to patient characteristics. The hazard ratio (HR) and 95% confidence limits are displayed in forest plots.

Table 2 Characteristics of Patients

Characteristic	Chemotherapy Alone (n = 1999)	Chemotherapy and Radiation (n = 7770)	Total (n = 9769)	*P*
Age, Years[a]				<.0001
18-49	92 (4.6)	488 (6.3)	580 (5.9)	
50-54	151 (7.6)	784 (10.1)	935 (9.6)	
55-59	219 (11.0)	1079 (13.9)	1298 (13.3)	
60-64	242 (12.1)	1271 (16.4)	1513 (15.5)	
65-69	368 (18.4)	1461 (18.8)	1829 (18.7)	
70-74	363 (18.2)	1264 (16.3)	1627 (16.7)	
75-79	307 (15.4)	889 (11.4)	1196 (12.2)	
80-84	183 (9.2)	423 (5.4)	606 (6.2)	
85-89	63 (3.2)	96 (1.2)	159 (1.6)	
≥90	11 (0.6)	15 (0.2)	26 (0.3)	
Sex[a]				.0357
Male	1061 (53.1)	4374 (56.3)	5435 (55.6)	
Female	938 (46.9)	3396 (43.7)	4334 (44.4)	
Race[a]				.8508
White	1661 (83.1)	6523 (84.0)	8184 (83.8)	
Black	253 (12.7)	956 (12.3)	1209 (12.4)	
Other/unknown	85 (4.3)	291 (3.7)	376 (3.8)	
Ethnicity[a]				.9999
Non-Hispanic	1871 (93.6)	7273 (93.6)	9144 (93.6)	
Hispanic	45 (2.3)	171 (2.2)	216 (2.2)	
Unknown	83 (4.2)	326 (4.2)	409 (4.2)	
Insurance Status[a]				<.0001
Not insured	74 (3.7)	306 (3.9)	380 (3.9)	
Private/managed care	499 (25.0)	2571 (33.1)	3070 (31.4)	
Medicaid	131 (6.6)	638 (8.2)	769 (7.9)	
Medicare	1247 (62.4)	3987 (51.3)	5234 (53.6)	
Other/unknown	48 (2.4)	268 (3.4)	316 (3.2)	
Median Income Quartiles 2008-2012[a]				.1407
NA	27 (1.4)	90 (1.2)	117 (1.2)	
<$38,000	361 (18.1)	1610 (20.7)	1971 (20.2)	
$38,000-$47,999	508 (25.4)	2026 (26.1)	2534 (25.9)	
$48,000-$62,999	582 (29.1)	2018 (26.0)	2600 (26.6)	
≥$63,000	521 (26.1)	2026 (26.1)	2547 (26.1)	
Facility Type[a]				.9971
Nonacademic	1381 (69.1)	5361 (69.0)	6742 (69.0)	
Academic/research	618 (30.9)	2409 (31.0)	3027 (31.0)	
Urbanization[a]				.0388
Metro	1648 (82.4)	6167 (79.4)	7815 (80.0)	
Urban	312 (15.6)	1397 (18.0)	1709 (17.5)	
Rural	39 (2.0)	206 (2.7)	245 (2.5)	
CDCS[b]				.1852
0	1227 (61.4)	5044 (64.9)	6271 (64.2)	
1	534 (26.7)	1935 (24.9)	2469 (25.3)	
≥2	238 (11.9)	791 (10.2)	1029 (10.5)	
Clinical T Stage[a]				<.0001
0/1	428 (21.4)	1591 (20.5)	2019 (20.7)	
2	621 (31.1)	2651 (34.1)	3272 (33.5)	
3	353 (17.7)	1630 (21.0)	1983 (20.3)	

Table 2 Continued

Characteristic	Chemotherapy Alone (n = 1999)	Chemotherapy and Radiation (n = 7770)	Total (n = 9769)	*P*
4	429 (21.5)	1479 (19.0)	1908 (19.5)	
X	168 (8.4)	419 (5.4)	587 (6.0)	
Year of Diagnosis[a]				.6553
2010	489 (24.5)	1851 (23.8)	2340 (24.0)	
2011	521 (26.1)	2015 (25.9)	2536 (26.0)	
2012	532 (26.6)	1966 (25.3)	2498 (25.6)	
2013	457 (22.9)	1938 (24.9)	2395 (24.5)	
Histology[a]				<.0001
Adenocarcinoma	1127 (56.4)	3529 (45.4)	4656 (47.7)	
Squamous cell carcinoma	545 (27.3)	2912 (37.5)	3457 (35.4)	
Large cell carcinoma	30 (1.5)	114 (1.5)	144 (1.5)	
Other	297 (14.9)	1215 (15.6)	1512 (15.5)	

Abbreviation: CDCS = Charlson/Deyo comorbidity score.
[a]*P* derived using χ^2.
[b]*P* derived using Mantel–Haenszel.

Three multivariable Cox models, each including all covariates described in Table 2 were used to examine if patient selection modified the difference in the treatment effect on OS. Two of the models used propensity score methods to adjust for treatment selection differences. The propensity score was determined by fitting a logistic regression model with treatment as the outcome and patient characteristics as predictors. The first adjusted model used inverse probability treatment weighting to report the Cox regression HR of the treatment effect on OS. The second adjusted model used a decile-stratified propensity score to adjust for patient characteristics. The third model was a standard multivariable Cox model with adjustment including treatment and the patient characteristics with no additional adjustments. The HRs of the treatment effects and characteristic effects on OS are graphed in a forest plot.

Results

After factoring for specific inclusion and exclusion criteria (see Table 1), 9769 patients with N3 stage IIIB NSCLC were ultimately included in our analysis, 1999 received chemotherapy alone and 7770 received chemo-RT. The characteristics of the patients are described in Table 2.

There were more male compared with female patients (5435 [55.6%] versus 4334 [44.4%]) in our study population, consistent with the epidemiology of patients diagnosed with NSCLC. Most of the patients (8184 [83.8%]) were white, 1209 [12.4%] were black, and 376 [3.8%] were other/unknown; race was not significantly different between patients who received chemo-RT compared with chemotherapy alone. The most common histology was adenocarcinoma (4656 cases [47.7%]) followed by squamous cell carcinoma (3457 cases [35.4%]). A higher proportion of patients in the chemotherapy group were ≥70 years old compared with the chemo-RT group (927 patients [46.6%] vs. 2687 patients [34.5%]; $P < .0001$).

Overall Survival

Figure 1 shows the OS of patients who received chemotherapy alone compared with those who received chemo-RT. Figure 1A represents the entire cohort of patients, whereas Figure 1B includes only the subset of patients ≥70 years old. Patients who received chemo-RT had significantly longer survival compared with those who received chemotherapy alone (16.4 months vs. 12.7 months; $P < .0001$). This trend held true even if accounting for patients ≥70 years old (15.0 months vs. 12.4 months; $P < .0001$).

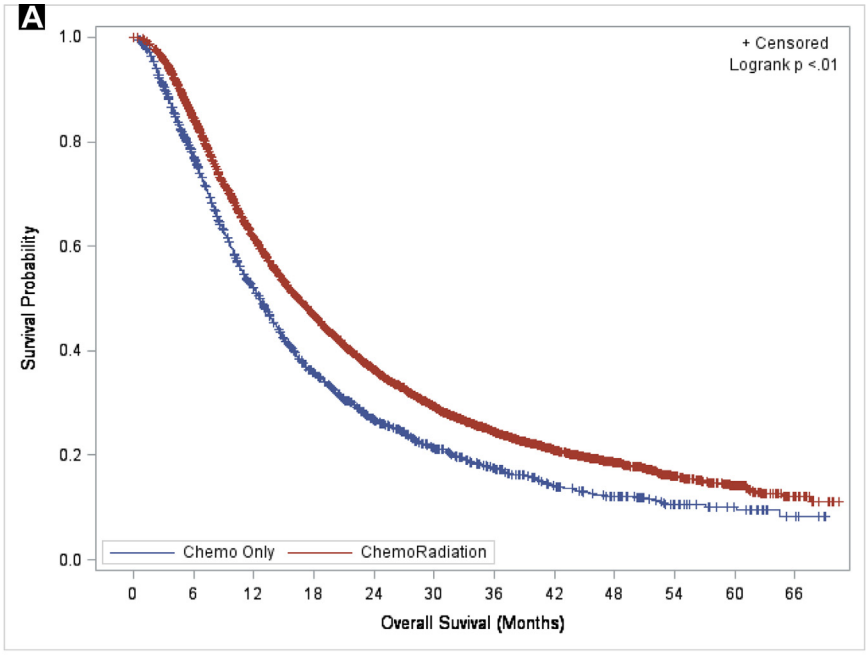
Survival Differences in Patients Who Received Chemo-RT Compared With Chemotherapy Alone

Figure 2 reports the HRs that represent survival comparisons between chemo-RT versus chemotherapy alone, in subgroup analyses; Figure 2A includes the entire cohort whereas Figure 2B includes only the subset of patients ≥70 years of age. Sex, race, income, and CDCS did not affect the treatment effect on OS in either the entire cohort or those ≥70 years of age.

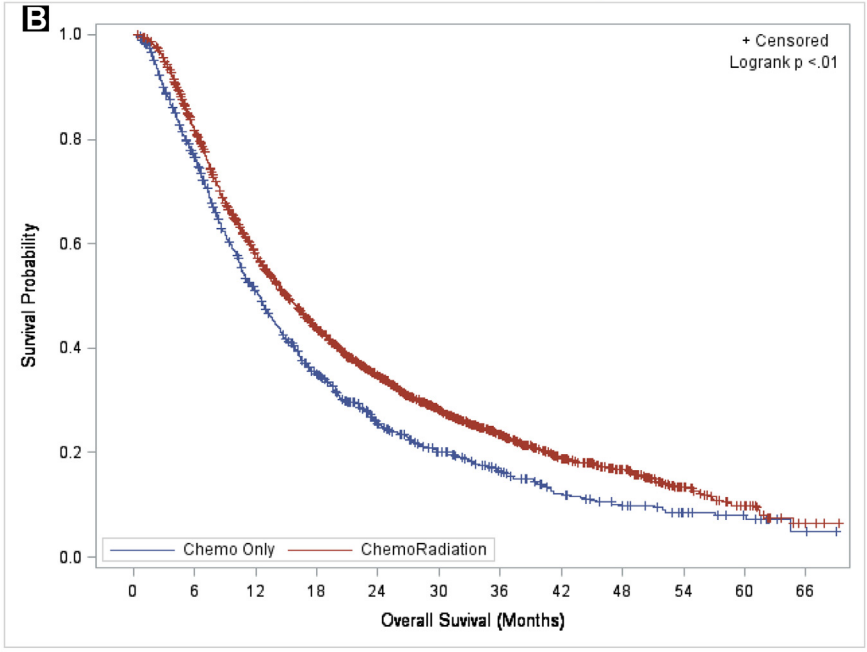
Subgroup analyses in patients ≥70 years indicated a benefit to chemo-RT (HR, <1.0) within all patient and disease strata, including CDCS ($P < .05$ for each score). Patients with adenocarcinoma and squamous cell histologies had longer median survival with the additional of radiation compared with chemotherapy alone. However, the same benefit was not seen with large-cell carcinoma. This might be a reflection of the small number of large-cell carcinoma patients (1.5% of cases in each group) and not a true survival difference. Similarly, type of insurance and location seem to affect the survival benefit of chemo-RT versus chemotherapy alone. However, this might also be because of small numbers in each group, because the same trends are not seen in the overall cohort.

Treatment with chemo-RT has a 24% lower risk of death compared with treatment with chemotherapy alone in this population. The estimate for the HR is the same for all models estimated with nearly identical 95% confidence intervals (HR, 0.76 with 95% confidence interval, 0.71-0.80; Figure 3). Multivariable Cox models with and without propensity score adjustment show that further adjustment for patient characteristics and treatment selection do not change the size or precision of the treatment effect on OS in this study population.

Figure 1 Survival Curves for Patients Treated With Chemotherapy and Radiation Versus Chemotherapy Alone: (A) Entire Cohort and (B) Patients ≥70 Years of Age

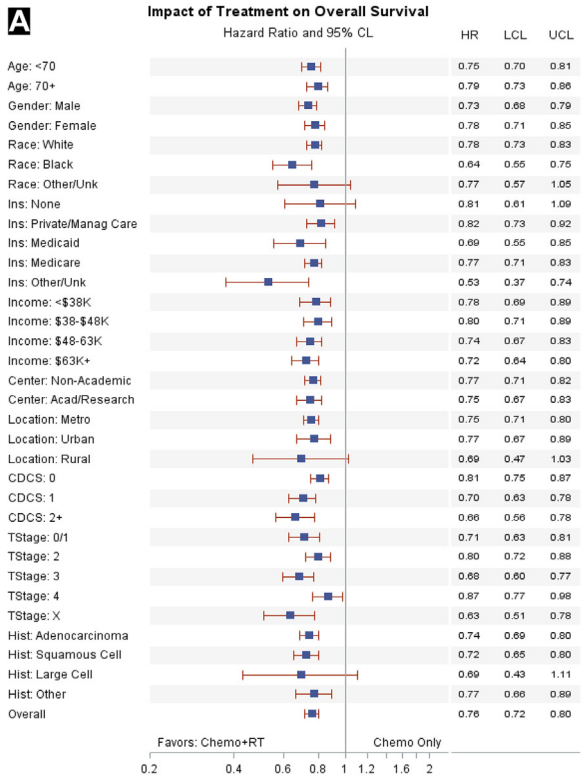


Group	Median survival (mo)	12-month survival	60-month survival
Chemo Only	12.7 (11.9, 13.3)	52% (49.8, 54.3)	10% (8.1, 12.4)
Chemo-RT	16.4 (15.9, 17.0)	62% (60.6, 62.8)	14% (13.0, 15.6)



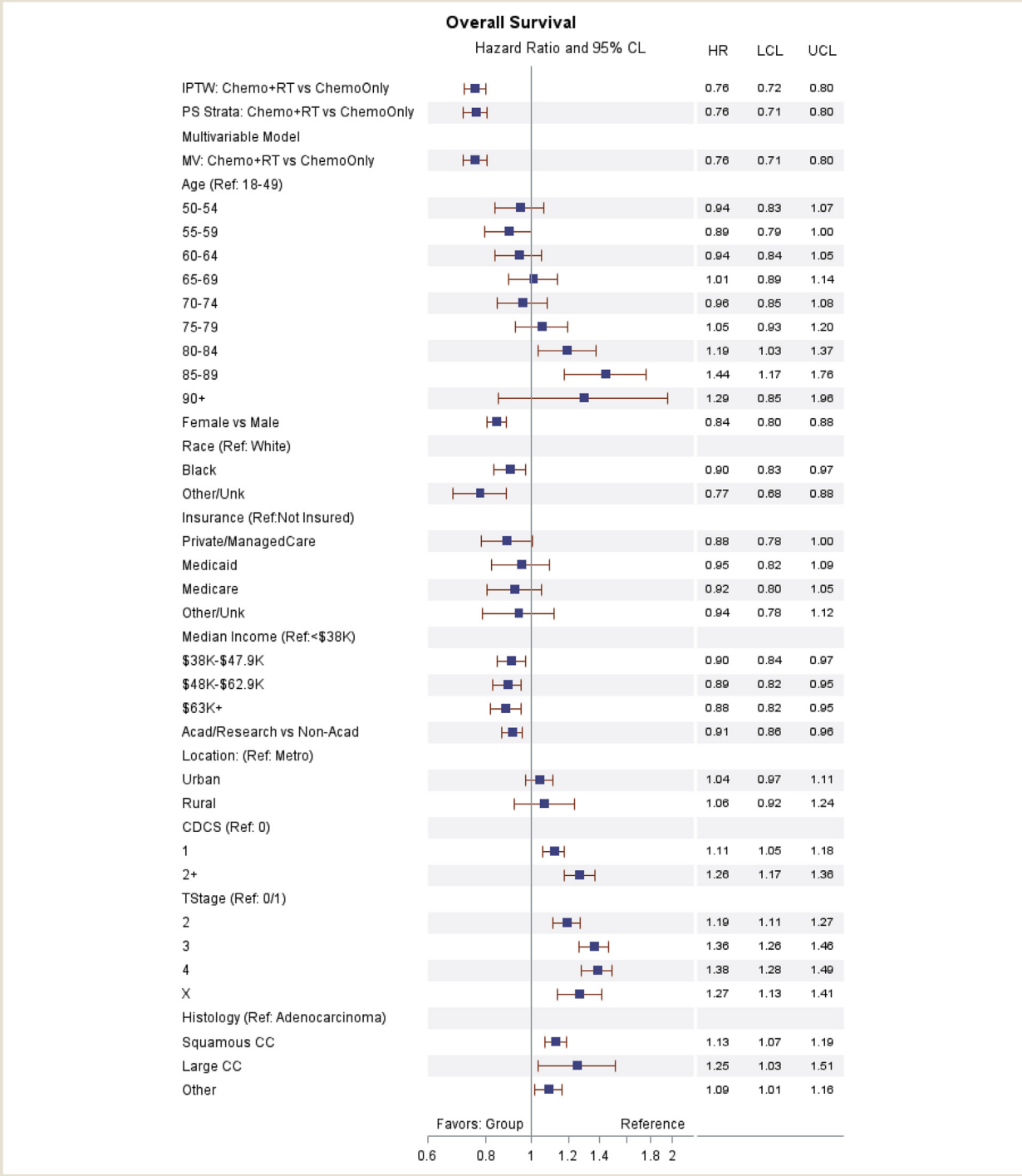
Group	Median survival (mo)	12-month survival	60-month survival
Chemo Only	12.4 (11.1, 13.1)	51% (47.8, 54.3)	8% (5.6, 11.0)
Chemo-RT	15.0 (14.3, 16.0)	58% (56.3, 60.0)	10% (7.9, 12.3)

Figure 2 Hazard Ratios (HRs) of Overall Survival of Concurrent Chemotherapy and Radiation (Chemo + RT) versus Chemotherapy Alone According to Strata: (A) Entire Cohort, and (B) Patients ≥70 Years of Age



Abbreviations: LCL = lower confidence limit; UCL = upper confidence limit.

Figure 3 Multivariable Cox Models on Overall Survival



Abbreviations: IPTW = inverse probability of treatment weighting propensity score model; LCL = lower confidence limit; PS Strata = stratified propensity score model; UCL = upper confidence limit.

Discussion

To our knowledge, this is the largest reported retrospective study to examine the survival benefit of chemo-RT versus chemotherapy alone in patients with N3 stage IIIB NSCLC, a subgroup that has been associated with a dismal prognosis. Furthermore, we performed an age-stratified analysis with a focus on patients ≥70 years old, which is the median age at diagnosis of lung cancer in the United States, but is frequently under-represented in clinical trials. Our analysis indicates an OS benefit of chemo-RT compared with chemotherapy alone when treating patients with TxN3M0 stage IIIB NSCLC. Importantly, the survival benefit was also apparent even in patients ≥70 years of age.

Table 3 Treatment According to Age and CDCS

CDCS	Age Group	Chemotherapy Alone	Chemotherapy and Radiation
0	<70	680 (16.8%)	3376 (83.2%)
0	≥70	547 (24.7%)	1668 (75.3%)
1	<70	282 (18.5%)	1245 (81.5%)
1	≥70	252 (26.8%)	690 (73.3)
≥2	<70	110 (19.2%)	462 (80.8%)
≥2	≥70	128 (28.0%)	329 (72.0%)

Abbreviation: CDCS = Charlson/Deyo comorbidity score.

Stinchcombe et al evaluated the survival benefit and tolerability of chemo-RT in elderly patients with stage IIIA/B NSCLC using individual patient data from 16 trials conducted between 1990 and 2012.[7] This analysis suggested that patients ≥70 years old had a worse median OS compared with younger patients plus a higher incidence of Grade ≥3 adverse events. However, in their analysis they examined only patients who received chemo-RT and evaluated the survival difference between older and younger patients. In contrast, we limited our analysis to IIIB (N3) patients and compared survival between chemo-RT versus chemotherapy alone (stratified according to age). Our survival analysis showed that the median OS was numerically longer for younger patients who received chemo-RT versus patients ≥70 years of age, but we did not specifically examine the significance of this finding.

In our study, there were significantly more patients with adenocarcinoma who received chemotherapy alone compared with chemo-RT (1127 [56.4%] vs. 3529 [45.4%]); the reverse was true for squamous-cell carcinoma for which more patients received chemo-RT compared with chemotherapy alone (2912 [37.5%] compared with 545 [27.3%]). This might be due to the central location of many squamous-cell carcinomas which might have increased the feasibility of including contralateral mediastinal lymph nodes and/or ipsilateral supraclavicular lymph nodes into a tolerable radiation field. Adenocarcinoma is more likely to originate in the periphery of the lung and it might be challenging to encompass the primary tumor and N3 nodes in a tolerable radiation field. The group of patients with stage III, N3 NSCLC is a heterogeneous group because of the location of included lymph nodes (supraclavicular vs. contralateral mediastinal/hilar). Although it is thought that supraclavicular lymph node involvement might limit the feasibility of radiation and therefore portend worse outcomes, the AJCC eighth edition of NSCLC does not separate this group from contralateral mediastinal/hilar nodes because of comparable survival outcomes between the 2 groups.[9] Furthermore, the most recent National Comprehensive Cancer Network guidelines continue to recommend chemo-RT for N3 disease regardless of the involved nodal stations.

Interestingly, the patients' CDCS did not affect treatment received and there was an equal distribution of comorbidity scores between patients who received chemo-RT and chemotherapy ($P = .19$). Furthermore, even in patients with higher CDCS, a survival benefit was suggested with chemo-RT compared with chemotherapy alone. However, it should be noted that in the NCDB PUF, the CDCS is only recorded as 0, 1, or 2, with 2 encompassing all scores 2 to 6 (this is reflected in our labeling). Therefore, we do not know the true distribution of the score in the 2 treatment groups and it is possible that patients with higher comorbidity scores did not derive the same benefit from chemo-RT. However, we did examine the distribution of treatment modality according to age and CDCS (Table 3) to evaluate for potential bias in age and CDCS that might influence treatment. We found that most patients, even those with CDCS ≥2 and age ≥70, received chemo-RT versus chemotherapy alone.

The limitations of this analysis include its retrospective nature and biases inherent when using a large database. While we limited patients to only N3 stage IIIB disease, it is not known how staging was specifically obtained in each patient (ie, radiographic vs. pathologic). Therefore, it is possible that the population we analyzed was more heterogeneous, thereby skewing the results. By limiting our study population to patients diagnosed between 2010 and 2013, we attempted to remove some of this heterogeneity by selecting for the most modern population that should have received the current standards of care. Another limitation of our study is that it is not known what specific chemotherapy agents and regimens these patients received, because the details are not recorded as part of the NCDB. It would be of interest to assess whether different chemotherapy regimens affected the survival, especially in the elderly population. The sequence of chemotherapy and radiation administration were not able to be determined from the NCDB; the sequence of treatments is only recorded with surgery (ie, before or after surgery). Therefore, we were unable to make any specific conclusions about concurrent versus sequential chemotherapy and radiation. Last, not all factors that influence treatment choice were available in this study. There might be other confounders that could contribute to the difference in hazard of death between the treatments.

Although there are limitations to our study on the basis of its retrospective nature, our findings suggest that advanced age and comorbidities alone should not routinely exclude patients from chemo-RT for N3, stage III NSCLC. Clinical trials that focus on lung cancer treatment in elderly patients and those with greater comorbidities in a "real-world setting" are greatly needed. An example of a clinical trial could be to evaluate chemo-RT versus sequential chemotherapy and radiation versus chemotherapy alone for N3 disease. Patients ≥70 years of age and those who are "frailer" more accurately represent the patient population encountered in the community oncology clinics. Overwhelming data show that they are frequently excluded from clinical trials, thereby limiting the applicability of current trial results to many of these patients seen in the community. The question of bimodality therapy versus chemotherapy alone is even more important to address now that durvalumab is approved by the US Food and Drug Administration for consolidation therapy in patients who received chemo-RT for stage III NSCLC.

Conclusion

Our study supports the use of chemo-RT versus chemotherapy alone in patients with N3 stage IIIB NSCLC, which is considered to have a very poor prognosis because of its advanced nature. The survival benefit remained in patients ≥70 years of age and therefore, clinicians should not use age or comorbidities alone as exclusion criteria when determining candidacy for potentially curative, multimodality treatment.

Clinical Practice Points

- Stage IIIB NSCLC with N3 disease confers a poor prognosis.
- The current standard of care for stage IIIB NSCLC is chemo-RT; whereas elderly patients >70 years old constitute a significant proportion of newly diagnosed stage IIIB patients, their representation in clinical trials is limited. Therefore, the optimal treatment for elderly patients is not known.
- We found that there was a statistically significant OS benefit to chemo-RT compared with chemotherapy alone irrespective of age and comorbidities.
- Age and comorbidities should not be routinely used to exclude patients from more aggressive bimodality therapy.

Acknowledgments

This work was supported by the National Institutes of Health Grants 5T32CA009357-35, 5T32CA083654, and P30 CA 46592.

Disclosure

Angel Qin has received consulting fees from Boehringer Ingelheim, and Stephanie Daignault-Newton has received consulting fees from Augmenix, Inc. The remaining authors have stated that they have no conflicts of interest.

References

1. Kaniski F, Enewold L, Thomas A, Malik S, Stevens JL, Harlan LC. Temporal patterns of care and outcomes of non−small cell lung cancer patients in the United States diagnosed in 1996, 2005, and 2010. *Lung Cancer* 2017; 103:66-74.
2. Goldstraw P, Crowley J, Chansky K, et al. The IASLC Lung Cancer Staging Project: proposals for the revision of the TNM stage groupings in the forthcoming (seventh) edition of the TNM Classification of malignant tumours. *J Thorac Oncol* 2007; 2: 706-14.
3. Ettinger DS, Wood DE, Akerley W, et al. NCCN Guidelines Insights: Non−Small-Cell Lung Cancer, Version 4.2016. *J Natl Compr Canc Netw* 2016; 14:255-64.
4. Früh M, Ris HB, Xyrafas A, et al. Preoperative chemoradiotherapy with cisplatin and docetaxel for stage IIIB non−small-cell lung cancer: 10-year follow-up of the SAKK 16/01 trial. *Ann Oncol* 2016; 27:1971-3.
5. Bott MJ, Patel AP, Crabtree TD, et al. Role for surgical resection in the multidisciplinary treatment of stage IIIB non−small-cell lung cancer. *Ann Thorac Surg* 2015; 99:1921-8.
6. Russell K, Healy B, Pantarotto J, et al. Prognostic factors in the radical nonsurgical treatment of stage IIIB non−small-cell lung cancer. *Clin Lung Cancer* 2014; 15:237-43.
7. Stinchcombe TE, Zhang Y, Vokes EE, et al. Pooled analysis of individual patient data on concurrent chemoradiotherapy for stage III non−small-cell lung cancer in elderly patients compared with younger patients who participated in US National Cancer Institute Cooperative Group Studies. *J Clin Oncol* 2017; 35:2885-92.
8. Boffa DJ, Rosen JE, Mallin K, et al. Using the National Cancer Database for outcomes research: a review. *JAMA Oncol* 2017; 3:1722-8.
9. Abdel-Rahman O. Validation of the prognostic value of new sub-stages within the AJCC 8th edition of non−small-cell lung cancer. *Clin Transl Oncol* 2017; 19:1414-20.