ORIGINAL ARTICLE

Treatment Characteristics and Real-World Progression-Free Survival in Patients With Unresectable Stage III NSCLC Who Received Durvalumab After Chemoradiotherapy: Findings From the PACIFIC-R Study

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ABSTRACT

Introduction: The phase 3 PACIFIC trial established consolidation therapy with durvalumab as standard of care for patients with unresectable, stage III NSCLC and no disease progression after definitive chemoradiotherapy (CRT). The observational PACIFIC-R study assesses the real-world effectiveness of durvalumab in patients from an early access program. Here, we report treatment characteristics and a preplanned analysis of real-world progression-free survival (rwPFS).

Methods: PACIFIC-R (NCT03798535) is an ongoing, international, retrospective study of patients who started durvalumab (intravenously; 10 mg/kg every 2 wk) within an early access program between September 2017 and December 2018. The primary end points are investigator-assessed rwPFS and overall survival (analyzed by Kaplan–Meier method).

Results: As of November 30, 2020, the full analysis set comprised 1399 patients from 11 countries (median follow-up duration, 23.5 mo). Patients received durvalumab for a median of 11.0 months. Median rwPFS was 21.7 months (95% confidence interval: 19.1–24.5). RwPFS was numerically longer among patients who received concurrent versus sequential CRT (median, 23.7 versus 19.3 mo) and among patients with programmed cell death-ligand 1 expression greater than or equal to 1% versus less than 1% (22.4 versus 15.6 mo). Overall, 16.5% of the patients had adverse events leading to treatment discontinuation; 9.5% of all patients discontinued because of pneumonitis or interstitial lung disease.

Conclusions: Consolidation durvalumab after definitive CRT was well tolerated and effective in this large, real-world cohort study of patients with unresectable, stage III NSCLC. As expected, rwPFS was longer among patients who

received concurrent versus sequential CRT and patients with higher programmed cell death-ligand 1 expression. Nevertheless, favorable rwPFS outcomes were observed regardless of these factors.

Keywords: Consolidation therapy; Immunotherapy; Locally advanced NSCLC; PD-L1 inhibition; Real-world data

Introduction

Approximately 20% to 30% of patients with NSCLC are diagnosed with stage III disease.[1–3] The historic standard of care (SoC) for patients with unresectable, stage III NSCLC was platinum-based chemotherapy administered concurrently with radiotherapy (cCRT), followed by active surveillance. This strategy was associated with 5-year overall survival (OS) rates ranging from 15% to 32%,[4–7] and there was no evidence that survival could be improved further with induction or consolidation therapy, either with chemotherapeutics or with other systemic anticancer agents.[8–13] This changed after the primary data readouts from the phase 3 PACIFIC trial (NCT02125461).[14,15]

In PACIFIC, up to 12 months of consolidation therapy with durvalumab (an inhibitor of programmed cell death-ligand 1 [PD-L1][16]) significantly improved progression-free survival (PFS) and OS versus placebo in patients with unresectable, stage III NSCLC and no disease progression after definitive cCRT.[14,15] Consolidation durvalumab also exhibited a manageable safety profile, and patient-reported outcomes were comparable with placebo.[14,15,17]

Updates from PACIFIC revealed that the robust survival benefit associated with durvalumab is sustained over time.[18–20] At the most recent update, median PFS (measured from random assignment) with durvalumab versus placebo was 16.9 months (95% confidence interval [CI]: 13.0–23.9) versus 5.6 months (95% CI: 4.8–7.7) (stratified hazard ratio [HR]: 0.55; 95% CI: 0.45–0.68), and median OS with durvalumab versus placebo was 47.5 months (95% CI: 38.1–52.9) versus 29.1 months (95% CI: 22.1–35.1) (stratified HR = 0.72; 95% CI: 0.59–0.89) (Kaplan–Meier estimates).[20] The 5-year PFS and OS rates for durvalumab versus placebo were 33.1% (95% CI: 28.0–38.2) versus 19.0% (95% CI: 13.6–25.2) and 42.9% (95% CI: 38.2–47.4) versus 33.4% (95% CI: 27.3–39.6), respectively.[20]

On the basis of the findings of PACIFIC, durvalumab became the first anticancer medicine to be approved as a consolidation therapy for patients with unresectable, stage III NSCLC and no disease progression after CRT and has subsequently been established as the global SoC in this setting.[21–24] Owing to the poor prognosis associated with unresectable, stage III NSCLC, the heterogeneity of this patient population, and the variability in real-world multidisciplinary treatment approaches,[25,26] there is a need for real-world data on the use, effectiveness, and tolerability of the PACIFIC regimen (i.e., consolidation durvalumab following CRT). Once the primary results from PACIFIC were available, an early access program (EAP) was started to provide ethical access to durvalumab. PACIFIC-R (NCT03798535) subsequently enrolled patients who received durvalumab through the EAP with the aim of providing the first real-world data on the use and effectiveness of the PACIFIC regimen. This includes data for patients who received sequential CRT (sCRT) and patients with PD-L1 expression less than 1%. A preliminary safety analysis from PACIFIC-R, based on the first 3 months of treatment using data from the first of several preplanned, retrospective chart extractions (spaced in a 5-y period), provided early evidence of the real-world tolerability of the PACIFIC regimen.[27] Here, we report more comprehensive analyses from PACIFIC-R, based on the second planned chart extraction (with approximately 2 y of follow-up), including treatment characteristics and a preplanned analysis of real-world PFS (rwPFS), as well as a preliminary OS analysis.

Methods and Materials

Study Design

PACIFIC-R is an ongoing, international, retrospective study of a cohort of patients who received at least one dose of durvalumab through an EAP. The study consists of a retrospective review of established medical records for a subset of adult patients with unresectable, stage III NSCLC. Chart extractions are planned at prespecified intervals over a 5-year period starting from the index date (i.e., the date of the first durvalumab infusion received within the EAP); a target of four (and a maximum of five) extractions are planned for each participant (Fig. 1). Details regarding the design of the EAP are available in the Supplementary Methods. In contrast with the design of the PACIFIC trial,[14] the EAP initially permitted durvalumab treatment to continue until disease progression (a 12-mo limit was applied in PACIFIC); did not exclude patients with poor performance status (PS) (PACIFIC enrollment was restricted to patients with PS 0 or 1); and allowed enrollment of patients who received either cCRT or sCRT (only cCRT was allowed in PACIFIC) in most participating countries (France being the exception).

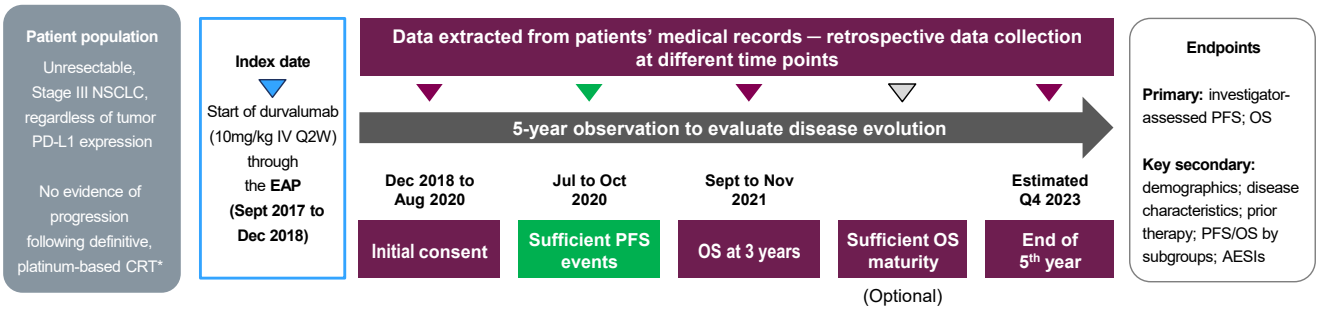

Figure 1. PACIFIC-R study design. The current analysis is based on the second data extraction of PACIFIC-R (highlighted in green), which was timed to allow sufficient PFS maturity. *Patients had completed platinum-based chemotherapy concurrent or sequential to radiotherapy within the previous 12 weeks without evidence of disease progression. AESIs, adverse events of special interest; CRT, chemoradiotherapy; EAP, early access program; IV, intravenously; OS, overall survival; PD-L1, programmed cell death-ligand 1; PFS, progression-free survival; Q, quarter; Q2W, every 2 weeks.

In accordance with regulatory requirements, a country was eligible to enter PACIFIC-R once the EAP had closed in that country. To be enrolled, patients must have started durvalumab within the EAP between September 2017 and December 2018 and have provided informed consent for data to be retrieved from their medical records. Patients who died during or after the EAP and before PACIFIC-R enrollment were eligible where local laws allowed for a consent waiver, or next-of-kin consent, provided all other entry criteria were met. Patients who received durvalumab in clinical studies were excluded.

Assessments

The primary end points are (1) rwPFS (measured from the index date to the date of investigator-determined disease progression or death [if no progression], or the end of follow-up) and (2) OS (measured from the index date to death, or the end of follow-up). Given the real-world nature of PACIFIC-R, progression could be determined by either investigator's assessment or according to Response Evaluation Criteria in Solid Tumors (RECIST) version 1.1, depending on local practice.

Key secondary end points include the following: (1) rwPFS and OS for subgroups of interest; (2) durvalumab treatment characteristics (e.g., treatment duration and time to start of durvalumab from completion of CRT); (3) demographics, disease characteristics, and details of prior therapy; and (4) adverse events (AEs) of special interest (AESIs).

The AESIs, defined as AEs potentially attributable to an immune-mediated cause (and reported in association with durvalumab), were collected when they required at least one of the following actions: concomitant use of systemic corticosteroids, use of immunosuppressants or endocrine therapies; and temporary interruption or permanent discontinuation of durvalumab. Predefined AESIs considered in the study were as follows: diarrhea or colitis and intestinal perforation; pneumonitis or interstitial lung disease (ILD); hepatitis or transaminase increases; endocrinopathies (hypophysitis or hypopituitarism, adrenal insufficiency, hyperthyroidism or hypothyroidism, and type 1 diabetes mellitus); rash or dermatitis; nephritis or blood creatinine increase; pancreatitis or serum lipase and amylase increase; myocarditis; myositis or polymyositis; neuropathy or neuromuscular toxicity (Guillain-Barré syndrome and myasthenia gravis); and other less frequent events with a potential immune-mediated cause (e.g., rheumatological events).

Statistical Analyses

Analyses were based on the full analysis set (all eligible, enrolled patients), or subgroups thereof, and were descriptive in nature with summary statistics for continuous variables or numbers and frequency for calculation of categorical variables. Missing values were not imputed. All analyses in this report were based on the second planned chart extraction from PACIFIC-R (extraction end date: November 30, 2020). The timing of this extraction was based on an estimate of when there would be enough observed progression events to determine median rwPFS (and corresponding 95% CI) for the full analysis set.

The rwPFS and OS data were censored for patients lost to follow-up (i.e., still alive as of their last visit or contact before the database cutoff). Medians and landmark rates were calculated by Kaplan–Meier method and corresponding 95% CIs were calculated by Greenwood's method.

Although Spain did not participate in PACIFIC-R, Spanish data were sourced from an externally sponsored, locally initiated study with the same design & study materials (NCT04285866). As regulatory restrictions in

Spain allowed only one data extraction, it was decided that data collection should be timed to allow for sufficient PFS maturity. Ultimately, the timing of data collection for the Spanish study was in line with the second planned chart extraction from PACIFIC-R (also timed for sufficient PFS maturity). Therefore, the Spanish data set was integrated for the analyses reported in this article (after internal quality review by AstraZeneca) but will not be integrated for analyses based on future PACIFIC-R chart extractions. November 30, 2020, was the last date of data entry for the analyses reported in this article; data cleaning was performed up to a database cutoff date of April 8, 2021, for the main PACIFIC-R cohort and July 2, 2021, for the Spanish data set.

Results

Patients and Hospital Site Characteristics

As of November 30, 2020 (end date of the second chart extraction), the full analysis set included 1399 eligible patients. Patients were enrolled across 290 hospital sites in 11 participating countries, including France (n = 342), Spain (244), Australia (165), The Netherlands (155), Belgium (118), Italy (116), Israel (92), Germany (62), the United Kingdom (54), Norway (36), and Switzerland (15). Most hospital sites (67.2%) had a primary medical specialty of medical or clinical oncology (Supplementary Table 1). The median follow-up duration in the full analysis set was 23.5 months (range: <0.1 to 35.3 mo); three patients (0.2%) were lost to follow-up.

An additional 347 patients who were potentially eligible for PACIFIC-R, but who were not enrolled, were identified by the participating hospital sites (as described in the Supplementary Methods).

Demographics, Disease Characteristics, and Medical History

The median age of the patients in the full analysis set was 66.0 years at EAP entry; 21.2% and 10.4% were aged 70 to 75 years and above 75 years, respectively (Table 1). Most patients were male (67.5%), current or former smokers (92.1%), and had a PS of 0 or 1 (98.0%) at EAP entry. The majority of patients (94.7%) had stage III disease at the time of initial NSCLC diagnosis, with the remainder relapsing to stage III from earlier disease stages. Overall, 5.3%, 43.4%, and 51.3% of the patients had stages IA to IIB, IIIA, and IIIB or IIIC disease, respectively, at the time of initial NSCLC diagnosis; 55.0% had N2 disease (Supplementary Table 2). Most patients (64.0%) had nonsquamous tumor histologic type. Comorbidities were reported in 71.5% of all patients (Supplementary Fig. 1). Hypertension was the most prevalent comorbidity (32.3%), followed by chronic obstructive pulmonary disease (25.2%), and diabetes (13.4%).

Table 1. Patient Demographics and Disease Characteristics

Characteristics	Full Analysis Set (N = 1399)
Median age at EAP inclusion, y (range)	66.0 (26-88)
Age category at EAP inclusion, n (%)	
<70 y	958 (68.5)
70-75 y	296 (21.2)
>75 y	145 (10.4)
Sex, n (%)	
Male	944 (67.5)
Female	455 (32.5)
Smoking status at EAP inclusion, n (%)	
Never	111 (7.9)
Current	456 (32.6)
Former	832 (59.5)
ECOG or WHO PS at EAP inclusion, n (%)	n = 951[a]
0	489 (51.4)
1	443 (46.6)
2 or 3	19 (2.0)
Disease stage at initial NSCLC diagnosis, n (%)	n = 1392[b]
IA to IIB	74 (5.3)
IIIA	604 (43.4)
IIIB or IIIC	714 (51.3)
Histologic subtype at stage III diagnosis, n (%)	n = 1378[c]
Squamous	496 (36.0)
Nonsquamous	882 (64.0)
PD-L1 status, n (%)	n = 967[d]
≥1%	700 (72.4)
<1%	174 (18.0)
Inconsistent	93 (9.6)
EGFR status, n (%)	n = 582[e]
Mutated	46 (7.9)
Wild type	517 (88.8)
Inconclusive or unknown	19 (3.3)

Note: Percentages reported in the table are calculated using the number of patients with available data (for each variable).
[a]ECOG or WHO PS at EAP inclusion data was missing for 448 patients.
[b]Disease stage at initial diagnosis was determined according to the seventh or eighth editions of the American Joint Committee on Cancer staging manual; data were missing for seven patients.
[c]Histologic subtype at stage III diagnosis data was missing or unknown for 21 patients.
[d]PD-L1 was not tested for in 431 patients, and data were missing for one patient. The PD-L1 inconsistent subgroup represents patients who were tested for PD-L1 but whose test results were not clearly reported owing to misalignment of three different variables in their case report forms (that precluded classification of the PD-L1 expression level as ≥1% or <1%); the variables were tumor cell %, PD-L1 status (positive or negative), and the threshold level used for classifying PD-L1 status.
[e]*EGFR* mutation status was not tested for in 817 patients.
EAP, early access program; ECOG or WHO PS, Eastern Cooperative Oncology Group or WHO performance status; PD-L1, programmed cell death-ligand 1.

Overall, 967 of 1399 patients (69.1%) were tested for PD-L1. Among those tested, 72.4% and 18.0% had expression on greater than or equal to 1% and less than 1% of tumor cells (TCs), respectively; test results were reported inconsistently for 9.6% of patients, precluding PD-L1 classification. Clinical characteristics were generally well balanced across the PD-L1 subgroups (Supplementary Table 3).

In total, 582 of 1399 patients (41.6%) were tested for *EGFR* mutations. Among those tested, 7.9% and 88.8% had *EGFR*-mutated and *EGFR* wild-type tumors, respectively; results were unknown or inconclusive for the remainder. Test results for this and other oncogenic aberrations are summarized in Supplementary Table 4.

Characteristics of Prior CRT

Patients typically received cCRT (76.6%); 14.4% received sCRT (Supplementary Table 5). cCRT was more common across all participating countries except Italy, where cCRT (44.8%) and sCRT (42.2%) were used in similar proportions. Compared with patients who received cCRT, a higher proportion of patients who received sCRT were greater than or equal to 70 years of age (40.8% versus 29.0%) and had stage IIIB or IIIC disease (61.7% versus 50.7%) (Supplementary Table 6). Other clinical characteristics were well balanced across the patient subgroups receiving the two types of CRT.

The median total radiotherapy (RT) dose in the full analysis set was 66.0 Gy (range: 8.0–92.0 Gy; n = 1344 with available data). Most patients received a total RT dose greater than 60 Gy to less than or equal to 66 Gy (52.4%), whereas 41.4% received less than or equal to 60 Gy. Among the patients who received cCRT, 51.2% and 37.3% had cisplatin-based and carboplatin-based chemotherapy, respectively; a further 11.6% switched between cisplatin-based and carboplatin-based regimens (Supplementary Table 7). Vinorelbine and paclitaxel were the most used nonplatinum chemotherapies during cCRT; 33.1% and 27.6% of patients who received cCRT had vinorelbine-containing and paclitaxel-containing regimens, respectively. Induction and consolidation chemotherapy were used in 48.4% and 6.4% of patients who received cCRT, respectively (Supplementary Table 5).

The RECIST-defined best response to CRT (based on 1072 patients with available data) included complete response (3.8%), partial response (61.0%), stable disease (24.4%), and progressive disease (1.2%) and was either not assessable or unknown for 9.5% of the patients.

Characteristics of Durvalumab Treatment

The median time to start of durvalumab from the end of RT was 56.0 days (1.8 months) (range: −35 to 981 d [−1.1 to 32.2 mo]; n = 1365) in the full analysis set; one patient started durvalumab before finishing RT. Overall, 30.1% of the patients started durvalumab within 42 days (and 1.2% within 14 d) of finishing RT; meanwhile, 14.4% and 1.0% started more than 3 months and more than 6 months after finishing RT, respectively.

At the time of database cutoff, the median total treatment duration (including the duration of dose interruptions) was 334.5 days (11.0 months) (range: 1–1029 d [<0.1 to 33.8 mo]; n = 1388). Overall, 19.8% and 4.2% of the patients received durvalumab for a total duration of more than 12 months and more than 14 months, respectively. Patients received a median of 22.0 durvalumab infusions (range: 1–65 infusions; n = 1339), with 7.1% receiving more than 26 infusions; 26 infusions represent a 12-month treatment duration when administered every 2 weeks without interruption. Overall, 11.2% of patients interrupted durvalumab treatment temporarily. The median duration of these interruptions was 29.0 days (1.0 months) (range: 3–295 d [0.1–9.7 mo]; n = 150).

Reasons for Discontinuing Durvalumab

Overall, 47.1% of the patients in the full analysis set completed durvalumab treatment; determination of whether a patient had completed treatment was based on the investigator's decision per their country-specific protocol. The median time to treatment discontinuation among patients considered to have completed treatment was 11.9 months (Table 2). The most common reasons for not completing treatment were disease progression (occurring in 26.9% of the patients in the full analysis set; median time to discontinuation, 4.9 mo) and AEs (occurring in 16.7% of the patients in the full analysis set; median time to discontinuation, 2.8 mo).

Preplanned Analysis of RwPFS

At the time of the database cutoff, 737 of 1399 patients (52.7%) had either experienced disease progression (n = 659) or had died without documentation of progression (n = 78); progression was determined per RECIST in 458 of 659 patients (69.5%), per investigator's assessment in 171 of 659 patients (25.9%), and by unknown means in 30 of 659 patients (4.6%). Median rwPFS was 21.7 months (95% CI: 19.1–24.5) in the full analysis set (Fig. 2); 62.2% (95% CI: 59.6–64.6) and 48.2% (95% CI: 45.4–50.9) of the patients were estimated to be alive and free of progression at 12 and 24 months, respectively.

Subgroup analyses were performed to evaluate possible associations between rwPFS and prognostic factors of interest. As found in Figure 3*A* to *D*, rwPFS was numerically longer among patients with PD-L1

Table 2. Reasons for and Timing of Durvalumab Treatment Discontinuation

	Full Analysis Set (N = 1399)	
Reason[a]	n (%)	Median Time to Discontinuation, mo (Range)[b]
Completed treatment[c]	659 (47.1)	11.9 (5.5-28.5)[d]
Disease progression	377 (26.9)	4.9 (0.0-30.2)[d]
Adverse event	233 (16.7)	2.8 (0.0-19.6)
Death	21 (1.5)	1.9 (0.0-13.6)
Patient decision	20 (1.4)	6.0 (0.0-19.5)
Other	68 (4.9)	5.9 (0.0-28.2)[d]

[a]Three patients (0.2%) in the full analysis set were lost to follow-up, and 18 (1.3%) were still receiving durvalumab treatment at the time of data cutoff.
[b]Measured from the index date (i.e., the date if the first durvalumab infusion received within the EAP); 1 month equates to 30.44 days.
[c]Based on the investigator's decision per their country-specific protocol and, where applicable, was beyond 12 months of treatment.
[d]Duration of exposure data was missing for four patients who completed treatment, three patients who discontinued owing to disease progression, and two patients who discontinued for other reasons.
EAP, early access program.

expression greater than or equal to 1% versus less than 1% (median, 22.4 versus 15.6 mo, respectively), stage IIIA versus IIIB or IIIC disease (median, 23.7 versus 19.2 mo, respectively), and nonsquamous versus squamous tumor histologic type (median, 25.3 versus 14.6 mo, respectively). RwPFS was also numerically longer among patients who received cCRT versus sCRT (median, 23.7 versus 19.3 mo, respectively), those who received cisplatin versus carboplatin during CRT (median, 24.4 versus 18.8 mo), and those who received durvalumab less than or equal to 42 days versus more than 42 days after finishing RT (median, 25.7 versus 20.8 mo, respectively) (Supplementary Table 8). Meanwhile, rwPFS was numerically similar among patients aged less than 70 years and 70 to 75 years (median, 22.8 versus 22.4 mo, respectively) and was comparatively shorter among patients aged greater than 75 years (median, 19.2 mo). Compared with the full analysis set, rwPFS was numerically longer among patients with known *KRAS* mutations (median, 24.2 mo) and numerically shorter

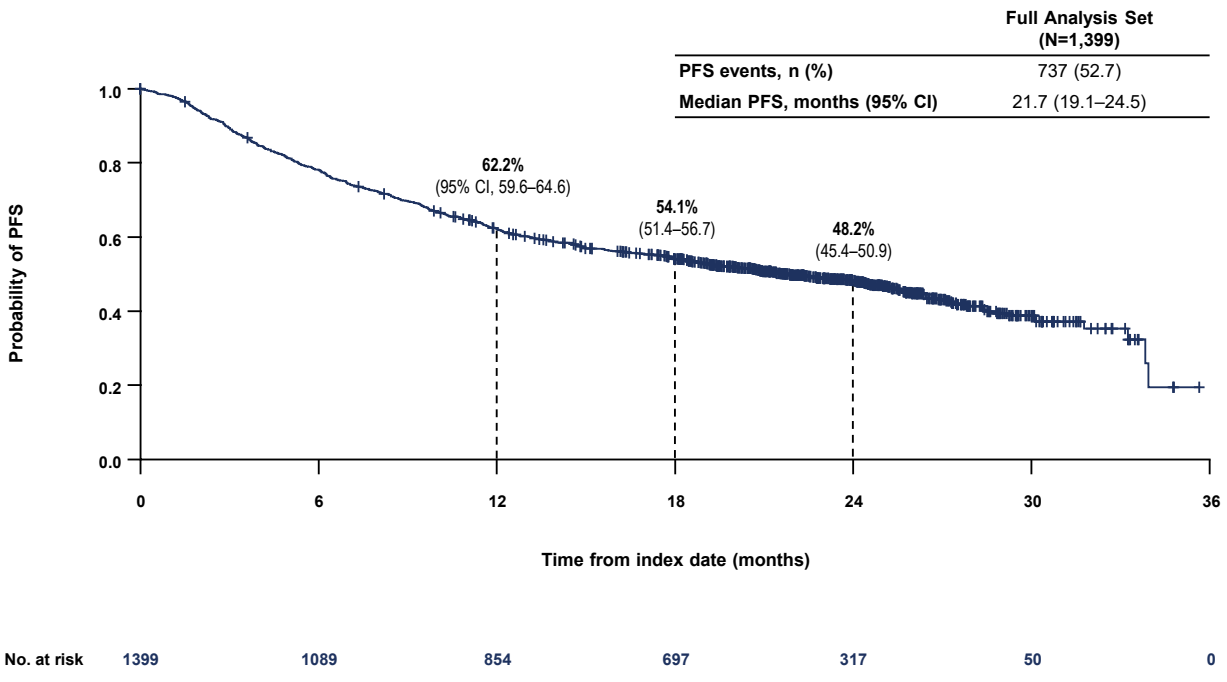

Figure 2. Real-world PFS in the full analysis set. Shown is a Kaplan-Meier distribution of real-world PFS in the full analysis set. The tick marks represent censored observations, and the dashed lines represent 12-, 18-, and 24-month landmark analyses. At the time of the database cutoff, the median duration of follow-up for patients who remained censored for PFS was 23.0 months (range: 0.0-35.6 mo); 10 patients (0.7%) were lost to follow-up. CI, confidence interval; PFS, progression-free survival.

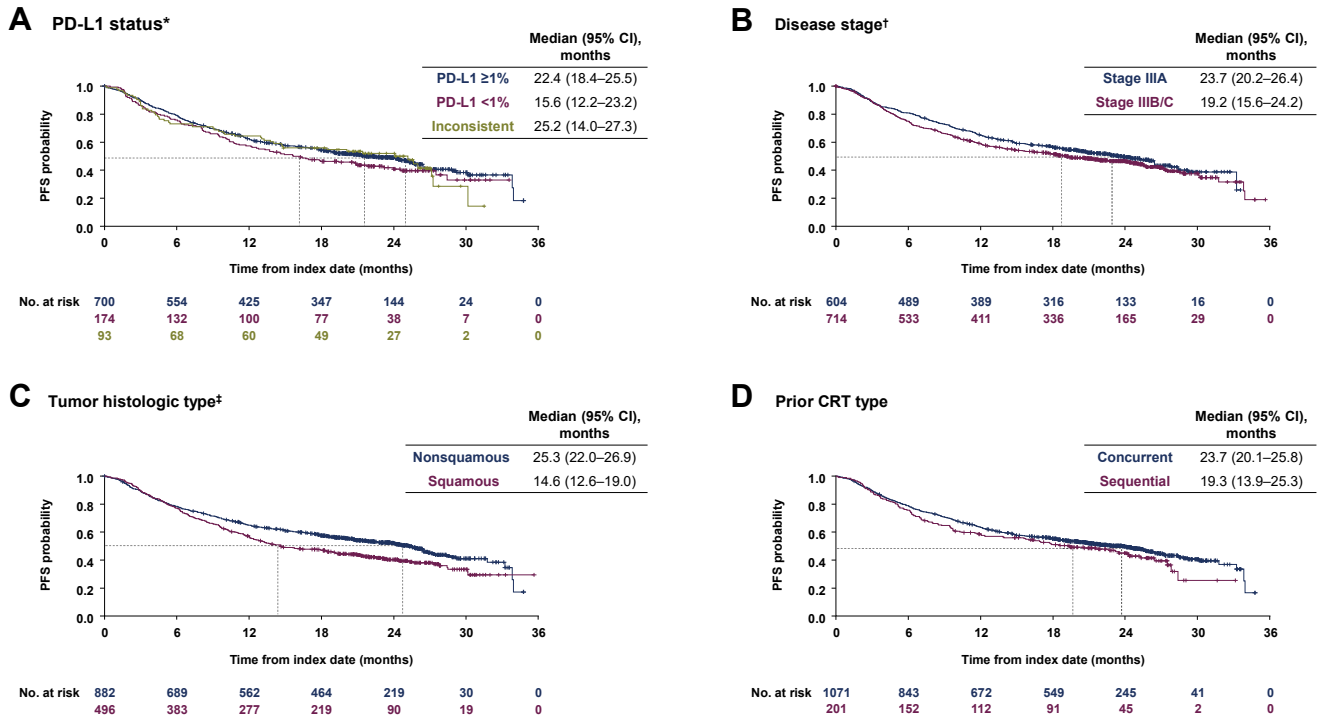

Figure 3. Real-world PFS in subgroups of interest. Shown are Kaplan-Meier distributions of real-world PFS for subgroups defined by (*A*) PD-L1 status, (*B*) disease stage, (*C*) tumor histologic type, and (*D*) prior CRT type. The tick marks represent censored observations, and the dashed lines illustrate the extrapolation of median PFS. *The PD-L1 inconsistent subgroup represents patients who were tested for PD-L1 but whose test results were not clearly reported owing to misalignment of three different variables in their case report forms (that precluded classification of the PD-L1 expression level as ≥1% or <1%); the variables were tumor cell %, PD-L1 status (positive or negative), and the threshold level used for classifying PD-L1 status. †As reported at the time of initial NSCLC diagnosis. ‡As reported at the time of stage III diagnosis. CI, confidence interval; CRT, chemoradiotherapy; PD-L1, programmed cell death-ligand 1; PFS, progression-free survival.

among patients with known *EGFR* mutations (median, 11.1 mo) (Supplementary Table 8).

Preliminary Analysis of OS

At the time of the database cutoff, 430 of 1399 patients (30.7%) had died. Median OS was not reached in the full analysis set; 71.2% (95% CI: 68.8–73.6) of the patients were estimated to be alive at 24 months.

AESIs

In total, 654 of 1399 patients (46.7%) in the full analysis set experienced AESIs; 11.2% (n = 156) and 16.5% (n = 231) of the patients had AESIs leading to temporary interruption and permanent discontinuation of durvalumab, respectively. Pneumonitis or ILD was the most common AESI leading to interruption (5.2% of the full analysis set) and permanent

Table 3. AESIs Leading to Interruption and Permanent Discontinuation of Durvalumab

	Full Analysis Set (N = 1399)	
AESI Category	Temporary Interruption, n (%)	Permanent Discontinuation, n (%)
Any	156 (11.2)	231 (16.5)
Pneumonitis or ILD	73 (5.2)	133 (9.5)
Diarrhea or colitis and intestinal perforation	16 (1.1)	15 (1.1)
Hepatitis or transaminase increases	10 (0.7)	17 (1.2)
Endocrinopathies	18 (1.3)	10 (0.7)
Other[a]	33 (2.4)	51 (3.6)

Note: AESI categories leading to temporary interruption and permanent discontinuation of durvalumab in less than 1% of the full analysis set are not tabulated.
[a]Free term written events (which may include the other terms listed in the table).
AESI, adverse event of special interest; ILD, interstitial lung disease.

discontinuation (9.5% of the full analysis set) (Table 3), noting that it is difficult to differentiate between immunotherapy-induced and RT-induced pneumonitis. Other AESIs leading to interruption or permanent discontinuation of treatment included diarrhea or colitis and intestinal perforation, hepatitis or transaminase increases, and endocrinopathies (Table 3). RwPFS among patients who had AESIs leading to interruption or permanent discontinuation of treatment was consistent with the full analysis set (median, 20.7 mo, 95% CI: 16.0–24.1, n = 367).

Pneumonitis or ILD

Overall, 250 patients in the full analysis set experienced pneumonitis or ILD (250 of 1399; 17.9%). Among patients who experienced pneumonitis or ILD, 23 (9.2%) had more than one event and four (1.6%) had more than two events. Median time to onset of the first event, measured from the start of durvalumab, was 68.5 days (2.3 months) (range: −41 to 444 d [−1.3 to 14.6 mo]; n = 250). In all, 4.0% (n = 56), 8.4% (n = 118), 2.9% (n = 41), and 0.4% (n = 5) of the patients in the full analysis set had pneumonitis or ILD events classified as mild, moderate, severe, and life threatening or fatal, respectively (assessed by the investigator), whereas 2.6% (n = 37) had events of unknown severity (noting that a single patient could have multiple events of different severity). Use of corticosteroids to manage pneumonitis or ILD was required in 199 patients with the event (199 of 250; 79.6%). Two patients (0.1%) had fatal pneumonitis or ILD events in the full analysis set. Both fatal events were recurrences of pneumonitis or ILD; one patient had been rechallenged with durvalumab, and the other had discontinued durvalumab permanently, following their original pneumonitis or ILD event.

Discussion

PACIFIC-R provides valuable insights into the treatment patterns and outcomes with the PACIFIC regimen in the real-world setting, on the basis of a population of more than 1000 patients enrolled across 11 countries. Median rwPFS was 21.7 months and nearly half of all patients were alive and free of disease progression 2 years after starting durvalumab. Furthermore, more than 70% of the patients were alive at 2 years regardless of their progression status. These findings confirm the effectiveness of durvalumab after definitive CRT in a large, predominantly European population with unresectable, stage III NSCLC. Durvalumab treatment, which lasted for a median duration of 11 months, was also well tolerated in the real-world setting, with safety observations being aligned with the known profile of durvalumab administered after CRT in the unresectable, stage III NSCLC setting.[14,15,28]

The outcomes from PACIFIC-R align with other real-world studies of the PACIFIC regimen.[29–33] For instance, Taugner et al.[30] reported a rwPFS rate of 62% at 12 months with durvalumab in their prospective study, which is consistent with the corresponding rate from PACIFIC-R. Moreover, outcomes for most of the analyzed subgroups from PACIFIC-R compare favorably with patients who received CRT alone in the pre-immunotherapy era[25,34]; in the international KINDLE study, median rwPFS was 12.1 and 10.4 months with cCRT and sCRT (without consolidation immunotherapy), respectively, among patients with unresectable, stage III NSCLC (acknowledging that the index date was the date of initial diagnosis for KINDLE, whereas it was the date that durvalumab was started within the EAP [i.e., post-CRT] in PACIFIC-R).[25]

Favorable rwPFS outcomes were observed across subgroups of interest in PACIFIC-R, and the results were broadly aligned with the findings of the PACIFIC trial[20,35,36]; better survival outcomes were observed for younger patients, patients with stage IIIA disease, patients with nonsquamous tumor histologic type, and patients who received cisplatin (during CRT) in both studies.[20,36]

As expected, better rwPFS outcomes were observed among patients who received cCRT compared with sCRT; this aligns with other studies that revealed the superiority of cCRT in the unresectable, stage III NSCLC setting.[5,37–39] Although cCRT is recognized as the SoC,[23,40,41] patients often receive sCRT in real-world clinical practice owing to concerns with the tolerability of concurrent treatment (among other reasons). Reassuringly, favorable rwPFS outcomes were still observed among patients who received sCRT in PACIFIC-R (median, 19.3 mo). The PACIFIC trial did not enroll patients who received prior sCRT; therefore, the benefit of consolidation therapy with durvalumab in these patients has not yet been established definitively. Use of durvalumab after sCRT falls outside of the approved label for durvalumab in the United States[22]; meanwhile, the label approved by the European Medicines Agency allows use of either cCRT or sCRT.[21] The favorable real-world outcomes found in the sCRT subset of PACIFIC-R complement recently published findings from the phase 2, single-arm, PACIFIC-6 trial, which revealed encouraging outcomes with durvalumab after sCRT.[28] Together, the findings of these studies suggest that durvalumab after sCRT could be a reasonable treatment strategy for patients who are considered unsuitable for cCRT; the benefit of this strategy is currently being investigated in the phase 3 PACIFIC-5 trial (NCT03706690).

Better outcomes were also observed among patients with PD-L1 expression greater than or equal to 1% compared with less than 1%, consistent with observations from PACIFIC.[20,35] Nevertheless, favorable rwPFS outcomes were still observed among patients with PD-L1 expression less than 1% (median, 15.6 mo). Patients with PD-L1 expression on less than 1% of TCs are excluded from the European Medicines Agency label based on an exploratory, post hoc analysis[21,24]; no restrictions regarding PD-L1 status are applied in other regions, including the United States.[22]

The analyses of outcomes for subgroups should be interpreted with caution. Because of the variance in clinical practice patterns across the world, many of the subgroup variables are inevitably associated with other clinical factors that may bias outcomes. For example, patterns of cCRT versus sCRT use in PACIFIC-R varied between countries, by age, and by disease stage; use of sCRT was more common among patients enrolled in Italy, patients aged greater than or equal to 70 years, and patients diagnosed with more advanced disease (i.e., stage IIIB or IIIC).

Preclinical evidence suggests that radiotherapy induces immunomodulatory changes, including upregulation of PD-L1, which potentially prime tumors to respond to immunotherapy.[42–45] PD-L1 has been an imperfect biomarker of response to immunotherapy, and dynamic changes induced by CRT may affect the reliability of PD-L1 expression measured before CRT.[46] Interestingly, rwPFS was better among patients who received durvalumab closer to the end of RT, consistent with findings from PACIFIC.[47] We are uncertain of the factors underpinning this observation, but preclinical evidence suggests that administering PD-L1 inhibitors as close as possible to CRT may increase effectiveness.[43] Nevertheless, it should be acknowledged that the timing of durvalumab initiation after CRT may correlate with other clinical factors that influence survival outcomes. The ongoing phase 3 PACIFIC-2 trial (NCT03519971) is investigating concurrent administration of durvalumab with cCRT.

The median rwPFS reported in PACIFIC-R is longer than the median PFS reported with durvalumab in PACIFIC (16.8 mo).[14] This may seem unexpected as, owing to strict enrollment criteria, clinical trial cohorts are typically healthier than real-world populations. Several factors can contribute to overestimation of PFS in the real-world setting. For instance, as local laws did not allow for a consent waiver, study sites in the United Kingdom and Germany were unable to collect information on patients who received durvalumab within the EAP but died before PACIFIC-R enrollment (50 early deaths were not counted). Moreover, assessments for disease progression typically occur less frequently in the real-world setting, causing delays in detection; therefore, PFS is generally overestimated in real-world studies. This issue may have been exacerbated by the coronavirus disease 2019 pandemic, which could have resulted in fewer hospital visits.[48] Lastly, the use of RECIST criteria for tumor assessments is heterogeneous across countries. Although progression had to be determined radiologically in PACIFIC, and was subject to blinded independent central review, patients in PACIFIC-R could have progression determined based on either radiological or clinical evidence. Future analyses to investigate the impact of the abovementioned limitations on rwPFS would be of interest.

The 2-year OS rate was also higher in PACIFIC-R (71.2%) compared with PACIFIC (66.3%).[15] As mentioned for rwPFS, overestimation of OS can be attributed to the fact that study sites in the United Kingdom and Germany could not collect information on patients who died before PACIFIC-R enrollment. Further analyses are planned on the basis of future chart extractions from PACIFIC-R, which will allow for more robust analyses of OS outcomes using sufficiently matured survival data. These analyses will provide valuable insights into the real-world effectiveness of the PACIFIC regimen.

Almost half of all patients completed durvalumab treatment in PACIFIC-R (47.1%), which is consistent with the corresponding rate in PACIFIC.[15] This suggests that patients are as likely to complete durvalumab treatment in the real-world setting as in a clinical trial. Aligned with PACIFIC,[15] the most common reasons for prematurely discontinuing durvalumab were disease progression and AEs, with pneumonitis or ILD being the most common AE leading to discontinuation.

The parameters for durvalumab use in the EAP (from which patients were enrolled onto PACIFIC-R) were wider in scope than those recommended in current approvals and guidelines.[21–23] Therefore, treatment patterns in PACIFIC-R may not align exactly with the way in which durvalumab is used in real-world practice currently. For example, the EAP initially allowed patients to continue durvalumab treatment in this curative-intent setting until they experienced disease progression (except in France), whereas current approvals include a 12-month treatment cap.[21,22] Nevertheless, only 19.8% and 4.2% of patients received durvalumab for a total duration of more than 12 and more than 14 months, respectively, and only 7.1% received more than 26 durvalumab infusions, so the impact of this on clinical outcomes is likely to be small. The optimal duration of consolidation immunotherapy in the unresectable, stage III NSCLC setting remains a matter of debate, and some ongoing trials permit treatment durations of more than 12 months.[49,50]

Although the EAP did not exclude patients on the basis of ECOG PS in most countries, the PACIFIC-R cohort includes very few patients with PS greater than 1 (2.0%); this is lower than may have been expected for a real-world patient population (although it should be acknowledged that PS data were missing for 448 patients). Limited recruitment of patients with PS greater than 1 may be because the EAP was the first time the PACIFIC regimen was used outside of clinical trials: given the relative novelty of the regimen at the time, clinicians may have initially been cautious about administering durvalumab to patients whose clinical characteristics did not align closely with the population of PACIFIC (which restricted enrollment to patients with PS 0 or 1[14]).

In conclusion, the findings from PACIFIC-R reveal that consolidation therapy with durvalumab after definitive CRT is well tolerated and effective in this curative-intent setting on the basis of a large, international, real-world population. As expected, rwPFS outcomes were better among patients who received cCRT versus sCRT and among patients with PD-L1 expression greater than or equal to 1% versus less than 1%. Nevertheless, favorable rwPFS outcomes were observed regardless of prior CRT type and PD-L1 status. Outcomes were broadly consistent with the PACIFIC trial, although the median rwPFS reported for PACIFIC-R was longer than the median PFS reported with durvalumab in PACIFIC; limitations associated with assessing disease progression in the real-world setting likely caused an overestimation of rwPFS. Although durvalumab was generally well tolerated, pneumonitis or ILD led to treatment discontinuation in 9.5% of patients; clinical vigilance is required to ensure effective diagnosis and management of this important and potentially serious toxicity. Overall, the findings of PACIFIC-R suggest that the potential of the PACIFIC regimen found in its pivotal phase 3 trial is being translated to real-world clinical practice as the global SoC for patients with unresectable, stage III NSCLC.

CRediT Authorship Contribution Statement

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Muriel Licour: Project administration, Supervision, Investigation, Conceptualization, Data curation, Writing—review and editing.

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Supplementary Data

Note: To access the supplementary material accompanying this article, visit the online version of the *Journal of Thoracic Oncology* at www.jto.org and at https://doi.org/10.1016/j.jtho.2022.10.003.

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