ARCHES: A Randomized, Phase III Study of Androgen Deprivation Therapy With Enzalutamide or Placebo in Men With Metastatic Hormone-Sensitive Prostate Cancer

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PURPOSE Enzalutamide, a potent androgen-receptor inhibitor, has demonstrated significant benefits in metastatic and nonmetastatic castration-resistant prostate cancer. We evaluated the efficacy and safety of enzalutamide in metastatic hormone-sensitive prostate cancer (mHSPC).

METHODS ARCHES (ClinicalTrials.gov identifier: NCT02677896) is a multinational, double-blind, phase III trial, wherein 1,150 men with mHSPC were randomly assigned 1:1 to enzalutamide (160 mg/day) or placebo, plus androgen deprivation therapy (ADT), stratified by disease volume and prior docetaxel chemotherapy. The primary end point was radiographic progression-free survival.

RESULTS As of October 14, 2018, the risk of radiographic progression or death was significantly reduced with enzalutamide plus ADT versus placebo plus ADT (hazard ratio, 0.39; 95% CI, 0.30 to 0.50; P < .001; median not reached v 19.0 months). Similar significant improvements in radiographic progression-free survival were reported in prespecified subgroups on the basis of disease volume and prior docetaxel therapy. Enzalutamide plus ADT significantly reduced the risk of prostate-specific antigen progression, initiation of new antineoplastic therapy, first symptomatic skeletal event, castration resistance, and reduced risk of pain progression. More men achieved an undetectable prostate-specific antigen level and/or an objective response with enzalutamide plus ADT (P < .001). Patients in both treatment groups reported a high baseline level of quality of life, which was maintained over time. Grade 3 or greater adverse events were reported in 24.3% of patients who received enzalutamide plus ADT versus 25.6% of patients who received placebo plus ADT, with no unexpected adverse events.

CONCLUSION Enzalutamide with ADT significantly reduced the risk of metastatic progression or death over time versus placebo plus ADT in men with mHSPC, including those with low-volume disease and/or prior docetaxel, with a safety analysis that seems consistent with the safety profile of enzalutamide in previous clinical trials in castration-resistant prostate cancer.
have demonstrated significant clinical benefits, including significantly improved overall survival (OS), and these combinations are now included in treatment guidelines as part of the SOC.\textsuperscript{12,13} Abiraterone plus ADT is approved in combination with prednisone for men with metastatic high-risk castration-sensitive prostate cancer,\textsuperscript{14,15} on the basis of the LATITUDE trial (ClinicalTrials.gov identifier: NCT01715285),\textsuperscript{10} which exclusively enrolled men with high-risk mHSPC and excluded previous chemotherapy.

The efficacy and safety of enzalutamide, a potent androgen-receptor (AR) inhibitor,\textsuperscript{16} has been demonstrated across the spectrum of castration-resistant prostate cancer (CRPC) by numerous, large-scale, randomized, controlled clinical trials.\textsuperscript{17-21} In addition, a phase II, open-label, single-arm study investigating enzalutamide monotherapy in patients with hormone-naive prostate cancer demonstrated long-term reductions in prostate-specific antigen (PSA) levels, with minimal changes in overall bone mineral density and global health status.\textsuperscript{22-24}

Two recent studies that investigated abiraterone in addition to ADT excluded men with prior docetaxel chemotherapy and did not include prospective evaluation of results by disease volume (high v low).\textsuperscript{10,11} ARCHES (ClinicalTrials.gov identifier: NCT02677896) aimed to assess efficacy and safety of enzalutamide plus ADT in men with mHSPC, regardless of prior docetaxel or disease volume. We hypothesized that enzalutamide, in combination with ADT, would prolong radiographic progression-free survival (rPFS) in men with mHSPC, compared with ADT alone.

METHODS

Study Design and Conduct

ARCHES is a multinational, double-blind, randomized, placebo-controlled, phase III trial. The study protocol was approved by local independent review boards and conducted according to provisions of the Declaration of Helsinki and Good Clinical Practice Guidelines of the International Conference on Harmonisation. All patients provided written informed consent. An independent Data Safety Monitoring Board (DSMB) evaluated unblinded safety data on an ongoing basis. Please refer to the Disclosures for full information on data sharing.

Patients and Treatments

Eligible patients were adult (defined according to local regulation) males with pathologically confirmed prostate adenocarcinoma, without neuroendocrine differentiation, signet-cell, or small-cell features, and an Eastern Cooperative Oncology Group performance status score of 0 or 1. Eligible patients had hormone-sensitive metastatic disease, either de novo or after recurrence after prior local therapy, documented by a positive bone scan, or metastatic lesions on computed tomography or magnetic resonance imaging. Enrollment was based on investigator-assessed metastases; after study entry, metastasis was evaluated by independent central review. Prior ADT and up to six cycles of prior docetaxel chemotherapy were permitted. Patients who experienced disease progression prior to randomization while receiving ADT and/or docetaxel were excluded. Additional details regarding inclusion/exclusion criteria are provided in the Data Supplement.

Patients were centrally randomized 1:1 to enzalutamide (160 mg/day) plus ADT or placebo plus ADT, stratified by disease volume (low v high) and prior docetaxel chemotherapy for prostate cancer (no cycles, one to five cycles, or six cycles). High-volume disease was defined as presence of metastases involving the viscera, or in the absence of visceral lesions, four or more bone lesions, one or more of which must have been in a bony structure beyond the vertebral column and pelvic bone, per CHAARTED (ClinicalTrials.gov identifier: NCT00309985) criteria.\textsuperscript{6} Treatment continued until occurrence of unacceptable toxicity, radiographic progression (confirmed by independent central review), or initiation of an investigational agent or new prostate cancer therapy. Subsequent therapy after treatment discontinuation was permitted per local practice. On the basis of the primary analysis results and DSMB recommendation of study continuation, eligible patients were offered the opportunity to transition to an open-label extension.

End Points

The primary end point was rPFS, defined as the time from randomization to the first objective evidence of radiographic disease progression, as assessed by independent central review or death (defined as death from any cause within 24 weeks from study drug discontinuation), whichever occurred first. The cutoff of 24 weeks from study drug discontinuation (ie, the second long-term follow-up visit) for deaths (in the absence of disease progression) ensured a similar follow-up period as for monitoring of radiographic progression (ie, two 12-week radiologic assessment cycles post-treatment discontinuation). In addition, sensitivity analyses for rPFS were performed, including all deaths (in the absence of evidence of radiographic progression) regardless of timing, and radiographic progression documented by central review according to Prostate Cancer Working Group 2 criteria,\textsuperscript{25} to assess the robustness of the primary analysis; additional details are provided in Data Supplement Table A1. Key secondary end points were time to PSA progression, time to initiation of new antineoplastic therapy (including cytotoxic and hormone therapies), PSA undetectable rate, objective response rate, time to deterioration in urinary symptoms, and OS. Other secondary end points included time to first symptomatic skeletal event, time to castration resistance, patient-reported outcomes (PROs), time to deterioration of quality of life (QoL), and time to pain progression. Additional prespecified analyses, per a separate PRO statistical analysis plan (SAP),
included QoL over time and sensitivity analyses of time to pain progression (using other clinically meaningful threshold criteria). Safety was also assessed. End point definitions are provided in Data Supplement Table A1.

**Assessments**

Efficacy assessments included sequential radiographic imaging performed at screening, at week 13, and every subsequent 12 weeks. Radiographic progression events were confirmed by independent central review; details regarding the definition of radiographic progression, including confirmatory scans required for new bone lesions observed over time, are provided in Data Supplement Table A2. PSA levels were measured at screening, at weeks 1, 5, and 13, every subsequent 12 weeks, and 30 days after the last dose or prior to initiation of new antineoplastic therapy for prostate cancer, whichever occurred first. PRO assessments, such as Functional Assessment of Cancer Therapy–Prostate,26 Quality of Life Prostate-Specific questionnaire 25, 27 and Brief Pain Inventory–Short Form (BPI-SF), were completed at baseline, week 13, and every 12 weeks thereafter. Adverse events (AEs) were graded by the investigator according to the National Cancer Institute Common Terminology Criteria for Adverse Events (version 4.03).

**Statistical Analysis**

The final rPFS analysis was planned to occur after 262 events, to detect a hazard ratio (HR) of 0.67 with 90% power, on the basis of a two-sided log-rank test and 5% significance level. To adjust for multiplicity, a parallel testing strategy was applied to the key secondary end points (Appendix Fig A1, online only). Key secondary end points, other than OS, were sequentially tested at a 1% significance level. A final OS analysis will be performed when 342 deaths have occurred to provide 80% power to detect an HR of 0.73 at a 4% significance level calculated using the O’Brien-Fleming function to control the overall alpha. Additional details regarding the statistical analyses (original and final) are provided in the Data Supplement (Fig A1 and Table A1) and Protocol (including SAP).

**RESULTS**

**Patients and Treatment**

From March 21, 2016, to January 12, 2018, a total of 1,150 patients were randomly assigned 1:1 from 202 centers in North and Latin America, Europe, and Asia; 1,146 patients received at least one dose of the study drug (Fig 1). Baseline demographics were well balanced between treatment groups (Table 1); 727 patients (63.2%) had high-volume disease, and 205 (17.9%) received prior docetaxel chemotherapy. Use of concomitant antiandrogens as prostate cancer therapy during the study was reported by 34 patients (5.9%) in the enzalutamide plus ADT group and 43 patients (7.5%) in the placebo plus ADT group.

As of the data cutoff on October 14, 2018, median follow-up time was 14.4 months. Overall, 377 patients (32.8%) discontinued study treatment (enzalutamide plus ADT, n = 135 [23.5%]; placebo plus ADT, n = 242 [42.0%]). The primary reason for treatment discontinuation was progressive disease (enzalutamide plus ADT, n = 65 [11.3%] v placebo plus ADT, n = 171 [29.7%]), followed by patient withdrawal (n = 25 [4.4%] v n = 30 [5.2%], respectively; Fig 1).

**rPFS**

At data cutoff, 292 radiographic disease progression events or deaths without radiographic disease progression within 24 weeks of treatment discontinuation had occurred (enzalutamide plus ADT, n = 91 [15.9%]; placebo plus ADT, n = 201 [34.9%]; Table 2). Overall, enzalutamide plus ADT significantly reduced the risk of radiographic disease progression or death compared with placebo plus ADT by 61% (HR, 0.39; 95% CI, 0.30 to 0.50; P < .001; Fig 2A). Median rPFS was not reached (NR) with enzalutamide plus ADT (95% CI, NR to NR) versus 19.0 months (95% CI, 16.6 to 22.2 months) with placebo plus ADT. The treatment effect of enzalutamide plus ADT was consistent across all prespecified subgroups, including disease volume and prior docetaxel chemotherapy (Fig 2B). A sensitivity analysis of rPFS, including all deaths (in the absence of evidence of radiographic disease progression) regardless of timing, and a sensitivity analysis of radiographic progression documented by central review according to Prostate Cancer Working Group 2 criteria28 were both consistent with the primary analysis (Table 2).

**Secondary End Points**

The superiority of enzalutamide plus ADT over placebo plus ADT was shown for the key secondary end points of time to PSA progression, time to initiation of new antineoplastic therapy, PSA undetectable rate, and objective response rate (Table 2; Fig 3). Although the median time to initiation of a new antineoplastic agent of 30.2 months in the enzalutamide arm is not a reliable estimate because it resulted from an event observed in the only remaining patient at risk, the treatment effect was robust, as evidenced by the HR of 0.28 (95% CI, 0.20 to 0.40; P < .001).

Of the patients who initiated new antineoplastic therapy, the most common therapy was abiraterone (n = 13; 28.3%) followed by docetaxel (n = 11; 23.9%) in the enzalutamide plus ADT group and docetaxel (n = 52; 39.1%) followed by abiraterone and enzalutamide (n = 28 each; 21.1%) in the placebo plus ADT group (Data Supplement Table A3). At this interim OS analysis, data were immature, with 84 deaths (enzalutamide plus ADT, n = 39; placebo plus ADT, n = 45); median duration of OS was NR in either treatment group (HR, 0.81; 95% CI, 0.53 to 1.25; P = .3361; Table 2; Data Supplement Fig A2). Enzalutamide plus ADT also significantly reduced the risk of a first symptomatic skeletal...
event (Table 2; Fig 3) and castration resistance (Table 2; Data Supplement Fig A3).

Mean Functional Assessment of Cancer Therapy–Prostate total score, as a global indicator of QoL, was high at baseline for both treatment groups (Table 1) and remained high over time (Data Supplement Fig A4). Enzalutamide plus ADT did not significantly affect time to deterioration in urinary symptoms or QoL compared with placebo plus ADT (Table 2). Although the analysis of time to pain progression, with progression defined as a 30% or greater increase from baseline in average BPI-SF pain severity score, was not delayed (Table 2), prespecified sensitivity analyses from the PRO SAP, using a clinically significant 2-point or greater increase from baseline in average BPI-SF score as the progression threshold, demonstrated that enzalutamide plus ADT delayed time to pain progression for worst pain and pain severity versus placebo plus ADT (Table 2; Data Supplement Fig A5).

Safety
Median treatment duration was 12.8 months (range, 0.2 to 26.6 months) in the enzalutamide plus ADT group and 11.6 months (range, 0.2 to 24.6 months) in the placebo plus ADT group. Grade 3 or greater AEs, serious AEs, and AEs leading to treatment discontinuation were reported in similar proportions of patients in both treatment groups (Table 3). There were no unexpected AEs; of the 14 AEs (2.4%) leading to death in the enzalutamide plus ADT group and 10 (1.7%) in the placebo plus ADT group, none were assessed by the investigator to be related to treatment in the enzalutamide plus ADT group, whereas one event (general physical health deterioration)
| Characteristic                                      | Enzalutamide Plus ADT (n = 574) | Placebo Plus ADT (n = 576) |
|----------------------------------------------------|---------------------------------|---------------------------|
| Age (years)                                        |                                 |                           |
| Median                                             | 70.0                            | 70.0                      |
| Range                                              | 46-92                           | 42-92                     |
| Age category, years                                |                                 |                           |
| < 65                                               | 148 (25.8)                      | 152 (26.4)                |
| 65-74                                              | 256 (44.6)                      | 255 (44.3)                |
| ≥ 75                                               | 170 (29.6)                      | 169 (29.3)                |
| Race*                                              |                                 |                           |
| White                                              | 466 (81.2)                      | 460 (79.9)                |
| Asian                                              | 75 (13.1)                       | 80 (13.9)                 |
| Black or African American                          | 8 (1.4)                         | 8 (1.4)                   |
| American Indian or Alaska Native                   | 0                               | 0                         |
| Native Hawaiian or other Pacific Islander           | 0                               | 0                         |
| Other                                              | 2 (0.3)                         | 3 (0.5)                   |
| Missing                                            | 23 (4.0)                        | 25 (4.3)                  |
| Geographic region                                  |                                 |                           |
| Europe                                             | 341 (59.4)                      | 344 (59.7)                |
| Asia-Pacific                                       | 104 (18.1)                      | 113 (19.6)                |
| North America                                      | 86 (15.0)                       | 77 (13.4)                 |
| South America                                      | 32 (5.6)                        | 30 (5.2)                  |
| Other                                              | 11 (1.9)                        | 12 (2.1)                  |
| ECOG performance status score on day 1             |                                 |                           |
| 0                                                  | 448 (78.0)                      | 443 (76.9)                |
| 1                                                  | 125 (21.8)                      | 133 (23.1)                |
| Total Gleason score at initial diagnosis           |                                 |                           |
| < 8                                                | 171 (29.8)                      | 187 (32.5)                |
| ≥ 8                                                | 386 (67.2)                      | 373 (64.8)                |
| Confirmed metastases at screeningb                 |                                 |                           |
| Yes                                                | 536 (93.4)                      | 531 (92.2)                |
| No                                                 | 34 (5.9)                        | 45 (7.8)                  |
| Unknown                                            | 4 (0.7)                         | 0                         |
| Localization of confirmed metastases at screeningb |                                 |                           |
| Bone only                                          | 268 (46.7)                      | 245 (42.5)                |
| Soft tissue only                                   | 51 (8.9)                        | 45 (7.8)                  |
| Bone and soft tissue                              | 217 (37.8)                      | 241 (41.8)                |
| Distant metastasis at initial diagnosis            |                                 |                           |
| M1                                                 | 402 (70.0)                      | 365 (63.4)                |
| M0                                                 | 83 (14.5)                       | 86 (14.9)                 |
| MX/unknown                                         | 88 (15.3)                       | 125 (21.7)                |
| Disease volume                                     |                                 |                           |
| High                                               | 354 (61.7)                      | 373 (64.8)                |
| Low                                                | 220 (38.3)                      | 203 (35.2)                |

(continued on following page)
DISCUSSION
In this phase III trial involving men with mHSPC, adding enzalutamide to ADT significantly reduced the risk of radiographic disease progression or death by 61% compared with placebo plus ADT (HR, 0.39; P < .001). Significant improvements with enzalutamide plus ADT were also observed in secondary efficacy end points. OS data are immature and will be analyzed when 342 deaths have occurred. Preliminary safety analysis showed an acceptable safety profile that seems consistent with that in

was assessed by the investigator to be related in the placebo plus ADT group.

### TABLE 1. Baseline Demographics (continued)

| Characteristic                                      | Enzalutamide Plus ADT (n = 574) | Placebo Plus ADT (n = 576) |
|-----------------------------------------------------|---------------------------------|---------------------------|
| Prior local therapy                                 |                                 |                           |
| Radical prostatectomy                               | 72 (12.5)                       | 89 (15.5)                 |
| Radiation therapy                                  | 73 (12.7)                       | 72 (12.5)                 |
| No. of cycles of prior docetaxel chemotherapy       |                                 |                           |
| 0                                                   | 471 (82.1)                      | 474 (82.3)                |
| 1-5                                                 | 14 (2.4)                        | 11 (1.9)                  |
| 6                                                   | 89 (15.5)                       | 91 (15.8)                 |
| Previous use of ADT<sup>a</sup>                     |                                 |                           |
| None                                                | 39 (6.8)                        | 61 (10.6)                 |
| ≤ 3 months                                          | 414 (72.1)                      | 394 (68.4)                |
| > 3 months                                          | 121 (21.1)                      | 120 (20.8)                |
| Unknown<sup>b</sup>                                 | 0                               | 1 (0.2)                   |
| Median duration of prior ADT, months (range)<sup>c</sup> | 1.6 (0.03-55.3)                | 1.6 (0.03-198.8)          |
| Previous use of antiandrogen<sup>d</sup>            |                                 |                           |
| None                                                | 205 (35.8)                      | 229 (39.9)                |
| Median PSA, ng/mL (range)<sup>e</sup>               | 5.4 (0.4-823.5)                 | 5.1 (0-19,000.0)          |
| Modified QLQ-PR25 urinary symptoms score, mean (SD)<sup>f</sup> | 35.2 (25.3)                    | 35.8 (25.4)               |
| FACT-P total score, mean (SD)<sup>g</sup>           | 113.9 (19.8)                    | 112.7 (19.0)              |
| BPI-SF Item 3 (worst pain), mean (SD)<sup>h</sup>    | 1.8 (2.4)                       | 1.8 (2.3)                 |
| BPI-SF pain severity score, mean (SD)<sup>i</sup>   | 1.4 (1.8)                       | 1.4 (1.7)                 |

NOTE. Data are No. (%) unless otherwise indicated.

Abbreviations: ADT, androgen deprivation therapy; BPI-SF, Brief Pain Inventory–Short Form; ECOG, Eastern Cooperative Oncology Group; FACT-P, Functional Assessment of Cancer Therapy–Prostate; MX, distant metastasis cannot be assessed (not evaluated by any modality); M0, no distant metastasis; M1, distant metastasis; PSA, prostate-specific antigen; QLQ-PR25, Quality of Life Prostate-Specific questionnaire; SD, standard deviation.

<sup>a</sup>By country regulations, race is not collected in France.

<sup>b</sup>Assessed by independent central review after investigator assessment at study entry.

<sup>c</sup>Defined by CHAARTED criteria<sup>6</sup> as presence of metastases involving the viscera, or, in the absence of visceral lesions, four or more bone lesions, one or more of which must be in a bony structure beyond the vertebral column and pelvic bone; some study sites incorrectly reported disease volume information for some patients at the time of randomization, which was corrected during medical review on study entry, resulting in a difference of approximately 20 patients with either high or low disease volume between the treatment arms.

<sup>d</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>e</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>f</sup>By country regulations, race is not collected in France.

<sup>g</sup>Assessed by independent central review after investigator assessment at study entry.

<sup>h</sup>Defined by CHAARTED criteria<sup>6</sup> as presence of metastases involving the viscera, or, in the absence of visceral lesions, four or more bone lesions, one or more of which must be in a bony structure beyond the vertebral column and pelvic bone; some study sites incorrectly reported disease volume information for some patients at the time of randomization, which was corrected during medical review on study entry, resulting in a difference of approximately 20 patients with either high or low disease volume between the treatment arms.

<sup>i</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>j</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>k</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>l</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>m</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>n</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>o</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>p</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>q</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>r</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>s</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>t</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>u</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>v</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>w</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>x</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>y</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>z</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>AA</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.

<sup>BB</sup>Includes the time since bilateral orchiectomy for patients who had prior bilateral orchiectomy.
previously reported clinical trials involving patients with CRPC,\textsuperscript{17,18} with maintenance of QoL at the high level reported at baseline. These efficacy and safety results prompted the DSMB to recommend crossing patients treated with placebo plus ADT over to enzalutamide plus ADT.

### Table 2: Primary and Secondary End Points

| End Point                                                                 | Enzalutamide Plus ADT \((n = 574)\) | Placebo Plus ADT \((n = 576)\) | HR (95% CI)    | \(P\)  |
|--------------------------------------------------------------------------|--------------------------------------|---------------------------------|----------------|-------|
| **Primary end point**                                                    |                                      |                                 |                |       |
| Median rPFS, months                                                      | NR                                   | 19.0                            | 0.39 (0.30 to 0.50) | < .001 |
| Radiographic progression                                                 | 79 (13.8)                            | 188 (32.6)                      |                |       |
| Prespecified sensitivity analysis (using PCWG2)\textsuperscript{a}       | NR                                   | 19.4                            | 0.39 (0.30 to 0.50) | < .001 |
| Death within 24 weeks of treatment discontinuation in the absence of radiographic progression | 12 (2.1)                             | 13 (2.3)                        |                |       |
| Prespecified sensitivity analysis (all deaths)\textsuperscript{b}        | NR                                   | 19.0                            | 0.39 (0.30 to 0.50) | < .001 |
| **Key secondary end points**                                            |                                      |                                 |                |       |
| Median time to PSA progression (months)                                  | NR                                   | NR                              | 0.19 (0.13 to 0.26) | < .001 |
| Median time to initiation of new antineoplastic therapy (months)         | 30.2                                 | NR                              |                |       |
| PSA undetectable (< 0.2 ng/mL) rate\textsuperscript{c}                   | 348 (68.1)                           | 89 (17.6)                       |                | < .001 |
| Objective response rate\textsuperscript{d}                              | 147 (83.1)                           | 116 (63.7)                      |                | < .001 |
| Complete response                                                        | 65 (36.7)                            | 42 (23.1)                       |                |       |
| Partial response                                                         | 82 (46.3)                            | 74 (40.7)                       |                |       |
| Stable disease                                                           | 17 (9.6)                             | 43 (23.6)                       |                |       |
| Progressive disease                                                      | 7 (4.0)                              | 9 (4.9)                         |                |       |
| NE/NA                                                                   | 6 (3.4)                              | 14 (7.7)                        |                |       |
| Median time to deterioration of urinary symptoms (months)\textsuperscript{e} | NR                                   | 16.8                            | 0.88 (0.72 to 1.08) | .2162 |
| Median OS (months)                                                       | NR                                   | NR                              | 0.81 (0.53 to 1.25) | .3361 |
| **Other secondary end points**                                           |                                      |                                 |                |       |
| Median time to first SSE, months                                         | NR                                   | NR                              | 0.52 (0.33 to 0.80) | .0026 |
| Median time to castration resistance, months                             | NR                                   | 13.8                            | 0.28 (0.22 to 0.36) | < .001 |
| Median time to deterioration of QoL (months)\textsuperscript{f}          | 11.3                                 | 11.1                            | 0.96 (0.81 to 1.14) | .6548 |
| Median time to pain progression (months)\textsuperscript{g}             | 8.3                                  | 8.3                             | 0.92 (0.78 to 1.07) | .2715 |
| Prespecified sensitivity analyses of time to pain progression from the PRO SAP |                                      |                                 |                |       |
| Median time to worst pain (item 3)\textsuperscript{h}                    | 14.1                                 | 11.1                            | 0.82 (0.69 to 0.98) | .0322 |
| Median time to pain severity (months)\textsuperscript{i}                | 19.4                                 | 16.8                            | 0.79 (0.65 to 0.97) | .0209 |

**NOTE.** All data are No. (%) unless otherwise specified.

*Abbreviations: ADT, androgen deprivation therapy; HR, hazard ratio; NA, not applicable; NE, not evaluable; NR, not reached; OS, overall survival; PCWG2, Prostate Cancer Working Group 2; PRO, patient-reported outcome; PSA, prostate-specific antigen; QoL, quality of life; rPFS, radiographic progression-free survival; SAP, statistical analysis plan; SSE, symptomatic skeletal event.*

\textsuperscript{a}Radiographic progression was documented by central review according to Prostate Cancer Working Group 2 criteria for bone assessment.\textsuperscript{25}

\textsuperscript{b}All deaths (in the absence of evidence of radiographic progression), regardless of timing, were included.

\textsuperscript{c}This analysis was conducted using intent-to-treat patients who had detectable PSA values at baseline (enzalutamide plus ADT, \(n = 511\); placebo plus ADT, \(n = 506\)).

\textsuperscript{d}Objective response is defined as patients achieving a complete or partial response in their soft tissue disease using the Response Evaluation Criteria in Solid Tumors (version 1.1).\textsuperscript{28} Patients with no postbaseline assessment at any visit are reported in the NE category. This analysis was conducted using intent-to-treat patients who had measurable soft tissue disease at baseline (enzalutamide plus ADT, \(n = 177\); placebo plus ADT, \(n = 182\)).

\textsuperscript{e}A deterioration in urinary symptoms is defined as an increase in the urinary symptoms subscale score by \(\geq 50\%\) of the standard deviation observed in the urinary symptoms subscale score at baseline (ie, Q31-Q33).

\textsuperscript{f}A deterioration of QoL is defined as a decrease of \(\geq 10\) points in the total Functional Assessment of Cancer Therapy–Prostate score from baseline.

\textsuperscript{g}Pain progression is defined as an increase of \(\geq 2\) points from baseline in the average Brief Pain Inventory–Short Form pain severity score.

\textsuperscript{h}Pain progression is defined as an increase of \(\geq 30\%\) from baseline in the average Brief Pain Inventory–Short Form pain severity score.
Importantly, the significant reduction in the risk of radiographic disease progression or death with enzalutamide plus ADT in this study (\( P < .001 \)) was observed in all prespecified subgroups, including men with or without prior docetaxel chemotherapy and those with a low or high volume of metastatic disease. These data support the
**FIG 3.** Kaplan-Meier estimates of time to (A) prostate-specific antigen (PSA) progression, (B) initiation of new antineoplastic therapy, and (C) first symptomatic skeletal event (intent-to-treat population). The dashed line at the 50th percentile indicates the median. Crosses indicate censored data. (*) In patients with no PSA progression, time to PSA progression was censored on the date of the last PSA sample taken. Patients without PSA progression before two or more consecutive missed PSA assessments were censored on the date of the last PSA assessment before the assessments missed. (†) In patients with no new antineoplastic therapy initiated for prostate cancer after randomization, time to start of new antineoplastic therapy was censored on the last visit date or the date of randomization, whichever occurred last. The median for the enzalutamide plus androgen deprivation therapy (ADT) group was not a reliable estimate because it resulted from an event observed in the only remaining patient at risk at approximately 30 months, leading to the vertical drop at the end of the Kaplan-Meier curve. The hazard ratio (HR; 95% CI) is a more accurate depiction of the differences between treatment arms. (‡) In patients with no symptomatic skeletal event by the time of the data cutoff point, time to symptomatic skeletal event was censored on the last visit date or the date of randomization, whichever occurred last. HR, hazard ratio; NR, not reached.
TABLE 3. Summary of AEs

| Event                                      | Enzalutamide Plus ADT (n = 572) | Placebo Plus ADT (n = 574) |
|--------------------------------------------|---------------------------------|----------------------------|
| AEs leading to withdrawal of treatment    | 41 (7.2)                        | 30 (5.2)                   |
| Drug-related serious AEs                   | 22 (3.8)                        | 16 (2.8)                   |
| AEs leading to death                       | 14 (2.4)                        | 10 (1.7)                   |

| AEs                                         | All Grades | Grade ≥ 3 | All Grades | Grade ≥ 3 |
|---------------------------------------------|------------|-----------|------------|-----------|
| AE, all grades                             | 487 (85.1) | 139 (24.3)| 493 (85.9) | 147 (25.6) |
| AE, grade ≥ 3                              | 104 (18.2) | 84 (14.7) | 112 (19.5) | 90 (15.7)  |

Most common AEs, occurring in ≥ 5% of patients*

| AEs                                          | All Grades | Grade ≥ 3 | All Grades | Grade ≥ 3 |
|----------------------------------------------|------------|-----------|------------|-----------|
| Hot flash                                    | 155 (27.1) | 2 (0.3)   | 128 (22.3) | 0         |
| Fatigue                                      | 112 (19.6) | 5 (0.9)   | 88 (15.3)  | 6 (1.0)   |
| Arthralgia                                   | 70 (12.2)  | 2 (0.3)   | 61 (10.6)  | 4 (0.7)   |
| Back pain                                    | 43 (7.5)   | 5 (0.9)   | 62 (10.8)  | 3 (0.5)   |
| Increased weight                            | 35 (6.1)   | 2 (0.3)   | 44 (7.7)   | 1 (0.2)   |
| Hypertension                                | 46 (8.0)   | 19 (3.3)  | 32 (5.6)   | 10 (1.7)  |
| Diarrhea                                     | 34 (5.9)   | 0         | 33 (5.7)   | 1 (0.2)   |
| Edema, peripheral                           | 29 (5.1)   | 1 (0.2)   | 38 (6.6)   | 1 (0.2)   |
| Nausea                                       | 37 (6.5)   | 1 (0.2)   | 29 (5.1)   | 0         |
| Asthenia                                     | 31 (5.4)   | 6 (1.0)   | 28 (4.9)   | 3 (0.5)   |
| Constipation                                 | 28 (4.9)   | 0         | 31 (5.4)   | 0         |
| Musculoskeletal pain                         | 36 (6.3)   | 1 (0.2)   | 23 (4.0)   | 1 (0.2)   |
| Dizziness                                    | 29 (5.1)   | 0         | 20 (3.5)   | 0         |

AEs of special interest†

| AEs                                          | All Grades | Grade ≥ 3 | All Grades | Grade ≥ 3 |
|----------------------------------------------|------------|-----------|------------|-----------|
| Convulsion                                  | 2 (0.3)    | 2 (0.3)   | 2 (0.3)    | 2 (0.3)   |
| Hypertension                                | 49 (8.6)   | 19 (3.3)  | 36 (6.3)   | 12 (2.1)  |
| Neutrophil count decreased                  | 5 (0.9)    | 2 (0.3)   | 4 (0.7)    | 2 (0.3)   |
| Cognitive/memory impairment                 | 26 (4.5)   | 4 (0.7)   | 12 (2.1)   | 0         |
| Ischemic heart disease                      | 10 (1.7)   | 3 (0.5)   | 8 (1.4)    | 6 (1.0)   |
| Other selected cardiovascular events         | 13 (2.3)   | 6 (1.0)   | 9 (1.6)    | 5 (0.9)   |
| Posterior reversible encephalopathy syndrome| 0          | 0         | 0          | 0         |
| Fatigue                                     | 138 (24.1) | 10 (1.7)  | 112 (19.5) | 9 (1.6)   |
| Fall                                        | 21 (3.7)   | 2 (0.3)   | 15 (2.6)   | 1 (0.2)   |
| Fractures                                   | 37 (6.5)   | 6 (1.0)   | 24 (4.2)   | 6 (1.0)   |
| Loss of consciousness                       | 9 (1.6)    | 6 (1.0)   | 1 (0.2)    | 1 (0.2)   |
| Thrombocytopenia                            | 3 (0.5)    | 0         | 3 (0.5)    | 0         |
| Musculoskeletal events                      | 151 (26.4) | 9 (1.6)   | 159 (27.7) | 12 (2.1)  |
| Severe cutaneous adverse reactions          | 0          | 0         | 1 (0.2)    | 0         |
| Angioedema                                  | 7 (1.2)    | 1 (0.2)   | 1 (0.2)    | 0         |
| Rash                                        | 15 (2.6)   | 0         | 9 (1.6)    | 0         |
| Second primary malignancies                 | 11 (1.9)   | 9 (1.6)   | 11 (1.9)   | 7 (1.2)   |

NOTE. All data are No. (%). AEs were recorded in the electronic case report form and graded based on the National Cancer Institute’s Common Terminology Criteria for Adverse Events (version 4.03) by the study investigator.

Abbreviations: ADT, androgen deprivation therapy; AE, adverse event.

*AEs reported in at least 5% of the patients in either treatment group, listed in descending order by preferred term. None of the most common AEs was grade 5.

†AEs of special interest were based on prespecified combinations of preferred terms (Medical Dictionary for Regulatory Activities, version 21.0) related to the AE of special interest; for example, the combination of preferred terms used to define fatigue as an AE of special interest was fatigue and asthenia. Two of the AEs of special interest in the enzalutamide plus ADT group were grade 5 (ischemic heart disease, n = 1; other selected cardiovascular events, n = 1).
consideration of enzalutamide in addition to ADT for men with mHSPC, including patients with prior docetaxel treatment and regardless of disease volume. Although OS data remain immature, these findings have clear clinical implications for the current management of these patients.

PROs from assessments of daily living have also been shown to predict survival in prostate cancer. In this population of men with mHSPC, we observed maintenance of high QoL over time, similar to that observed in the population with nonmetastatic castration-resistant disease. Baseline average BPI-SF scores were low overall, with almost half of patients reporting scores of zero. Consequently, no significant difference between treatment groups in risk of pain progression, defined as a 30% or greater increase in average BPI-SF pain severity score, was observed. However, when using a more clinically meaningful definition of pain progression (≥2-point threshold) during the prespecified sensitivity analyses from the PRO SAP, enzalutamide plus ADT showed a delay in pain progression versus placebo plus ADT. Ultimately, no significant difference between treatment groups in risk of deterioration of urinary symptoms or QoL was observed, suggesting there was no negative impact on PROs due to the addition of enzalutamide to ADT. Additional analyses of the PROs are ongoing and are also planned as part of the long-term follow-up.

Currently, ARCHES is the first trial to demonstrate clinically meaningful benefits of potent AR inhibition with a second-generation nonsteroidal antiandrogen (enzalutamide) in combination with ADT, including a subgroup of men with mHSPC after docetaxel chemotherapy. Whereas some previous studies focused on patients with high risk and entirely excluded patients with previous chemotherapy, the specific inclusion of patients with prior docetaxel chemotherapy in ARCHES provides unique insight into this important patient subgroup with unmet clinical needs.

Both rPFS and metastasis-free survival are accepted by the US Food and Drug Administration as primary efficacy end points in metastatic CRPC and nonmetastatic CRPC, respectively. However, although rPFS has not yet been established as a surrogate for OS in mHSPC, it is an acceptable regulatory end point, and reducing the risk of radiographic progression or death is of clinical importance, given the strong positive correlation reported for rPFS and OS in patients with metastatic CRPC and the direct impact of additional metastatic progression in this setting on patient management. Furthermore, rPFS requires shorter follow-up periods and fewer patients compared with OS as a result of the higher event rate, accelerating trial completion. It is also in the interest of patients to unblind trials earlier, on the basis of robust rPFS evidence, especially when supported by strong secondary end points, to allow crossover to active treatment. Therefore, ARCHES was accelerated, with rPFS analysis conducted after only 262 events, despite an immature OS analysis. At the time of manuscript submission, a phase III study investigating the addition of enzalutamide versus a first-generation nonsteroidal antiandrogen, such as bicalutamide, to ADT, with or without docetaxel chemotherapy, in men with mHSPC is currently ongoing and will provide additional data on the clinical benefits of enzalutamide plus ADT, including the impact on OS.

Several therapies have recently been shown to be effective in men with mHSPC; therefore, ADT alone may no longer be an appropriate control arm in this patient population. However, docetaxel plus ADT only became part of the global SOC for mHSPC in 2016, after patients were already enrolling in ARCHES, and thus, docetaxel could not have been considered as part of the comparator arm in the current study. Furthermore, patients with high-volume disease who had completed prior docetaxel were eligible for trial entry by study design, and for those with low-volume disease, the benefit of early treatment with docetaxel combined with ADT has not been established.

In conclusion, in comparison with placebo, the addition of enzalutamide to ADT for men with mHSPC provided clinically meaningful improvements across key efficacy end points while maintaining the high level of QoL reported at baseline. Enzalutamide was generally well tolerated, with a preliminary safety analysis seeming to be consistent with the safety profile of enzalutamide in previous clinical trials in CRPC. Enzalutamide plus ADT should therefore be considered as a treatment option for men with mHSPC, including those with low-volume disease or who had received prior docetaxel. Additional studies are necessary to clarify whether combination or sequential approaches with AR-targeted therapies or chemotherapy are favored for initial management.

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Data Sharing
Access to anonymized, individual, participant-level data collected during the trial, in addition to supporting clinical documentation, is planned for trials conducted with approved product indications and formulations, as well as compounds terminated during development. Conditions and exceptions are described under the Sponsor Specific Details for Astellas on www.clinicalstudydatarequest.com. Study-related supporting documentation is redacted and provided if available, such as the protocol and amendments, statistical analysis plan, and clinical study report. Access to participant-level data is offered to researchers after publication of the primary manuscript (if applicable) and is available as long as Astellas has legal authority to provide the data. Researchers must submit a proposal to conduct a scientifically relevant analysis of the study data. The research proposal is reviewed by an Independent Research Panel. If the proposal is approved, access to the study data is provided in a secure data-sharing environment after receipt of a signed Data-Sharing Agreement.
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FIG A1. Multiplicity adjustment strategy. (*) Overall survival will be tested at 0.05 only if all the other five secondary end points analyses are statistically significant at 0.01, otherwise it will be tested at 0.04. N, no; Y, yes.