Predictive Factors for Response to Abiraterone in Metastatic Castration Refractory Prostate Cancer

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Abstract. *Background: Management of metastatic castration refractory prostate cancer (CRPC) is rapidly evolving. Rationalisation of treatment requires identification of those patients more likely to benefit from a particular therapy. We reviewed the outcome of patients treated with abiraterone at our Institution to describe factors predictive for response. Patients and Methods: Patients with CRCP treated with abiraterone were identified. Baseline variables and potential prognostic factors were extracted from electronic records. Outcome measures included overall survival (OS), prostate-specific antigen (PSA) response and time to PSA progression (TTPP). The Kaplan–Meier method and Cox proportional hazards model were used to analyze survival data. Results: A total of 61 patients met the inclusion criteria. In multivariate analysis, three independent predictors of OS were identified: Duration of response to androgen deprivation therapy (ADT) (hazard ratio(HR)=0.95, p=0.006), performance status (HR=7.4, p=0.013), and baseline haemoglobin (HR=0.47, p≤0.001). Conclusion: This study has identified three factors predictive for response to abiraterone in CRPC. Duration of response to ADT has not been previously shown to be a predictive factor for patients with CRCP. We suggest that a prospective validation is required.*

As the most common non-cutaneous male malignancy and second most common cause of male cancer mortality within the Western world (1), prostate cancer commands a substantial level of interest for researchers endeavouring to identify new therapeutic strategies in cancer care. This interest is sustained given the increasing worldwide incidence of prostate cancer (2) combined with the fact that disease in at least one-third of these patients progresses to metastatic castrate-resistant disease (CRPC) (3). Great success has been achieved over the past three years, during which several novel therapeutic strategies for prostate cancer have been identified, ranging from developments in conventional cytotoxic chemotherapy and hormonal therapies, to bone microenvironment-targeted agents, novel immunotherapies and bone-targeted radioisotopes. Although this progress is welcomed, it presents the treating clinician with a challenge as well as an opportunity. The increasing number of therapeutic options gives scope for individualizing treatment strategies for patients, but in order to decide on a rational treatment strategy and design a coherent sequence of therapies, an ability to identify patients who are going to benefit more from a specific treatment is required. It is therefore imperative for researchers to develop a means of using baseline clinical variables to enable prognosis and thereby individualization of treatment and potential stratification of patients for prospective clinical trials.

Abiraterone represents one novel therapy that is established for patients who have failed first-line docetaxel chemotherapy (4), and which has more recently shown survival benefit in the pre-docetaxel setting (5). Abiraterone acetate marketed under the trade name Zytiga by Janssen Biotech is a steroidal, potent and selective inhibitor of the cytochrome *P450 17* (CYP17) enzyme, irreversibly inhibiting the 17α-hydroxylase and 17-20-lyase activities of CYP17, thereby inhibiting androgen and steroid biosynthesis. In a large randomized controlled trial 1,195 patients with metastatic CRPC who had progression of disease after docetaxel, abiraterone was shown to be superior to placebo for overall survival (OS), time to prostate specific antigen (PSA) progression (TTPP), progression-free survival (PFS) and PSA response rate (3). Other therapeutic options which have also shown survival benefit include enzalutamide, radium-223, and cabazitaxel (6-8), with several more still under investigation (9). These

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Table I. *Univariate analysis of patient risk factors and overall survival (continuous variables)*

Risk factor (continuous)	Median (range)	HR (95%CI)	Standard error	*p*-Value
Age at diagnosis (years) (n=61)	63.89 (49.02-78.46)	1.060 (1.005-1.116)	0.028	0.029*
Age at start of abiraterone (years)	61 68.86 (56.04, 86.79)	1.040 (0.982, 1.100)	0.030	0.178
PSA at diagnosis (ng/dl)	51 98.80 (0.83, 6000)	1.000 (1.000, 1.000)	0.000	0.977
Duration of hormonal therapy response (months)	57 19.55 (3.91, 167.79)	0.977 (0.951, 1.004)	0.014	0.048*
PSA at start of abiraterone (ng/dl)	61 168.4 (0.1, 4019)	1.000 (1.000, 1.000)	0.295	0.332
Number of docetaxel cycles	57 9 (1, 12)	0.960 (0.795, 1.160)	0.093	0.679
Hb at start of abiraterone (g/dl)	54 11.8 (7.7, 16.0)	0.647 (0.500, 0.838)	0.085	0.001*
Time from docetaxel progression to starting aberaterone (months)	49 8.1 (0.53, 43.80)	0.970 (0.928, 1.014)	0.022	0.181
Time from diagnosis to aberaterone (months)	61 58.12 (6.21, 187.90)	0.989 (0.979, 1.000)	0.006	0.057*

CI: Confidence interval; Hb: haemoglobin; HR: Hazard ratio; PSA: prostate specific antigen. *Significant at 0.1 level, therefore included in the multivariate analysis.

treatments have different degrees of associated toxicity. Abiraterone causes fatigue, symptoms of mineralocorticoid excess, elevation in liver transaminases and adverse cardiac events. Furthermore, the costs of treatments vary, and in an era where the costs of cancer therapies are skyrocketing and options are expanding (10), identifying those patients who are more likely to benefit from abiraterone may improve its cost-effectiveness.

Under this setting, physician judgment forms the basis for risk estimation, patient counselling, and decision-making (11). It is clear that bias exists in estimates by clinicians because of subjective and objective confounders at all stages of the prediction process (12, 13). An unmet clinical need exists for prognostic factors that may aid the clinician in this setting. Our aim for this analysis was to perform a retrospective review of patients with metastatic CRPC, after failure of docetaxel chemotherapy, who were treated with abiraterone at our Centre in order to identify factors that are predictive for response.

Patients and Methods

We retrospectively reviewed electronic records of patients treated with abiraterone post docetaxel therapy at our Institution, a tertiary specialist centre, between 25th August 2010 and 15th February 2012. The study protocol was reviewed and approved by the regional Research and Development group (approval number A1459).

The inclusion criteria for the analysis were: i) Patients with metastatic CRPC, confirmed by bone scan, computed tomography (CT) or magnetic resonance imaging (MRI); ii) patients on continuous androgen deprivation therapy (ADT) or post-orchidectomy; iii) prior docetaxel chemotherapy, with failure because of progressive disease evidenced by PSA or imaging, or discontinuation secondary to intolerability; iv) Eastern Co-operative Oncology Group Performance Status (ECOG-PS) less than 2.

Clinical, laboratory and radiological data were collected from electronic patient records stored on the hospital database, and chemotherapy prescriptions. Data regarding patient demographics, disease characteristics, details of treatments received, and biochemical tests were recorded. Internationally accepted definitions of criteria such as PSA nadir, baseline PSA and PSA response/progression were used (14).

Outcome measures assessed were OS, TTPP, and PSA response rate. The data were analysed using the STATA package version 12.1 (StataCorp. 2011. Stata Statistical Software: Release 12. College Station, TX, USA: StataCorp LP). OS was analysed from the date of starting abiraterone to the date of death. Patients were censored if alive at the follow-up visit and Kaplan–Meier survival curves were used to estimate OS and TTPP. Univariate analysis was conducted investigating nine continuous and eight

Table II. *Univariate analysis of patient risk factors and overall survival (categorical variables).*

Risk factor (categorical)		Number (%)	HR (95%CI)	Standard error	*p*-Value
Gleason score at diagnosis					*p*=0.054*
7 or less		18	1	-	
8		10	0.610 (0.123, 3.025)	0.498	
9 or greater		22	2.532 (0.916, 7.002)	1.314	
Missing		11	2.909 (0.926, 9.140)	1.99	
Metastatic sites at baseline					*p*=0.745
Bone Only		42 (70)	1		
Bone & LN or LN Alone		18 (30)	0.860 (0.343, 2.159)	0.404	
ECOG-PS at starting aberaterone					*p*=0.051*
0		13 (22)	1		
1/2		46 (78)	2.911 (0.863, 9.815)	1.805	
Tumor stage at diagnosis					*p*=0.889
M0		25 (41)	1		
M1		36 (59)	1.058 (0.477, 2.350)	0.431	
PSA response to chemotherapy					*p*=0.174
No		16 (31)	1		
Yes		35 (69)	0.517 (0.204, 1.313)	0.246	
Prior diethylstilbestrol therapy					*p*=0.274
No		28 (47)	1		
Yes		32 (53)	0.636 (0.282, 1.432)	0.263	
ALP at start aberaterone					*p*=0.008*
0=Normal	0	29 (48)	1		
1=Above normal, but <2xULN	1	13 (21)	1.890 (0.615, 5.812)	1.083	
2=>2xULN, <3xULN	2&3	19 (31)	4.224 (1.695, 10.524)	1.967	
3=>3xULN					
Sites of metastatses at starting aberaterone					*p*=0.124
Bone		20 (42)	1		
Bone & LN		17 (35)	0.698 (0.197, 2.480)	0.452	
Bone & LN & Visceral		11 (23)	2.376 (0.795, 7.107)	1.328	

*Significant at 0.1 level, therefore included in the multivariate analysis.

categorical variables as risk factors for OS. Continuous variables were: age at diagnosis, age at starting abiraterone, PSA at diagnosis, response to primary ADT, baseline PSA at starting abiraterone, number of cycles of docetaxel, baseline haemoglobin (Hb) at starting abiraterone, time from docetaxel progression to starting abiraterone, and time from diagnosis to starting abiraterone. Categorical variables were: Gleason score at diagnosis, number of metastatic sites at diagnosis of metastatic disease, baseline ECOG-PS, tumour stage at diagnosis, PSA response to docetaxel, post-docetaxel diethylstilboestrol therapy, baseline ALP at starting abiraterone, and number of metastatic sites at starting abiraterone. Due to the exploratory nature of this study, the univariate significance level required for inclusion into the multivariate model was set at 1.0. A Cox proportional hazards model was generated using likelihood ratio tests with significance levels set at 0.05 to determine the exclusion/inclusion of individual factors in the model. The proportionality assumption of the model was tested and found to be upheld.

The beta coefficients for the risk factors included in the model were calculated and used to generate a predictive score by which patients were divided into two risk groups. The probability of survival was assessed for each group.

Results

A total of 61 patients met our inclusion criteria. Tables I and II summarize the continuous and categorical patient characteristics used in univariate analysis. The median age was 69 years, with 30% of patients being over the age of 75 years. Fifty three (90%) patients had an ECOG-PS of 0 or 1, with six (10%) having an ECOG-PS of 2. Gleason score was only available for 50 (82%) patients; 18 (36%) patients had a Gleason score of less than 7, and 32 (64%) patients had a score of 8-10, the majority of whom scored 9 (4+5). The baseline PSA at starting abiraterone was 168.4 (range=0.1-4019) ng/dI. Thirty-two (52%) patients had an elevated alkaline phosphatase (ALP) on starting abiraterone. All 61 patients had confirmed bone metastases, and out of the 48 patients in whom other metastatic sites were evaluable, 28 (58%) had lymph node involvement, 7 (14.5%) had liver metastases, 7 (14.5%) had lung metastases, and 1 patient had meningeal metastases.

The median time from date of diagnosis of prostate cancer to starting abiraterone was 59 (range=6-188) months. The

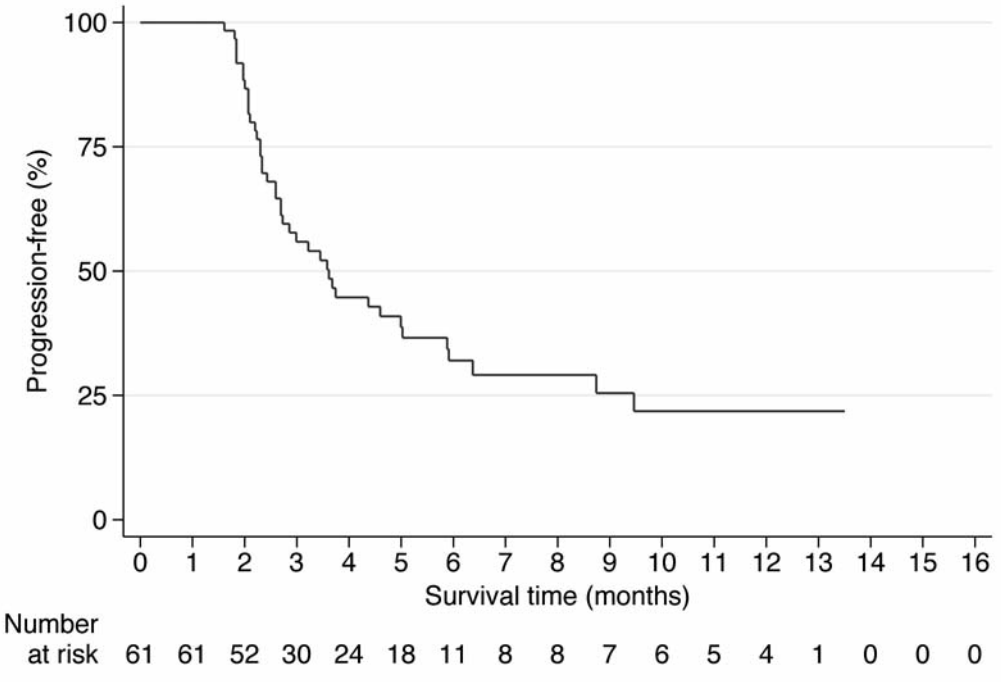

Figure 1. *Time to PSA progression*.

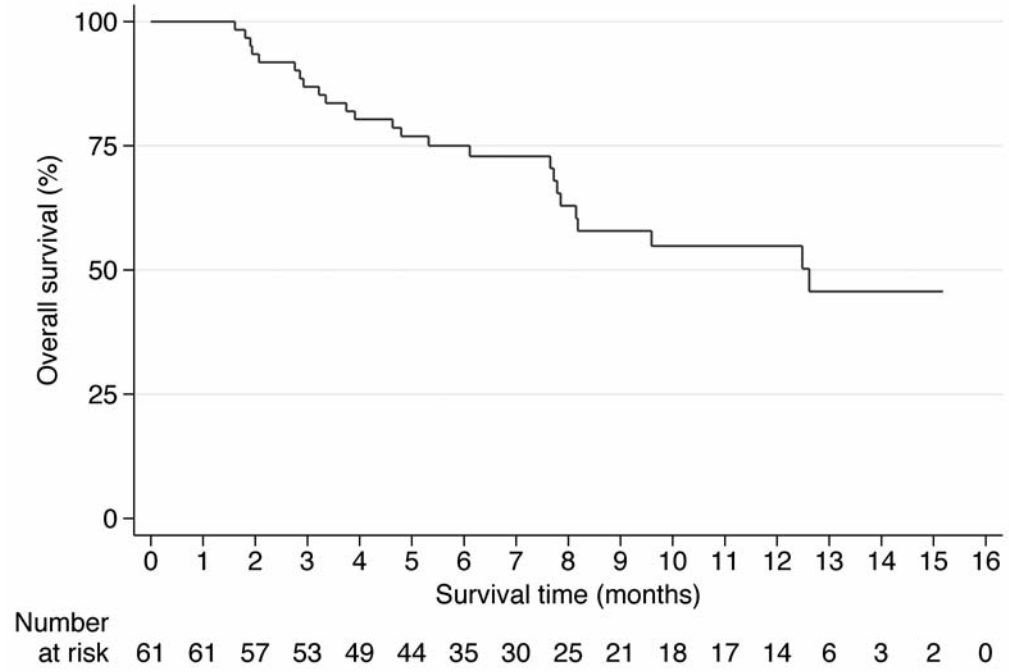

Figure 2. *Overall survival*.

median time from docetaxel failure to starting abiraterone was 8.3 (range=0.5-43.8) months. Forty-one (67%) patients had a PSA progression on abiraterone. The median TTPP was 3.58 (95% CI=2.69-5.03) months (Figure 1). Twenty-one (34%) patients achieved a decline in PSA of >50%. For the PSA responder group, the median baseline PSA was 190.7 (range=9.3-4019) ng/dl and the median nadir PSA was 36.6 (range=0.06-547.8) ng/dl. Median time to PSA response

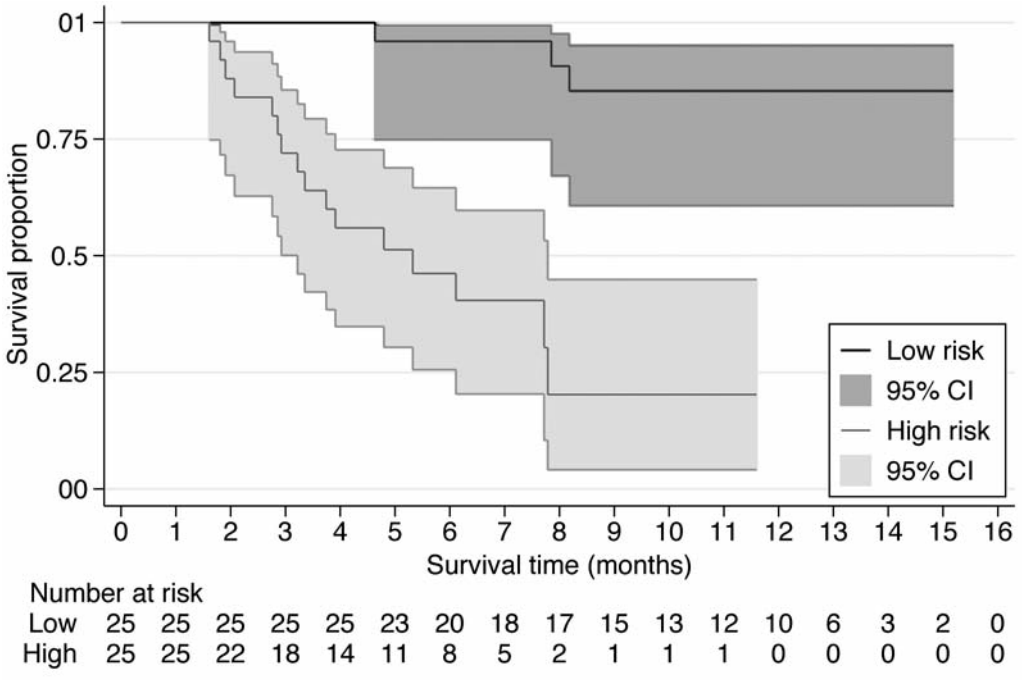

Figure 3. *Risk group analysis using agorithm.*

Table III. *Multivariate analysis for final predictive model.*

Prognostic factor	Beta coefficient (95%CI)	Standard error	Hazard ratio (95%CI)	*p*-Value
Duration of hormonal therapy response (months)	–0.019 (–0.037-0.000)	0.009	0.981 (0.964-1.000)	0.046
ECOG-PS at start of abiraterone				0.047
0	-	-	1	
1/2	0.911 (0.010-1.812)	0.460	2.487 (1.010-6.122)	
Hb at start of abiraterone	–0.333 (–0.540-0.127)	0.105	0.717 (0.583-0.881)	0.002

was 1 month (range=0.6-2.3 months), and duration of response was 5.1 (range=0.3-12.4) months.

At the time of analysis, 25 patients had died. With a median duration of follow-up of 11.5 (95% CI=7.7-12.6) months, estimated by the reverse Kaplan–Meier method, the median OS from the time of starting abiraterone was 12.6 months (Figure 2).

Of the potential risk factors in the univariate analysis, seven were linked to OS. They were: age at diagnosis, duration of tumor response to primary ADT, baseline Hb at starting abiraterone, time from diagnosis of prostate cancer to starting abiraterone, Gleason score at diagnosis, ECOG-PS at starting abiraterone and ALP at starting abiraterone. All factors that were univariately significant were considered for inclusion in the multivariate model (Table III).

In the Cox proportional hazards model, three out of the seven univariately significant factors were independent predictors of OS: the duration of response to primary ADT (a previously undefined predictive factor), ECOG-PS, and baseline Hb. A prolonged duration of response to ADT was associated with a 4.3% reduction in the hazard of death, a higher Hb was associated with a lower hazard of death by 53% and an ECOG-PS of 1 or 2 was associated with a 7.4-fold increase in the risk of death compared with an ECOG-PS of 0.

The beta coefficients calculated from the multivariate model were used to generate a predictive score to identify two distinct risk groups: Predictive score=(0.0443×no. of months of hormone therapy response) + (2.002×Performance Status Score) + (–0.739×Hb). The Performance Status Score

(PSS) was defined as follows: If ECOG-PS=0, PSS=0; if ECOG PS=1 or 2 , PSS=1. Low-risk group patients were those with a predictive score below the cut-off value of −7.679274. The OS curves of the two groups diverged early without overlapping 95% CIs. Due to a limited number of events, the low-risk group did not reach the median by the end of follow-up (Figure 3).

Discussion

The main efficacy results of our study are comparable to those reported in the phase III clinical trial (4) with a median OS of 12.6 months, and 34.4% PSA response rate. However, the TTPP in our cohort was shorter than in the trial cohort, being 3.58 months in our study and 10.2 months in the trial cohort. The advanced disease status of our patient cohort may provide an explanation for this disparity. The subgroup of patients in a phase II trial looking at the use of abiraterone post-docetaxel who were previously treated with ketoconazole, which acts by inhibiting adrenal steroidogenesis, had a short TTPP, with a median value of 99 days (3.25 months) (15). The extensive prior use of glucocorticoid hormonal therapy in our patient cohort may account for the shorter TTPP. The disparity in our data between TTPP and OS could reflect the weakness of the association between TTPP and OS.

Our Cox regression analysis concluded that Hb level, ECOG-PS and duration of response to ADT are independent prognostic factors for OS. Although Hb and ECOG-PS are well-known predictors for survival in CRPC (16, 17), the duration of response to ADT is a previously undefined predictor for outcomes. Furthermore, some data suggest that prolonged exposure to ADT may increase neuroendocrine differentiation of prostate cancer tissue, which is androgen receptor-negative (18), and given the fact that prolonged exposure to ADT is a risk factor for chronic anaemia (19), the natural inclination may be to suspect that extended exposure is a poor prognosticator. However, a longer duration of response to ADT was associated with a 4.3% reduced risk of death, possibly signifying a more androgen sensitive disease hence a better response to abiraterone. A recent abstract presented at the American Society for Clinical Oncology Genitourinary Cancers Symposium 2014, described the findings of a retrospective analysis of 132 patients with metastatic CRPC in which survival analysis was performed according to time to progression to CRPC after first hormonal therapy (<12 months *vs.* >12 months) (21). The investigators found a median PFS of 8 months *versus* 26.1 months, respectively ($p<0.05$). The findings of this study coupled with those of ours are suggestive that the duration of response to ADT is a predictive factor for survival and response to treatment, and warrants further prospective investigation.

Although studies have shown ALP to be prognostic of OS in metastatic CRPC after docetaxel therapy (20), in our multivariate analysis ALP was not linked to OS, whilst in univariate analysis it was. This discrepancy may be attributable to the small sample size of our study.

Using the three significant prognostic factors (Hb, ECOG-PS, and duration of response to ADT) detected in our study, we were able to stratify our patient cohort into high-risk and low-risk groups by use of a scoring algorithm utilizing beta coefficients. The number of patients included in this analysis is too low for a clinically relevant algorithm, particularly without validation.

There are some important limitations to the present study, the main ones being its small sample size and its retrospective nature. We suggest that further validation of the factors identified is required, and we encourage continued analyses of patients with metastatic CRPC in different settings to aid the development of best practice. Patients who are unlikely to benefit from abiraterone could be offered other treatment options, such as second-line chemotherapy, or referred to ongoing clinical trials. Additionally, identifying patient sub-groups that may gain the most benefit from this therapy could be important in maximizing its cost-effectiveness.

References

1 Hsing AW and Chokkalingam AP: Prostate cancer epidemiology. Front Biosci *11*: 1388-1413, 2006.

2 Center MM, Jemal A, Lortet-Tieulent J, Ward E, Ferlay J, Brawley O and Bray F: International variation in prostate cancer incidence and mortality rates. Eur Urol *61(6)*: 1079-1092, 2012.

3 Omlin A and de Bono JS: Therapeutic options for advanced prostate cancer: 2011 update. Curr Urol Rep *13*: 170-8, 2012.

4 de Bono JS, Logothetis CJ, Molina A, Fizazi K, North S, Chu L, Chi KN, Jones RJ, Goodman OB Jr, Saad F, Staffurth JN, Mainwaring P, Harland S, Flaig TW, Hutson TE, Cheng T, Patterson H, Hainsworth JD, Ryan CJ, Sternberg CN, Ellard SL, Fléchon A, Saleh M, Scholz M, Efstathiou E, Zivi A, Bianchini D, Loriot Y, Chieffo N, Kheoh T, Haqq CM, Scher HI; COU-AA-301 Investigators. Abiraterone and increased survival in metastatic prostate cancer. N Engl J Med *364*: 1995-2005, 2011.

5 Ryan CJ, Smith MR, de Bono JS, Molina A, Logothetis CJ, de Souza P, Fizazi K, Mainwaring P, Piulats JM, Ng S, Carles J, Mulders PF, Basch E, Small EJ, Saad F, Schrijvers D, Van Poppel H, Mukherjee SD, Suttmann H, Gerritsen WR, Flaig TW, George DJ, Yu EY, Efstathiou E, Pantuck A, Winquist E, Higano CS, Taplin ME, Park Y, Kheoh T, Griffin T, Scher HI, Rathkopf DE; COU-AA-302 Investigators. Abiraterone in metastatic prostate cancer without previous chemotherapy. N Eng J of Med *368(138)*: 48, 2013.

6 Scher HI, Fizazi K, Saad F, Taplin ME, Sternberg CN, Miller K, de Wit R, Mulders P, Chi KN, Shore ND, Armstrong AJ, Flaig TW, Fléchon A, Mainwaring P, Fleming M, Hainsworth JD, Hirmand M, Selby B, Seely L, de Bono JS; AFFIRM Investigators. Increased survival with enzalutamide in prostate cancer after chemotherapy. N Eng J of Med *367*: 1187-1197, 2012.

7 Parker C, Nilsson S, Heinrich D, Helle SI, O'Sullivan JM, Fosså SD, Chodacki A, Wiechno P, Logue J, Seke M, Widmark A, Johannessen DC, Hoskin P, Bottomley D, James ND, Solberg A, Syndikus I, Kliment J, Wedel S, Boehmer S, Dall'Oglio M, Franzén L, Coleman R, Vogelzang NJ, O'Bryan-Tear CG, Staudacher K, Garcia-Vargas J, Shan M, Bruland ØS, Sartor O; ALSYMPCA Investigators. Alpha emitter radium-223 and survival in metastatic prostate cancer. N Engl J Med *369*: 213-223, 2013.

8 de Bono JS, Oudard S, Ozguroglu M, Hansen S, Machiels JP, Kocak I, Gravis G, Bodrogi I, Mackenzie MJ, Shen L, Roessner M, Gupta S and Sartor AO: TROPIC Investigators Lancet. *376(9747)*: 1147-1154, 2010 Oct.

9 Massari F, Maines F, Modena A, Brunelli M, Bria E, Artibani W, Martignoni G and Tortora G: Castration Resistant Prostate Cancer (CRPC): State of the Art, Perspectives and New Challenge. Anti-Can Agen in Med Chem *13(6)*: 872-886, 2013.

10 Smith TJ, Hillner BE. Bending the Cost Curve of Cancer Care. N Engl J Med *364*: 2060-2065, 2011.

11 Shariat SF, Karakiewicz PI, Suardi N and Kattan MW: Comparison of nomograms with other methods for predicting outcomes in prostate cancer: a critical analysis of the literature. Clin Cancer Res *14(14)*: 4400-4407, 2008.

12 Vlaev I, Chater N. Game relativity: how context influences strategic decision making. J Exp Psychol Learn Mem Cogn *32*: 131-149, 2006.

13 Ross PL,Gerigk C,Gonen M, Yossepowitch O, Cagiannos I, Sogani PC, Scardino PT and Kattan MW: Comparisons of nomograms and urologists' predictions in prostate cancer. Semin Urol Oncol *20*: 82-88, 2002.

14 Bubley GJ, Carducci M, Dahut W, Dawson N, Daliani D, Eisenberger M, Figg WD, Freidlin B, Halabi S, Hudes G, Hussain M, Kaplan R, Myers C, Oh W, Petrylak DP, Reed E, Roth B, Sartor O, Scher H, Simons J, Sinibaldi V, Small EJ, Smith MR, Trump DL and Wilding G: Eligibility and response guidelines for Phase II clinical trials in androgen-independent prostate cancer: recommendations from the prostate specific antigen working group. J of Clin Onc *17(11)*: 3461-3467, 1999.

15 Danila DC, Morris MJ, de Bono JS, Ryan CJ, Denmeade SR, Smith MR, Taplin M-E, Bubley GJ, Kheoh T, Haqq C, Molina A, Anand A, Koscuiszka M, Larson SM, Schwartz LH, Fleisher M and Scher HI: Phase II Multicenter Study of Abiraterone Acetate Plus Prednisolone Therapy in Patients with Docetaxel-Treated Castration-Resistant Prostate Cancer. J of Clin Onc *28(9)*: 1496-1501, 2010.

16 Armstrong AJ, Eisenberger MA, Halabi S, Oudard S, Nanus DM, Petrylak DP, Sartor AO and Scher HI: Biomarkers in the management and treatment of men with metastatic castration resistant prostate cancer. Eur Urol *61(3)*: 549-559, 2012.

17 Halabi S, Small EJ, Kantoff PW, Kattan MW, Kaplan EP, Dawson NA, Levine EG, Blumenstein BA and Vogelzang NJ: Prognostic model for predicting survival in men with hormone-refractory Metastatic Prostate Cancer. J of Clin Onc *21(7)*: 1232-1237, 2003.

18 Daneshmand S, Quek ML and Pinski J: Neuroendocrine differentiation in prostate cancer. Cancer Therapy *3*: 383-396, 2005.

19 Huang J, Yao JL, di Saint'Agnese PA, Yang Q, Bourne PA, Na Y. Immunohistochemical characterization of neuroendocrine cells in prostate cancer. Prostate *66(13)*: 1399-1406, 2006.

20 Bahl AK, Bertelli G, Lewis PD, Jenkins P, Aziz A, Davies PJ, Persad R, Smith CG, Hurley K and Mason MD: Correlation of elevated alkaline phosphatase (ALP) and survival in metastatic castration resistant prostate cancer (CRPC) treated with docetaxel chemotherapy: Results of SWSW Uro-oncology Group study from three UK centres. J of Clin Oncol *29*: 2011 (suppl 7; abst 206)

21 Angelergues A, Maillet D, Flechon A, Ozguroglu M, Mercier F, Guillot A, Le Moulec S, Gravis G, Beuzeboc P, Massard C, De La Motte Rouge T, Delanoy N, Elaidi R-T and Oudard S: Duration of response to androgen-deprivation therapy (ADT) and efficacy of secondary hormone therapy, docetaxel (D), and cabazitaxel (C) in metastatic castration-resistant prostate cancer (mCRPC). J of Clin Oncol *32*: 2014 (suppl 4; abst 282).

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