

ADVANCES IN
Cancer
IMMUNOTHERAPY™



Immunotherapy for the Treatment of Genitourinary Cancers

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Society for Immunotherapy of Cancer

Disclosures

- Advisory board: Exelixis, Sanofi
- Research: BMS, Pfizer, Incyte, Bayer, AstraZeneca, Nektar, Genentech, Peloton, Tracon

Key Takeaways:

- *Describe the rationale for common approaches to cancer immunotherapy, particularly with respect to prostate, kidney and bladder cancers*
- *Recognize patient selection criteria and familiarize the clinical data for approved therapies*
- *Select appropriate sequencing of approved therapies*

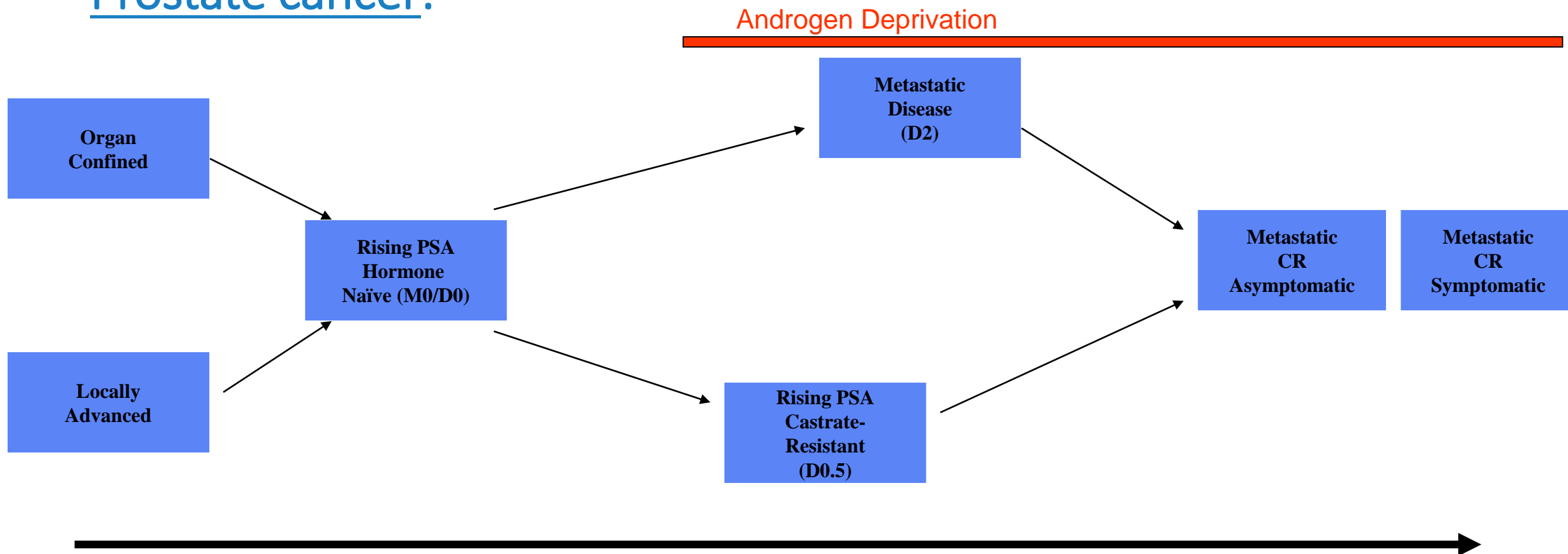
Prostate Cancer – Case #1:

You are seeing a 68 y/o man who was diagnosed with a Gleason 5+4 prostate cancer 5 years ago. He had evidence of metastases to the bone and retroperitoneal lymph nodes, and was started on treatment with leuprolide and bicalutamide. His PSA initially declined, but then began rising two years ago, and the bicalutamide was discontinued. His PSA continued to rise, and is currently 5 ng/mL. Bone scan shows new metastases, but he remains asymptomatic. What are appropriate immunotherapy treatment options for him?

- A) Nivolumab
- B) Sipuleucel-T
- C) Pembrolizumab
- D) B or C

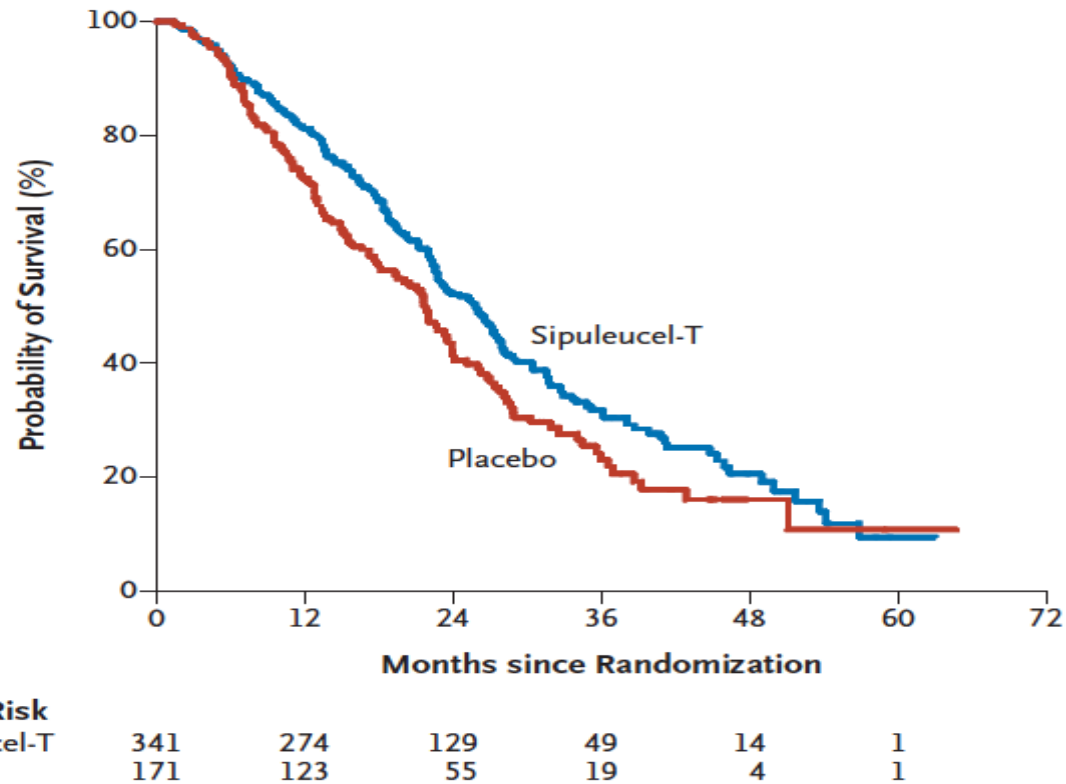


Prostate cancer:

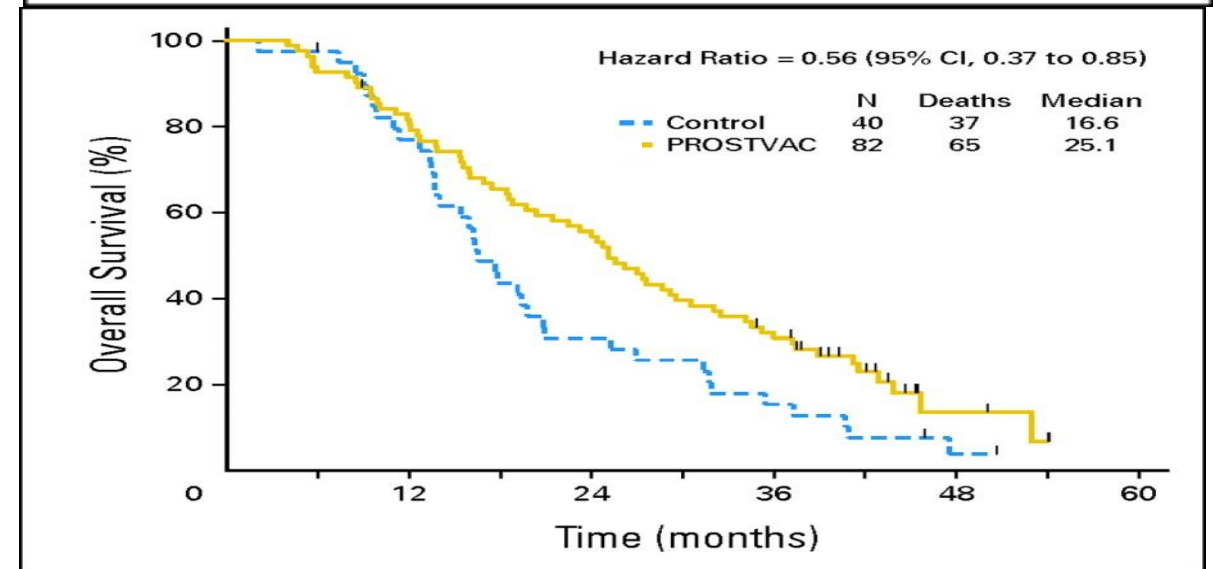
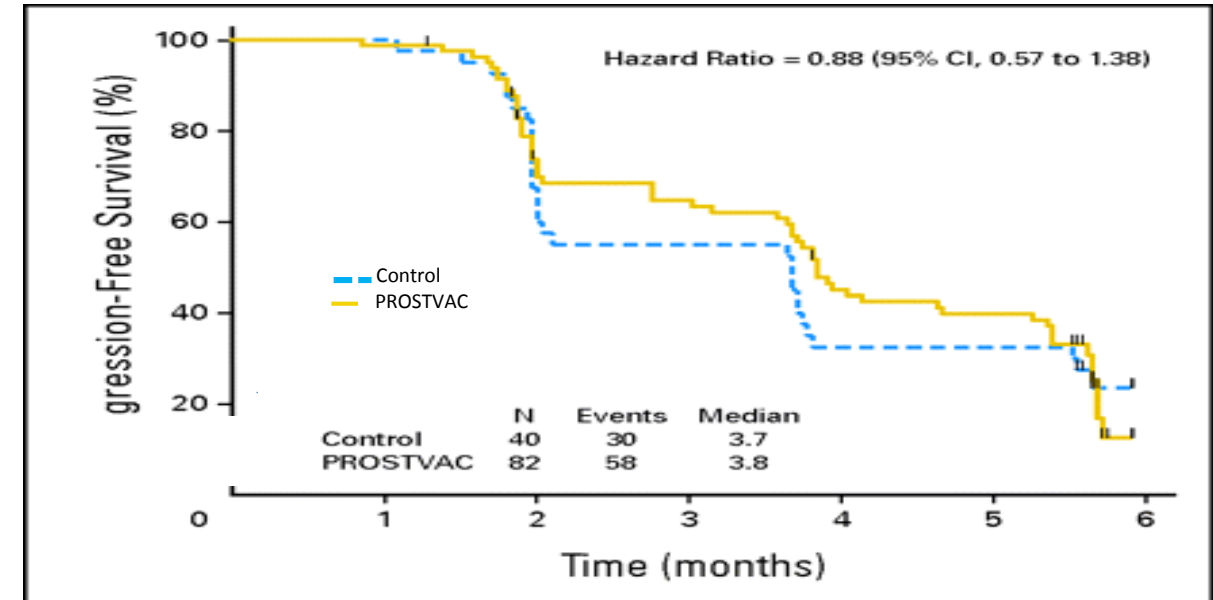


Vaccines in Prostate Cancer

A Primary Efficacy



Kantoff, et al, NEJM 2010.



Kantoff, et al, JCO 2010



Sipuleucel-T:

Approval indications:

Patients with asymptomatic to minimally symptomatic prostate cancer castration-resistant metastatic

Dosing: Collection and infusion every 2 weeks x 3

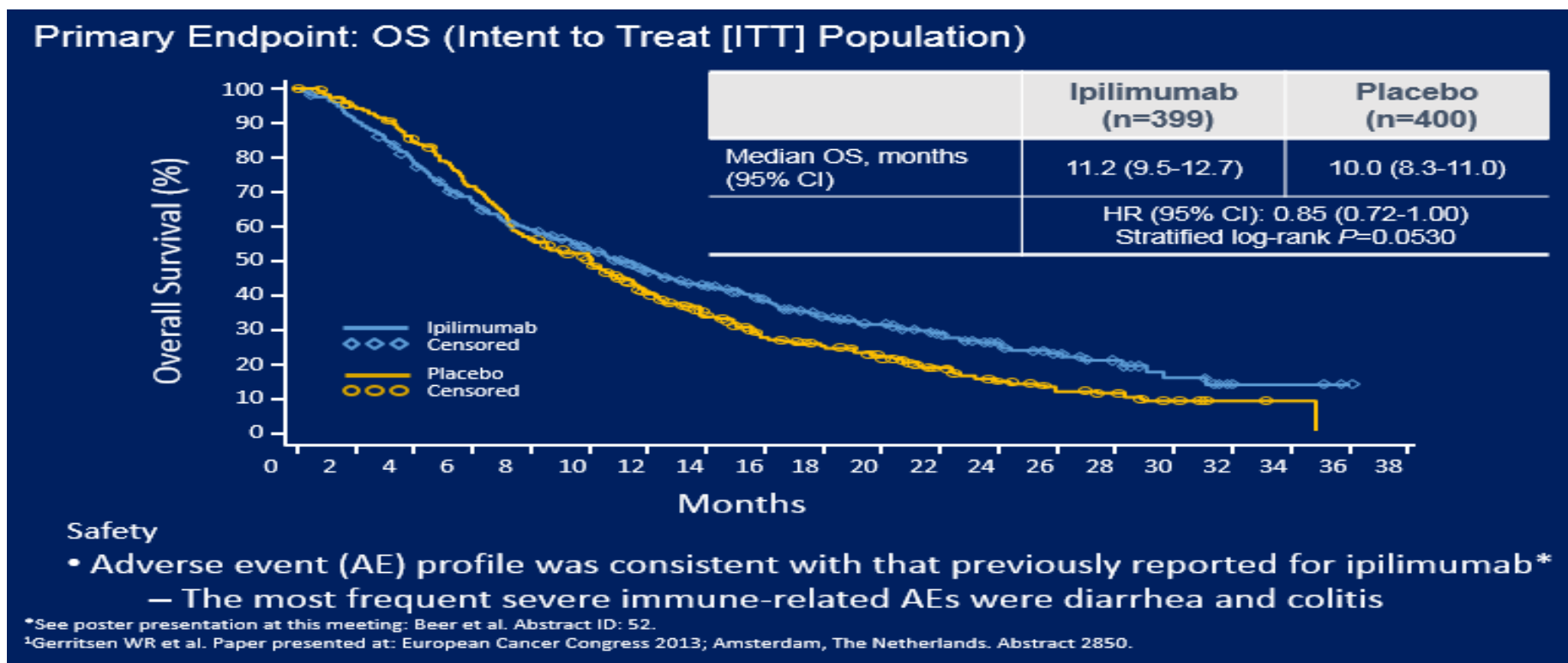
Common adverse reactions:

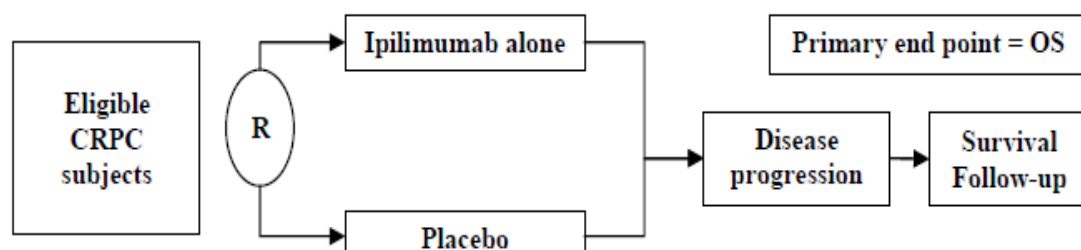
Chills, fatigue, fever, back pain, nausea, joint aches, headache

Warnings:

Infusion reactions, not tested for transmissible infectious diseases,
syncope/hypotension, myocardial infarction, thromboembolic events

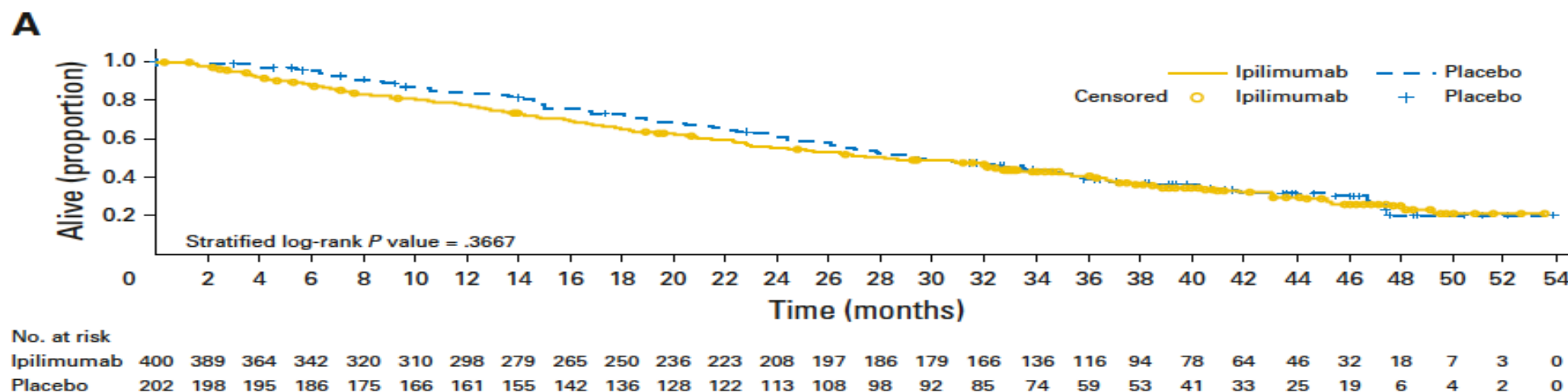
Phase 3 Study of Ipilimumab in Post-Docetaxel mCRPC (CA184-043)





Patients:

- Asymptomatic/minimally symptomatic, chemotherapy-naïve castration resistant prostate carcinoma (CRPC)
- No visceral metastases

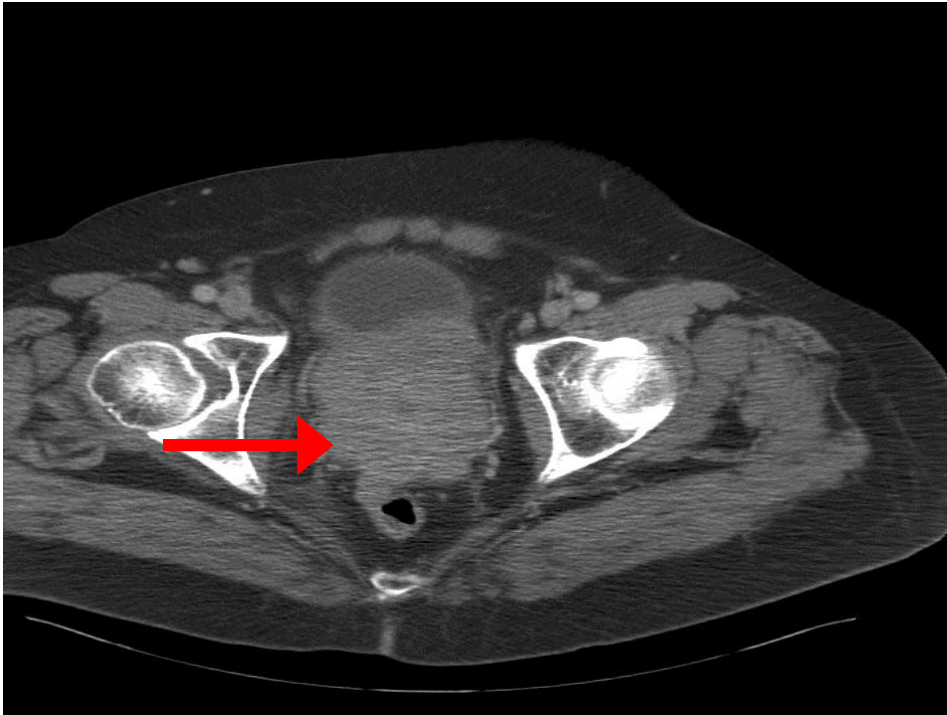


mOS 28.7 vs. 29.7 mos (HR 1.11; 0.88 – 1.39)

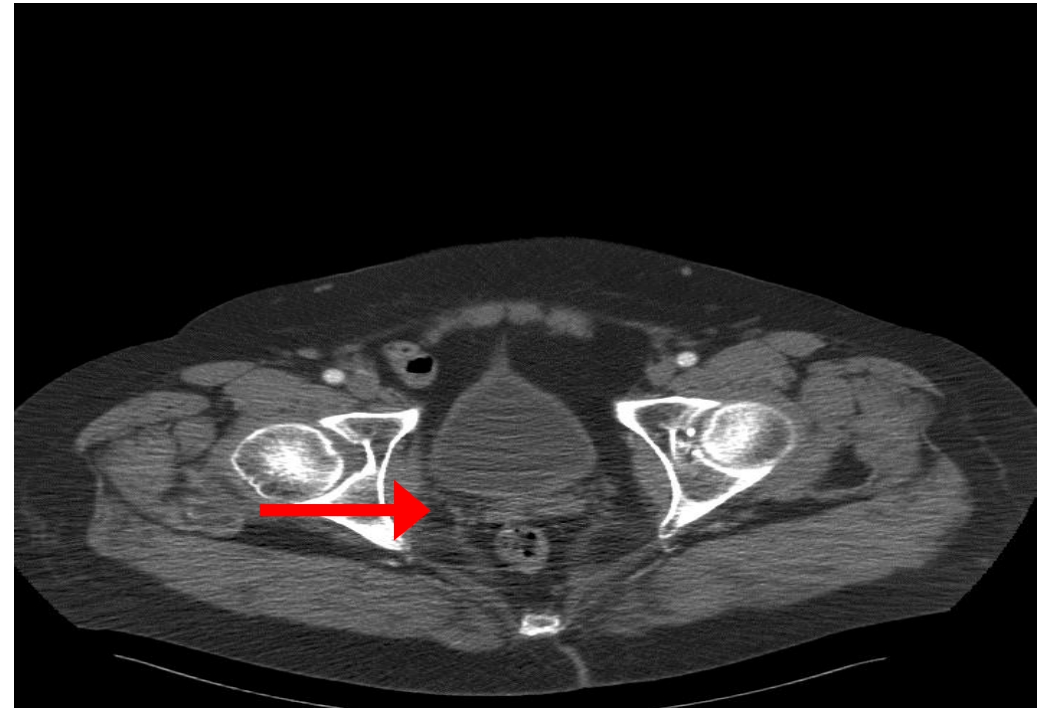


Resolution of Prostate Mass

Screening



14 months





PD-1/PD-L1 blockade in mCRPC

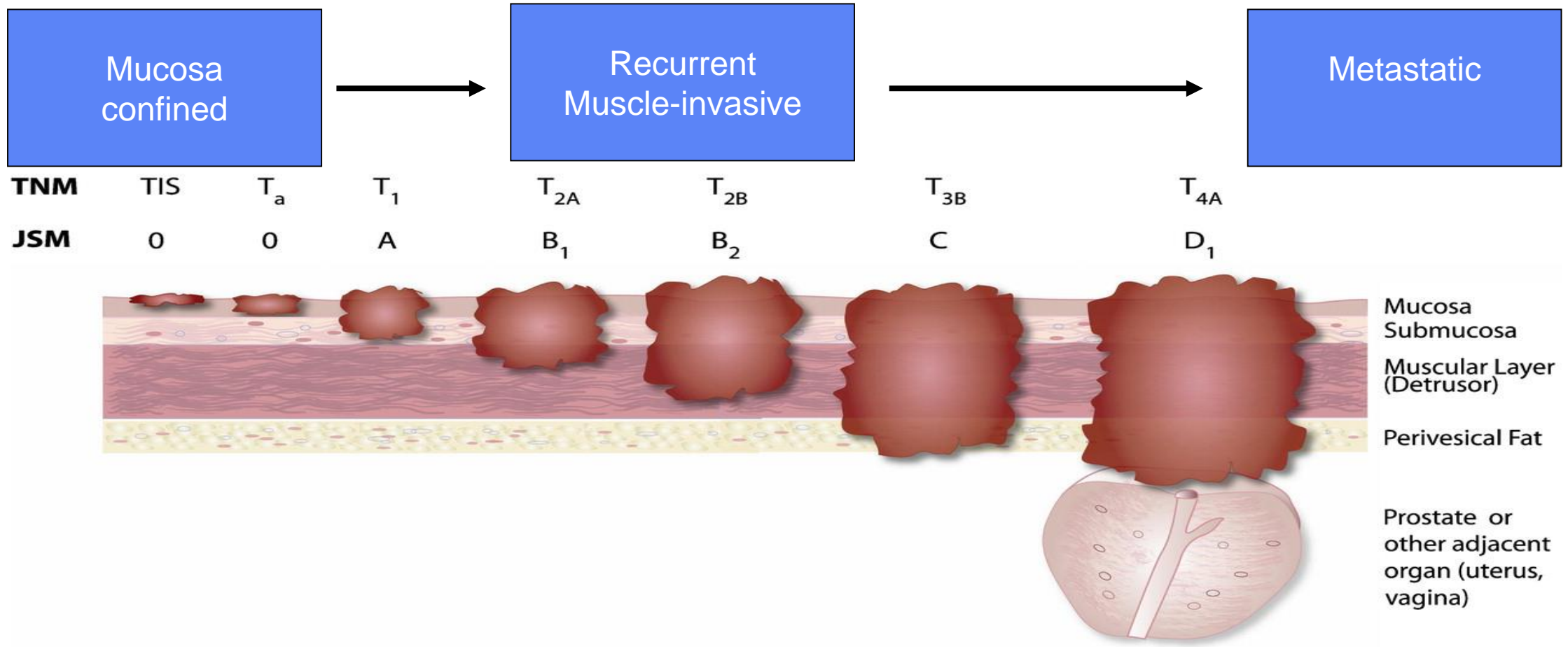
- Phase I trials with nivolumab
 - No evidence of single-agent activity in mCRPC
- Phase I trials with pembrolizumab
 - Small percentage response rate in patients with advanced mCRCP
 - Pembrolizumab now approved (May 2017) for MSI-high and mismatch repair deficient tumors – hence data exists to support this in the small percentage of prostate cancer that are MSI^{high}
- Multiple combinations are underway with ipilimumab or PD-pathway inhibitors with vaccines (including sipuleucel-T), chemotherapy, androgen deprivation, and radiation therapy



Lessons learned: Prostate cancer immunotherapy trials

- Prostate *not* an “hot” solid tumor like melanoma, renal, lung, bladder
- *Not* significantly hyper-mutated
- For vaccines ↑ doses of vaccine ≠ augmentation of immunity
- *Limited efficacy* of checkpoint inhibitors, anti-CTLA-4, anti- PD1
- No evidence of disease pseudoprogression before response

Bladder Cancer:



www.cancersymptoms.xyz

Bladder Cancer – Case #2:

You are seeing a 60 y/o man who was diagnosed with superficial bladder cancer 5 years ago. After several courses of resection and intravesical BCG therapy, he developed muscle-invasive disease 2 years ago and underwent radical cystoprostatectomy. He then did well until 4 months ago when he was found to have lung and liver metastases. He started treatment with gemcitabine and cisplatin chemotherapy, but unfortunately had progressive disease after 3 cycles of therapy. What is the best immunotherapy treatment option for him?

- A) IL-2
- B) Atezolizumab
- C) Pembrolizumab

The new bladder landscape: new drug approvals

- Durvalumab – anti-PDL1
- Atezolizumab – anti-PDL1
- Avelumab – anti-PDL1
- Nivolumab – anti-PD1
- Pembrolizumab – anti-PD1





Atezolizumab – IMvigor 210 Study

- Open-label, multilabel, two cohort Phase II Study
 - Cohort 1: cisplatin-ineligible (N=119)
 - Cohort 2: progression after platinum-containing chemo (N=310)
 - Assessed PD-L1 expression on tumor infiltrating immune cells

	<u>PD-L1 Expression</u>	<u>ORR</u>
ORR all patients 15%	≥ 5%	26%
	1 – 5%	10%
Median OS 7.9 months	< 1%	8%



Atezolizumab – IMvigor 210 Study

- May 2016: Accelerated approval for patients with locally advanced or metastatic urothelial carcinoma with disease progression following platinum-based chemotherapy (or whose disease has worsened within 12 months of receiving platinum-based neoadjuvant or adjuvant chemotherapy).
- Expanded approval as a first-line treatment in cisplatin-ineligible patients (IMvigor 210 Cohort 1).
 - ORR 23.5% (CR in 6.7%, PR in 16.8%)
- Approved regardless of PD-L1 status



IMvigor 211 trial

- Open-label, multicenter, randomized Phase III study (atezolizumab vs. physician's choice)
- 931 patients
- Primary endpoint: Overall survival
- **Primary endpoint not met**
- ORR 14.8%, 26% in patients with high PD-L1 expression
- mPFS 2.7 months
- OS 15.9 months

Nivolumab – Checkmate 275 Study

- Phase II Study in locally advanced/metastatic disease following platinum chemotherapy (N=270)
 - Stratified by PD-L1 expression $\geq 5\%$ or $< 5\%$

ORR all patients 19.6%

Median OS 8.7 months

PD-L1 Expression

$\geq 5\%$

$< 5\%$

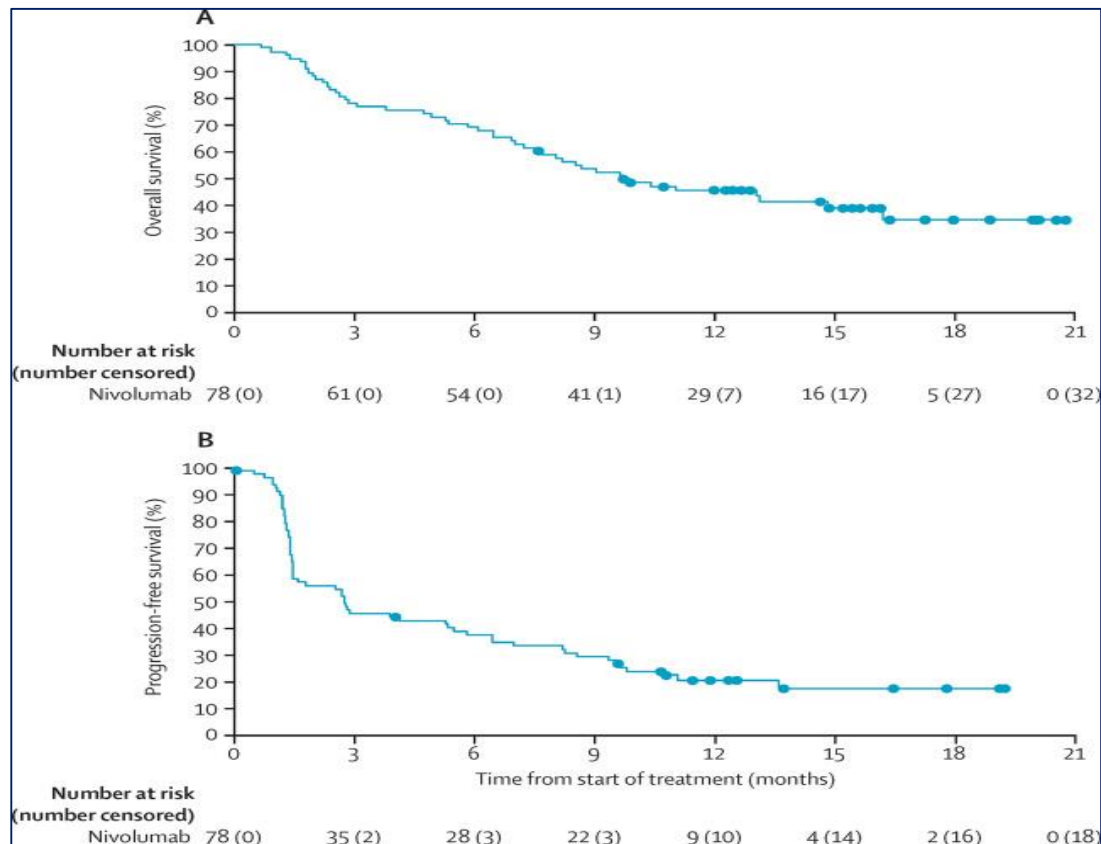
ORR

28.4%

15.8%



Checkmate 275 Study



Kaplan-Meier curves of overall survival (A) and progression-free survival (B); circles are censored patients.

Confirmed objective response

Nivolumab (n=78)	PD-L1 <1% (n=42)	PD-L1 ≥1% (n=25)
19 (24.4%, 15.3–35.4)	11 (26.2%, 13.9–42.0)	6 (24.0%, 9.4–45.1)

Best overall response

Complete response

5 (6%)	1 (2%)	4 (16%)
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Partial response

14 (18%)	10 (24%)	2 (8%)
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Stable disease

22 (28%)	11 (26%)	8 (32%)
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Progressive disease

30 (38%)	18 (43%)	8 (32%)
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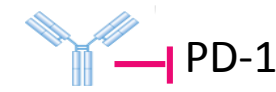
Unable to establish

7 (9%)	2 (5%)	3 (12%)
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Antitumour activity

Nivolumab

Nivolumab:



- February 2017: FDA approval for patients with locally advanced or metastatic urothelial carcinoma with disease progression following platinum-based chemotherapy (or whose disease has worsened within 12 months of receiving platinum-based neoadjuvant or adjuvant chemotherapy).
- Approved regardless of PD-L1 status

Avelumab/Durvalumab

- Locally advanced or metastatic bladder cancer whose disease has progressed during or after platinum-containing chemotherapy or within 12 months of neoadjuvant or adjuvant chemotherapy.
- Approval based on single-arm, open-label JAVELIN trial in which ORR was 13.3% among 226 patients. Median duration of response not reached (1.4+ to 17.4+ months)
- **VENTANA PD-L1 (SP263) Assay** (Ventana Medical Systems, Inc.) as a complementary diagnostic for the assessment of the PD-L1 protein in formalin-fixed, paraffin-embedded urothelial carcinoma tissue.

Pembrolizumab

- Locally advanced or metastatic urothelial carcinoma who have disease progression during or following platinum-containing chemotherapy or within 12 months of neoadjuvant or adjuvant treatment with platinum-containing chemotherapy; accelerated approval for patients with locally advanced or metastatic urothelial carcinoma who are not eligible for cisplatin-containing chemotherapy.
- Based on **Trial KEYNOTE-045**, a multicenter, randomized, active-controlled trial in patients with locally advanced or metastatic urothelial carcinoma with disease progression on or after platinum-containing chemotherapy.
- Accelerated approval for the first-line indication was based on data from **KEYNOTE-052**, a single-arm, open-label trial in 370 patients with locally advanced or metastatic urothelial carcinoma who were deemed not eligible for cisplatin-containing chemotherapy. Patients received pembrolizumab 200 mg every 3 weeks. With a median follow-up time of 7.8 months, the ORR was 28.6% (95% CI 24, 34) and the median response duration was not reached (range 1.4+, 17.8+ months).



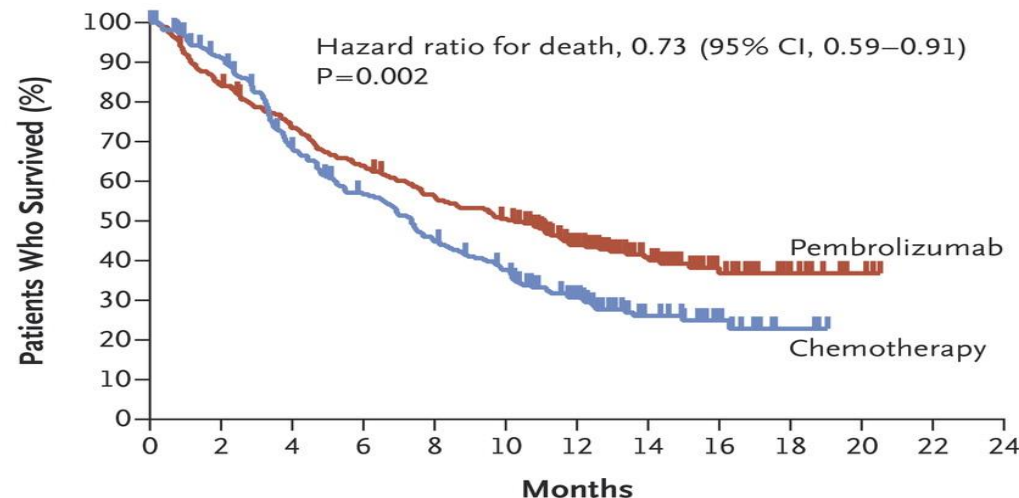
KEYNOTE-045

OS: Median 10.3 months
versus 7.4 months

PFS: Not significantly
different

AE: Fewer TRAE of any
grade in the pembrolizumab
group (60.9% versus 90.2%)

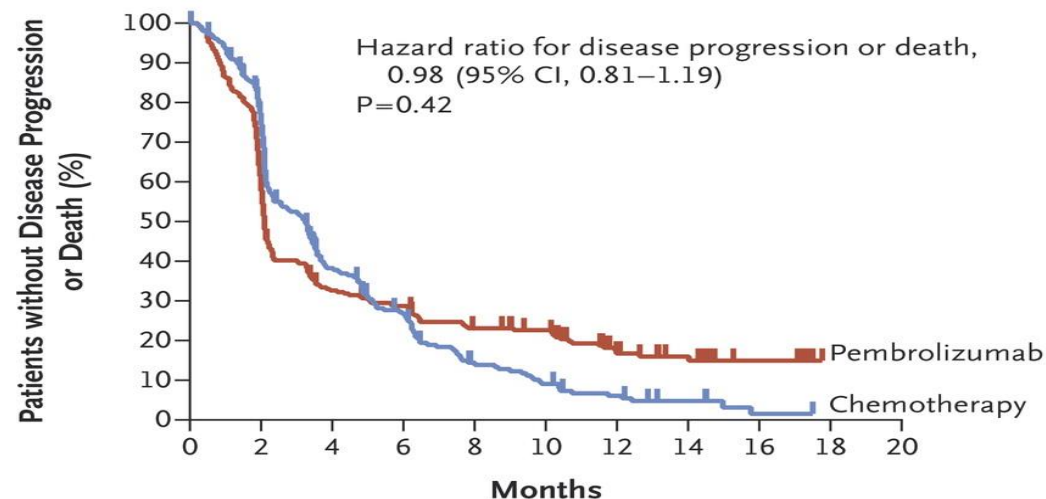
A Overall Survival



No. at Risk

Pembrolizumab	270	226	194	169	147	131	87	54	27	13	4	0	0
Chemotherapy	272	232	171	138	109	89	55	27	14	3	0	0	0

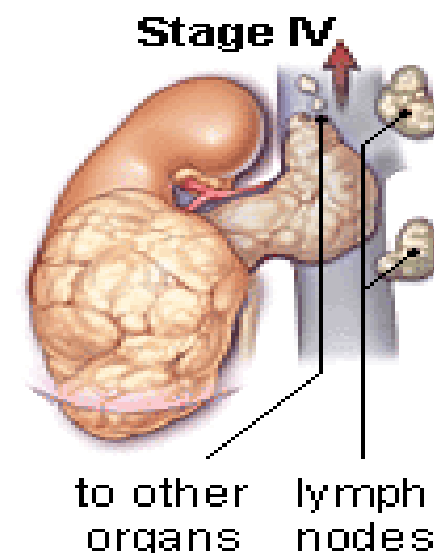
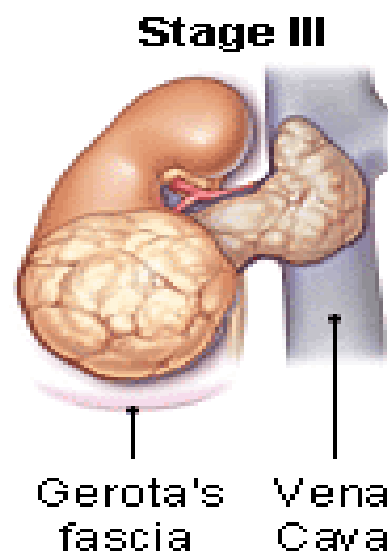
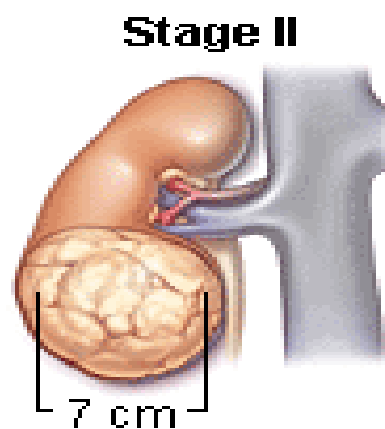
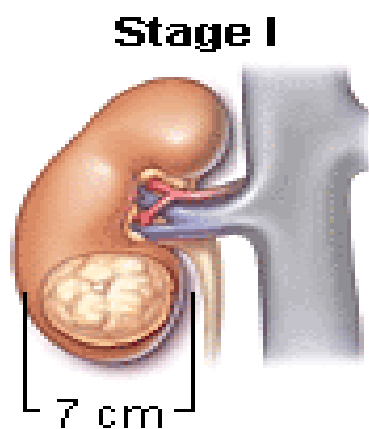
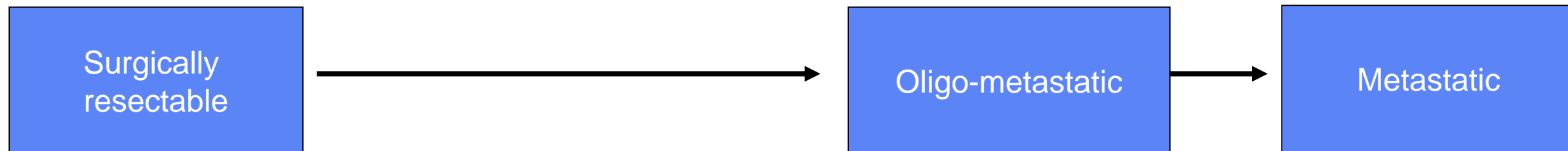
B Progression-free Survival



No. at Risk

Pembrolizumab	270	165	85	73	56	51	23	16	7	0	0
Chemotherapy	272	188	85	56	27	17	10	5	1	0	0

Kidney Cancer:



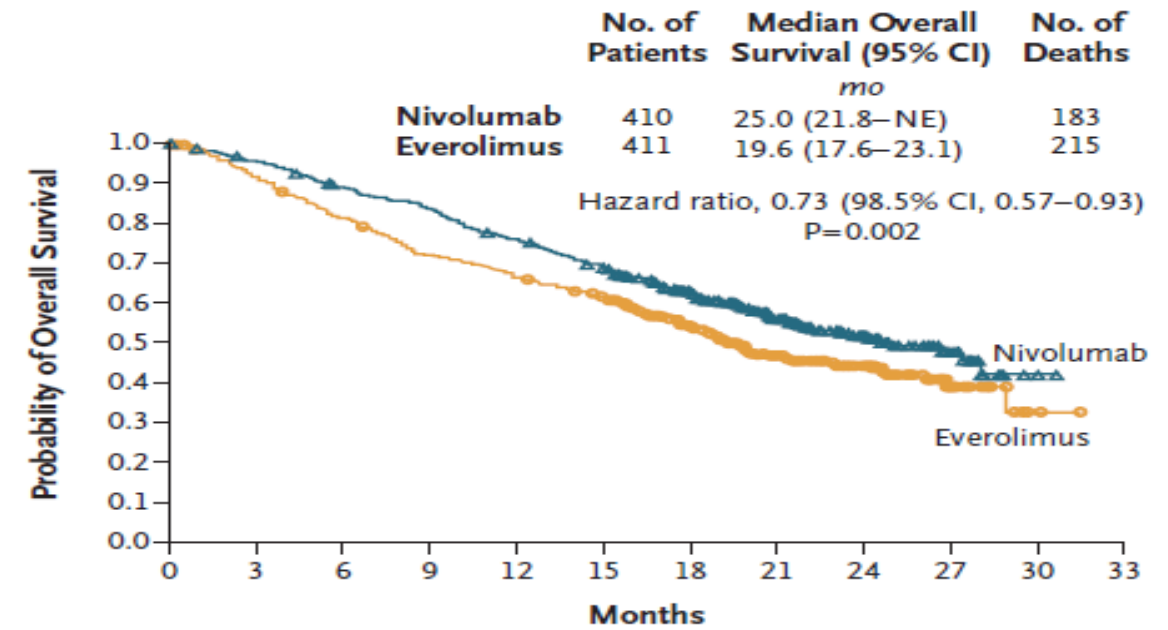
reemakeup.blogspot.com



- Phase III CheckMate 025 trial – 821 patients with previously treated mRCC (1-2 VEGF TKI):
Nivolumab (anti-PD-1) 3 mg/kg q 2 wk versus everolimus 10 mg per day

- Median OS: 25m vs 19.6m
- ORR: 25% vs 5%
- Median PFS: 4.6m vs 4.4m
- Median duration: 23m vs 13.7m
- Grade 3/4 AE: 19% vs 37%
- Most common AE with nivolumab was fatigue (2%)

Approved by FDA in 2015



Nivolumab:

Approval indications:

Patients with metastatic renal cell cancer who have received prior anti-angiogenic therapy

Dosing: 240 mg IV every 2 weeks

Common adverse reactions:

Asthenia, cough, nausea, rash, dyspnea, diarrhea, constipation, decreased appetite, back pain, arthralgia

Warnings:

Immune-mediated pneumonitis, colitis, hepatitis, endocrinopathies, nephritis, rash, encephalitis, others



Other PD-1/PD-L1 Inhibitors:

- Phase III – Nivolumab + Ipilimumab vs. Sunitinib
Previously untreated mRCC (CheckMate 214)
- Phase III – Atezolizumab (anti-PD-L1) + Bevacizumab vs. Sunitinib
Previously untreated mRCC
- Phase III – Avelumab (anti-PD-L1) + axitinib vs. Sunitinib
Previously untreated mRCC
- Phase III – Nivolumab in adjuvant RCC (PROSPER)
- Phase III- Atezolizumab (anti-PD-L1) vs placebo (IMmotion 010)- adjuvant RCC
- Multiple combinations with pembrolizumab
- Different combinations with chemotherapy, IFN α , etc



McNeel et al. *Journal for ImmunoTherapy of Cancer* (2016) 4:92
DOI 10.1186/s40425-016-0198-x

Journal for ImmunoTherapy
of Cancer

POSITION ARTICLE AND GUIDELINES

Open Access

The Society for Immunotherapy of Cancer consensus statement on immunotherapy for the treatment of prostate carcinoma



Douglas G. McNeel¹, Neil H. Bander², Tomasz M. Beer³, Charles G. Drake⁴, Lawrence Fong⁵, Stacey Harrelson⁶, Philip W. Kantoff⁷, Ravi A. Madan⁸, William K. Oh⁹, David J. Peace¹⁰, Daniel P. Petrylak¹¹, Hank Porterfield¹², Oliver Sartor¹³, Neal D. Shore⁶, Susan F. Slovin⁷, Mark N. Stein¹⁴, Johannes Vieweg¹⁵ and James L. Gulley^{16*}

Rini et al. *Journal for ImmunoTherapy of Cancer* (2016) 4:81
DOI 10.1186/s40425-016-0180-7

Journal for ImmunoTherapy
of Cancer

POSITION ARTICLE AND GUIDELINES

Open Access

Society for Immunotherapy of Cancer consensus statement on immunotherapy for the treatment of renal cell carcinoma



Brian I. Rini¹, David F. McDermott², Hans Hammers³, William Bro⁴, Ronald M. Bukowski⁵, Bernard Faba⁶, Jo Faba⁶, Robert A. Figlin⁷, Thomas Hutson⁸, Eric Jonasch⁹, Richard W. Joseph¹⁰, Bradley C. Leibovich¹¹, Thomas Olencki¹², Allan J. Pantuck¹³, David I. Quinn¹⁴, Virginia Seery², Martin H. Voss¹⁵, Christopher G. Wood⁹, Laura S. Wood¹ and Michael B. Atkins^{16*}

Kamat et al. *Journal for ImmunoTherapy of Cancer* (2017) 5:68
DOI 10.1186/s40425-017-0271-0

Journal for ImmunoTherapy
of Cancer

POSITION ARTICLE AND GUIDELINES

Open Access

Society for Immunotherapy of Cancer consensus statement on immunotherapy for the treatment of bladder carcinoma



Ashish M. Kamat^{1*}, Joaquim Bellmunt², Matthew D. Galsky³, Badrinath R. Konety⁴, Donald L. Lamm⁵, David Langham⁶, Cheryl T. Lee⁷, Matthew I. Milowsky⁸, Michael A. O'Donnell⁹, Peter H. O'Donnell¹⁰, Daniel P. Petrylak¹¹, Padmanee Sharma¹², Eila C. Skinner¹³, Guru Sonpavde¹⁴, John A. Taylor III¹⁵, Prasanth Abraham¹⁶ and Jonathan E. Rosenberg¹⁷

