Immunotherapy and Targeted in Melanoma

Sanjiv S. Agarwala, MD

Professor, Temple University School of Medicine

CMO, Cancer Expert Now

Overview

- Immunotherapy
- Targeted therapy
- Choosing between immunotherapy & targeted therapy as first-line
- Combining immunotherapy with targeted therapy
- Future directions

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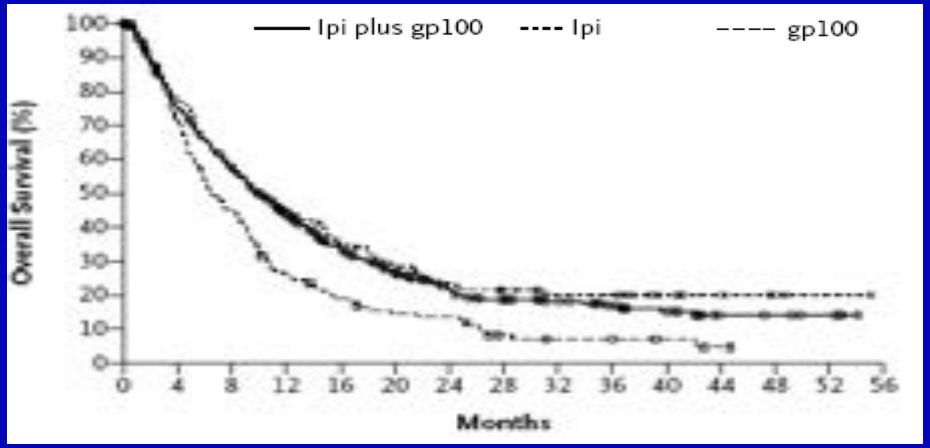
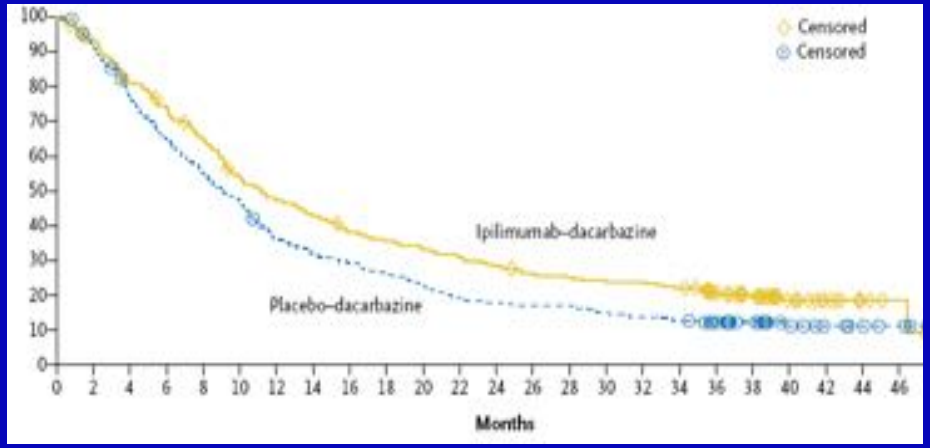
Anti-CTLA4 Ipilimumab Changed the Landscape



HR: 0.66 and 0.68
Pre-treated pts
Ipi 3 mg/kg +/- gp100

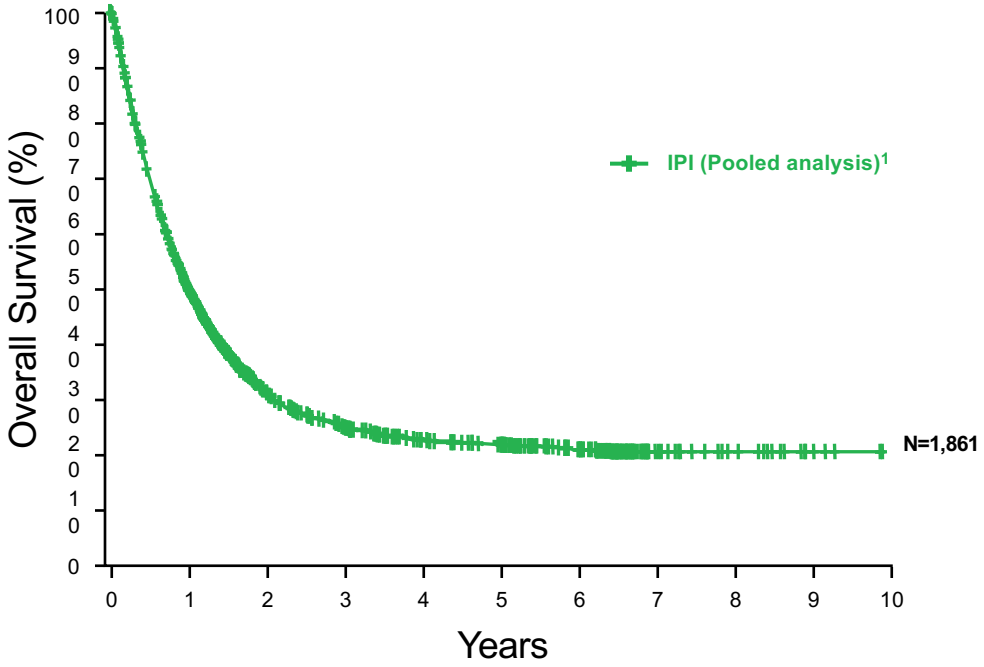
Hodi FS, et al. *N Engl J Med.* 2010;363:711-23.



HR: 0.72
First line
Ipi 10 mg/kg + DTIC

Robert C, et al. *N Engl J Med*. 2011;364:2517-26.

Long-Term Data with Single Agent Ipilimumab in Melanoma

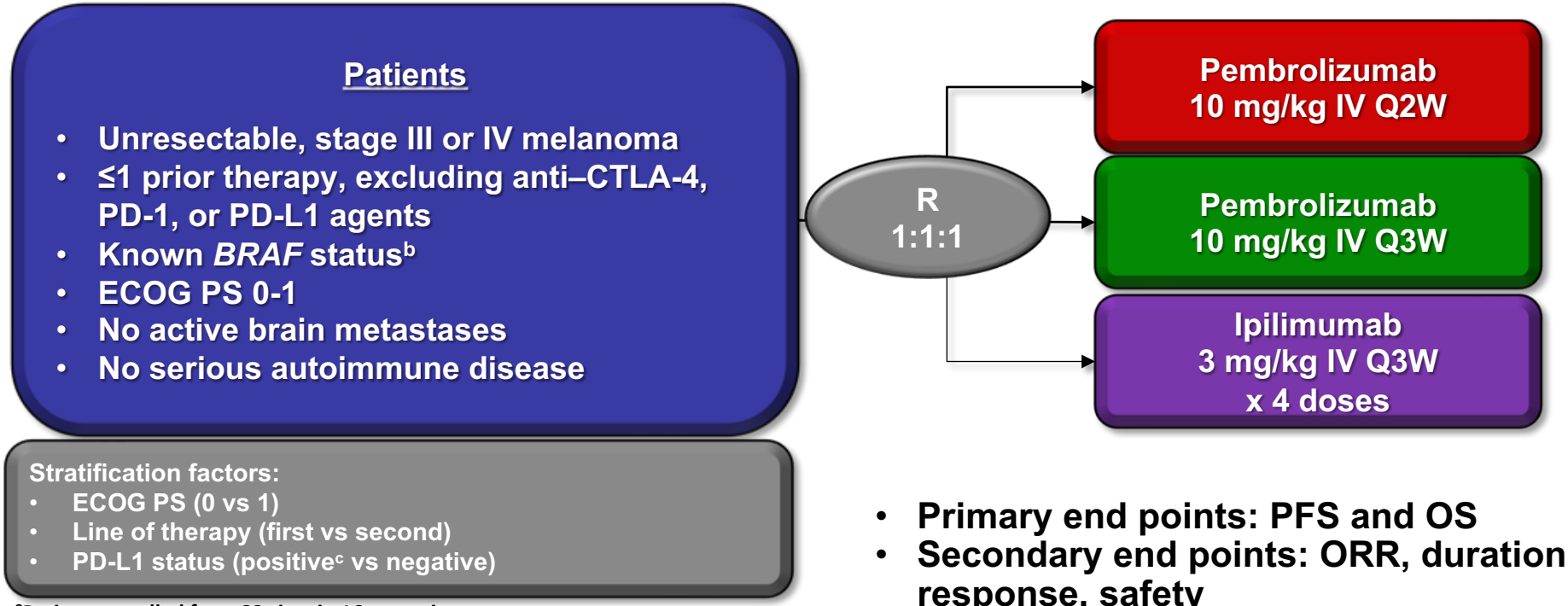


1. Schadendorf et al. *J Clin Oncol* 2015;33:1889-1894; 2. Current analysis; 3. Poster presentation by Dr. Victoria Atkinson at SMR 2015 International Congress.

Ipilimumab became the standard of care for advanced melanoma in 2011

But can we do better?

Keynote-006 Front-line Pembrolizumab vs Ipilimumab



- **Primary end points: PFS and OS**
- **Secondary end points: ORR, duration of response, safety**

[a]Patients enrolled from 83 sites in 16 countries.

[b]Prior anti-BRAF targeted therapy was not required for patients with normal LDH levels and no clinically significant tumor-related symptoms or evidence of rapidly progressing disease.

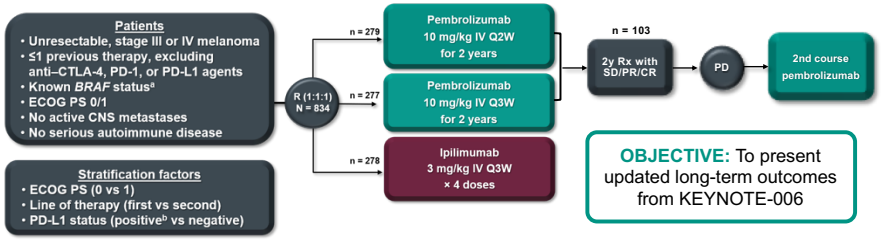
[c]Defined as membranous PD-L1 expression in ≥1% of tumor cells as assessed by IHC using the 22C3 antibody.

Long-Term Survival From Pembrolizumab Completion and Pembrolizumab Retreatment: Phase 3 KEYNOTE-006 in Advanced Melanoma

G. V. Long[1-4], J. Schachter[5], A. Arance[6], J.-J. Grob[7], L. Mortier[8], A. Daud[9], M. S. Carlino[1,2,10,11], A. Ribas[12], C. M. McNeil[2,13], M. Lotem[14], J. Larkin[15], P. Lorigan[16], B. Neyns[17], C. U. Blank[18], T. M. Petrella[19], O. Hamid[20], E. Jensen[21], C. Krepler[21], S. J. Diede[21], C. Robert[22]

ASCO 2020

[1]Melanoma Institute Australia, Sydney, NSW, Australia; [2]University of Sydney, Sydney, NSW, Australia; [3]Royal North Shore Hospital, Sydney, NSW, Australia; [4]Mater Hospital, North Sydney, NSW, Australia; [5]Sheba Medical Center, Tel HaShomer Hospital, Tel Aviv, Israel, [6]Hospital Clinic de Barcelona, Barcelona, Spain; [7]Aix Marseille University, Hôpital de la Timone, Marseille, France; [8]Université Lille, Centre Hospitalier Regional Universitaire de Lille, Lille, France; [9]UCSF, San Francisco, CA, USA; [10]Blacktown Hospital, Blacktown, NSW, Australia; [11]Crown Princess Mary Cancer Centre, Westmead Hospital, Sydney, NSW, Australia; [12]David Geffen School of Medicine at UCLA, Los Angeles, CA, USA; [13]Chris O'Brien Lifehouse, Camperdown, NSW, Australia; [14]Sharett Institute of Oncology, Hadassah Hebrew Medical Center, Jerusalem, Israel; [15]Royal Marsden Hospital, London, England; [16]University of Manchester and the Christie NHS Foundation Trust, Manchester, England; [17]Universitair Ziekenhuis Brussel, Brussels, Belgium; [18]Netherlands Cancer Institute, Amsterdam, Netherlands; [19]Sunnybrook Health Sciences Centre, Toronto, ON, Canada; [20]The Angeles Clinic and Research Institute, Los Angeles, CA, USA; [21]Merck & Co., Inc., Kenilworth, NJ, USA; [22]Gustave Roussy and Paris-Sud University, Villejuif, France

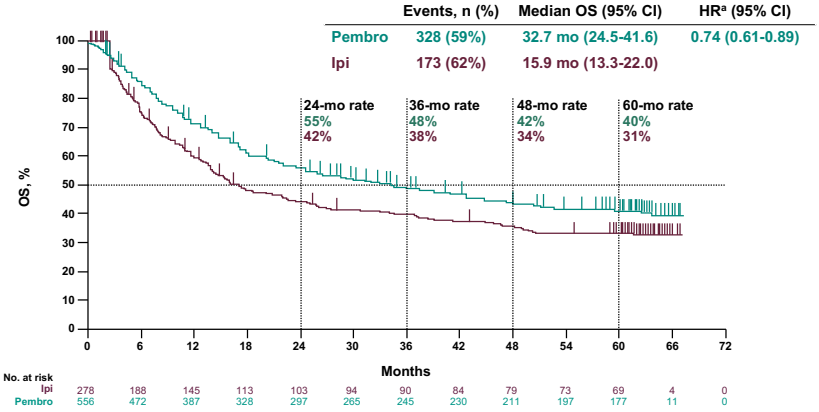


OBJECTIVE: To present updated long-term outcomes from KEYNOTE-006

- Two pembrolizumab arms pooled as similar efficacy[2]
- Patients completing ≥94 weeks of pembrolizumab with SD/PR/CR were considered to have completed 2 years of treatment
- Patients could receive a 2nd course of 1 year of pembrolizumab if progressed after SD/PR/CR
- Data cut-off: July 31, 2019; median follow-up: 66.8 months (range, 65.0-70.4); time from last patient enrolled to data cutoff, 65.0 months

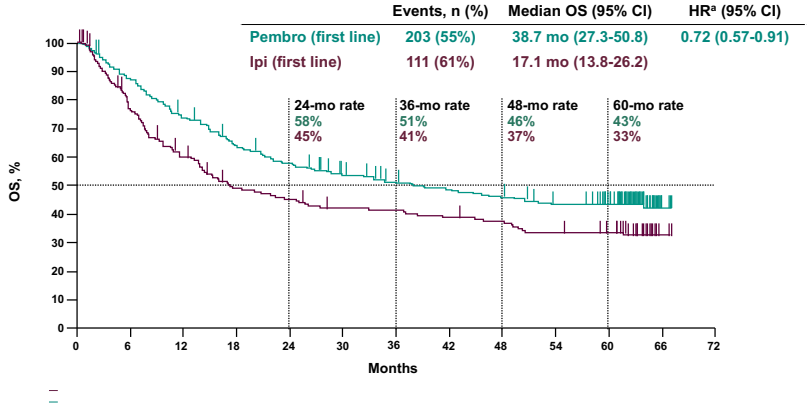
[a]Prior anti-BRAF therapy was not required for patients with normal LDH levels and no clinically significant tumor-related symptoms or evidence of rapidly progressing disease.
[b]Defined as ≥1% staining in tumor and adjacent immune cells as assessed by IHC using 22C3 antibody.

Overall Survival: Total Population



Data cut-off: July 31, 2019. [a]Based on Cox regression model with treatment as a covariate stratified by line of therapy (1st vs 2nd), PD-L1 status (positive vs negative) and ECOG (0 vs 1); in instances where there were no patients in one of the treatment groups involved in a comparison for a particular stratum, that stratum was excluded from the treatment comparison.

Overall Survival: First Line Patients



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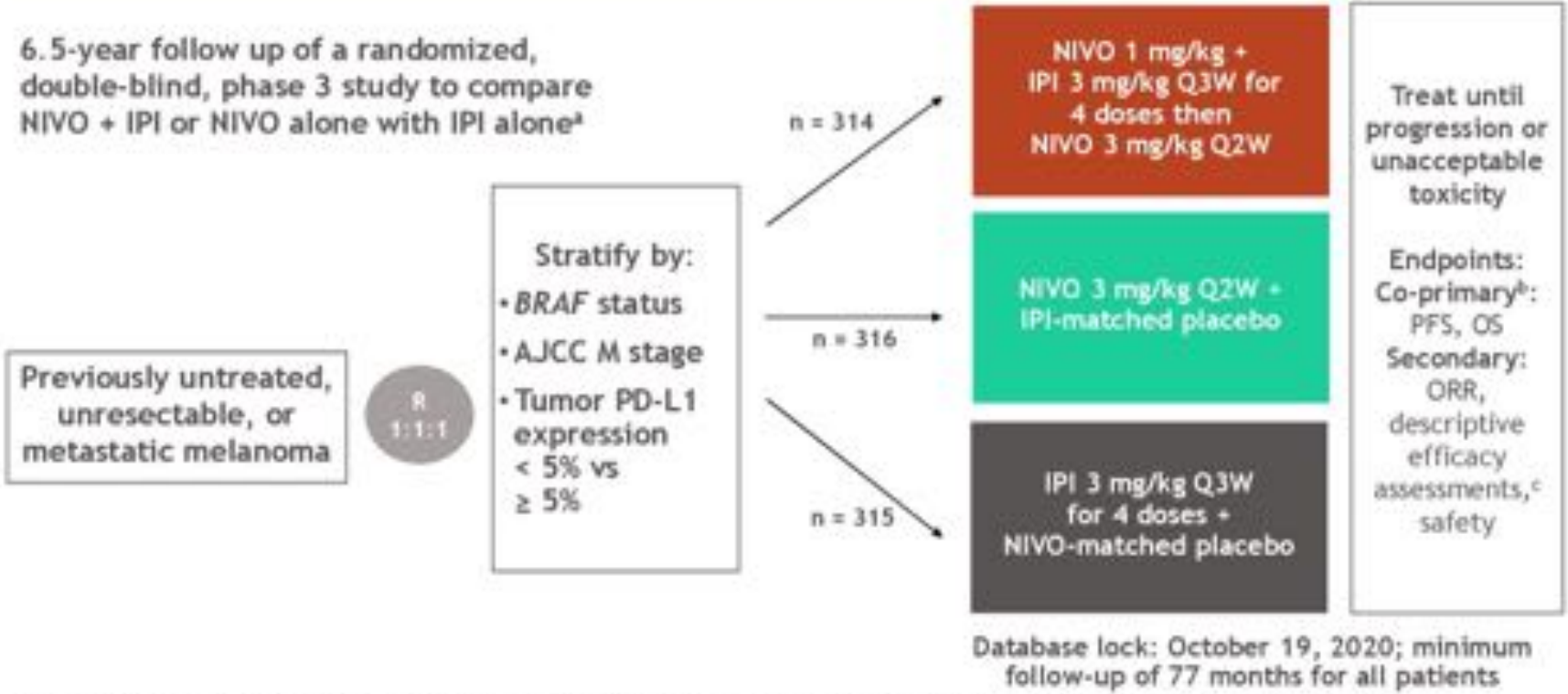
Anti PD-1 is better than ipilimumab frontline and responses are durable even after stopping treatment

But what about combining CTLA-4 and PD-1?

CheckMate 067: study design

6.5-year follow up of a randomized, double-blind, phase 3 study to compare NIVO + IPI or NIVO alone with IPI alone[a]

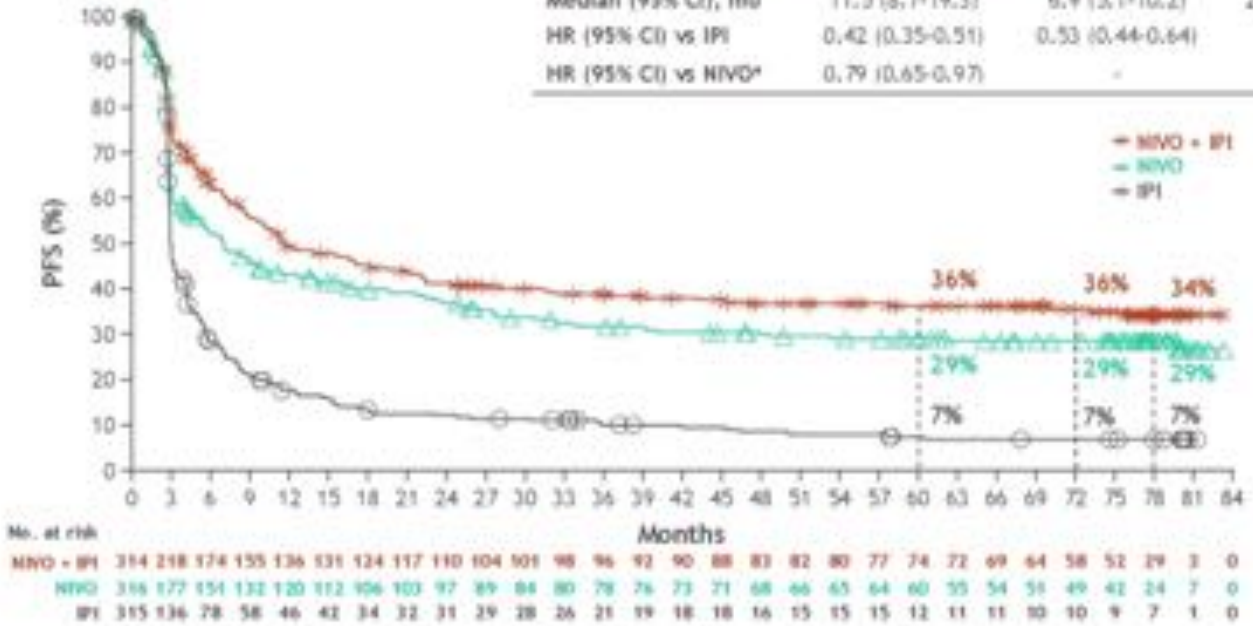


Database lock: October 19, 2020; minimum follow-up of 77 months for all patients

[a]The study was not powered for a comparison between NIVO+IPI and NIVO. [b]NIVO + IPI or NIVO vs IPI alone. [c]NIVO + IPI vs NIVO alone. AJCC, American Joint Committee on Cancer; M stage, metastasis stage; ORR, objective response rate; PD-L1, programmed death ligand 1; PFS, progression-free survival; Q2W, every 2 weeks; Q3W, every 3 weeks.

Progression-free survival

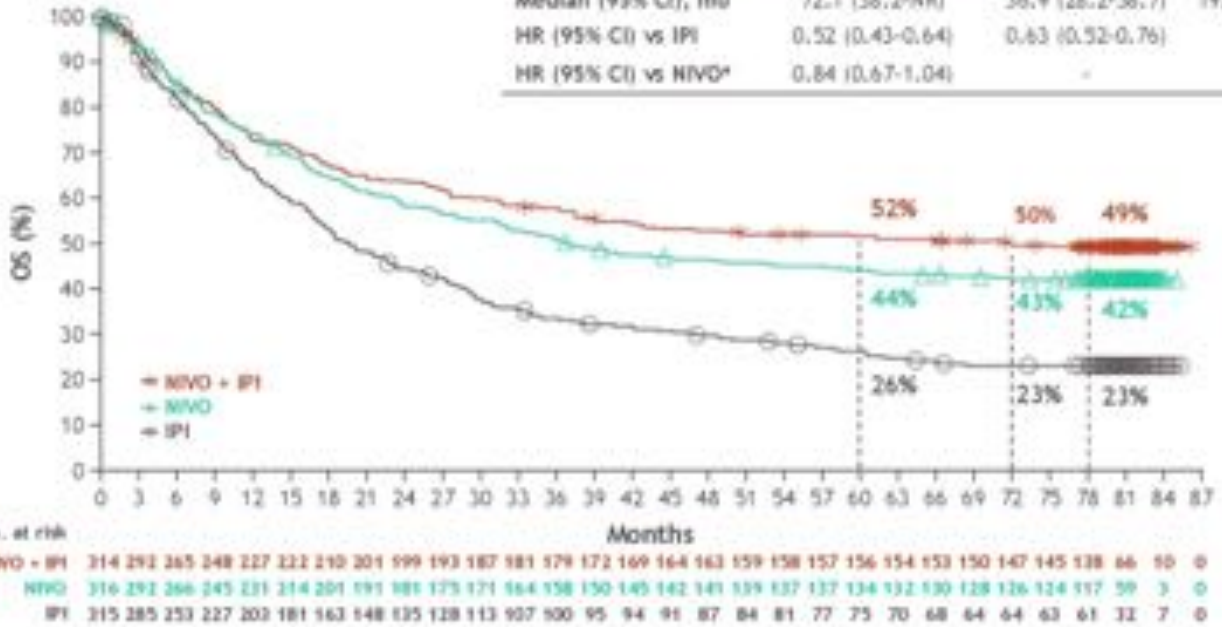
	NIVO + IPI (n = 314)	NIVO (n = 316)	IPI (n = 315)
Median (95% CI), mo	11.5 (8.7-19.3)	6.9 (5.1-10.2)	2.9 (2.8-3.2)
HR (95% CI) vs IPI	0.42 (0.35-0.51)	0.53 (0.44-0.64)	-
HR (95% CI) vs NIVO[a]	0.79 (0.65-0.97)	-	-



[a]Descriptive analysis.

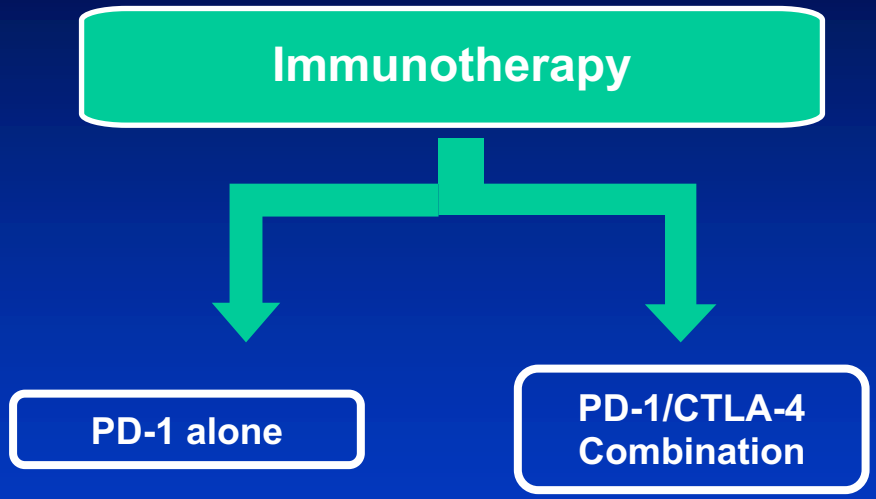
Overall survival

	NIVO + IPI (n = 314)	NIVO (n = 316)	IPI (n = 315)
Median (95% CI), mo	72.1 (38.2-NR)	36.9 (28.2-58.7)	19.9 (16.8-24.6)
HR (95% CI) vs IPI	0.52 (0.43-0.64)	0.63 (0.52-0.76)	-
HR (95% CI) vs NIVO[a]	0.84 (0.67-1.04)	-	-



[a]Descriptive analysis.

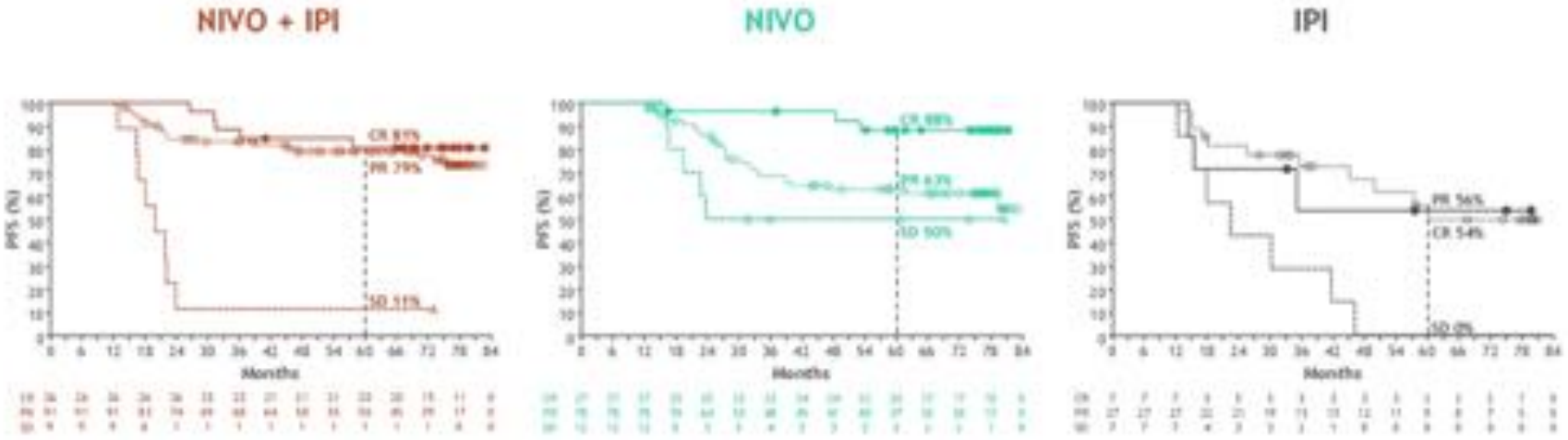
Combination or monotherapy?



Decision Factors

- Efficacy
- Toxicity

PFS by best overall response, 12-month landmark analysis[a]



- **Patients with a best overall response of a CR, PR, or SD at 12 months were followed for PFS[b]**

[a]To address guarantee-time bias, landmark analysis excluded patients who had an event during the first 12 months.
[b]Since PD is a PFS event, patients with a best overall response of PD were excluded from this analysis.

Decision Factors

- Efficacy
- Toxicity

Safety Summary

- With an additional 19 months of follow-up, safety was consistent with the initial report[1]

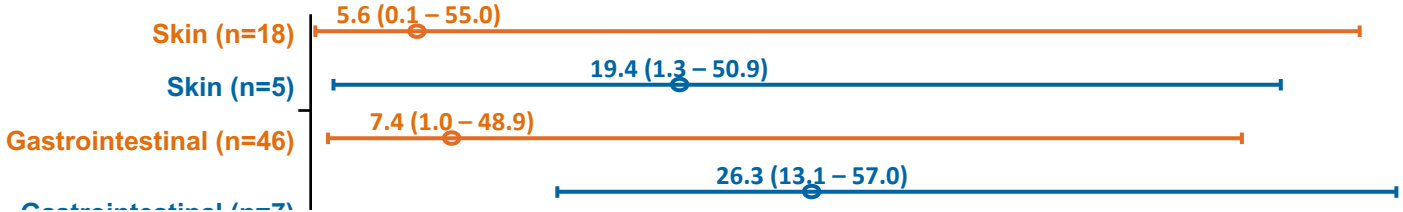
	NIVO+IPI (N=313)		NIVO (N=313)		IPI (N=311)	
Patients reporting event, %	Any Grade	Grade 3-4	Any Grade	Grade 3-4	Any Grade	Grade 3-4
Treatment-related adverse event (AE)	95.8	58.5	86.3	20.8	86.2	27.7
Treatment-related AE leading to discontinuation	39.6	31.0	11.5	7.7	16.1	14.1
Treatment-related death, n (%)	2 (0.6)[a]		1 (0.3)[b]		1 (0.3)[b]	

- Most select AEs were managed and resolved within 3-4 weeks (85–100% across organ categories)
- ORR was 70.7% for pts who discontinued NIVO+IPI due to AEs, with median OS not reached

[a]Cardiomyopathy (NIVO+IPI, n=1); Liver necrosis (NIVO+IPI, n=1). Both deaths occurred >100 days after the last treatment.
[b]Neutropenia (NIVO, n=1); colon perforation (IPI, n=1).[1]

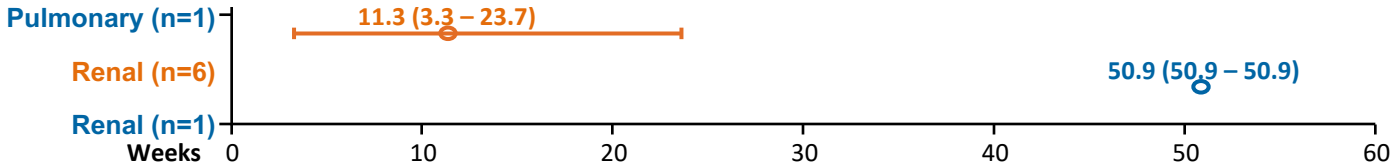
1. Larkin J, et al. *NEJM* 2015;373:23–34.

Checkmate 067: Safety
Onset Grade 3–4 Treatment-Related Select AEs



Toxicity Earlier

Longer Time to Resolution

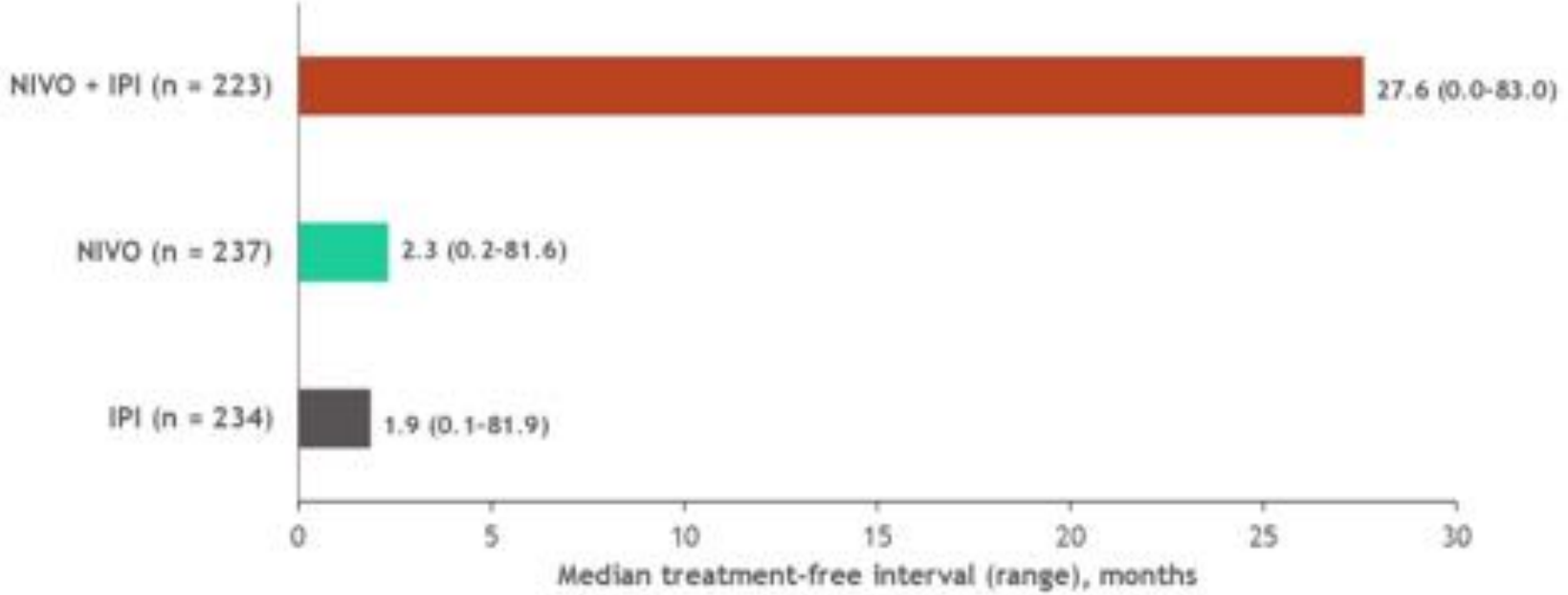


Circles represent medians; bars signify ranges

Larkin J et al ECC 2015

Treatment-free interval following study therapy discontinuation

- Patients analyzed were those who (1) were alive or (2) who died following subsequent systemic therapy



- Median duration of treatment was 3.6 mo (range, 0-80.1) with NIVO + IPI, 8.6 mo (0-79.8) with NIVO, and 3.7 mo (0-49.9) with IPI

Combination immunotherapy ipilimumab + nivolumab has become the preferred treatment option (if you select immunotherapy)

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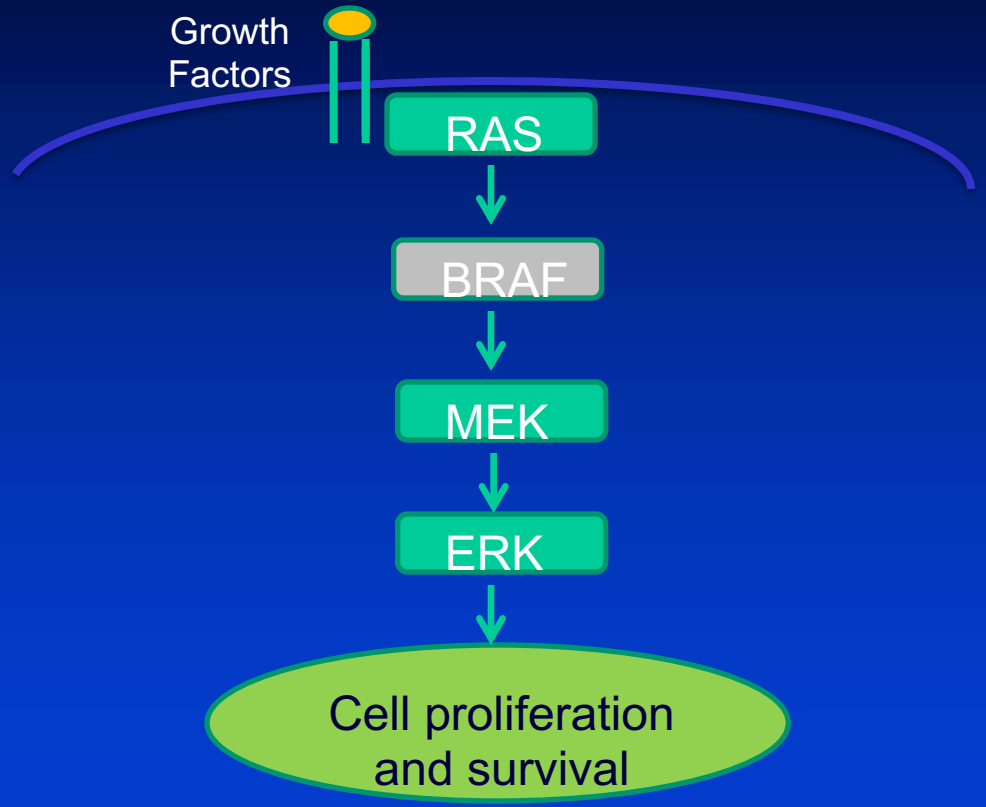
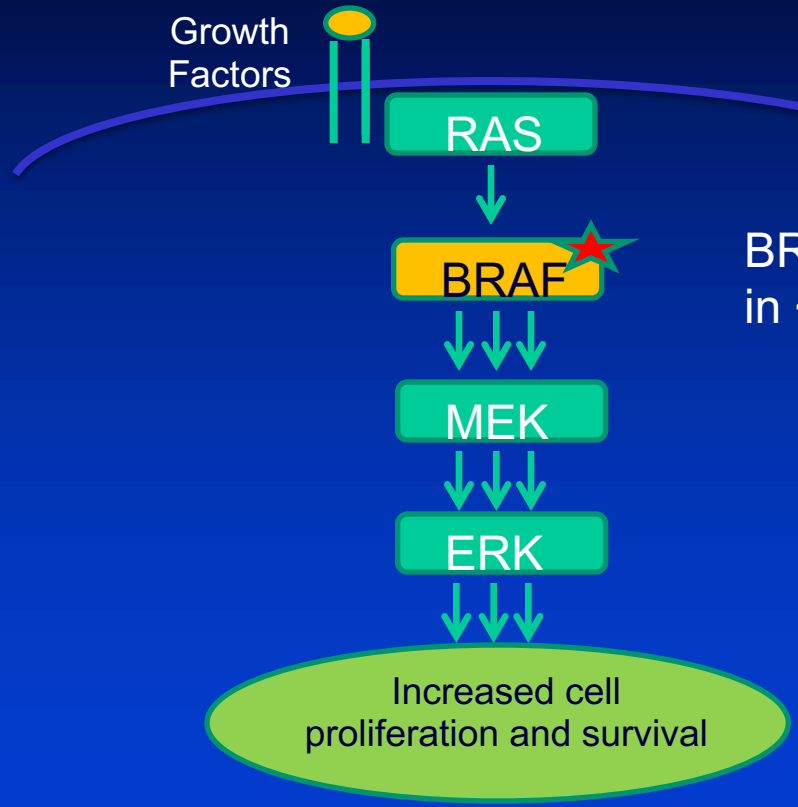
Targeted Therapy: MAPK Pathway

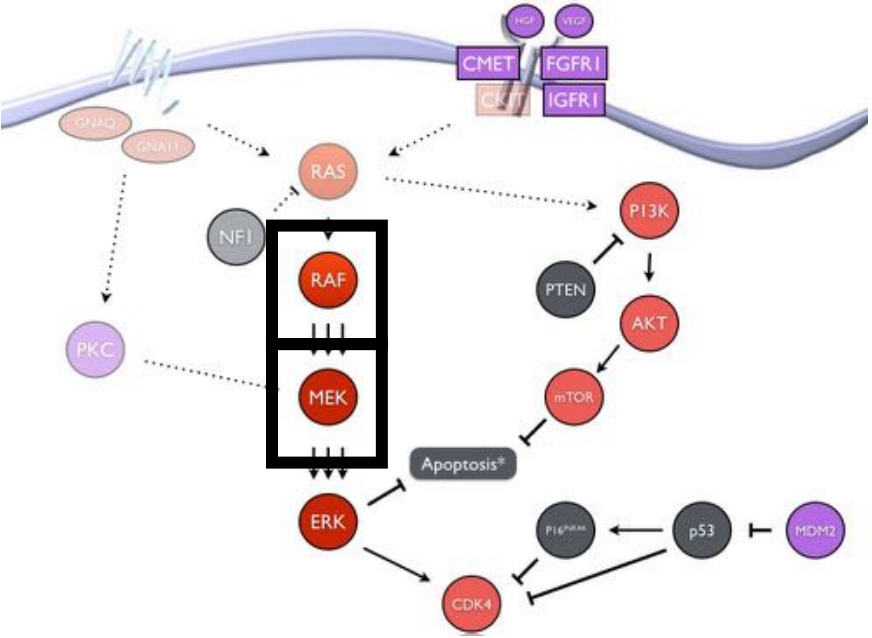


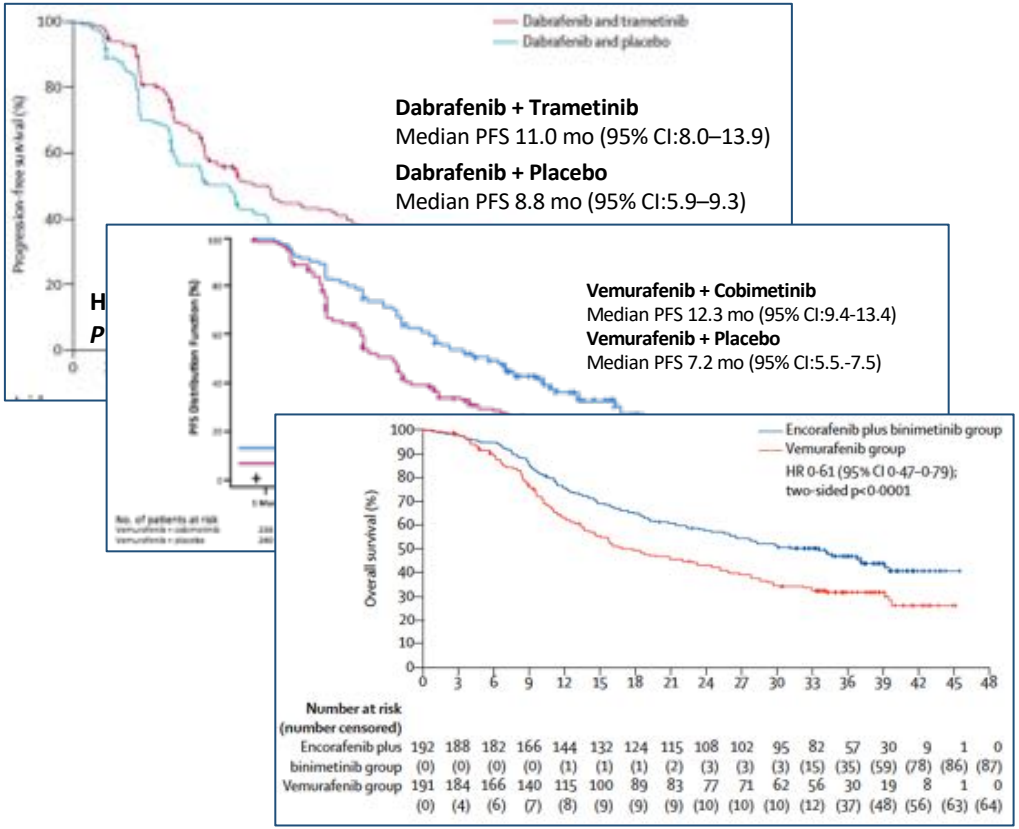
BRAF Mutation



BRAF mutation is present in ~50% of melanomas

Dual BRAF and MEK Inhibition Is Associated With High Response Rates and Improved PFS and OS





Long GV et al. *Lancet*. 2015.
Ascierto PA et al. *Lancet Oncol.* 2016.
Dummer R et al. *Lancet Oncol*. 2018.

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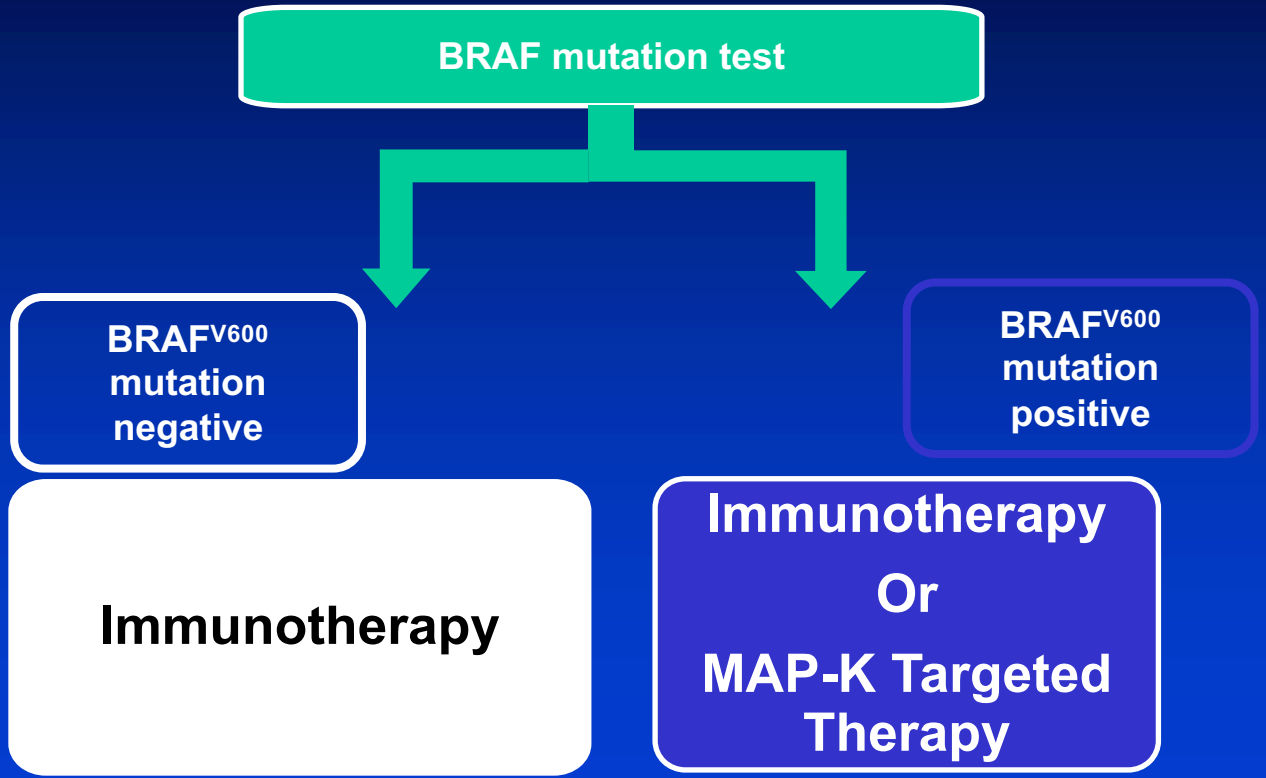
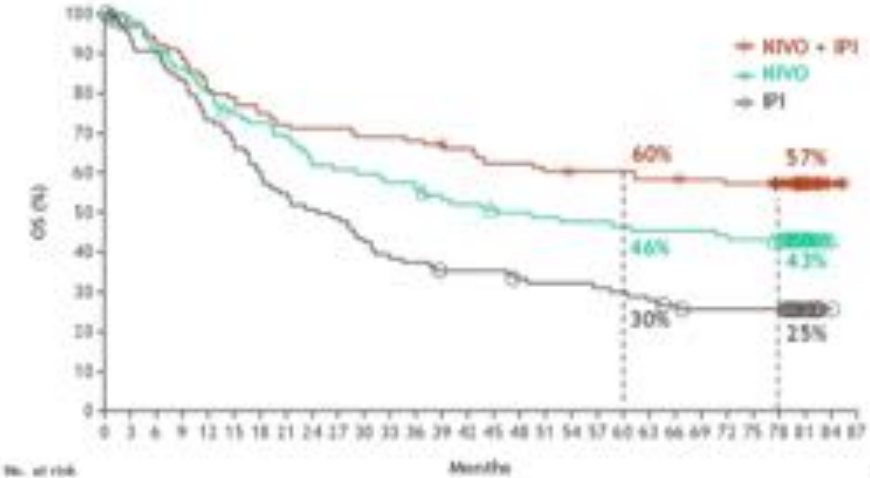
Melanoma Therapy Decision Point



OS by *BRAF* mutation status[a]

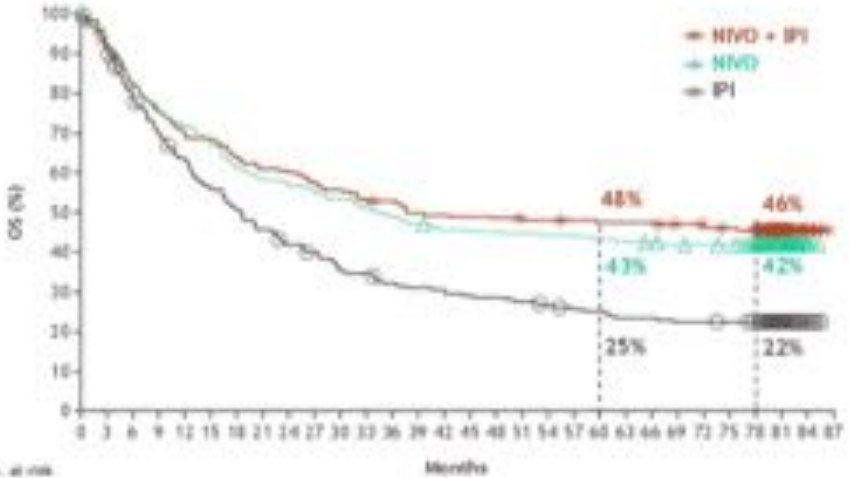
BRAF mutant

	NIVO + IPI (n = 103)	NIVO (n = 98)	IPI (n = 100)
Median (95% CI), mo	NR (50.7-NR)	45.5 (26.4-NR)	24.6 (17.9-31.0)
HR (95% CI) vs IPI	0.43 (0.30-0.60)	0.63 (0.44-0.90)	-
HR (95% CI) vs NIVO[b]	0.68 (0.46-1.0)	-	-



BRAF wild-type

	NIVO + IPI (n = 211)	NIVO (n = 218)	IPI (n = 215)
Median (95% CI), mo	39.1 (27.5-NR)	34.4 (24.1-59.2)	18.5 (14.1-22.7)
HR (95% CI) vs IPI	0.58 (0.45-0.74)	0.63 (0.50-0.80)	-
HR (95% CI) vs NIVO[b]	0.92 (0.71-1.18)	-	-



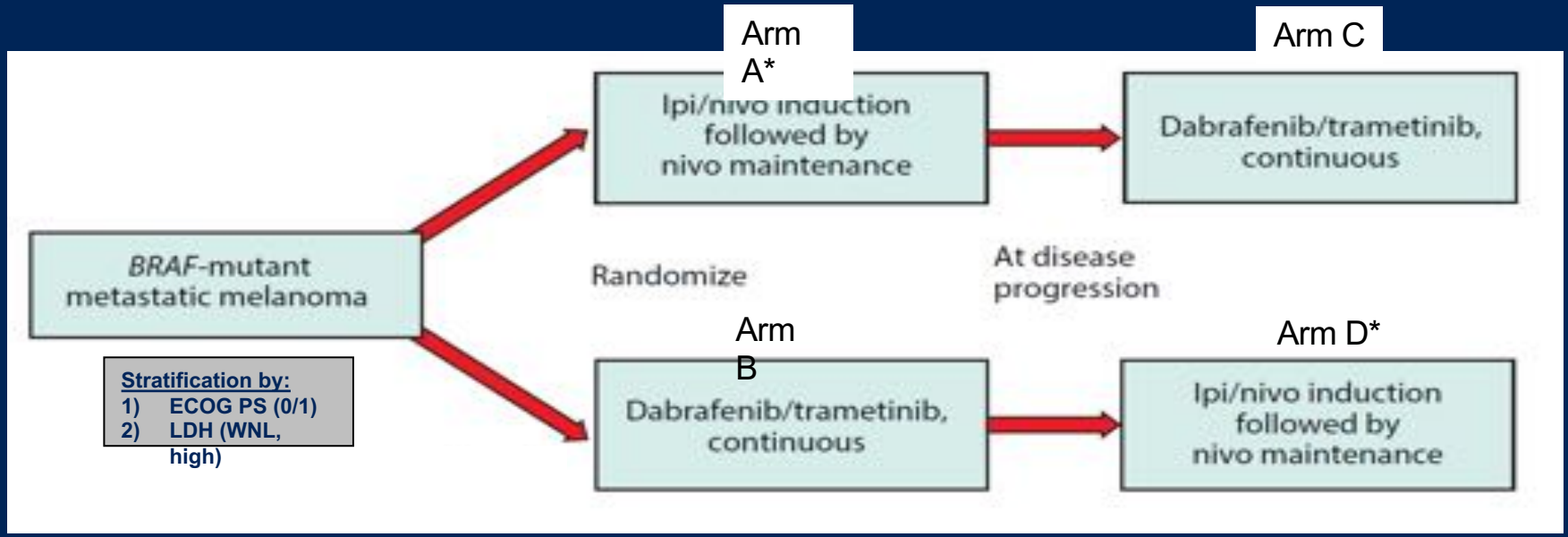
Key Ongoing Trials Evaluating Targeted Therapy Vs Combination Immunotherapy

	SECOMBIT	EORTC-1612-MG	DREAMseq
Population	Stage III (unresectable) or IV	stage III or IV (cutaneous or mucosal)	Stage III (unresectable) or IV
	BRAF V600-mutant	*BRAF V600E* or *V600K*-mutant	*BRAF V600*-mutant
N	251	270	300
Primary Endpoint	OS	PFS	OS
Primary Completion	April 2021	April 2022	October 2022
IO Regimen	NIVO 1 mg/kg IV + IPI 3 mg/kg IV Q3W x 4 → NIVO 3 mg/kg IV Q2W	NIVO 3 mg/kg Q3W + IPI 1 mg/kg Q3W x4 → NIVO 480 mg Q4W	NIVO 1 mg/kg + IPI 3 mg/kg **or** NIVO 3 mg/kg + IPI 1 mg/kg → NIVO 3 mg/kg maintenance
Targeted Regimen	Encorafenib 450 mg PO QD + Binimetinib 45 mg PO BID	Encorafenib 450 mg QD + Binimetinib 45 mg BID	Dabrafenib 150 mg PO BID + Trametinib 2 mg PO QD
Sequencing	Targeted → IO IO → Targeted Targeted → IO → Targeted	Targeted → IO IO only	Targeted → IO IO → Targeted

BID = twice daily; IO = immunotherapy; IPI = ipilimumab; IV = intravenous; NIVO = nivolumab; OS = overall survival; PD = progressive disease; PFS = progression-free survival; PO = orally; Q2W = every 2 weeks; Q3W = every 3 weeks; Q4W = every 4 weeks; QD = once daily.

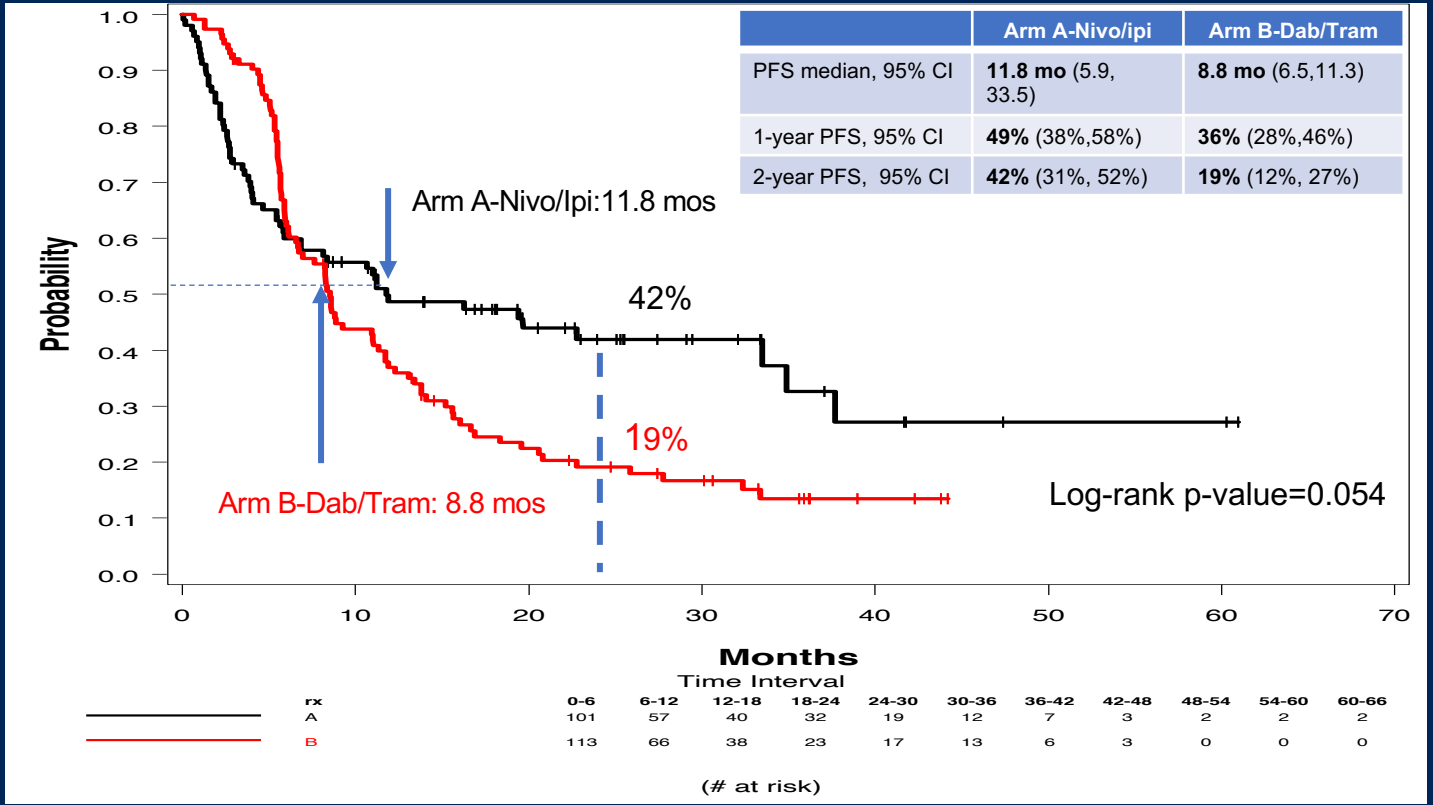
Clinical trial information: https://clinicaltrials.gov/ct2/show/NCT02631447; https://clinicaltrials.gov/ct2/show/NCT03235245; https://clinicaltrials.gov/ct2/show/NCT02224781

DREAMseq Trial Treatment Schema



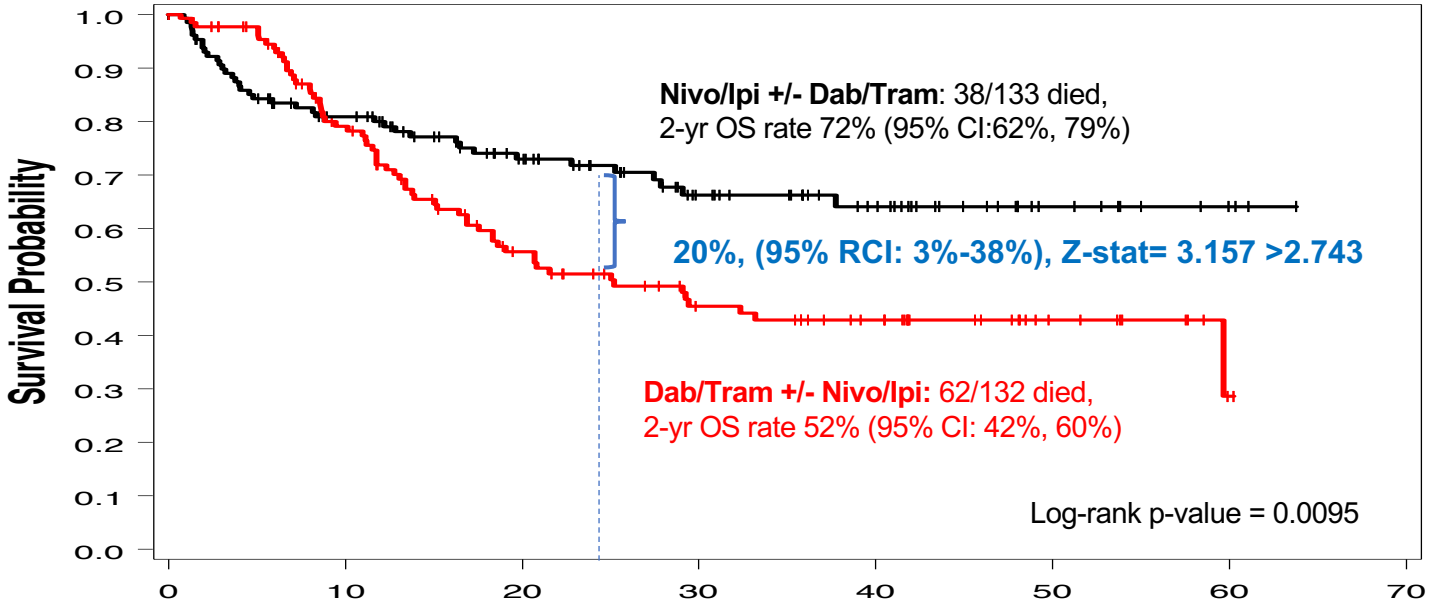
*Nivo/Ipi Induction = 12 wks; nivo maintenance = 72 wks

Progression Free Survival (PFS): Step1 (n=214)



	Arm A-Nivo/ipi	Arm B-Dab/Tram
PFS median, 95% CI	**11.8 mo** (5.9, 33.5)	**8.8 mo** (6.5,11.3)
1-year PFS, 95% CI	**49%** (38%,58%)	**36%** (28%,46%)
2-year PFS, 95% CI	**42%** (31%, 52%)	**19%** (12%, 27%)

Overall Survival (OS): Step 1 +/- Step 2



Time Interval

Treatment	0-6	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66
IO+/-TT	133	99	87	71	55	42	33	23	15	6	3
TT+/-IO	132	115	78	60	47	35	30	18	15	6	1

(# at risk)

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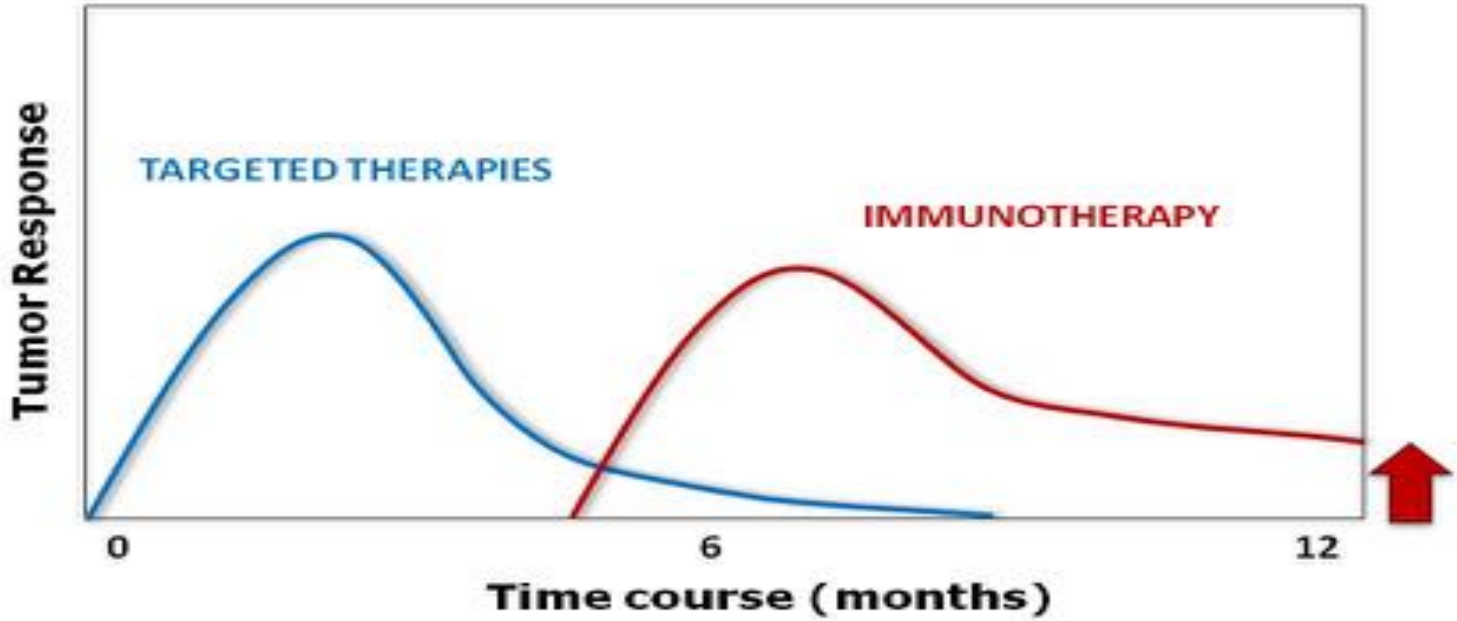
Antitumoral response: Targeted therapies vs. Immunotherapies (CTLA-4 antibodies)



Is This a Marriage Made in Heaven?

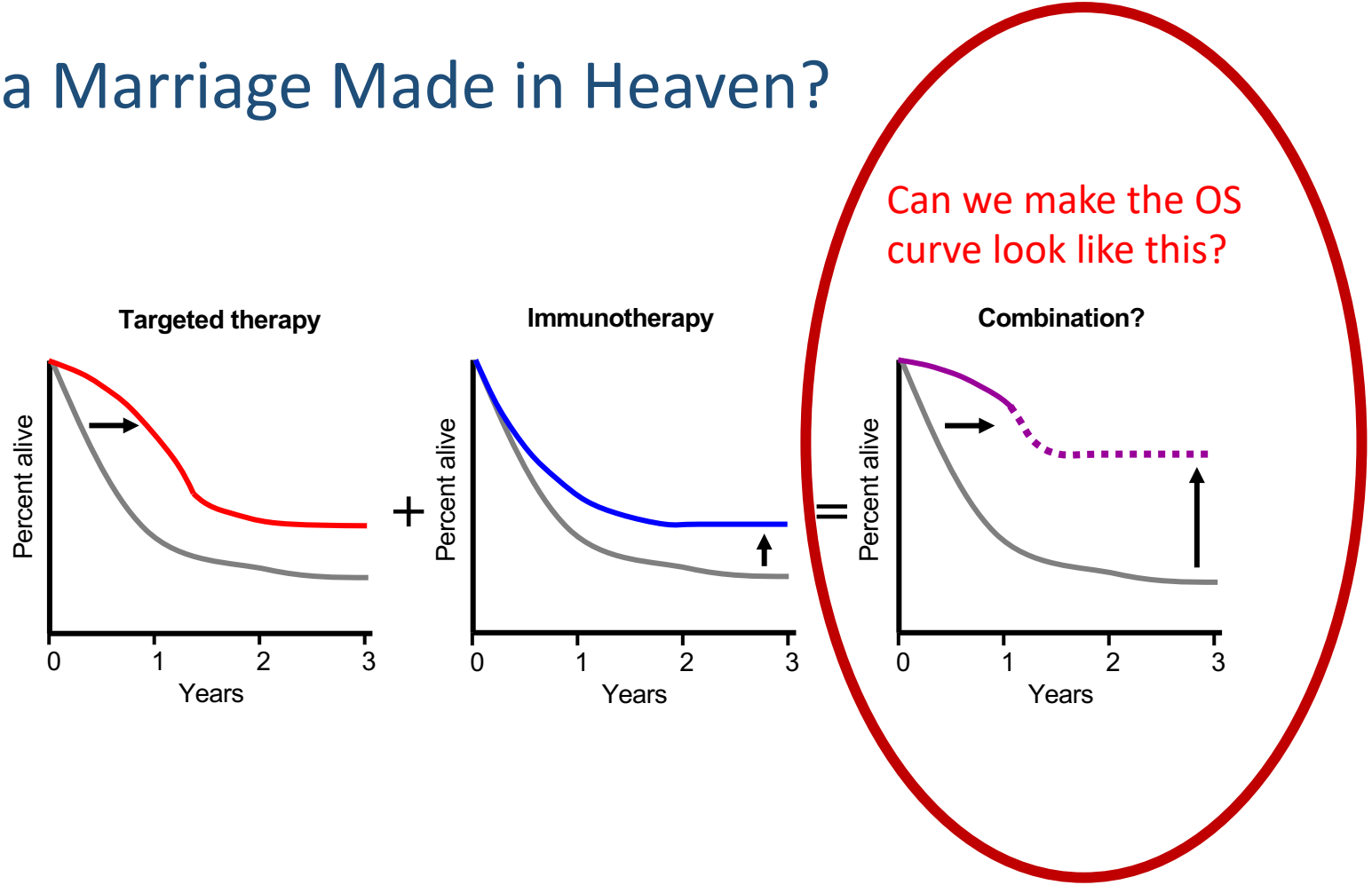


Figure modified from Ribas A et al. *Clin Cancer Res.* 2012, and Hamid O et al. SMR 2015.

Evaluation of Atezolizumab, Cobimetinib, and Vemurafenib in Previously Untreated Patients With *BRAF*^{V600} Mutation–Positive Advanced Melanoma: Primary Results From the Phase 3 IMspire150 Trial

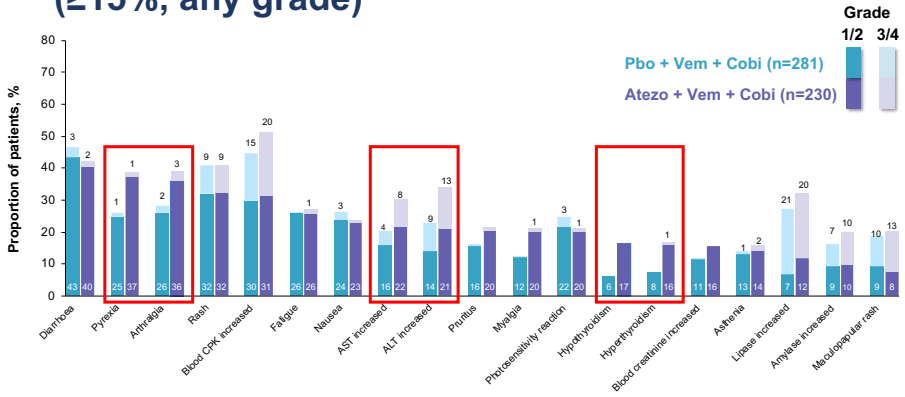
Grant A. McArthur, M.B., B.S., Ph.D.,[1] Daniil Stroyakovskiy, M.D.,[2] Helen Gogas, M.D., Ph.D.,[3] Caroline Robert, M.D., Ph.D.,[4] Karl Lewis, M.D.,[5] Svetlana Protsenko, M.D.,[6] Rodrigo Pereira, M.D.,[7] Thomas Eigentler, M.D.,[8] Piotr Rutkowski, M.D., Ph.D.,[9] Lev Demidov, M.D.,[10] Georgy Moiseevich Manikhas, M.D.,[11] Yibing Yan,[12] Kuan-Chieh Huang, Ph.D.,[12] Anne Uyei, M.D.,[12] Virginia McNally, Ph.D.,[13] Ralf Gutzmer, M.D.,[14] Paolo Ascierto, M.D.[15]

AACR Annual Meeting 2020

[1]Melanoma and Skin Service and Cancer Therapeutics Program, Peter MacCallum Cancer Centre, Melbourne, Victoria, Australia; [2]Moscow City Oncology Hospital #62 of Moscow Healthcare Department, Moscow, Russia; [3]First Department of Medicine, Laiko General Hospital, National and Kapodistrian University of Athens, Greece; [4]Gustave Roussy and Université Paris-Saclay, Villejuif-Paris, France; [5]University of Colorado Comprehensive Cancer Center, Aurora, CO, USA; [6]Department of Chemotherapy and Innovative Technologies, N. N. Petrov National Medical Research Center of Oncology, St. Petersburg, Russia; [7]Hospital das Clinicas, Porto Alegre, Brazil; [8]University Hospital Tübingen, Tübingen, Germany; [9]Department of Soft Tissue/Bone Sarcoma and Melanoma, Maria Sklodowska-Curie National Research Institute of Oncology, Warsaw, Poland; [10]N. N. Blokhin Russian Cancer Research Center, Ministry of Health, Moscow, Russia; [11]St. Petersburg Oncology Hospital, St. Petersburg, Russia; [12]Genentech, Inc., South San Francisco, CA, USA; [13]Roche Products Ltd., Welwyn Garden City, UK; [14]Haut-Tumour-Zentrum Hannover (HTZH), Klinik für Dermatologie, Allergologie und Venerologie, Medizinische Hochschule Hannover (MHH), Hannover, Germany; [15]Istituto Nazionale Tumori IRCCS Fondazione "G. Pascale," Naples, Italy.

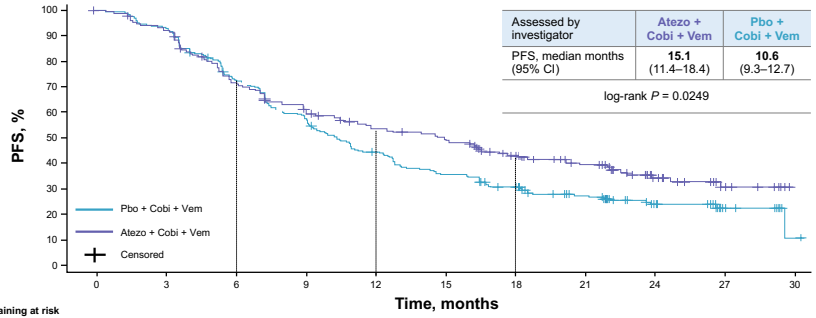
AACR Annual Meeting 2020

Common Treatment-Related AEs (≥15%, any grade)



AE, adverse event; ALT, alanine aminotransferase; AST, aspartate aminotransferase; CPK, creatine phosphokinase.
Listed AEs were reported at a frequency of ≥15%, along with corresponding frequencies for grade 3/4 events.

IMspire150: Primary Endpoint: Investigator-Assessed PFS



Assessed by investigator	Atezo + Cobi + Vem	Pbo + Cobi + Vem
PFS, median months (95% CI)	**15.1** (11.4–18.4)	**10.6** (9.3–12.7)

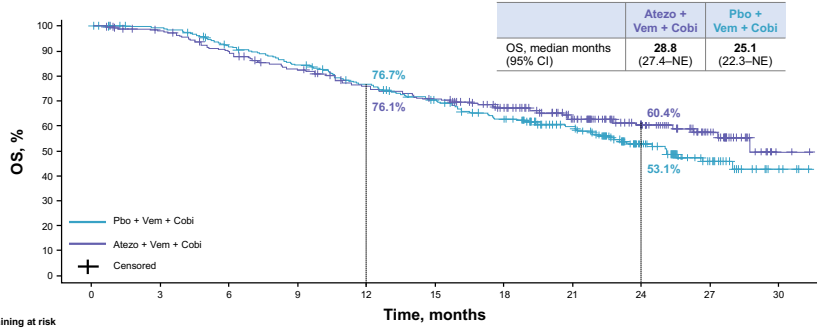
log-rank $P = 0.0249$

Patients remaining at risk

Pbo + Cobi + Vem	258	230	179	143	107	86	71	51	27	11	1
Atezo + Cobi + Vem	256	229	174	149	123	114	90	66	34	11	

Atezo, atezolizumab; CI, confidence interval; Cobi, cobimetinib; Pbo, placebo; Vem, vemurafenib.

IMspire150: Overall Survival



	Atezo + Vem + Cobi	Pbo + Vem + Cobi
OS, median months (95% CI)	**28.8** (27.4–NE)	**25.1** (22.3–NE)

Patients remaining at risk

Pbo + Vem + Cobi	258	249	225	206	175	161	139	105	57	26	5
Atezo + Vem + Cobi	256	242	220	198	173	165	144	105	66	28	2

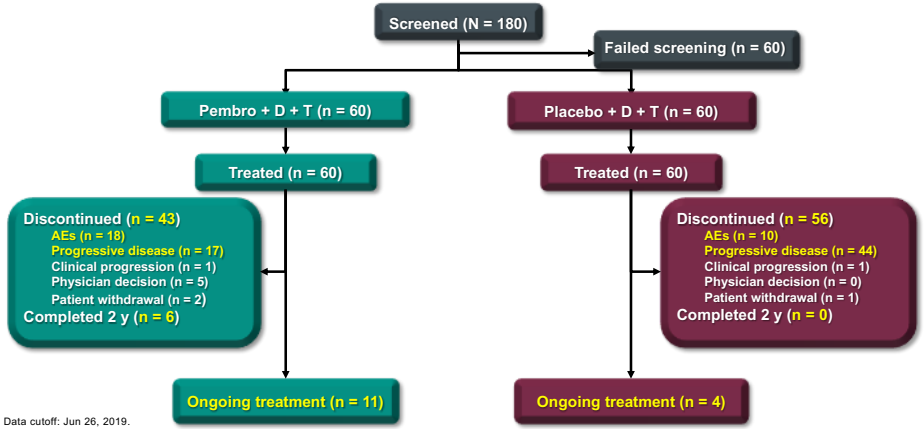
Updated Survival In Patients With *BRAF*-mutant Melanoma Administered Pembrolizumab, Dabrafenib And Trametinib

Pier Francesco Ferrucci[1a]; Paolo A. Ascierto[2a]; Michele Maio[3]; Michele Del Vecchio[4]; Victoria Atkinson[5]; Henrik Schmidt[6]; Jacob E. Schachter[7]; Paola Queirolo[8]; Georgina V. Long[9]; Rosalie Stephens[10]; Inge Marie Svane[11]; Michal Lotem[12]; Mahmoud Abu-Amna[13]; Eduard Gasal[14]; Razi Ghori[15]; Scott J. Diede[15]; Elizabeth Croydon[15]; Antoni Ribas[16]

[a]Both authors contributed equally

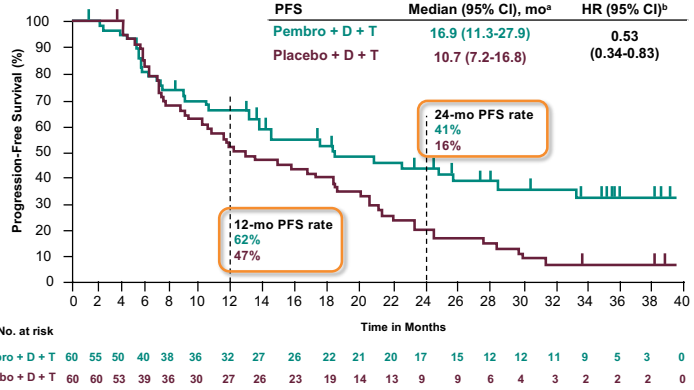
[1]Istituto Europeo di Oncologia IRCCS, Milan, Italy; [2]Istituto Nazionale Tumori IRCCS Fondazione "G. Pascale," Naples, Italy; [3]Center for Immuno-Oncology, University Hospital of Siena, Siena, Italy; [4]Fondazione IRCCS Istituto Nazionale dei Tumori, Milan, Italy; [5]Gallipoli Medical Research Foundation, Greenslopes Private Hospital, Brisbane, QLD, Australia; [6]Aarhus University Hospital, Aarhus, Denmark; [7]Ella Lemelbaum Institute for Immuno-Oncology, The Chaim Sheba Medical Center at Tel HaShomer, Cancer Center (Oncology Institute), Ramat Gan, Israel; [8]IEO, European Institute of Oncology IRCCS, Milan, Italy; [9]Melanoma Institute Australia; the University of Sydney; Mater and Royal North Shore Hospitals, Sydney, NSW, Australia; [10]Auckland City Hospital, Auckland, New Zealand; [11]Herlev Hospital, University of Copenhagen, Herlev, Denmark; [12]Sharett Institute of Oncology, Hadassah Hebrew Medical Center, Jerusalem, Israel; [13]Rambam Health Care Campus, Haifa, Israel; [14]Novartis, East Hanover, NJ, USA; [15]Merck & Co., Inc., Kenilworth, NJ, USA; [16]UCLA and the Jonsson Comprehensive Cancer Center, Los Angeles, CA, USA

Study Disposition



Data cutoff: Jun 26, 2019.

Progression-Free Survival



[a]Based on Kaplan-Meier estimate of PFS, per investigator assessment.
[b]Based on Cox regression model with treatment as a covariate stratified by ECOG PS (0 vs 1) and LDH (LDH >1.1 × ULN vs =1.1 × ULN); owing to the small number of patients enrolled in the ECOG PS 1 and LDH ≤1.1 × ULN strata, these strata were combined.
Data cutoff: Jun 26, 2019.

Ascierto et al. Nature Med 2019

VIRTUAL ESMO congress 2020

Spartalizumab plus dabrafenib and trametinib in patients with previously untreated *BRAF* V600–mutant unresectable or metastatic melanoma: results from the randomized part 3 of the Phase III COMBI-i trial

Paul D. Nathan,[1] Reinhard Dummer,[2] Georgina V. Long,[3] Paolo A. Ascierto,[4] Hussein A. Tawbi,[5] Caroline Robert,[6] Piotr Rutkowski,[7] Oleg Leonov,[8] Caroline Dutriaux,[9] Mario Mandalà,[10] Paul Lorigan,[11] Pier Francesco Ferrucci,[12] Keith T. Flaherty,[13] Jan C. Brase,[14] Steven Green,[15] Tomas Haas,[15] Aisha Masood,[16] Eduard Gasal,[16] Antoni Ribas,[17] Dirk Schadendorf[18]

[1]Department of Medical Oncology, Mount Vernon Cancer Centre, Northwood, UK; [2]Department of Dermatology, University Hospital Zürich Skin Cancer Center, Zürich, Switzerland; [3]Department of Medical Oncology, Melanoma Institute Australia, The University of Sydney, and Royal North Shore and Mater Hospitals, Sydney, NSW, Australia; [4]Department of Melanoma, Cancer Immunotherapy and Development Therapeutics, Istituto Nazionale Tumori IRCCS "G. Pascale," Napoli, Italy; [5]Department of Melanoma Medical Oncology, The University of Texas MD Anderson Cancer Center, Houston, TX, USA; [6]Dermatology Service and Melanoma Research Unit, Gustave Roussy and Paris-Sud-Paris-Saclay University, Villejuif, France; [7]Department of Soft Tissue/Bone Sarcoma and Melanoma, Maria Skłodowska-Curie National Research Institute of Oncology, Warsaw, Poland; [8]Department of Medical Oncology, Clinical Oncological Dispensary, Omsk, Russian Federation; [9]Service de Dermatologie, Centre Hospitalier Universitaire de Bordeaux, Hôpital Saint-André, Bordeaux, France; [10]Department of Oncology and Haematology, Papa Giovanni XXIII Cancer Center Hospital, Bergamo, Italy; [11]Department of Medical Oncology, The Christie NHS Foundation Trust, Manchester, UK; [12]Cancer Biotherapy Unit, Department of Experimental Oncology, European Institute of Oncology, IRCCS, Milan, Italy; [13]Department of Medicine and Cancer Center, Massachusetts General Hospital Cancer Center and Harvard Medical School, Boston, MA, USA; [14]Precision Medicine, Novartis Pharma AG, Basel, Switzerland; [15]Clinical Development and Analytics, Novartis Pharma AG, Basel, Switzerland; [16]Oncology Clinical Development, Novartis Pharmaceuticals Corporation, East Hanover, NJ, USA; [17]Department of Medicine, Division of Hematology-Oncology, University of California, Los Angeles, Los Angeles, CA, USA; [18]Department of Dermatology, Comprehensive Cancer Center (Westdeutsches Tumorzentrum), University Hospital Essen, Essen, and German Cancer Consortium, Heidelberg, Germany

COMBI-i Study Design (Part 3)

N = 532

Key eligibility criteria
- *BRAF* V600 mutation–positive unresectable or metastatic melanoma
- Previously untreated
- No active brain metastases
- ECOG PS ≤ 2

Randomization stratification
- ECOG PS
- LDH level

RANDOMIZATION

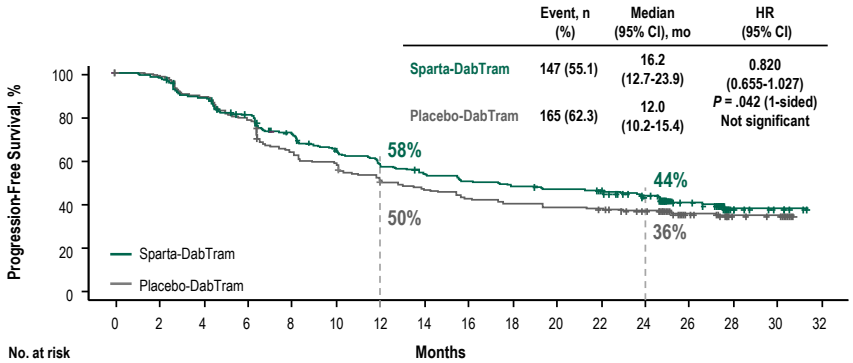
- Spartalizumab 400 mg Q4W + dabrafenib 150 mg BID + trametinib 2 mg QD
- Placebo Q4W + dabrafenib 150 mg BID + trametinib 2 mg QD

Primary endpoint: Investigator-assessed PFS using RECIST 1.1

Secondary endpoints: OS, ORR, DOR, DCR, safety, PRO, PK

BID, twice daily; DCR, disease control rate; DOR, duration of response; ECOG PS, Eastern Cooperative Oncology Group performance status; LDH, lactate dehydrogenase; ORR, objective response rate; OS, overall survival; PFS, progression-free survival; PK, pharmacokinetics; Q4W, every 4 weeks; QD, once daily; RECIST, Response Evaluation Criteria in Solid Tumors.

Investigator-Assessed Progression-Free Survival

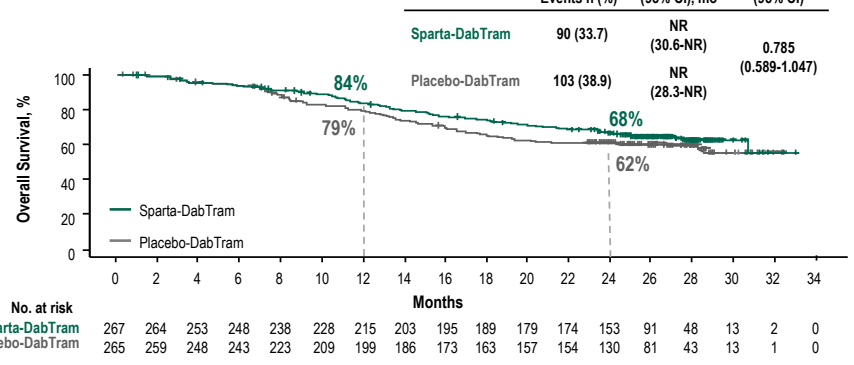


	Event, n (%)	Median (95% CI), mo	HR (95% CI)
Sparta-DabTram	147 (55.1)	16.2 (12.7-23.9)	0.820 (0.655-1.027)
Placebo-DabTram	165 (62.3)	12.0 (10.2-15.4)	*P* = .042 (1-sided) Not significant

No. at risk																
Sparta-DabTram	267	256	229	204	180	159	142	130	121	115	111	108	90	40	13	5	0
Placebo-DabTram	265	252	228	202	162	148	127	115	105	100	95	93	76	36	11	8	0

HR, hazard ratio.

Overall Survival



	Events n (%)	Median (95% CI), mo	HR (95% CI)
Sparta-DabTram	90 (33.7)	NR (30.6-NR)	0.785 (0.589-1.047)
Placebo-DabTram	103 (38.9)	NR (28.3-NR)	

No. at risk																
Sparta-DabTram	267	264	253	248	238	228	215	203	195	189	179	174	153	91	48	13	2	0
Placebo-DabTram	265	259	248	243	223	209	199	186	173	163	157	154	130	81	43	13	1	0

- Overall survival could be statistically tested only after the primary endpoint was determined to be statistically significant

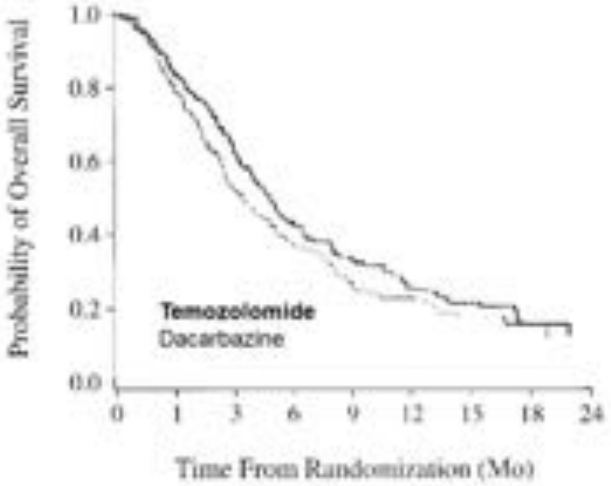
NR, not reached.

Overview

- Immunotherapy
- Targeted therapy
- Choosing between immunotherapy & targeted therapy as first-line
- Combining immunotherapy with targeted therapy
- Future directions

The Moving Overall Survival Bar for Metastatic Melanoma

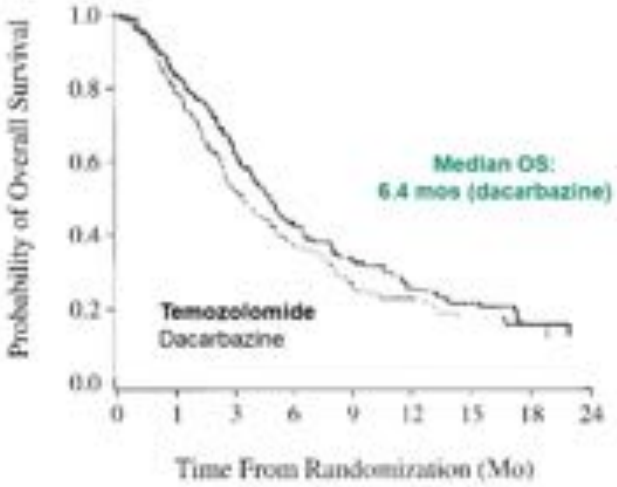
Pre-Checkpoint Blockade/
BRAF-Targeted Therapy: Chemotherapy



(Middleton MR et al. *J Clin Oncol* 2000)

The Moving Overall Survival Bar for Metastatic Melanoma

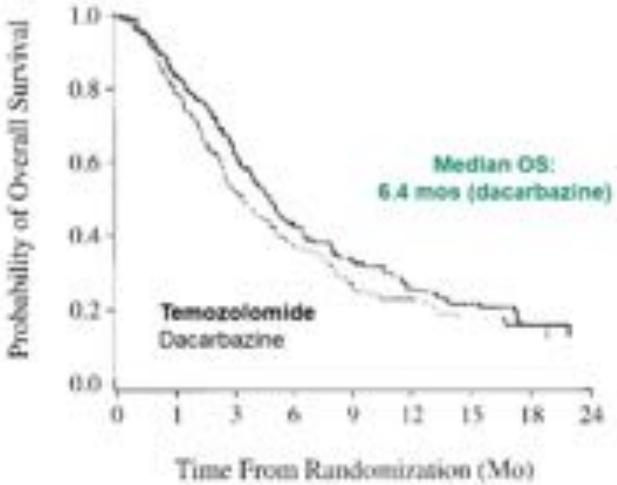
Pre-Checkpoint Blockade/ BRAF-Targeted Therapy: Chemotherapy



(Middleton MR et al. *J Clin Oncol* 2000)

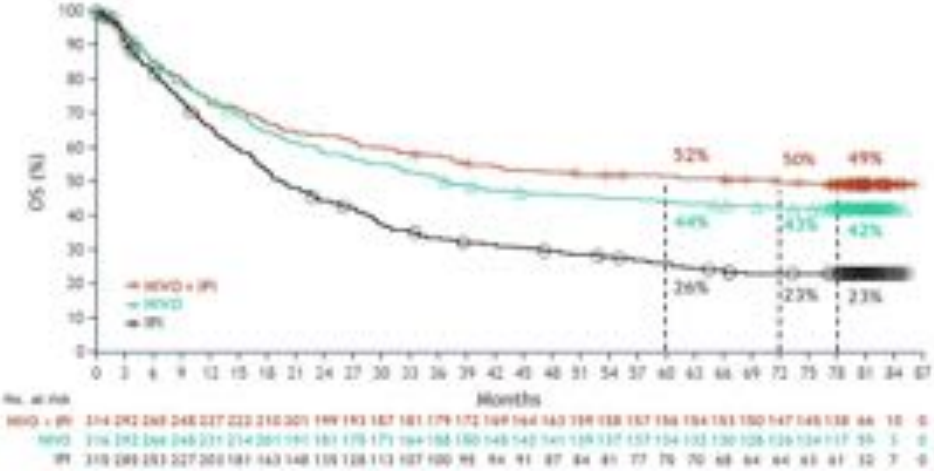
The Moving Overall Survival Bar for Metastatic Melanoma

Pre-Checkpoint Blockade/ BRAF-Targeted Therapy: Chemotherapy



(Middleton MR et al. *J Clin Oncol* 2000)

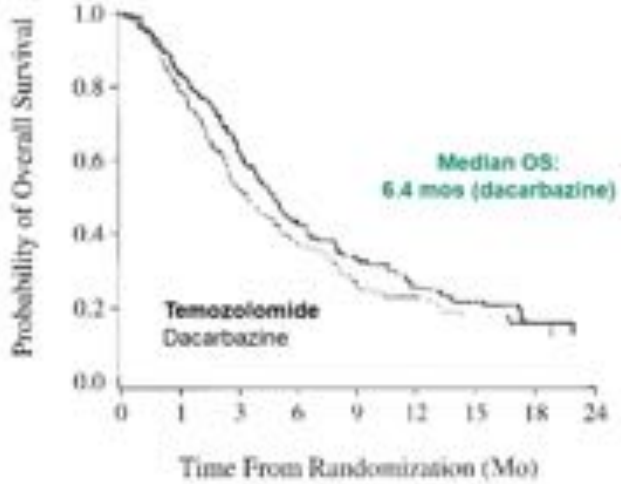
PD-1 +/- CTLA-4 Inhibition



(Wolchok et al. *JCO* 2021)

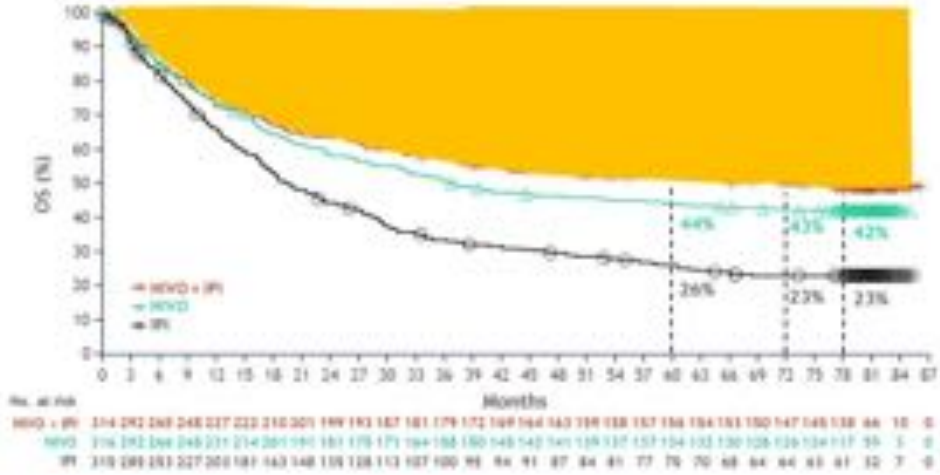
(Still) Unmet Clinical Need for Advanced Melanoma

Pre-Checkpoint Blockade/
BRAF-Targeted Therapy: Chemotherapy



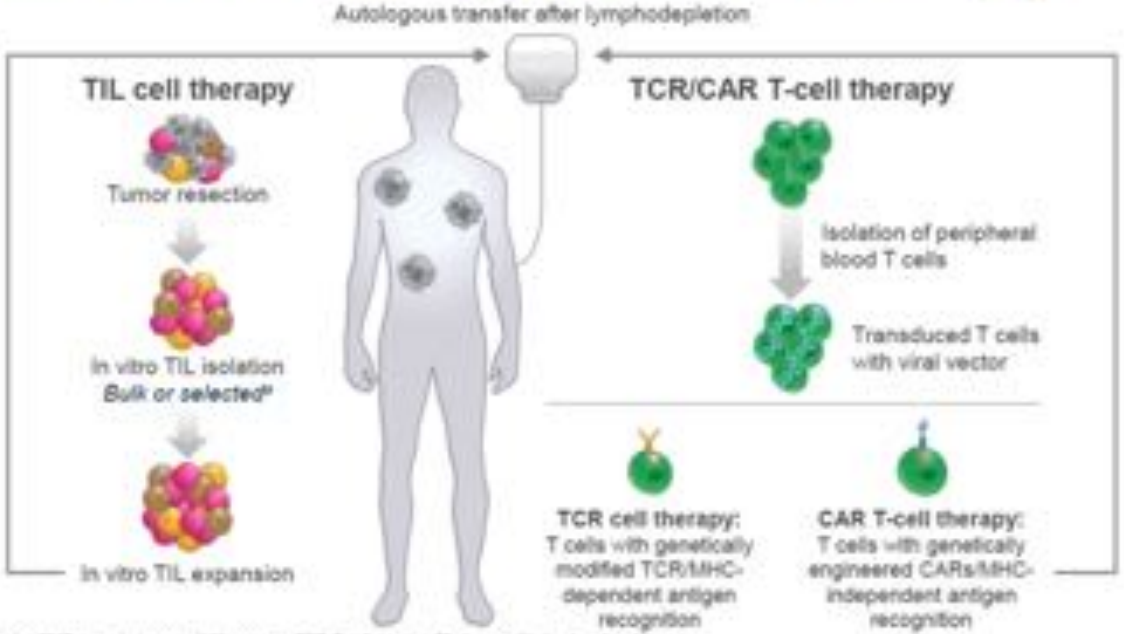
(Middleton MR et al. *J Clin Oncol* 2000)

PD-1 +/- CTLA-4 Inhibition



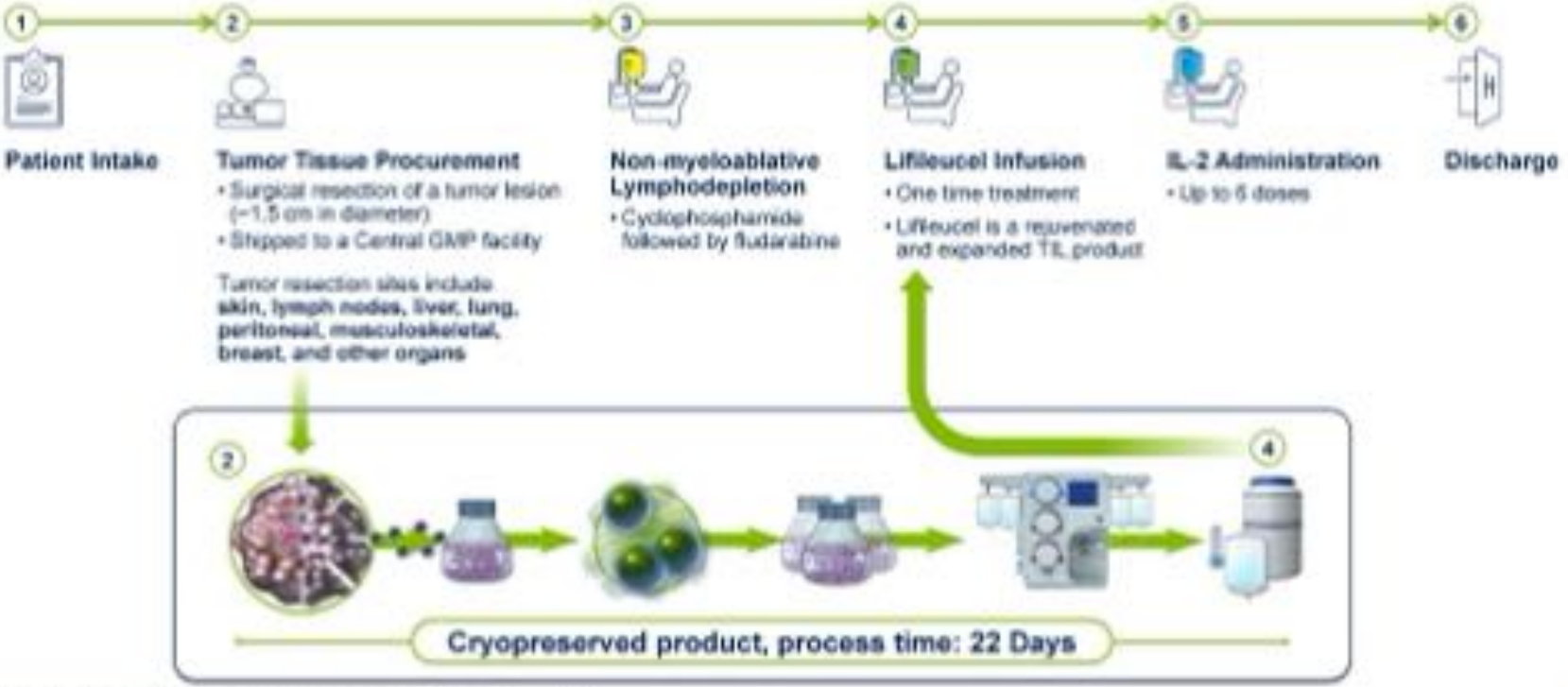
(Wolchok et al. *JCO* 2021)

Clinical Potential of Adoptive Cell Therapy

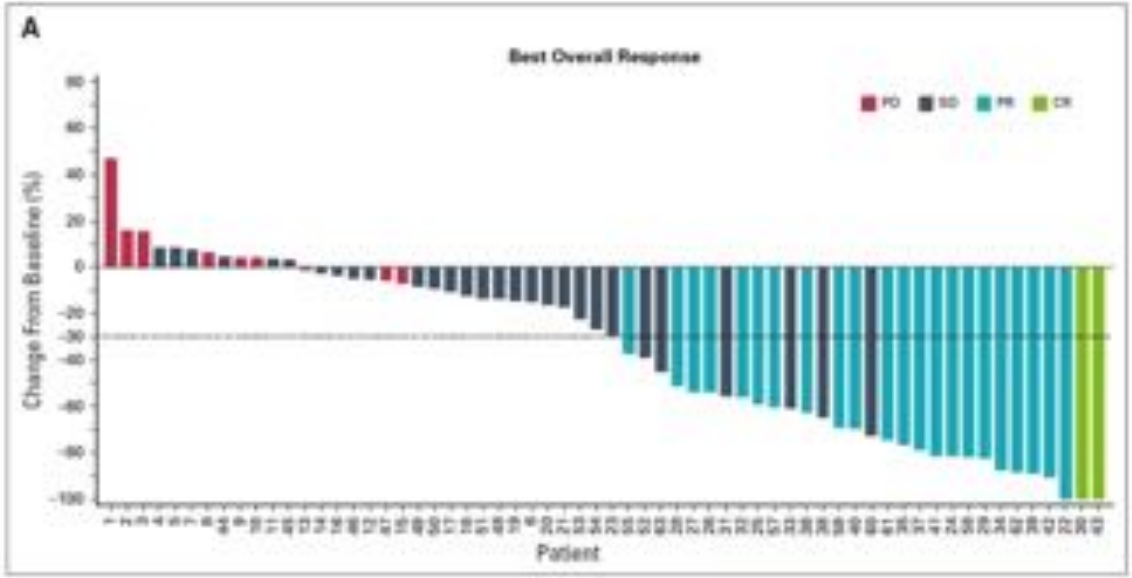


CAR, chimeric antigen receptor; MHC, major histocompatibility complex; TCR, T-cell receptor; TIL, tumor-infiltrating lymphocyte.
*Bulk TIL refers to non-selected TILs; selected TILs refers to TILs selected against specific antigens.
Bobisse MW, et al. Virchows Arch. 2015;474:449.

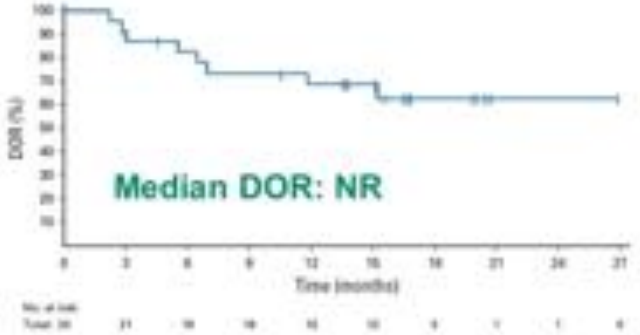
Patient Journey and TIL Manufacturing

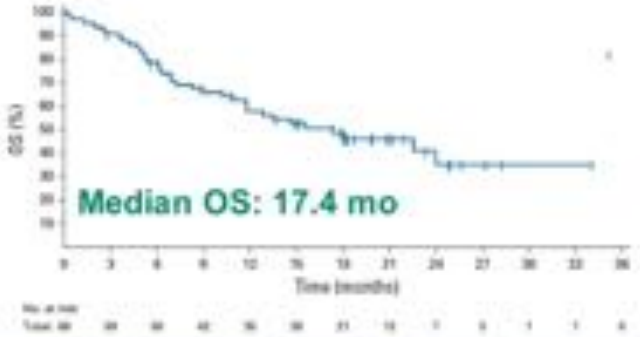


Lifileucel for PD-1 Refractory Melanoma



ORR: 36%
(95% CI, 25 to 49)





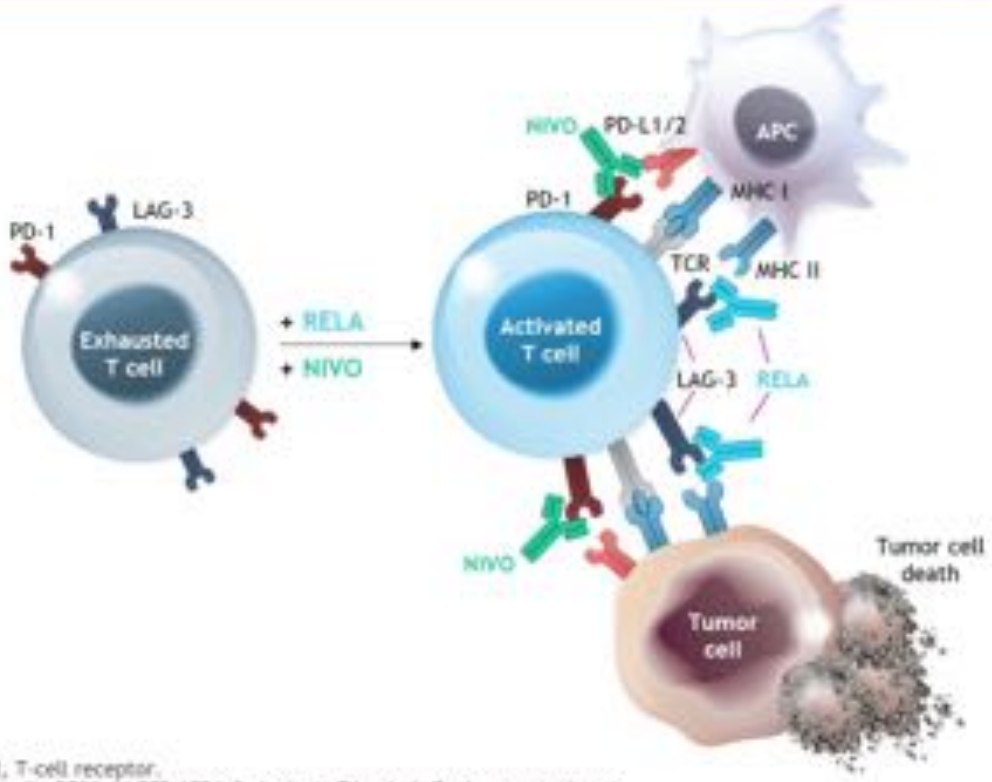
(Sarnaik et al. *J Clin Oncol* 2021)

Select Accruing Melanoma TIL Trials
(*Beyond Phase 1)

Trial Identifier	Sponsor	Description
NCT05396640		Expanded access program for lifileucel
NCT02278887	Netherlands Cancer Institute	Phase 3, Lymphodepletion+ TIL+ IL-2 vs. ipilimumab
NCT03645928		Phase 2, Lymphodepletion+ lifileucel + IL-2
NCT05050006		Phase 2, Lymphodepletion+ ITIL-168 + IL-2
NCT03467516	UPMC Hillman Cancer Center	Phase 2, Lymphodepletion+ TIL + IL-2
NCT04762225	Repertoire Immune Medicines	Phase 1/2, Autologous Multi-Targeted T Cell Therapy (RPTR-168)
NCT03997474		Phase 1/2, Lymphodepletion +ATL001 +/- checkpoint inhibitor+ IL-2
NCT03815682		Phase 1/2, Autologous Multi-Targeted T Cell Therapy + IL-15 (RPTR-147.1) +/- Pembro
NCT03638375		Phase 1/2, TIL + nivo +/- IFN-α
NCT03374839	Nantes University Hospital	Phase 1/2, TIL + IL-2 +/- DC vaccine

Rationale for RELA + NIVO

- LAG-3 and PD-1 are distinct immune checkpoints, often co-expressed on tumor-infiltrating lymphocytes, and contribute to tumor-mediated T-cell exhaustion[1,2]
- In preclinical models, LAG-3 and PD-1 blockade demonstrated synergistic antitumor activity[1]
- RELA + NIVO demonstrated clinically meaningful antitumor activity including durable objective responses and was well tolerated in patients with melanoma that was relapsed/refractory to anti-PD-1 therapy[3,4]



APC, antigen-presenting cell; MHC, major histocompatibility complex; TCR, T-cell receptor.
1. Woo S-R, et al. *Cancer Res* 2012;72:917-927; 2. Anderson AC, et al. *Immunity* 2016;44:989-1004; 3. Ascierto PA, et al. Oral presentation at ASCO Annual Meeting; June 2-6, 2017; Chicago, IL. Abstract 9520; 4. Ascierto PA, et al. Oral presentation at ESMO Congress; September 8-12, 2017; Madrid, Spain. Abstract LBA18.

Study design

- **RELATIVITY-047** is a global, randomized, double-blind, phase 2/3 study

Key eligibility criteria

- Previously untreated unresectable or metastatic melanoma[a]
- ECOG PS 0-1

Stratification factors

- LAG-3[b]
- PD-L1[c]
- *BRAF*
- AJCC v8 M stage

N = 714

R 1:1

- RELA 160 mg + NIVO 480 mg fixed-dose combination (FDC) IV Q4W
- NIVO 480 mg IV Q4W

Primary endpoint

- PFS by BICR[d]

Secondary endpoints

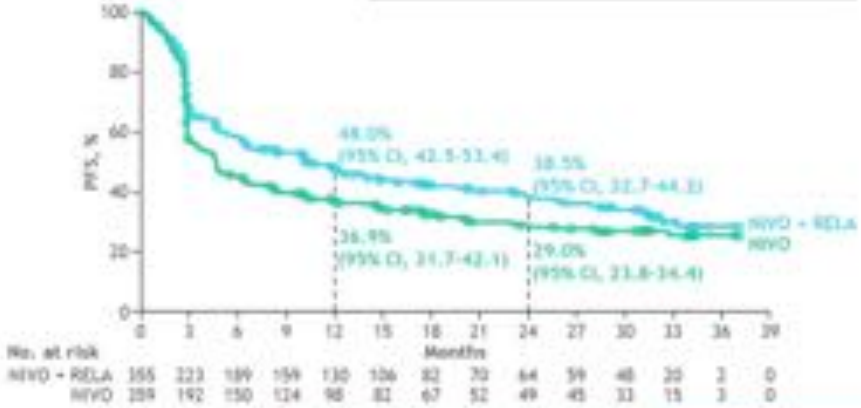
- OS
- ORR by BICR[d]

AJCC, American Joint Committee on Cancer; BICR, blinded independent central review; CTLA-4, cytotoxic T lymphocyte antigen-4; ECOG PS, Eastern Cooperative Oncology Group performance status; IHC, immunohistochemistry; IV, intravenous; ORR, overall response rate; Q4W, every 4 weeks; R, randomization.
ClinicalTrials.gov: NCT03470922; Lipson E, et al. Poster presentation at ESMO Congress; October 19-23, 2018; Munich, Germany. Abstract 1302TiP.
[a]Prior adjuvant/neoadjuvant treatment permitted (anti-PD-1 or anti-CTLA-4 permitted if at least 6 months between the last dose and recurrence; interferon therapy permitted if the last dose was at least 6 weeks before randomization); [b]LAG-3 expression on immune cells was determined using an analytically validated IHC assay (LabCorp); [c]PD-L1 expression on tumor cells was determined using the validated Agilent/Dako PD-L1 IHC 28-8 pharmDx test; [d]First tumor assessment (RECIST v1.1) performed 12 weeks after randomization, every 8 weeks up to 52 weeks, and then every 12 weeks. Database lock date: March 9, 2021.

PFS, OS, and ORR in all randomized patients

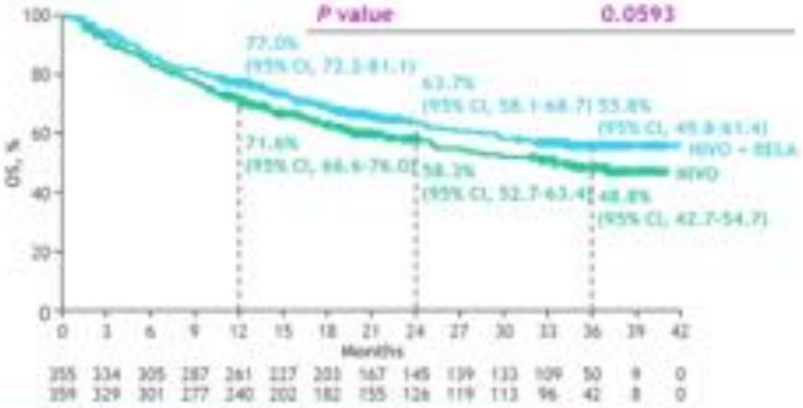
Updated PFS by BICR

	NIVO + RELA (n = 355)	NIVO (n = 359)
mPFS, mo (95% CI)	10.22 (6.51-14.75)	4.63 (3.48-6.44)
HR (95% CI)	0.78 (0.64-0.94)	



OS

	NIVO + RELA (n = 355)	NIVO (n = 359)
mOS, mo (95% CI)	NR (34.20-NR)	34.10 (25.23-NR)
HR (95% CI)	0.80 (0.64-1.01)	
P value	0.0593	



Confirmed ORR by BICR	NIVO + RELA (n = 355)	NIVO (n = 359)
ORR % (95% CI)	**43.1** (37.9-48.4)	**32.6** (27.8-37.7)

DBL date: October 28, 2021. Median follow-up: 19.3 mo

Statistical model for HR and *P* value: stratified Cox proportional hazard model and stratified log-rank test. Stratified by LAG-3, *BRAF* mutation status, and AJCC M stage. PD-L1 was removed from stratification because it led to subgroups with < 10 patients. OS boundary for statistical significance was *P* < 0.0432. (1-sided) analyzed at 49% power; target HR, 0.71; ORR could not be formally tested and was descriptively analyzed. Minimum potential follow-up (time from last patient randomized to last patient last visit) was 8.7 mo.

Long GV, et al. Oral presentation at the American Society of Clinical Oncology (ASCO) 2022 March Plenary Series; March 15, 2022; Virtual. Abstract 9M085.

Why neoadjuvant treatment?

- **Downstaging disease**

→ facilitate resection/less morbidity

- **Destruction of micrometastases**

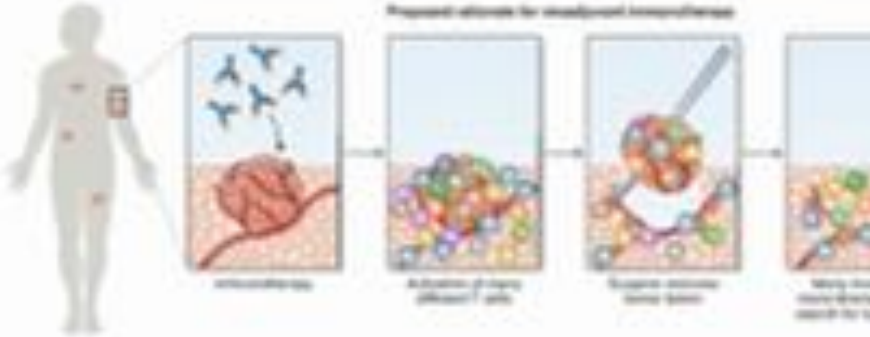
→ prevention of distant metastasis

- **More tumor antigens**

→ better and deeper immune response

- **Objectify the individual therapy response**

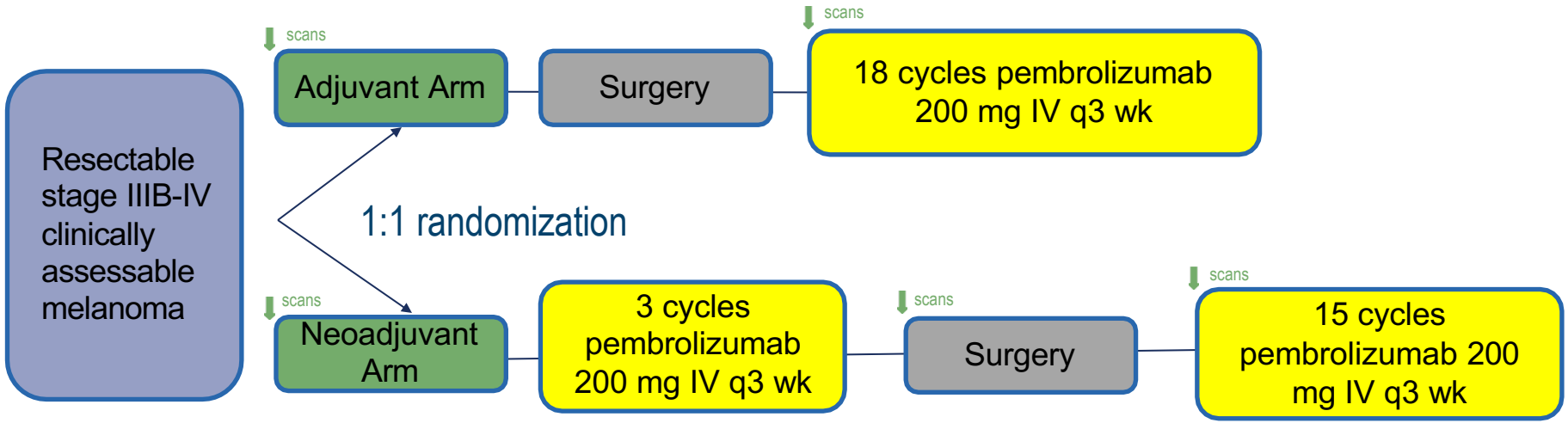
→ Personalised therapy



Versluis et al. Nature Medicine, 2020.

S1801 Study Schema

Primary endpoint: Event-free survival

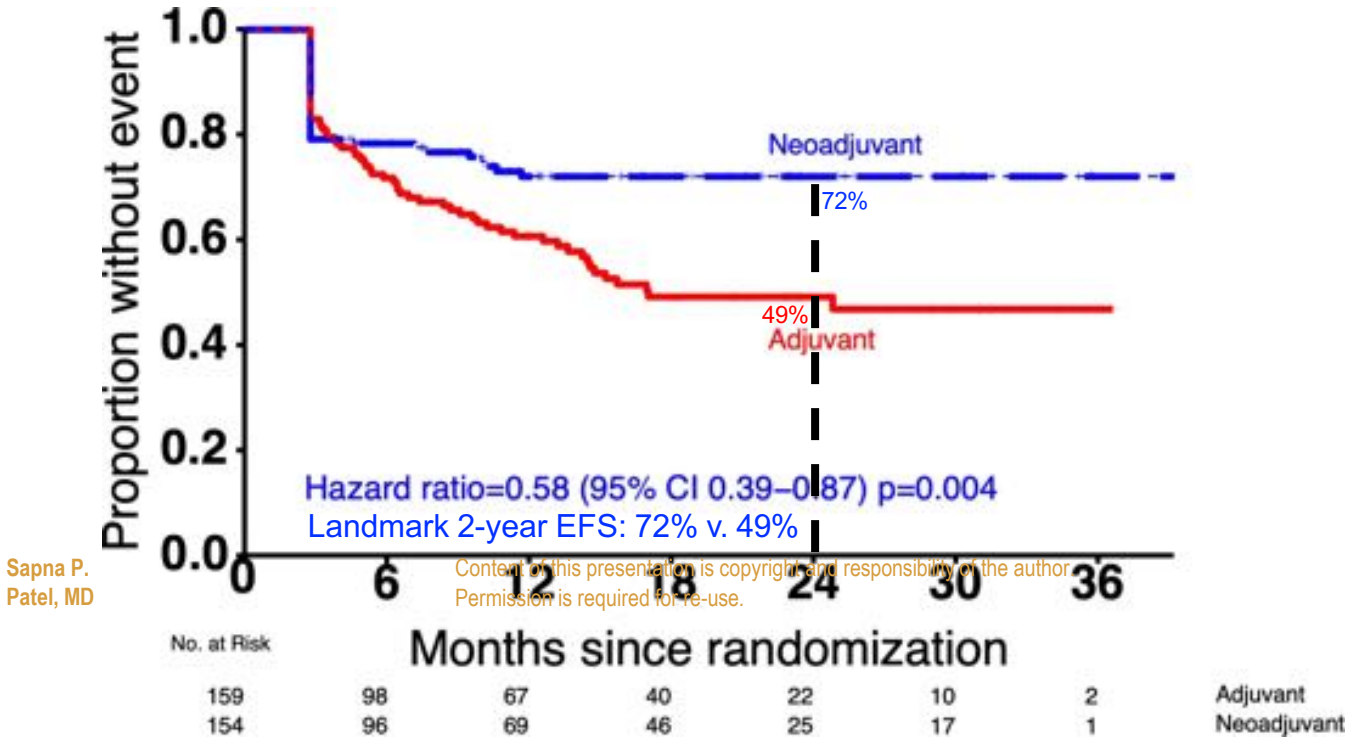


radiographic assessment (scans)

Additional criteria: strata included AJCC 8th ed. stage and LDH, adjuvant radiation allowed, concomitant radiation & pembrolizumab was not allowed, brain metastasis excluded, uveal melanoma excluded

Surgery type and extent was required to be pre-specified and carried out regardless of radiologic response to therapy

S1801 primary endpoint: Event-free survival



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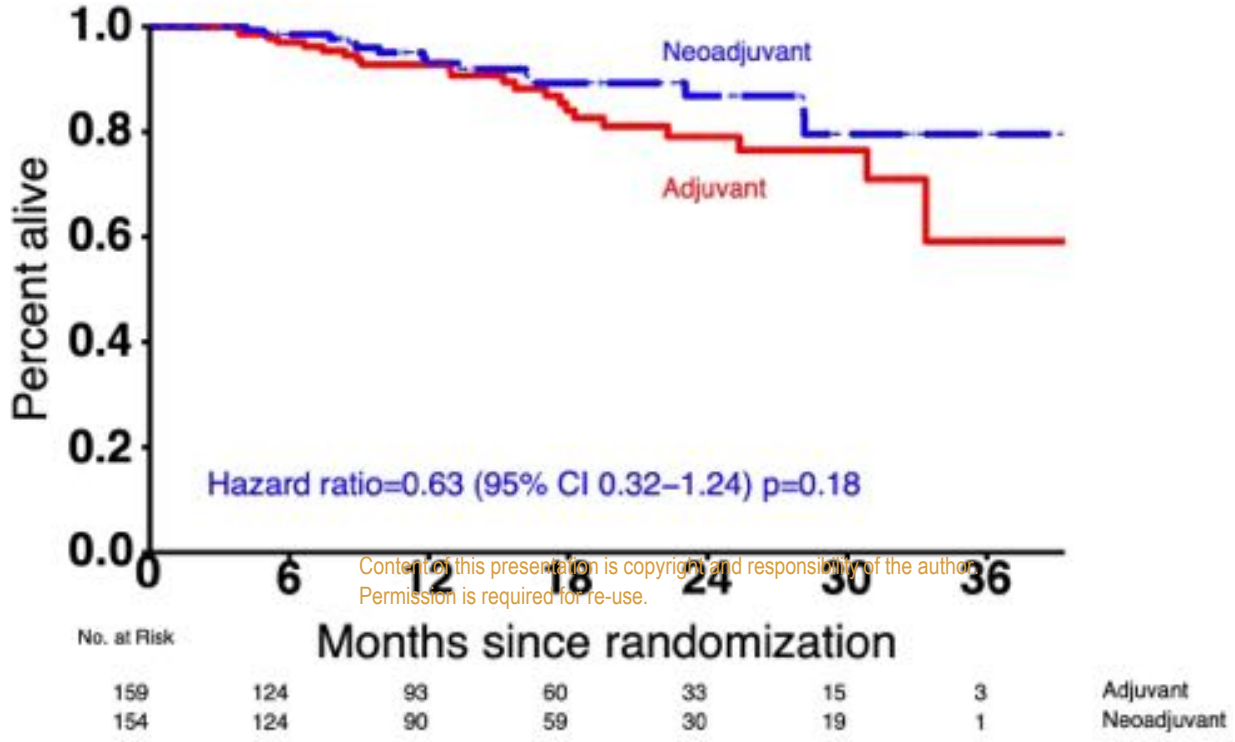
Overall survival



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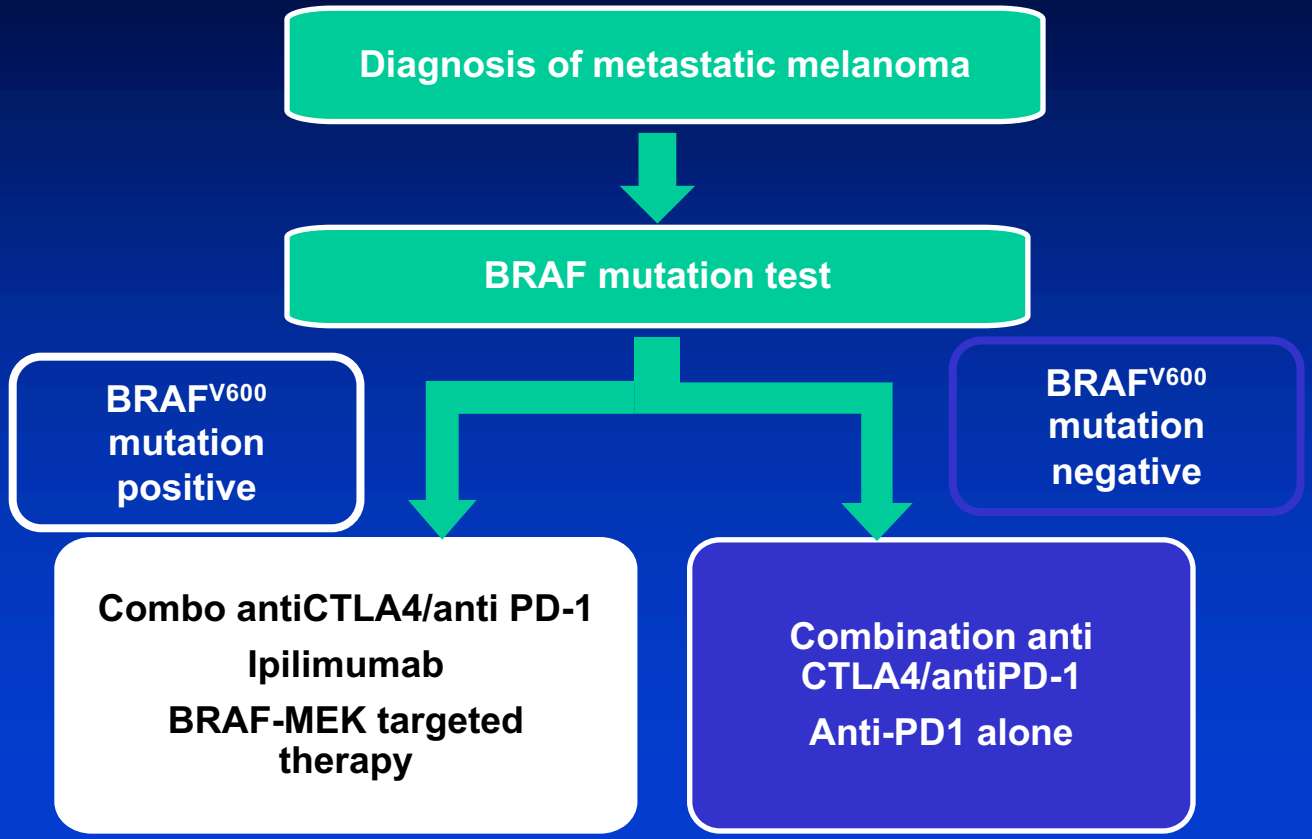
Summary & Conclusions

- Immunotherapy is an option for all patients
  - Single agent PD1
  - Combination PD-1/CTLA-4
- Targeted therapy (BRAF/MEK combination) is an option for BRAF-MT patients
- Triple therapy for BRAF-MT patients is an approved option but the data are controversial
- For first-line treatment, combination immunotherapy (CTLA-4 + PD1) is preferred for most patients including those with a BRAF mutation
- Future directions include new targets and other immunotherapy approaches including neoadjuvant therapy

How I Treat Metastatic Melanoma



Thank you!