

# Highlights from IMW 2019

19-20 novembre 2019  
Bologna  
Royal Hotel Carlton

**Mieloma e neoplasie plasmacellulari ad alto rischio**

**Strategie terapeutiche adattate al rischio**

**Dr. Vittorio Montefusco**



FONDAZIONE IRCCS  
ISTITUTO NAZIONALE  
DEI TUMORI



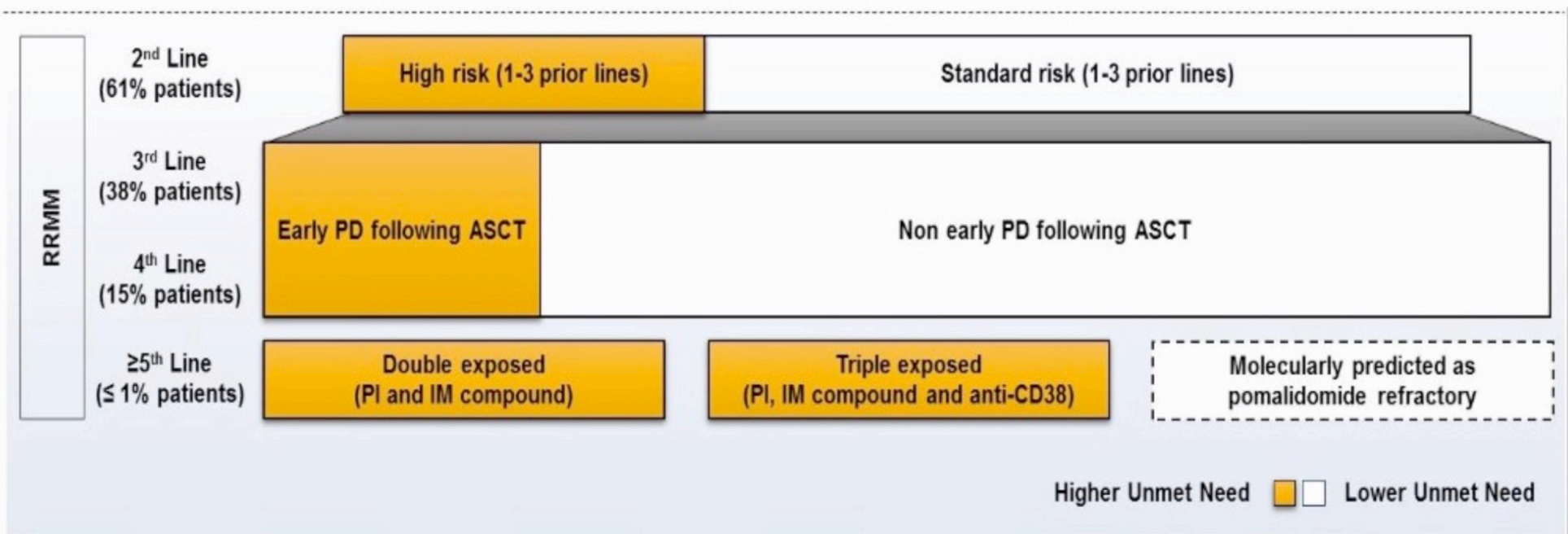
# **DISCLOSURES**

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**Honoraria and travel grants from:**

- **Celgene**
- **Janssen**
- **Amgen**
- **Bristol-Myers Squibb**
- **Takeda**

# Patient Populations with High Unmet Medical Need in the RR setting

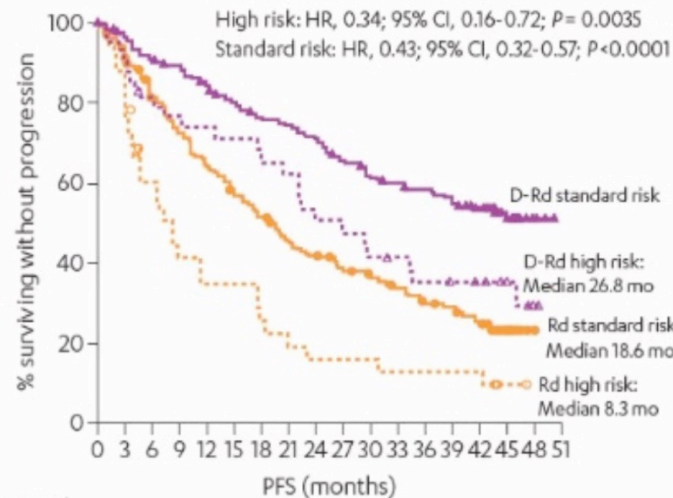


# High Risk Disease Remains an unmet Need in RRMM

## POLLUX: Results based on Cytogenetic Risk

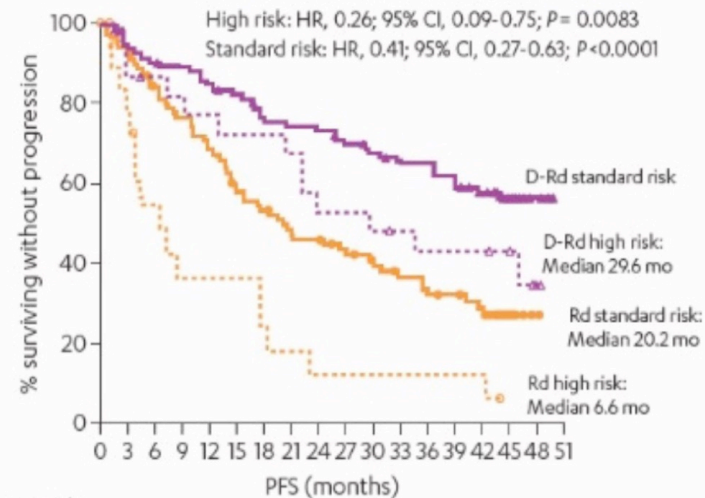
- Median follow-up: 44.3 months (ITT population)

### ITT/biomarker evaluable



No. at risk	0	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51
Rd standard risk	176	157	135	120	106	94	84	72	67	58	54	49	42	40	33	14	1	0
D-Rd standard risk	193	180	171	165	157	146	137	133	128	117	109	106	102	96	85	38	5	0
Rd high risk	35	28	19	13	11	11	8	6	5	5	5	4	4	4	4	1	0	0
D-Rd high risk	35	31	27	26	25	24	23	21	17	16	14	13	11	10	9	6	1	0

### 1 prior line of therapy



No. at risk	0	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51
Rd standard risk	90	84	73	66	59	49	45	39	38	32	28	25	22	21	17	8	1	0
D-Rd standard risk	96	89	85	83	79	75	69	67	66	62	59	57	56	52	44	21	4	0
Rd high risk	20	14	9	6	6	6	4	3	2	2	2	2	2	2	2	0	0	0
D-Rd high risk	22	19	18	17	16	15	14	11	11	10	9	8	8	8	5	1	0	0

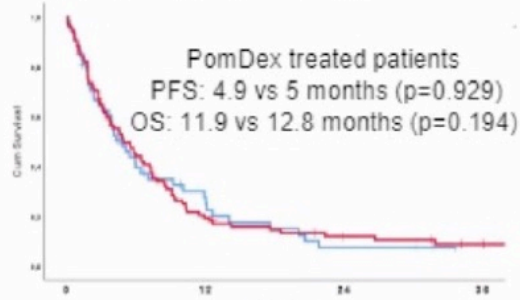
Kaufman JL, et al. ASCO 2019: Poster presentation (8038); EHA 2019: Poster presentation (PFS91)

Dimoupolos, IMW 2019

# Lenalidomide Refractoriness

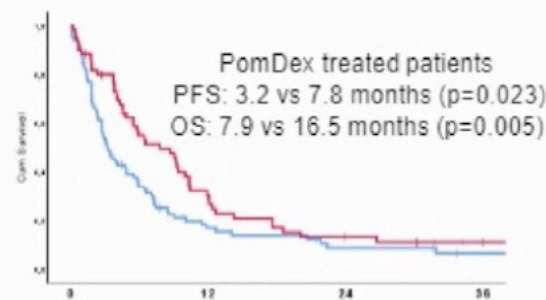
- How is lenalidomide resistance defined? What are the mechanisms?
- What is the impact of lenalidomide dose?
- Is the duration of prior Len exposure significant? Is it the same if exposed for long or short time to Len? Is there an IMiD-sensitive MM subtype?
- Is Lenalidomide re-treatment feasible in at least a subset of patients?
- Are newer IMiDs (CellIMods) able to overcome Len-resistance more efficiently?

PFS according to last Len dose  
(5-15 mg vs 25 mg)



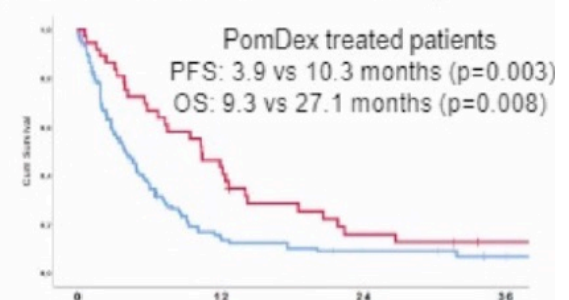
Len last dose	0	12	24	36
5-15 mg	52	11	3	
25 mg	95	17	8	4

PFS according to Duration on  
Len therapy <12 vs ≥12 months



Len duration	0	12	24	36
<12 months	86	12	5	2
>12 months	61	16	6	2

PFS according to IMiD free interval  
(<18 months vs ≥18 months)



IMiD free interval	0	12	24	36
<18 months	110	13	6	2
>18 months	37	15	5	2



# Lenalidomide Refractoriness: An Unmet Need

Regimen	Median PFS (months)
Kd (Endeavor)	8.6
DaraVd (Castor)	7.8
PomVd (OPTIMISMM)	9.5
DaraKd (MMY1001-phase2)	25.7
DaraPomDex (MMY1001-phase 2)	10.1

## Progression on Lenalidomide maintenance:

- Is resistance to maintenance lenalidomide same as resistance to lenalidomide when given in the relapsed setting or as a full therapy (as Rd or VRd?)
- What is the impact of induction therapy?
- What is the impact of lenalidomide dose?
- Can we increase to full dose and add dexa and a 3<sup>rd</sup> agent?

Dimoupolos, IMW 2019

Siegel DS et al. Haematologica 2017; abstract P333 (presented at EHA 2017);

Moreau P et al. Leukemia. 2017;31:115-22;

Richardson DG, et al. Lancet Oncol 2019;20:781-94

# Efficacy of isatuximab/pomalidomide/dexamethasone in relapsed/refractory multiple myeloma: ICARIA-MM high-risk cytogenetics subgroup analysis

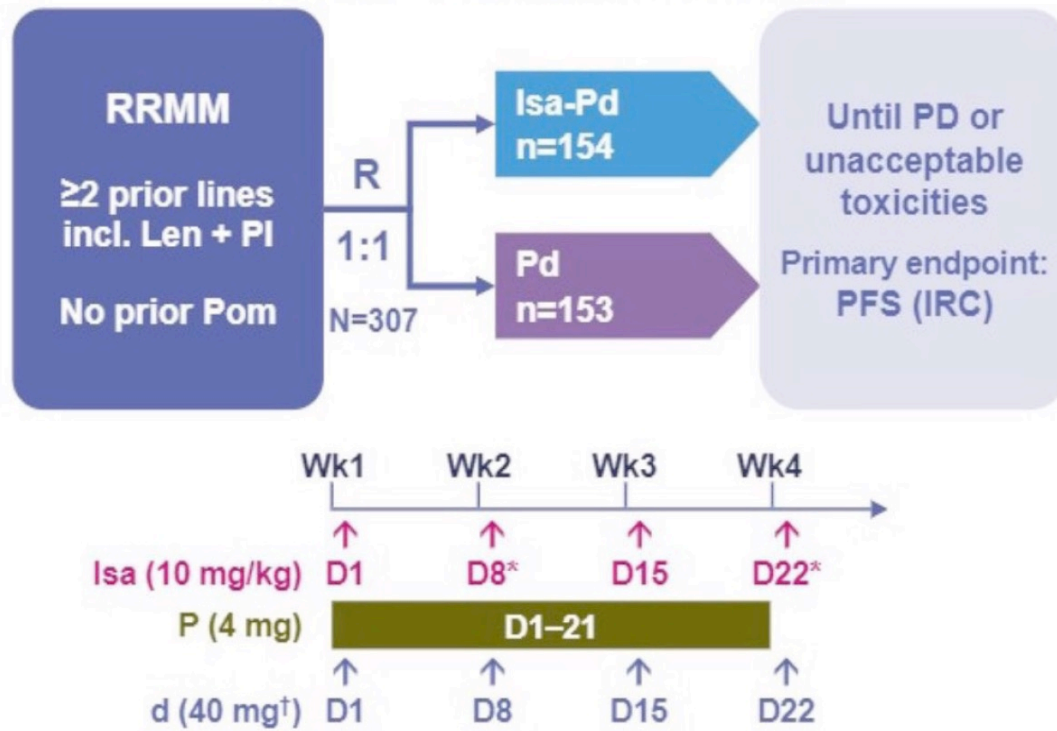


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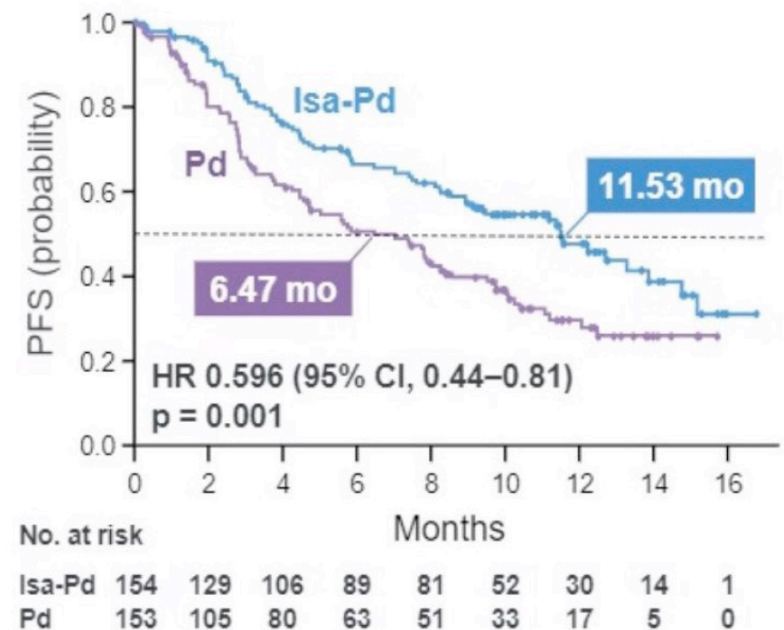
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# Overall study design and primary results

Study design (NCT02990338)<sup>1</sup>



PFS (IRC) in ITT population<sup>2,†</sup>



## Global phase 3 ICARIA-MM study: Isa-Pd significantly improved PFS vs Pd alone

<sup>†</sup>Cycle 1 only; <sup>‡</sup>20 mg in patients aged ≥75 years; <sup>§</sup>Median follow-up duration 11.6 mo  
 d, dexamethasone; D, day; HR, hazard ratio; IRC, independent review committee; Isa, isatuximab; ITT, intent-to-treat;  
 Len, lenalidomide; mo, months; (P/Pom), pomalidomide; PD, progressive disease; PFS, progression-free survival;  
 PI, proteasome inhibitor; R, randomization; RRMM, relapsed/refractory multiple myeloma; Wk, week



# High-risk cytogenetic subgroup analysis

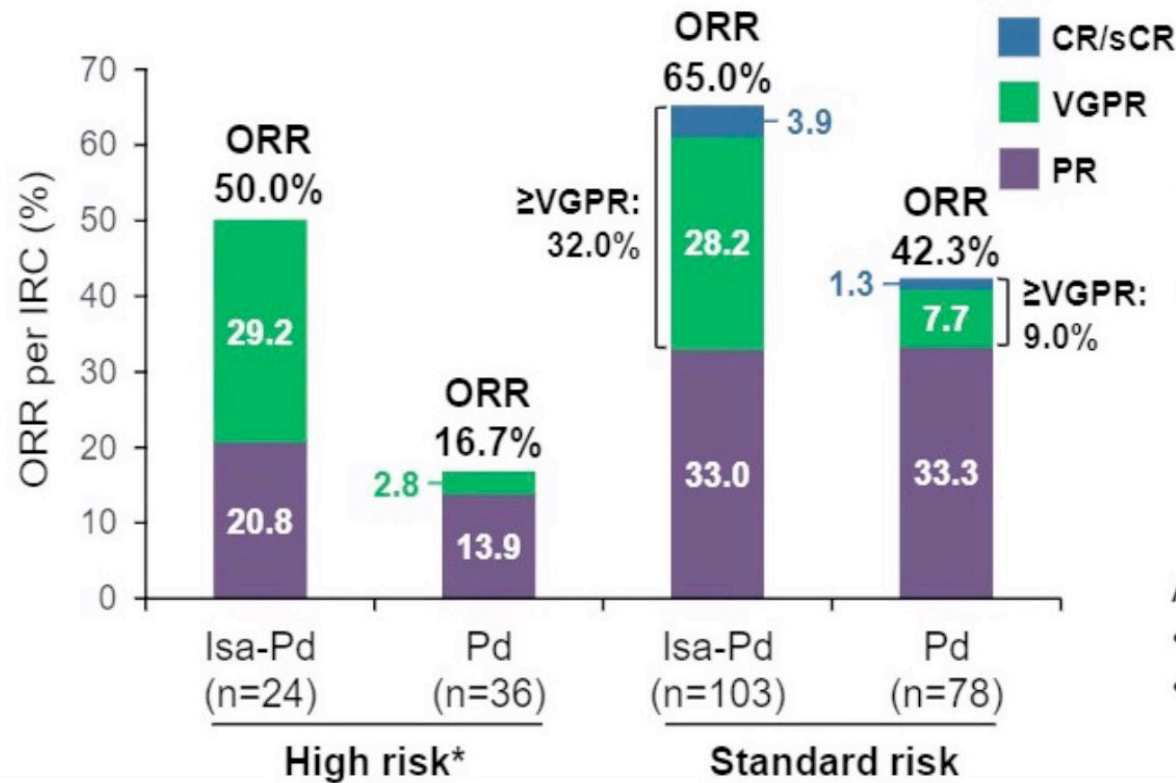
High-risk cytogenetics was prespecified as  $\geq 1$  of:

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- 
- 

Cytogenetic risk in the ITT population at baseline, n (%)	Isa-Pd (n=154)	Pd (n=153)
Standard	103 (66.9)	78 (51.0)
High	24 (15.6)	36 (23.5)
del(17p)	14 (9.1)	23 (15.0)
t(4;14)	12 (7.8)	14 (9.2)
t(14;16)	1 (0.6)	4 (2.6)
del(17p) and t(4;14)	3 (1.9)	4 (2.6)
del(17p) and t(14;16)	0	1 (0.7)
Unknown / missing	27 (17.5)	39 (25.5)

**Cytogenetic testing was performed by central laboratory**

# Response in cytogenetic subgroups



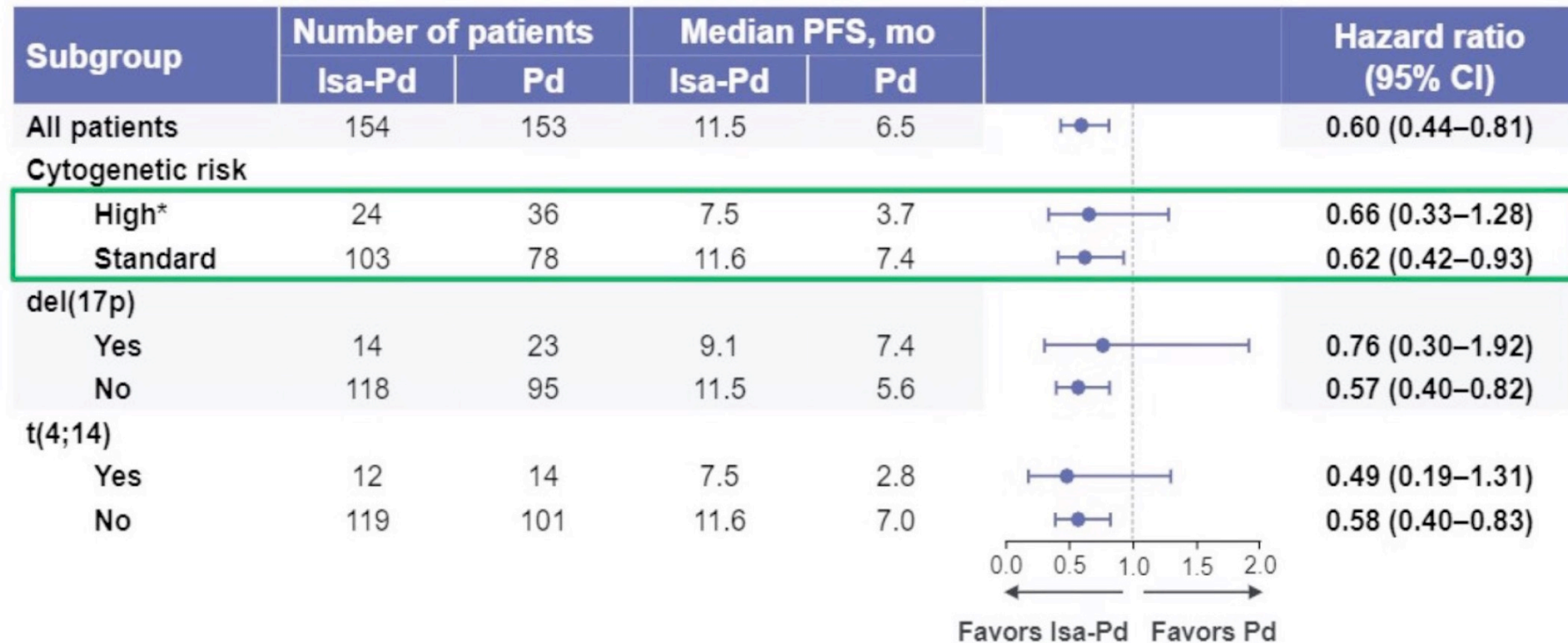
Isa-Pd vs Pd odds ratio (95% CI)	High risk	Standard risk
ORR	5.00 (1.33–19.79)	2.54 (1.33–4.86)
≥VGPR	14.41 (1.57–667.48)	4.78 (1.90–13.57)

- Among patients with del(17p) and t(4;14)
- Isa-Pd (n=3), 1 VGPR
  - Pd (n=4), 1 PR

**ORR benefit with Isa-Pd vs Pd was maintained among patients with high-risk cytogenetics**

\*≥1 of del(17p), t(4;14) or t(14;16) at study entry  
 CI, confidence interval; CR, complete response; d, dexamethasone; IRC, independent review committee; Isa, isatuximab;  
 ORR, overall response rate; P, pomalidomide; PR, partial response; sCR, stringent complete response; VGPR, very good partial response

# PFS in cytogenetic subgroups



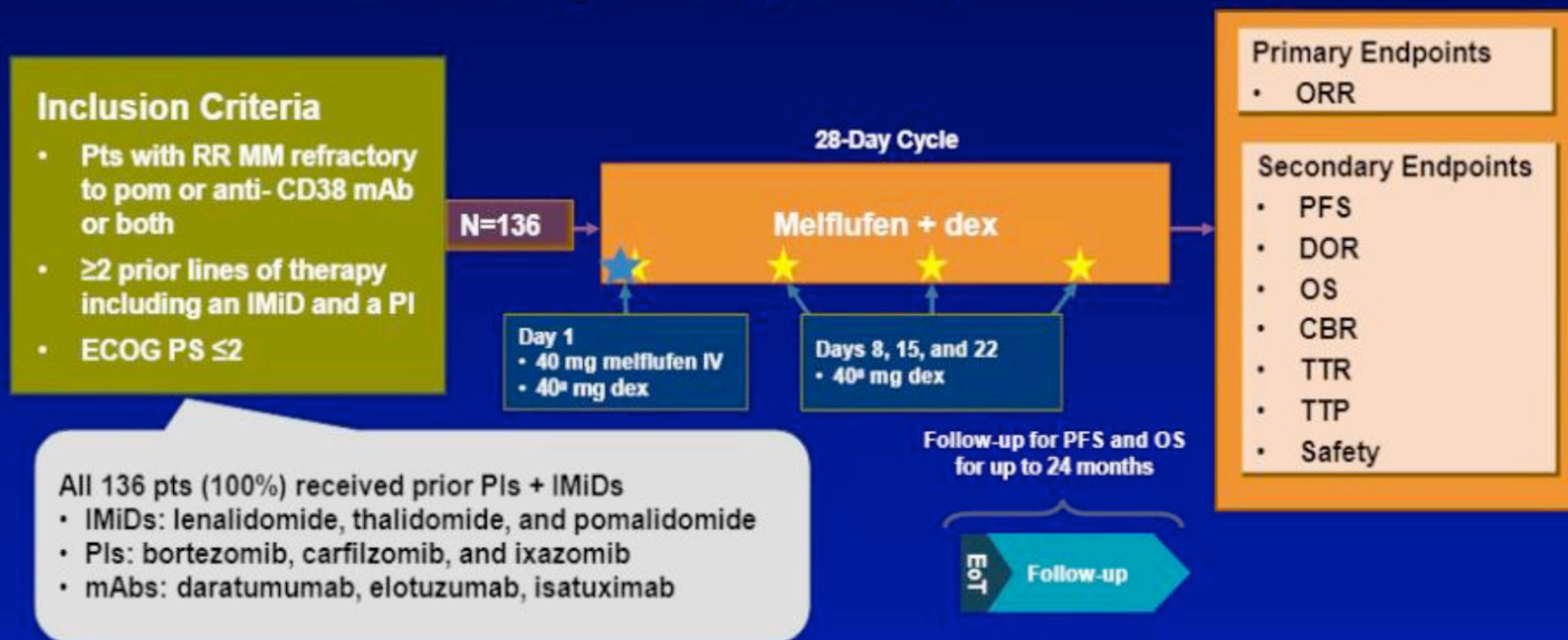
**PFS benefit observed in both high- and standard-risk patients with Isa-Pd vs Pd**

\*≥1 of del(17p), t(4;14) or t(14;16) at study entry  
 CI, confidence interval; d, dexamethasone; Isa, isatuximab;  
 mo, months; P, pomalidomide; PFS, progression-free survival



# HORIZON: Study Design

## Phase 2, Single-Arm, Open-Label, Multicenter Study



ClinicalTrials.gov Identified: NCT02963493.

CBR, clinical benefit rate; dara, daratumumab; dex, dexamethasone; DOR, duration of response; ECOG PS, Eastern Cooperative Oncology Group performance status; EoT, end of treatment; IMiD, immunomodulatory agent; IV, intravenous; mAbs, monoclonal antibodies; ORR, overall response rate; OS, overall survival; PFS, progression-free survival; PI, proteasome inhibitor; pom, pomalidomide; pts, patients; RR MM, relapsed/refractory multiple myeloma; TTP, time to progression; TTR, time to response.

\*Pts aged >75 years received dex 20 mg.



# Baseline Characteristics and Prior Therapy

<b>Patient Characteristics (n=130)</b>	<b>Non-EMD (n=86)</b>	<b>EMD (n=44)</b>
Age, median (range), years	64 (35-86)	64 (43-82)
Time since diagnosis, median, years	6.6 (1.6-24.2)	5.5 (0.6-12.7)
No. of prior lines of therapy, median (range)	5 (2-10)	5 (3-12)
	<b>%</b>	<b>%</b>
Gender (male / female)	53 / 47	59 / 41
ISS stage I / II / III / unknown	42 / 29 / 23 / 6	43 / 23 / 27 / 7
ECOG PS 0 / 1 / 2 / unknown	27 / 58 / 13 / 2	18 / 64 / 16 / 2
<b>High-risk cytogenetics<sup>a</sup></b>	<b>57</b>	<b>52</b>
<b>≥2 high-risk abnormalities</b>	<b>25</b>	<b>10</b>
<b>Del(17p)</b>	<b>19</b>	<b>13</b>
<b>Double-class (IMiD+PI) exposed / refractory</b>	<b>100 / 90</b>	<b>100 / 93</b>
<b>Triple-class (IMiD+PI+anti-CD38) exposed / refractory</b>	<b>71 / 63</b>	<b>93 / 91<sup>b</sup></b>
<b>Anti-CD38 mAb exposed / refractory</b>	<b>72 / 72</b>	<b>93 / 93</b>
<b>Alkylator exposed / refractory</b>	<b>91 / 58</b>	<b>82 / 59</b>
<b>≥1 Prior ASCT</b>	<b>69</b>	<b>73</b>
<b>≥2 Prior ASCTs</b>	<b>13</b>	<b>14</b>
<b>Relapsed/progressed within 1 year of ASCT</b>	<b>17</b>	<b>23</b>
<b>Refractory in last line of therapy</b>	<b>95</b>	<b>100</b>

<sup>a</sup>High-risk cytogenetics [t(4;14), del(17/17p), t(14;16), t(14;20), nonhyperdiploidy, gain(1q) or karyotype del(13)] at study entry; data pending for 33 pts in the non-EMD group and 13 pts in the EMD group.

<sup>b</sup>Includes 2 PI-intolerant pts.

# EMD Characteristics

Bone-related or Soft Tissue EMD, n (%)	EMD Pts	CNS Involvement
Pts with EMD <sup>a</sup>	44 (100)	5 (11)
Soft tissue <sup>b</sup>	26 (59)	2 (5)
Bone-related <sup>c</sup>	18 (41)	3 (7)

CNS, central nervous system; EMD, extramedullary disease; Pt, patient.

<sup>a</sup>Majority of pts had multiple lesions at baseline.

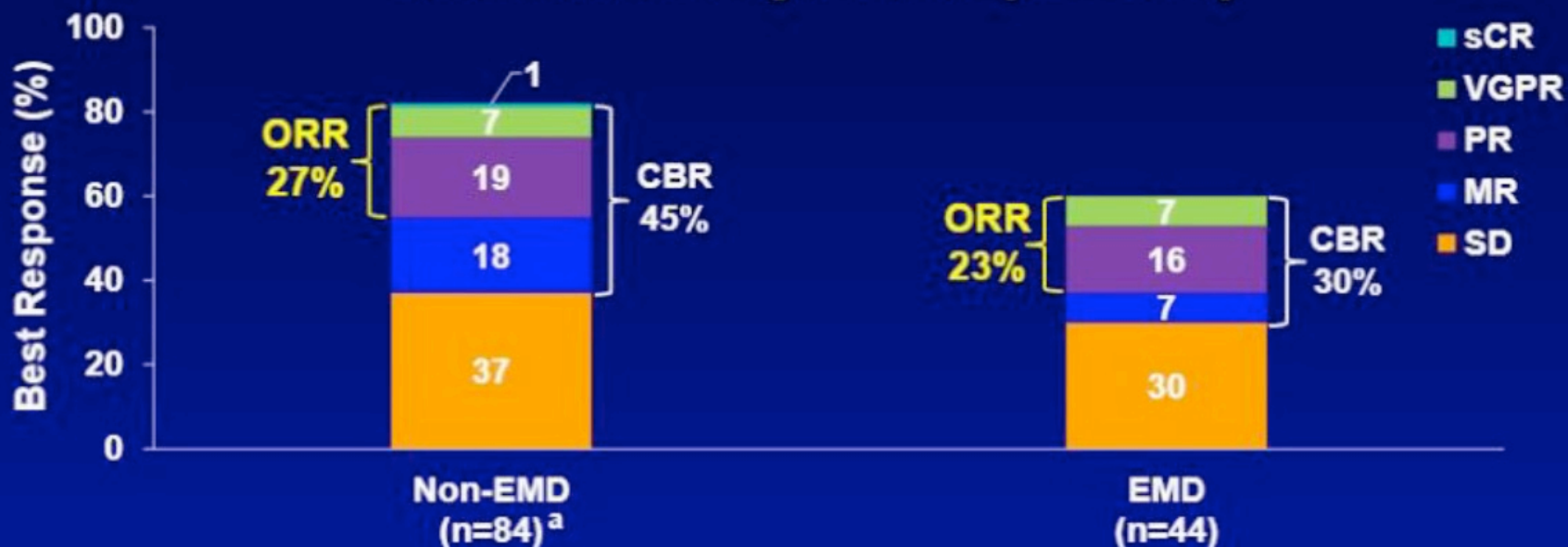
<sup>b</sup>Includes pts with both bone-related and soft tissue EMD.

<sup>c</sup>Three pts had bone-related EMD with extension into CNS.

- Method of baseline assessment for known or suspected EMD was by investigator choice including PET/CT, MRI and physical examination
- 59% of pts had soft-tissue EMD (with or without additional bone-related EMD) and 41% had bone-related EMD alone
- 5 pts (11%) had CNS involvement, of which 3 pts had bone-related EMD with extension into CNS
- Majority of pts (29 of 44) had multiple sites of EMD



## Overall Response (n=128)

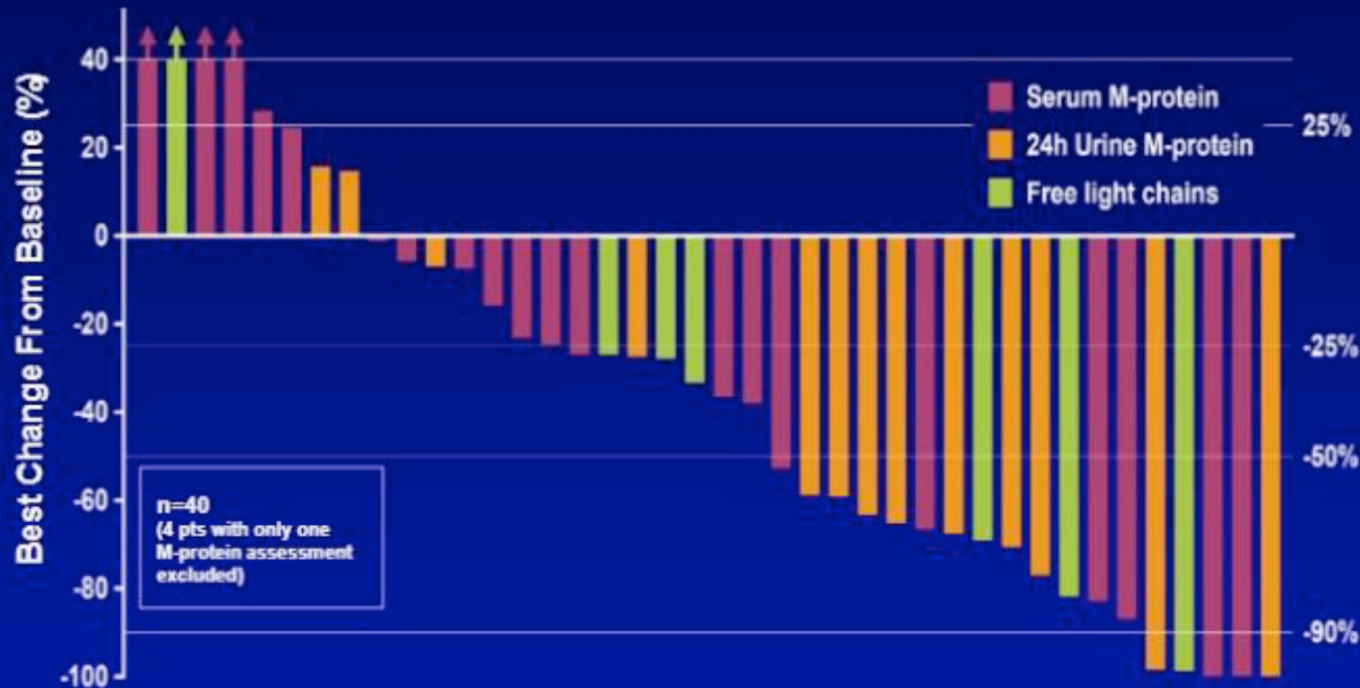


- Similar ORR in non-EMD and EMD pts, with an ORR of 27% and 23% respectively
  - Investigator-assessed response<sup>1</sup>
  - IRC review ongoing
- Median DOR for non-EMD pts 4.4 mos (95% CI, 3.5-11.2)
- Median DOR for EMD pts 3.4 mos (95% CI, 1.8-15.4)

<sup>a</sup> Two non-EMD pts with pending response information available at data cut off 30<sup>th</sup> July 2019.

1. Rajkumar SV, et al. *Blood*. 2011;117:4691-4695.

# Response in EMD Pts (n=44)

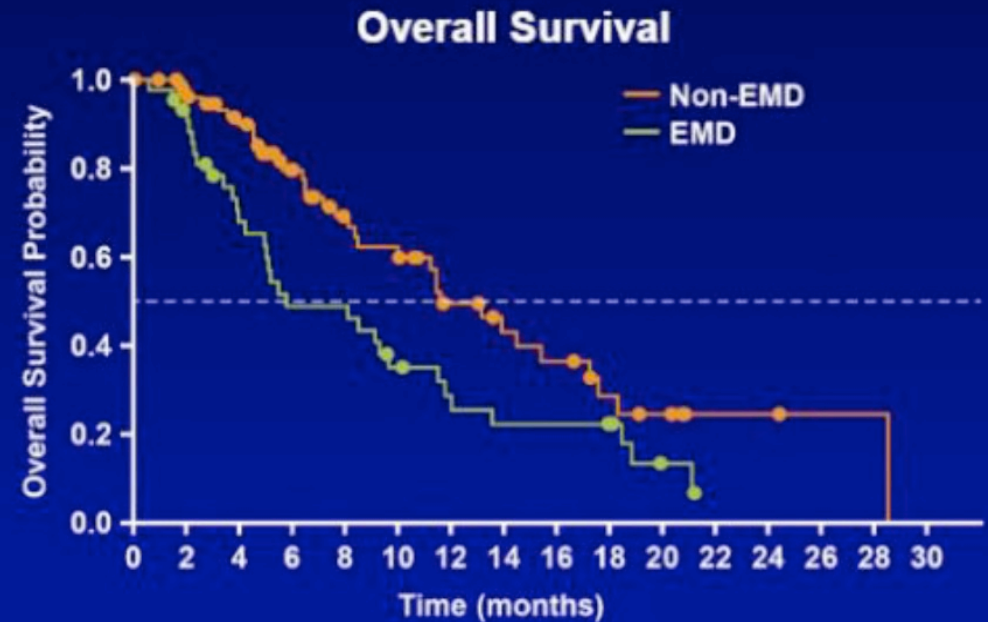
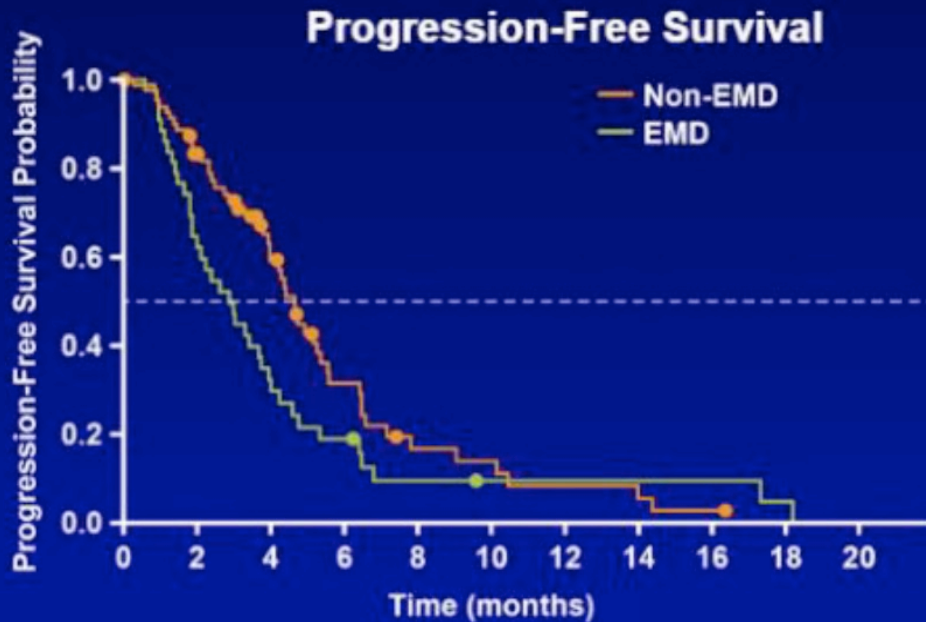


n=44	ORR
Soft tissue n=26	19%
Bone-related n=18	28%
CNS n=5	0%

- PET/CT (including TIMC), MRI, physical exam for EMD assessment
- “Flaring” observed in EMD PET/CT imaging (reported by 2 lead sites)



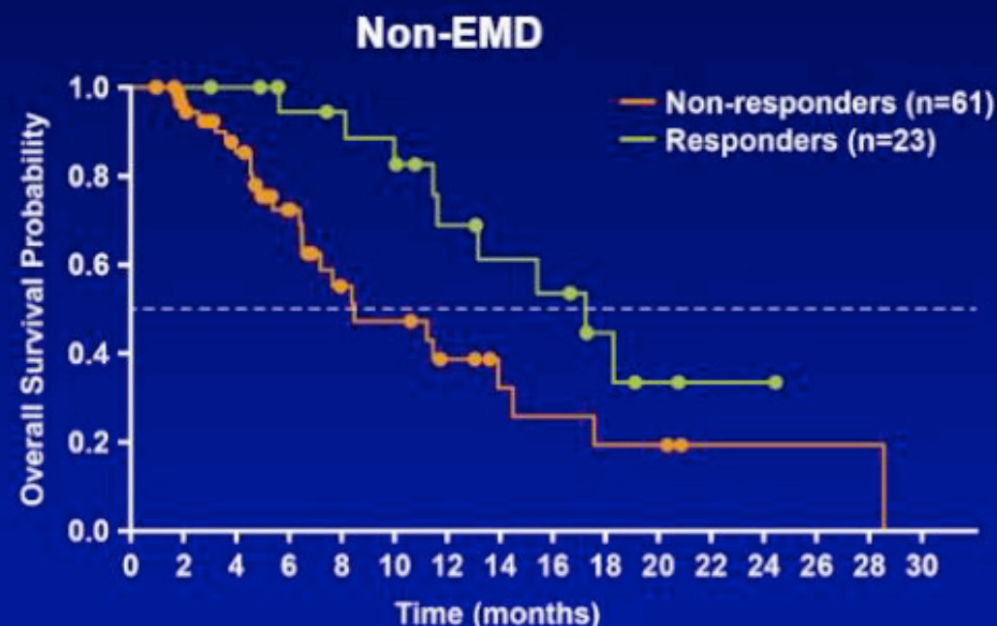
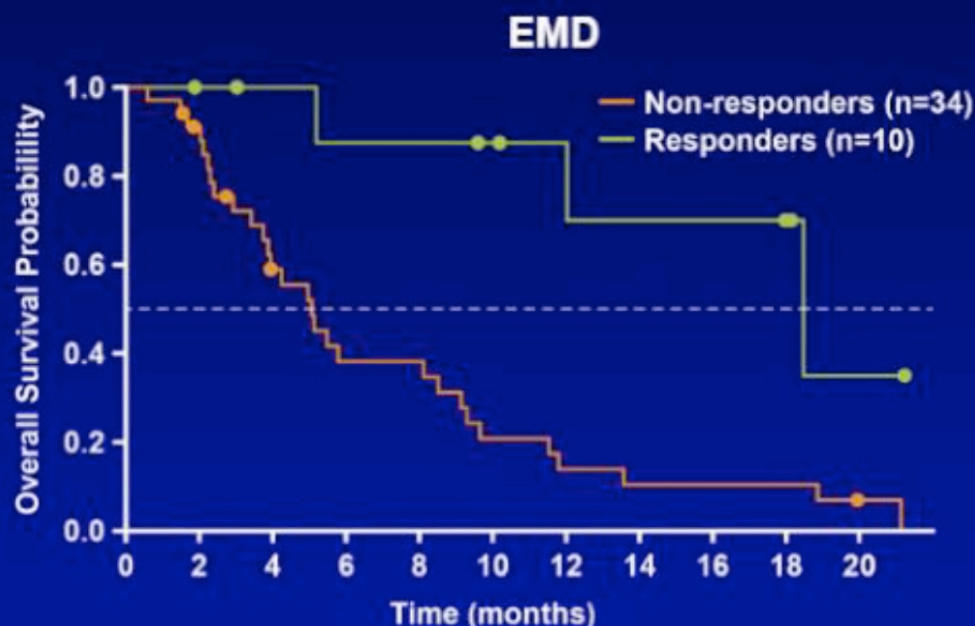
# Progression-Free and Overall Survival EMD vs Non-EMD Pts



- **Median PFS 2.9 mos (95% CI, 2.0-4.0) for pts with EMD vs. 4.6 mos (95% CI, 4.0-5.6) without EMD**

- **Median OS 5.8 mos (95% CI, 5.0-11.8) for pts with EMD vs. 11.6 mos (95% CI, 10.0-17.6) without EMD**

# OS in EMD and Non-EMD Pts Stratified by Response



- **Median OS in EMD responders vs. non-responders: 18.5 vs. 5.1 mos**
- **Median OS in Non-EMD responders vs. non-responders: 17.2 vs. 8.5 mos**
  - Similar trend for PFS in responders vs. non-responders: 4.8 vs. 2.2 mos in EMD pts; 6.4 vs. 3.8 mos in non-EMD pts
- **54% of ITT pts received subsequent therapy with no significant difference in outcome between EMD vs. non-EMD pts<sup>1</sup>**

Data cutoff 30 July 2019.

Richardson PG, et al

IMW 2019

#OAB-86

1. Gandhi UH, et al. *Blood*. 2018;132(suppl 1):Abstract 3233.

Richardson, IMW 2019 <sup>13</sup>



# Daratumumab Plus Bortezomib, Thalidomide, and Dexamethasone (D-VTd) in Transplant-eligible Newly Diagnosed Multiple Myeloma (NDMM): Subgroup Analysis of High-risk Patients in CASSIOPEIA\*

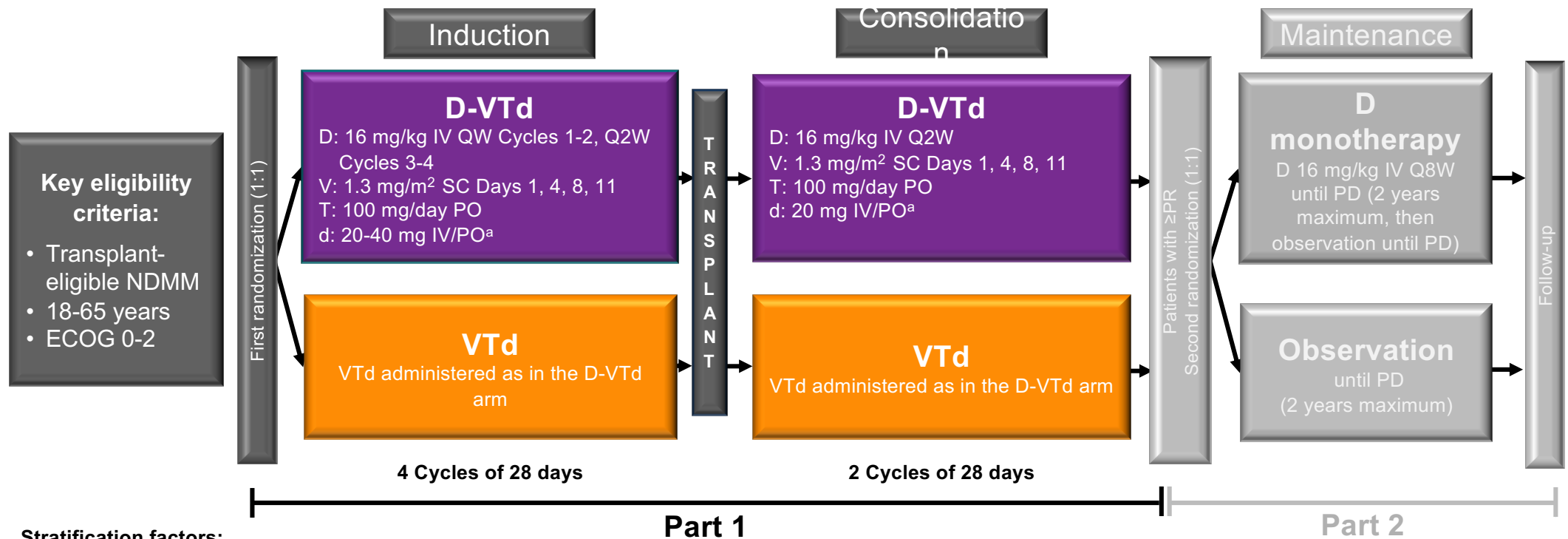
**Pieter Sonneveld**,<sup>1</sup> Michel Attal,<sup>2</sup> Aurore Perrot,<sup>3</sup> Cyrille Hulin,<sup>4</sup> Denis Caillot,<sup>5</sup> Thierry Facon,<sup>6</sup> Xavier Leleu,<sup>7</sup> Karim Belhadj,<sup>8</sup> Lionel Karlin,<sup>9</sup> Lotfi Benboubker,<sup>10</sup> Mark-David Levin,<sup>11</sup> Monique C. Minnema,<sup>12</sup> Matthijs Westerman,<sup>13</sup> Michel Delforge,<sup>14</sup> Sonja Zweegman,<sup>15</sup> Lixia Pei,<sup>16</sup> Carla de Boer,<sup>17</sup> Veronique Vanquickenberghe,<sup>18</sup> Tobias Kampfenkel,<sup>17</sup> Philippe Moreau<sup>19</sup>; on behalf of **IFM** and **HOVON**

<sup>1</sup>Erasmus MC Cancer Institute, Rotterdam, The Netherlands; <sup>2</sup>Institut Universitaire du Cancer de Toulouse-OncoPole, Toulouse, France; <sup>3</sup>Hematology Department, University Hospital, Vandoeuvre Les Nancy, France; <sup>4</sup>Department of Hematology, Hospital Haut Leveque, University Hospital Bordeaux, France; <sup>5</sup>CHU Dijon, Hôpital Du Bocage, Dijon, France; <sup>6</sup>University of Lille, CHU Lille, Service des Maladies du Sang, Lille, France; <sup>7</sup>CHU Poitiers – Hôpital la Milétrie, Poitiers, France; <sup>8</sup>Hematology, Hopital Henri Mondor, Creteil, France; <sup>9</sup>Centre Hospitalier Lyon-Sud Hematologie (HCL), Pierre – Benite Cedex, France; <sup>10</sup>CHU de Tours, Hôpital de Bretonneau, Tours, Cedex 9, France; <sup>11</sup>Albert Schweitzer Hospital, Dordrecht, The Netherlands; <sup>12</sup>Department of Hematology, UMC Utrecht Cancer Center, Utrecht, The Netherlands; <sup>13</sup>Northwest Clinics, Alkmaar, The Netherlands; <sup>14</sup>Universitaire Ziekenhuizen Leuven, Leuven, Belgium; <sup>15</sup>Amsterdam UMC, Vrije Universiteit Amsterdam, Department of Hematology, Amsterdam, The Netherlands; <sup>16</sup>Janssen Research & Development, LLC, Raritan, NJ, USA; <sup>17</sup>Janssen Research & Development, LLC, Leiden, The Netherlands; <sup>18</sup>Janssen Research & Development, Beerse, Belgium; <sup>19</sup>Hematology, University Hospital Hôtel-Dieu, Nantes, France.

Sonneveld, IMW 2019

# CASSIOPEIA Study Design

- Phase 3 study of D-VTd versus VTd in transplant-eligible NDMM (N = 1,085), 111 sites from 9/2015 to 8/2017



**Stratification factors:**

- Site affiliation (IFM or HOVON)
- ISS disease stage (I, II, or III)
- Cytogenetic risk status (high or standard/unknown risk)

Sonneveld, IMW 2019

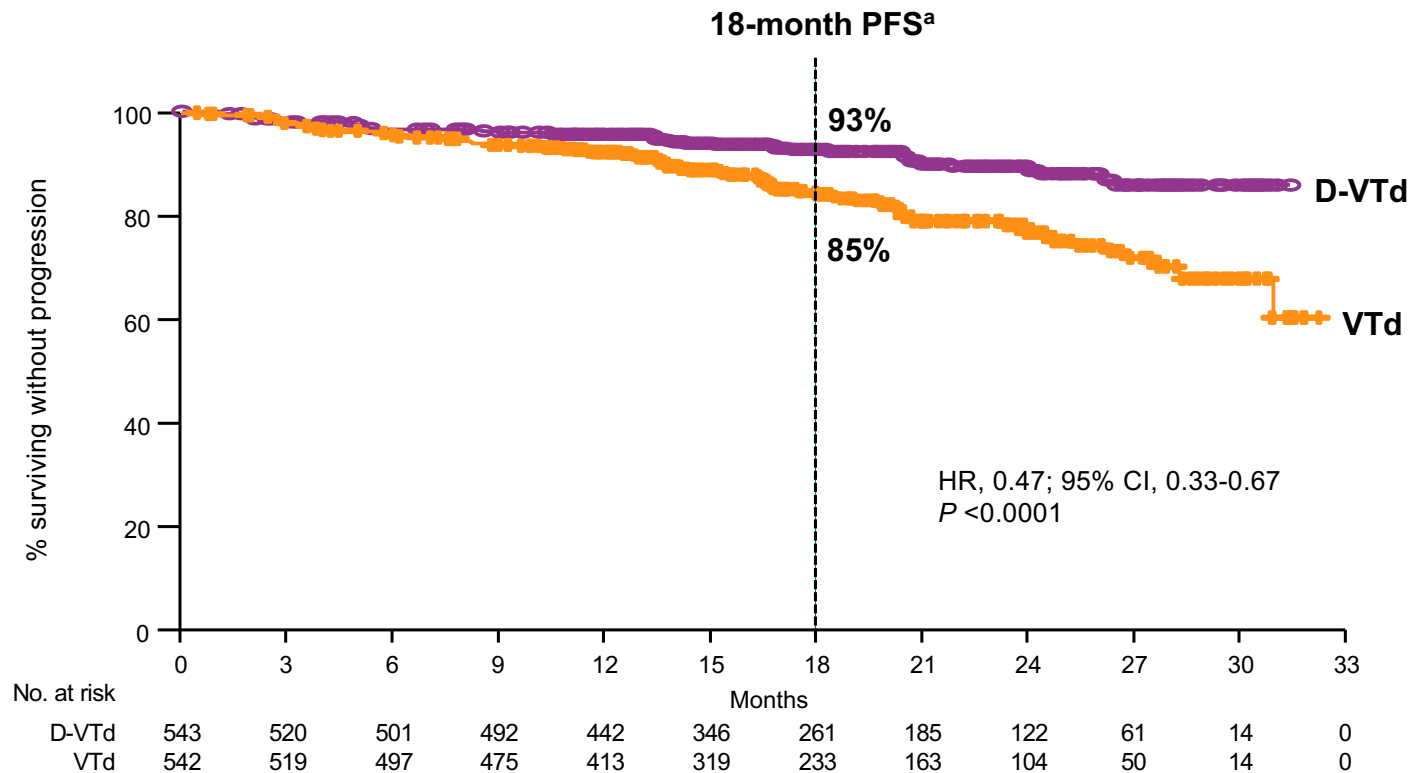
D-VTd, daratumumab/bortezomib/thalidomide/dexamethasone; VTd, bortezomib/thalidomide/dexamethasone; NDMM, newly diagnosed multiple myeloma; ECOG, Eastern Cooperative Oncology Group; IV, intravenous; QW, weekly; Q2W, every 2 weeks; SC, subcutaneous; PO, oral; PR, partial response; Q8W, every 8 weeks; PD, progressive disease; IFM, The Intergroupe Francophone du Myélome; HOVON, Dutch-Belgian Cooperative Trial Group for Hematology Oncology; ISS, International staging system.

<sup>a</sup>Dexamethasone 40 mg on Days 1, 2, 8, 9, 15, 16, 22, 23 of Cycles 1-2 and Days 1 & 2 of Cycles 3-4; 20 mg on Days 8, 9, 15, 16 of Cycles 3-4; 20 mg on Days 1, 2, 8, 9, 15, 16 of Cycles 5-6.



# Efficacy Results: ITT Population

- Median (range) follow-up: 18.8 (0.0-32.2) months



**53% reduction in the risk of progression or death with D-VTd**

ITT, intent-to-treat; ORR, overall response rate; VGPR, very good partial response; HR, hazard ratio; CI, confidence interval.  
<sup>a</sup>Kaplan-Meier estimate.

## Baseline Demographic and Clinical Characteristics (ITT)

	D-VTd (n = 543)	VTd (n = 542)
Age		
Median (range), yrs	59 (22-65)	58 (26-65)
Male, n (%)	316 (58)	319 (59)
ECOG status, <sup>a</sup> n (%)		
0	265 (49)	257 (47)
1	225 (41)	230 (42)
2	53 (10)	55 (10)
Type of measurable disease, <sup>b</sup> n (%)		
IgG	331 (61)	314 (58)
IgA	80 (15)	99 (18)

	D-VTd (n = 543)	VTd (n = 542)
ISS stage, <sup>c</sup> n (%)		
I	204 (38)	228 (42)
II	255 (47)	233 (43)
III	84 (16)	81 (15)
Cytogenetic profile <sup>d</sup>		
N	542	540
Standard risk, n (%)	460 (85)	454 (84)
High risk (del17p or t[4;14]), n (%)	82 (15)	86 (16)

**Treatment arms were well balanced**

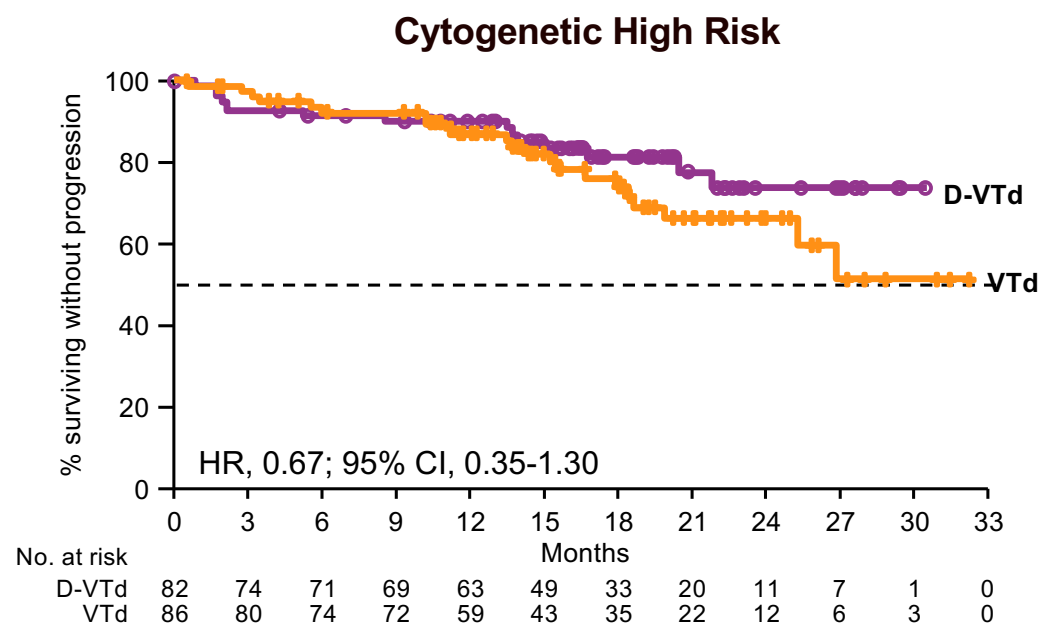
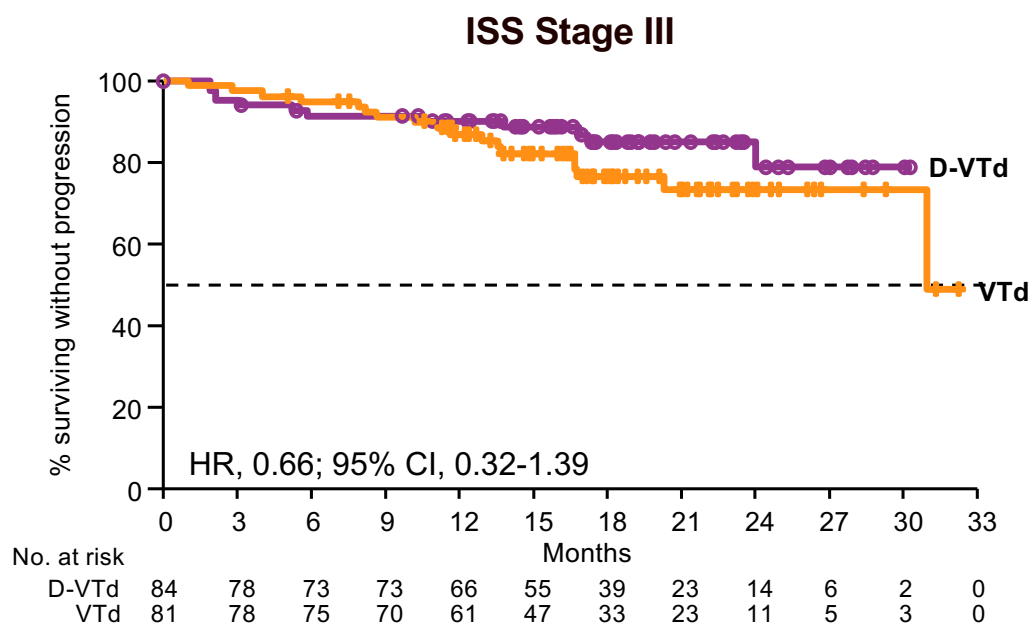
<sup>a</sup>ECOG performance status is scored on a scale from 0 to 5, with 0 indicating no symptoms and higher scores indicating increasing disability. <sup>b</sup>Includes patients without measurable disease in serum and urine.

<sup>c</sup>Based on the combination of serum  $\beta_2$ -microglobulin and albumin. <sup>d</sup>Based on fluorescence in situ hybridization; high risk was defined as the presence of del17p or t(4;14), as centrally confirmed during screening. Note: Percentages may not add to 100% due to rounding.

Sonneveld, IMW 2019

# PFS in High-risk Subgroups

- Median (range) follow-up: 18.8 (0.0-32.2) months

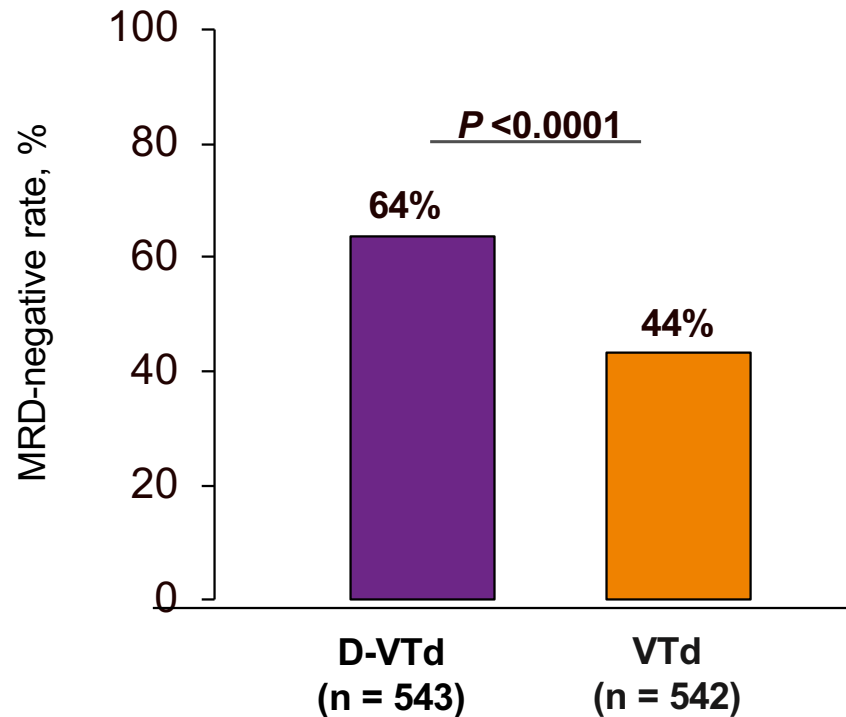


**D-VTd reduced the risk of progression or death in high-risk subgroups**



# Post-consolidation MRD (Flow Cytometry; $10^{-5}$ )

Regardless of Response

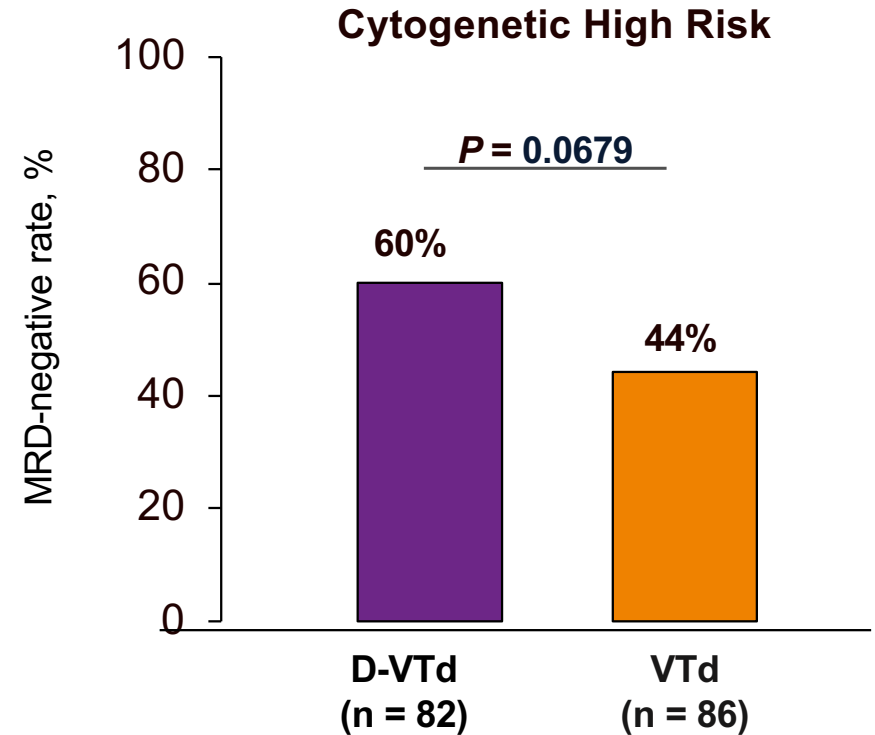
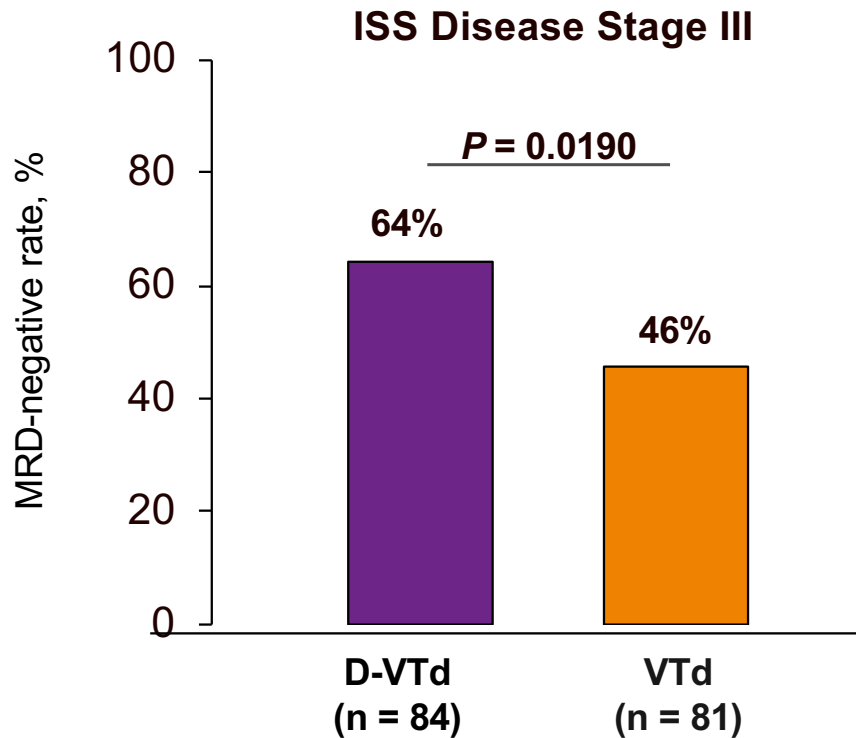


**Higher proportions of patients achieved MRD negativity with D-VTd**

MRD analyses were performed on bone marrow aspirates post-consolidation.

Additional MRD results will be presented immediately following this presentation at the Main Plenary Session: Avet-Loiseau H, et al. IMW 2019. Oral presentation OAB-004.

# Post-consolidation MRD in High-risk Subgroups (Flow Cytometry; $10^{-5}$ )



**MRD-negativity rates were superior with D-VTd in patients with high-risk cytogenetics and ISS stage III disease**

# Can we abrogate High-Risk MM by making the right treatment choices?

- Choice of drugs and schedule
- Continuous treatment
- Maintenance treatment
- MRD guided treatment
- Allo-SCT - Immune therapies



# Strategies to overcome HR disease

## Evidence based

- Single HDM/ASCT = standard; Double HDM/ASCT for patients with HR-FISH/R-ISS3 (Cavo et al., ASH 2018)
- Quadruple regimens including PI, IMiD, MoAb for induction (Moreau et al., Lancet 2019)
- Tandem auto-allo for HR-FISH (Knop et al., Leukemia 2019)
- The impact must be achieved during initial treatment before RRMM

# Potential strategies to overcome HR disease

## Hypothesis based

- Continuous treatment with alternating regimens/schedules
- Change of regimen if no CR/sCR or MRD negativity
  - At the end of induction (TE-MM + TNE-MM)
  - Upgrade to experimental therapy (immune) if response suboptimal

# Relevant facts for clinical practice and drug choices in patients with High-Risk FISH

## Proteasome inhibitors

- Improve PFS/OS for t(4;14)
- Carfilzomib may improve PFS for del17p
- May be less effective for t(14;16) (ISS3)

## Immunomodulatory drugs

- Thal/Len/Pom do not improve PFS/OS for t(4;14)
- Pom may abrogate del17p for PFS/OS (RRMM)

## High Dose Melphalan/ASCT

- Mel200 superior with RVd induction/consolidation
- Tandem may abrogate t(4;14) along with PI based induction/maintenance
- Tandem may help in del17p, however TP53 status is important



# Relevant facts for clinical practice and drug choices in patients with High-Risk FISH

## Antibodies

- Improve PFS (and OS), MRD in SR and HR
- Daratumumab improves outcome across subgroups, offers a better prognosis for HR

## Targeted therapy

- Venetoclax for t(11;14), bcl-2/XL, MCL-1
- MYC, MAPK etc too early, Selinexor

## Immune therapy

- Checkpoint inhibitors poor balance between efficacy and safety
- CAR-T cell and other BCMA directed treatment
- Bites under investigation

# Conclusions

Trial record **2 of 73** for: car-t | Myeloma Multiple

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## Up-front CART-BCMA With or Without huCART19 in High-risk Multiple Myeloma



The safety and scientific validity of this study is the responsibility of the study sponsor and investigators. Listing a study does not mean it has been evaluated by the U.S. Federal Government. [Know the risks and potential benefits](#) of clinical studies and talk to your health care provider before participating. Read our [disclaimer](#) for details.

ClinicalTrials.gov Identifier: NCT03549442

[Recruitment Status ⓘ](#) : Recruiting

[First Posted ⓘ](#) : June 8, 2018

[Last Update Posted ⓘ](#) : April 18, 2019

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