

Highlights from IMW 2021

1-2 febbraio 2022
Bologna
Royal Hotel Carlton

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**Terapia di prima linea del
paziente candidato ad ASCT:
induzione e consolidamento**

Coordinatore Scientifico
Michele CAVO

Comitato Scientifico
Michele CAVO
Maria Teresa PETRUCCI

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Onoraria from:

AbbVie, Amgen, BMS, Celgene, Janssen, GSK, Roche, Sanofi, Takeda

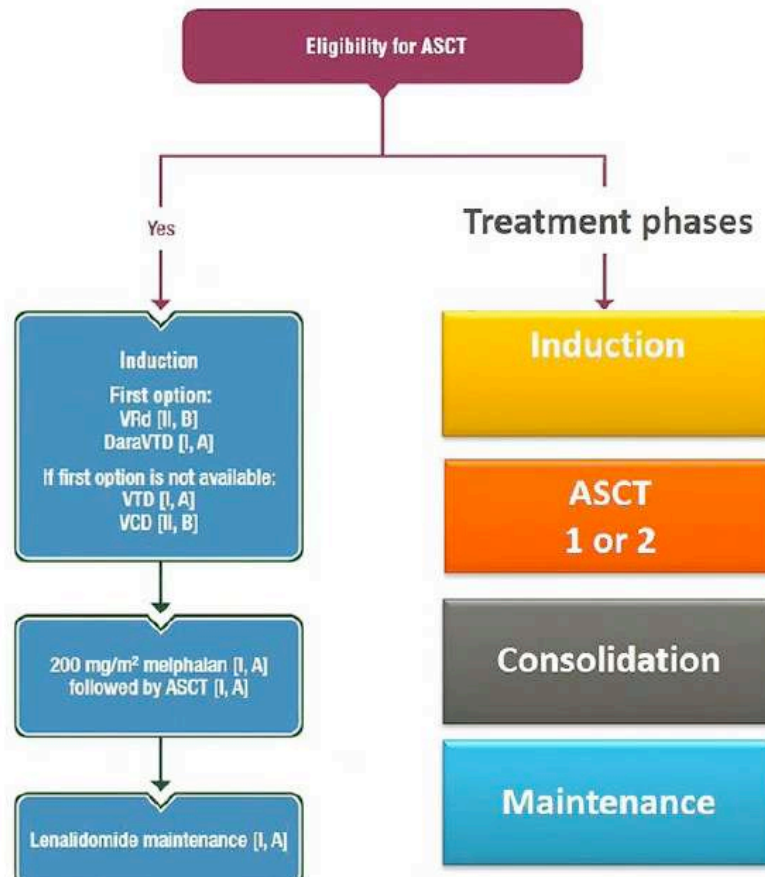
Advisory for:

Amgen, BMS, Celgene, Janssen, GSK, Roche, Sanofi, Takeda

Research funds: Sanofi



Evolving treatment paradigm for ASCT-eligible NDMM patients



Endpoints

- To maximize the rate of undetectable MRD
- To sustain MRD negativity
- To prolong PFS/OS, offering a chance of cure (to a fraction of patients)
- To inform clinical decisions and tailor treatment

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EARLY VS. LATE ASCT

Doctor, what about continuous optimised treatment with novel agents, with the goal of controlling the disease for as long as possible, and to reserve ASCT for relapse?



		Early	Late	P
Pooled analysis of two trials (n=529)^{1,2}	4-year PFS	44%	26%	p<0.001 (HR 0.53)
	4-year OS	84%	70%	p<0.001 (HR 0.51)
GIMEMA MM-RV-209... Rd-MPR vs. Rd-Mel200 (2nd rand: +/- maintenance) EMN MM-RV-441... Rd-CRD vs. Rd-Mel200 (2nd rand: R vs. RP Maint.)				
IFM-DFCI 2009 trial³	4-year PFS	47%	35%	p<0.001 (HR 0.69)
	8-year OS	62%	60%	p=NS
RVD x 8 + ASCT at relapse vs. RVD x 3 + ASCT (Mel200) + RVD x 2				
EMN02/HO95⁴	3-year PFS	65%	57%	p=0,001 (HR 0.73); High Risk 0.53
	3-year OS	86.3%	84.6%	p=NS
Induction VCD x 3-4 => VMP intensive vs ASCT => VRD conso vs. no conso => R maint				
FORTE trial ⁵	3-year PFS	78%	66%	p=0,02 (HR 0.64);
	3-year OS	NA	NA	p=NS
KRDx4 + ASCT vs KRDx4 + 4 KRD consol + Maintenance (Rvs KR). vs KCD+ASCT (FORTE trial)				

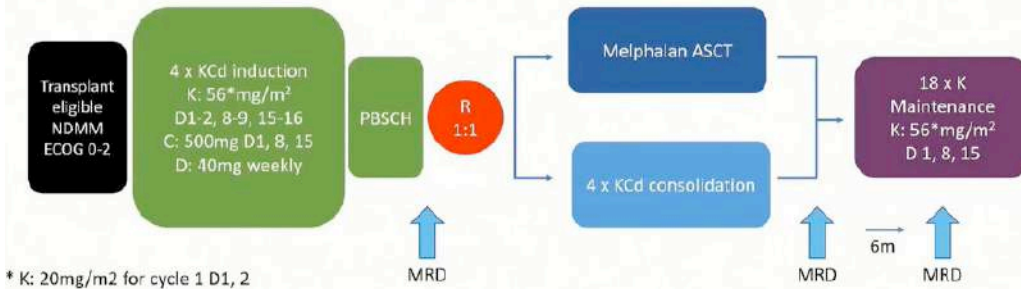
1. Ekemite A, et al. N Engl J Med 2014;371:895-905; 2. Gay F, et al. Lancet Oncol 2015;16(16):1617-29; 3. Attal M, et al. Blood 2015;126: Abstract 391. Presented at ASH 2015; 4. Cavaliere M, et al. Blood 2016;128: Abstract 673. Presented at ASH 2016, Oliva S. ASH 2020.

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CARDAMON

CARDAMON STUDY DESIGN

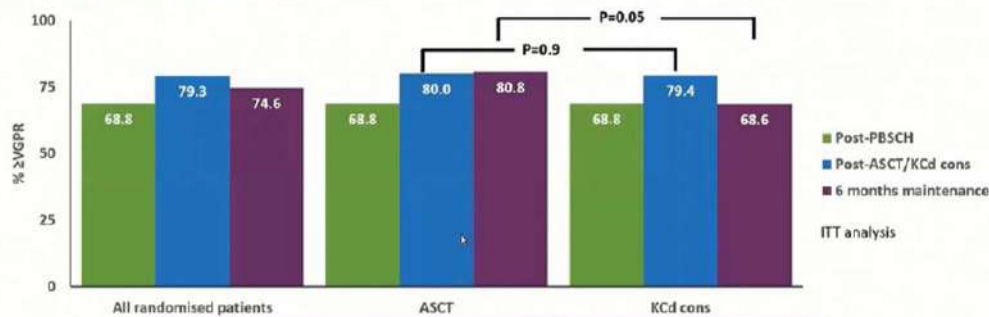
- Primary Endpoints:
- ≥VGPR pre-randomisation
 - PFS at 2 years



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RESPONSES FOLLOWING ASCT/ CONS AND MAINTENANCE

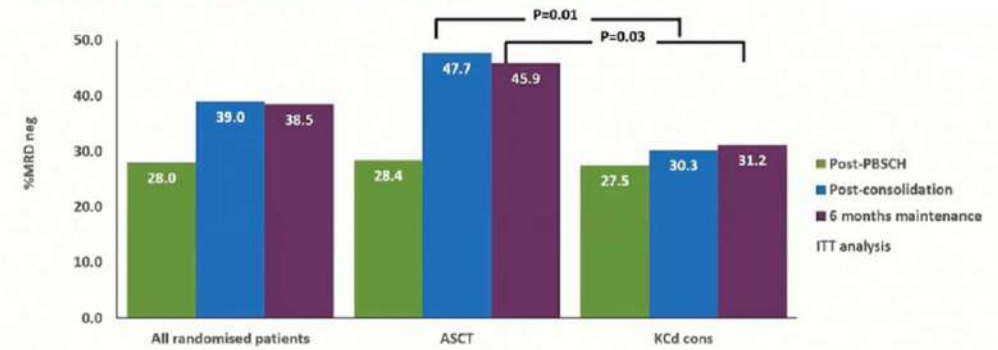


MAINTENANCE VS POST-ASCT/KCD CONS	ASCT N=89	KCD CONS N=91	P VALUE
Response improved	31 (34.8)	11 (12.1)	<0.001
Response remained the same	45 (50.6)	58 (63.7)	0.07
Response worsened	13 (14.6)	22 (24.2)	0.1

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CARDAMON

MRD NEGATIVE RATES BY ARM



MAINTENANCE VS POST-ASCT/KCD CONS	ASCT N=75	KCD CONS N=67	P VALUE
MRD neg improved	11 (14.7)	8 (11.9)	0.6
MRD neg remained the same	59 (78.7)	52 (77.6)	0.9
MRD neg worsened	5 (6.7)	7 (10.4)	0.4

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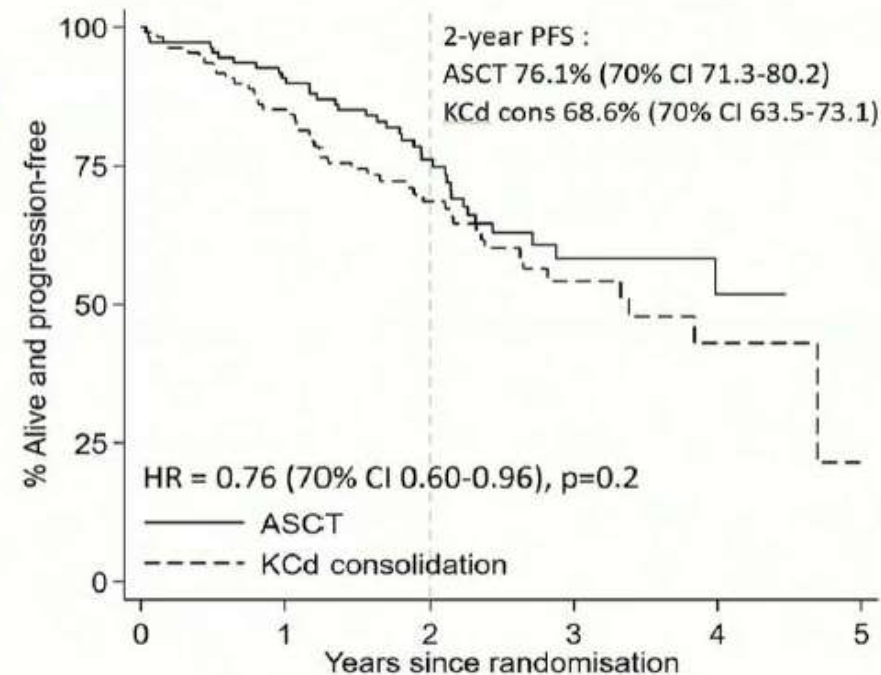
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UPDATED PROGRESSION FREE SURVIVAL BY RANDOMISATION ARM

Median follow-up from randomisation
32.1 months

**2-year PFS for KCd is not
non-inferior to ASCT**

The difference in 2-year PFS rate (KCd
cons vs ASCT) using the rate in the
experimental arm and the HR is
-6.5% (70% CI -11.1% to -1.0%)



In follow-up	ASCT	98	62	23	8	0
ASCT	109	98	62	23	8	0
KCd consolidation	109	90	54	20	6	0

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JAMA Oncology | Original Investigation

Safety and Effectiveness of Weekly Carfilzomib, Lenalidomide, Dexamethasone, and Daratumumab Combination Therapy for Patients With Newly Diagnosed Multiple Myeloma: The MANHATTAN Nonrandomized Clinical Trial

Ola Landgren, MD, PhD; Malin Hultcrantz, MD, PhD; Benjamin Diamond, MD; Alexander M. Lesokhin, MD; Sham Mailankody, MBBS; Hani Hassoun, MD; Carlyn Tan, MD; Urvi A Shah, MD; Sydney X. Lu, MD, PhD; Meghan Salcedo, RN; Kelly Werner, RN; Jenna Rispoli, RN; Julia Caple, RN; Allison Sams, NP; Dennis Verducci, NP; Katie Jones, NP; Isabel Concepcion, NP; Amanda Ciardello, MS; Aisara Chansakul, BS; Julia Schlossman, BA; Elizabet Tavitian, BS; Tala Shekarkhand, BS; Angela Harrison, MS; Casey Piacentini, BS; Even H. Rustad, MD, PhD; Venkata Yellapantula, PhD; Kylee MacLaughlan, MD, PhD; Francesco Maura, MD; Heather J. Landau, MD; Michael Scordo, MD; David J. Chung, MD, PhD; Gunjan Shah, MD; Oscar B. Lahoud, MD; Katie Thoren, PhD; Kazunori Murata, PhD; Lakshmi Ramanathan, PhD; Maria E. Arcila, MD; Caleb Ho, MD; Mikhail Roshal, MD, PhD; Ahmet Dogan, MD, PhD; Andriy Derkach, PhD; Sergio A. Giralt, MD; Neha Korde, MD

JAMA Oncol. doi:10.1001/jamaoncol.2021.0611
Published online April 15, 2021.

KRd-Dara without ASCT

Figure 1. Response to Therapy, by Number of Cycles and Follow-up

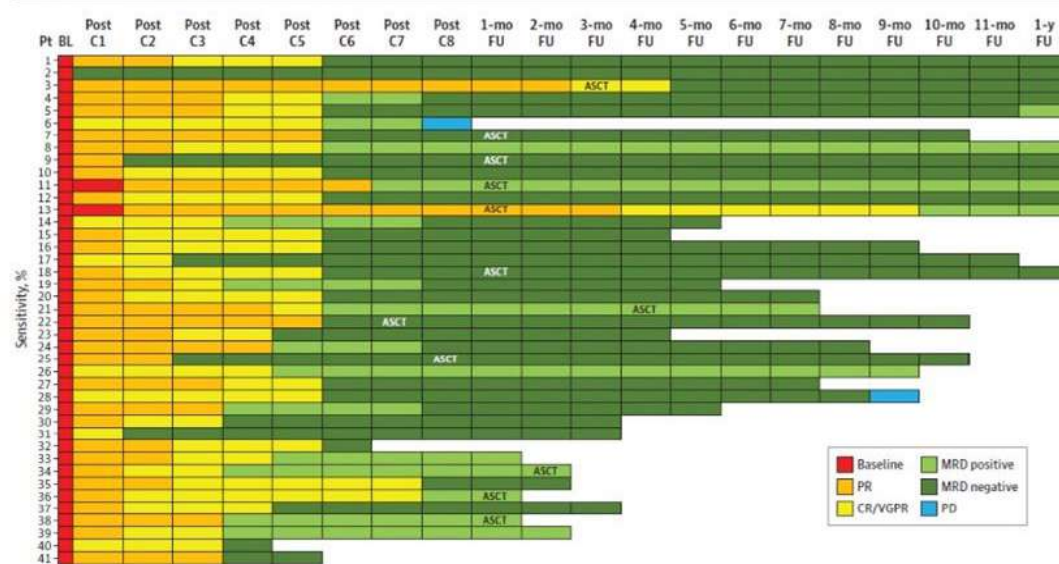
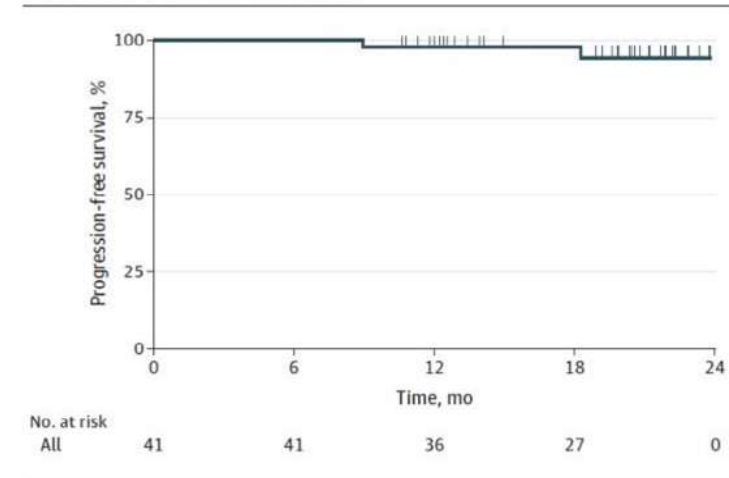


Figure 2. Progression-free Survival



CR: 95%; MRD-: 71%

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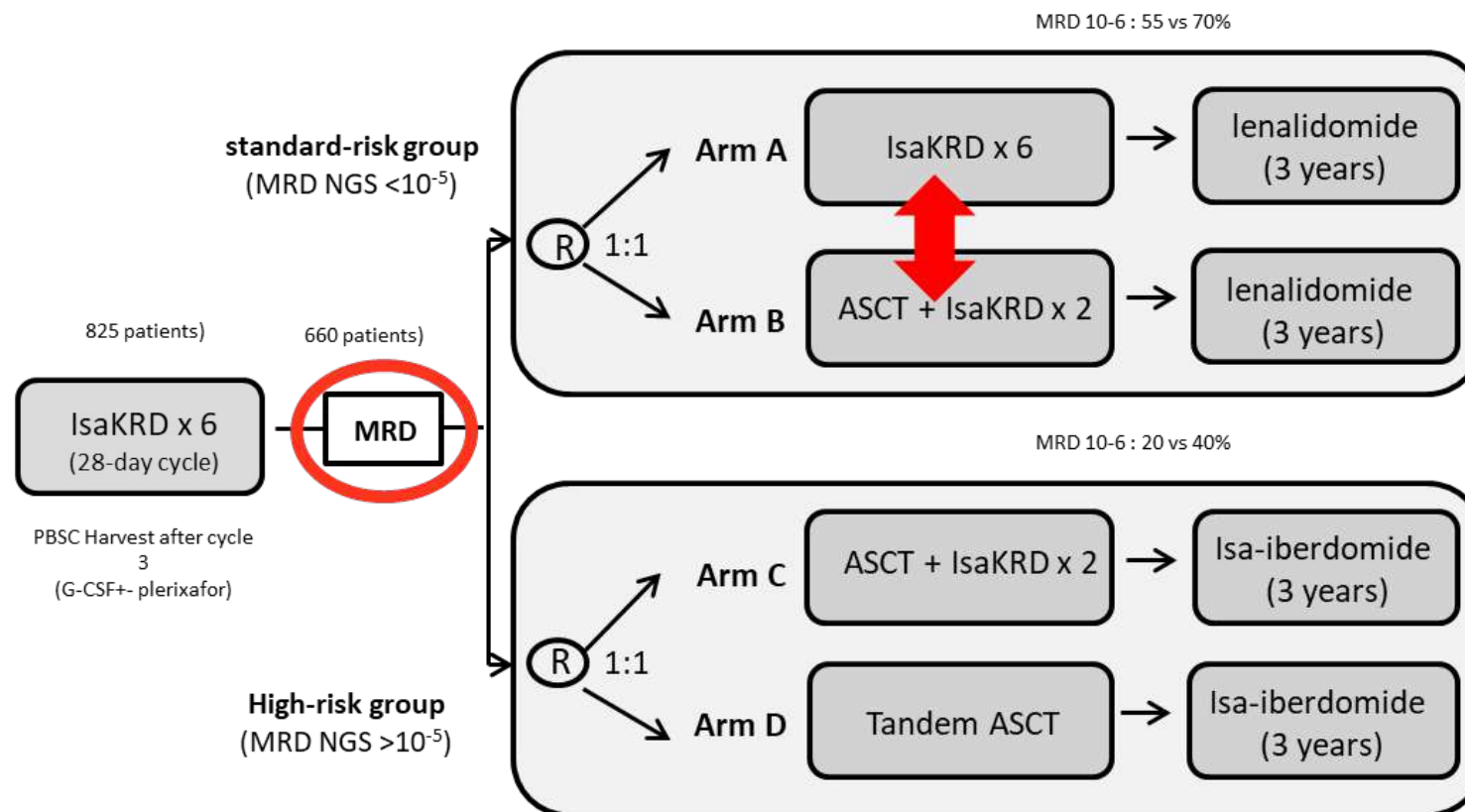
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MIDAS study : Minimal res Disease Adapted Strategy

Induction and PBSC harvest

Risk-adapted consolidation and maintenance





Which is the best induction therapy? VRd vs VTD

Figure 4. \geq VGPR and MRD-Negative Rates After Induction and ASCT in the GEM Studies^a

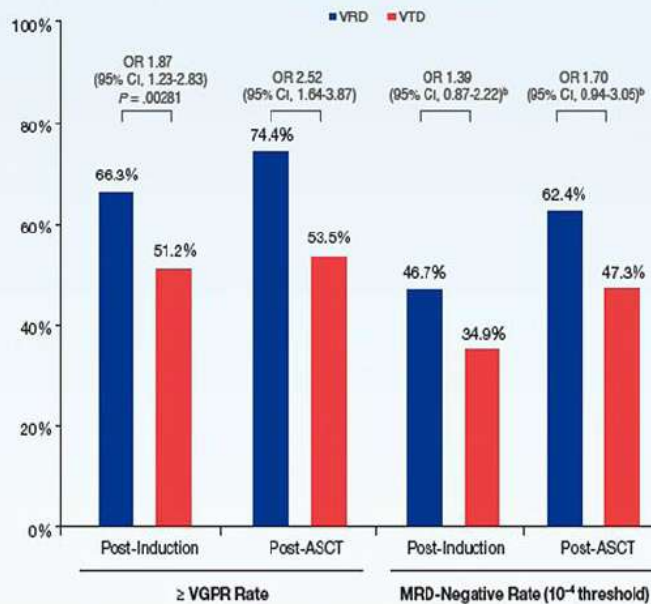
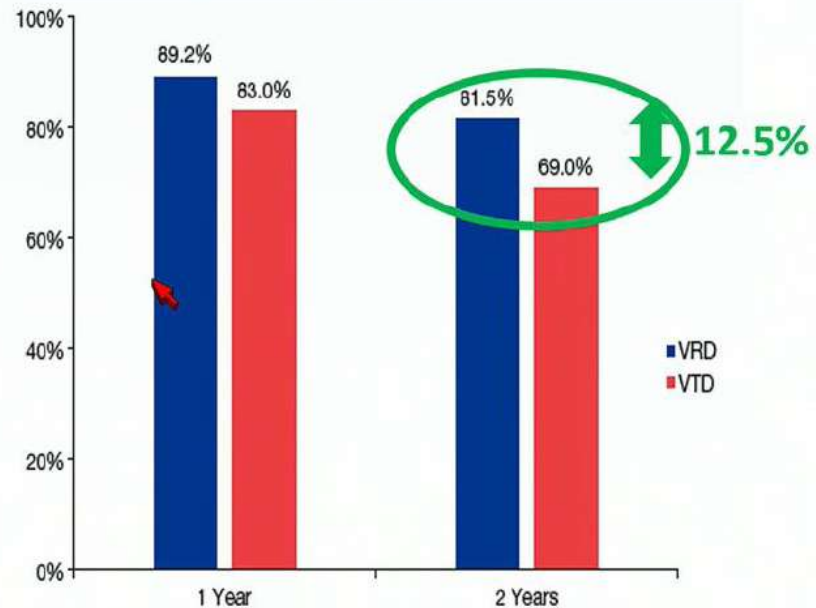


Figure 5. Event-Free PFS in the GEM Studies



Rosinol L et al. Blood. 2019 Oct 17; 134(16): 1337–1345.
Rosinol et al. EHA 2019

Table 3. Peripheral Neuropathy^a

	VRd GEM2012 (n = 458)	VTD GEM2005 (n = 130)
Grade \geq 2	95 (20.7)	58 (44.6)
Grade 3/4	25 (5.5)	20 (15.4)

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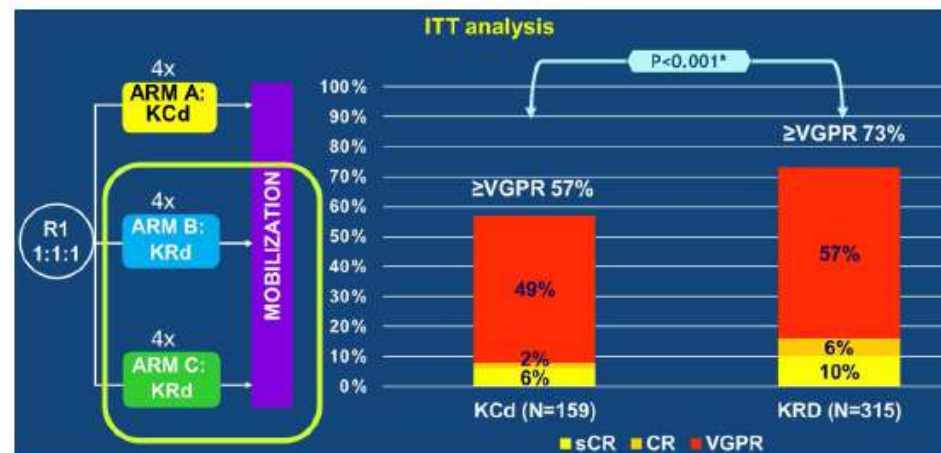
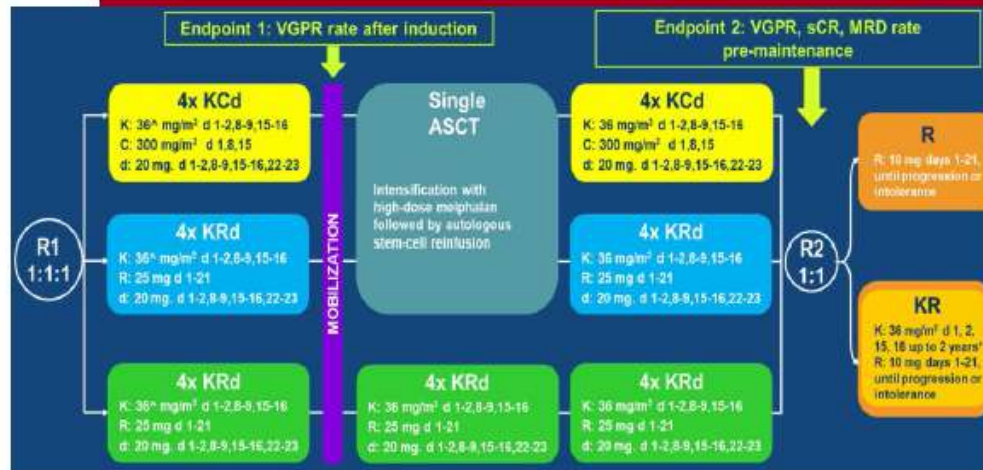
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INDUCTION phase: how to improve?

2nd generation PIs

FORTE ph.2 trial



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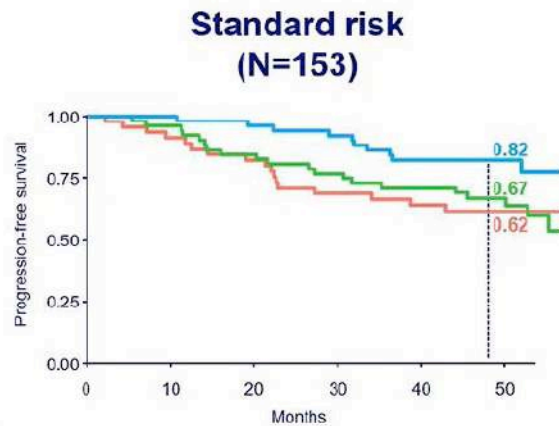


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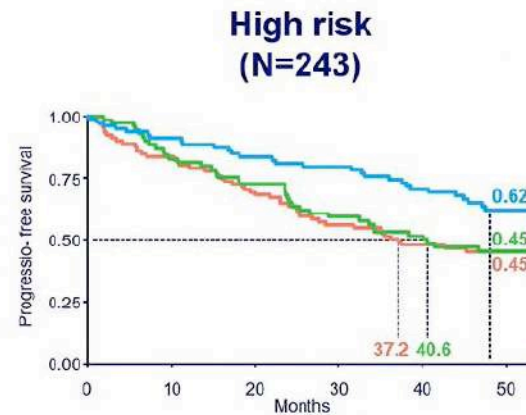
Progression-free survival: Random 1

KCd_ASCT vs. KRd_ASCT vs. KRd12

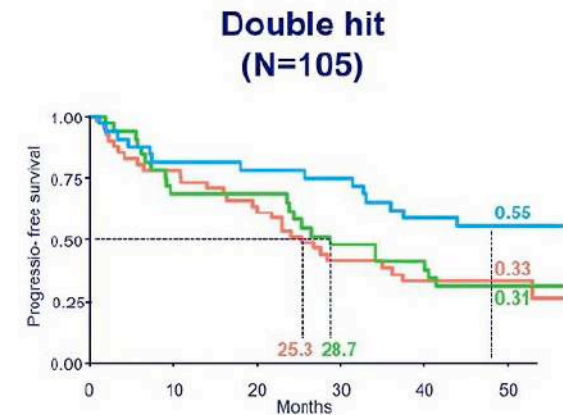
Median follow-up from Random 1: 51 months (IQR 46-55)



KRd_ASCT vs. KCd_ASCT: HR 0.43, p=0.035
KRd_ASCT vs. KRd12: HR 0.43, p=0.032
KRd12 vs. KCd_ASCT: HR 0.99, p=0.99



KRd_ASCT vs. KCd_ASCT: HR 0.57, p=0.015
KRd_ASCT vs. KRd12: HR 0.61, p=0.040
KRd12 vs. KCd_ASCT: HR 0.94, p=0.78

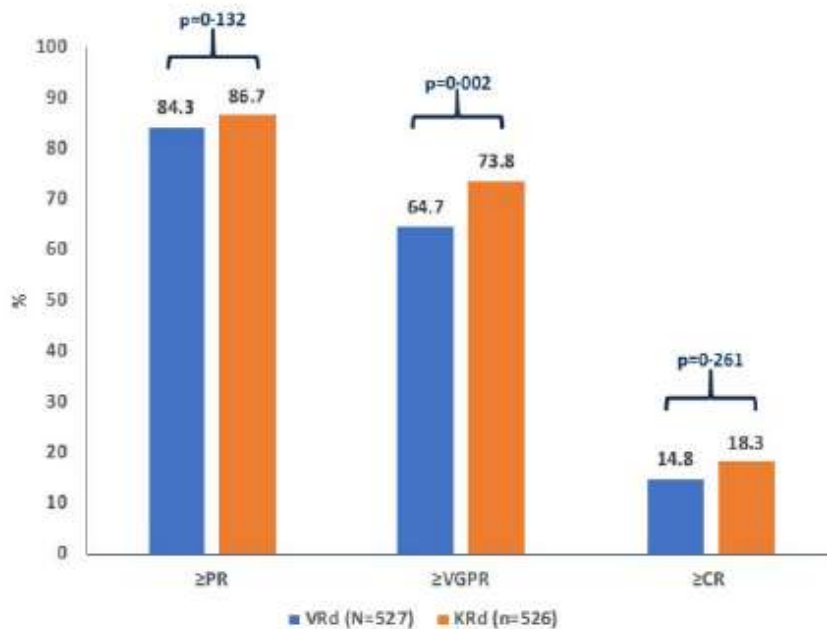


KRd_ASCT vs. KCd_ASCT: HR 0.46, p=0.024
KRd_ASCT vs. KRd12: HR 0.52, p=0.063
KRd12 vs. KCd_ASCT: HR 0.89, p=0.69

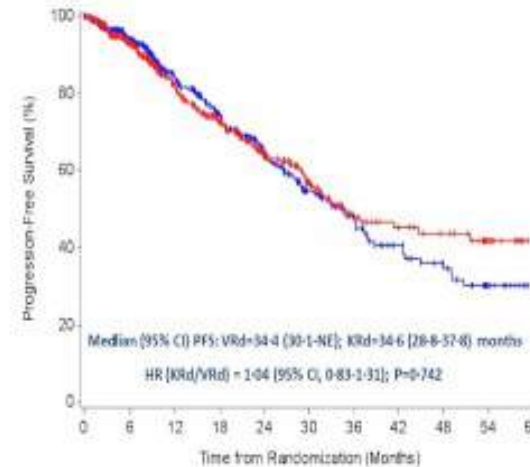
Random 1, first randomization (induction/consolidation treatment); ASCT, autologous stem-cell transplantation; K, carfilzomib; R, lenalidomide; C, cyclophosphamide; d, dexamethasone; KCd_ASCT, KCd induction-ASCT-KCd consolidation; KRd_ASCT, KRd induction-ASCT-KRd consolidation; KRd12, 12 cycles of KRd; HR, hazard ratio; CI, confidence interval; p, p-value; iQR, interquartile range.



VRD or KRd? The ENDURANCE phase III trial



Progression Free Survival from Induction Randomization

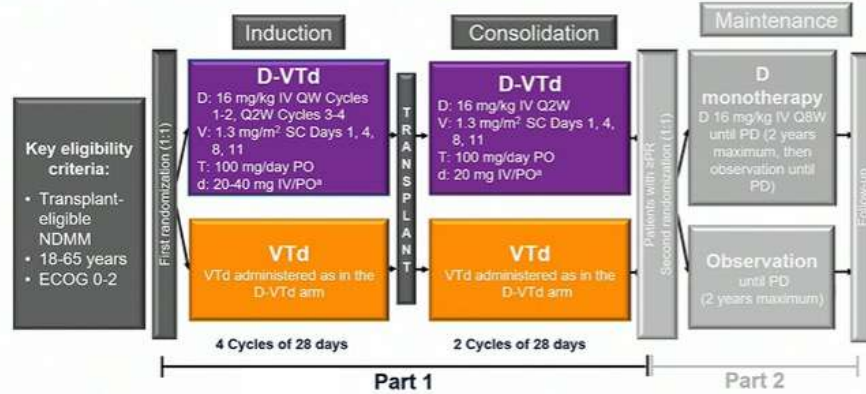


	0	6	12	18	24	30	36	42	48	54	60
KRd	545	401	252	167	127	83	59	38	25	13	3
VRd	542	377	243	163	114	73	43	31	26	14	0

- 2nd interim analysis of PFS (Jan 2020): 298 PFS events (75% of 399 planned)
- Median (95% CI) estimated follow up of 15 (13-18) months
- For patients ≥ 70 years, median PFS(95% CI) for VRd = 37 (29-NE) and KRd = 28 (24-36) months
- With censoring at SCT or alternative therapy: Median PFS (95% CI) for VRd = 31.7 (28.5-44.6) and KRd = 32.8 (27.2-37.5) months

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

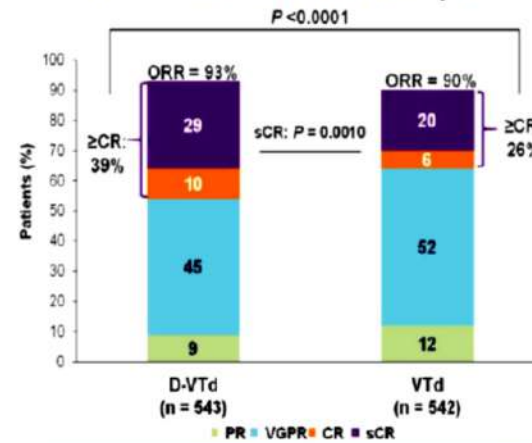


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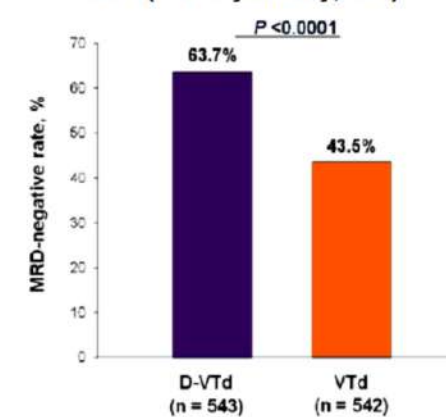


CASSIOPEIA study: depth of response

Post-consolidation rates of response

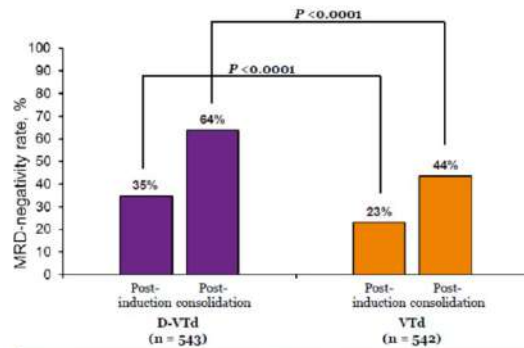


MRD (Flow Cytometry; 10⁻⁵)

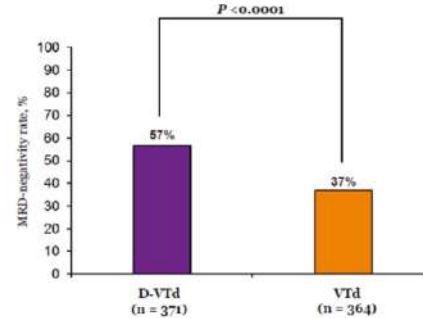


MRD-negativity Rates (10⁻⁵)

Post-induction and Post-consolidation; Flow Cytometry^a



Post-consolidation; NGS^b



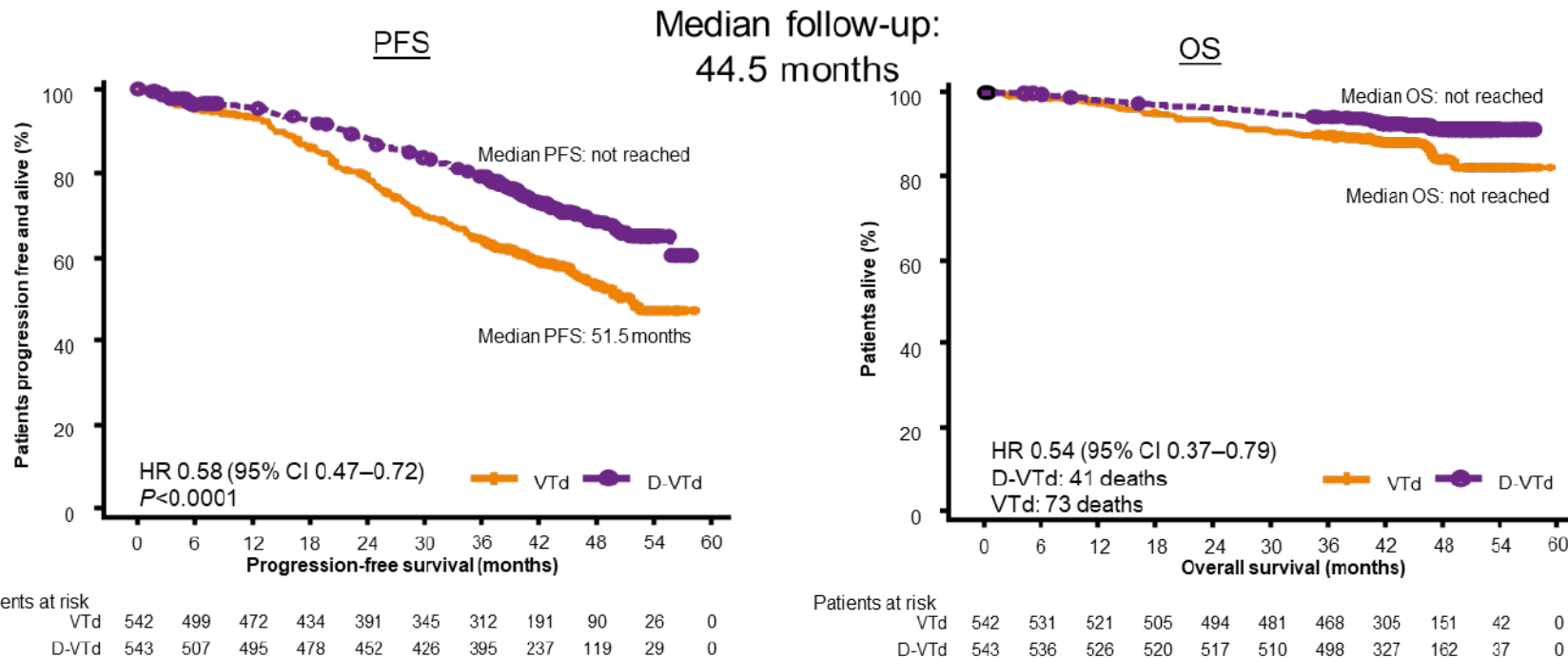
D-VTd improved the rate of sCR (primary study endpoint), ≥CR and MRD negativity

Moreau P et al. Lancet 2019

- Early (post-induction) significant difference in MRD-negativity rates for D-VTd versus VTd
- Post-consolidation MRD-negativity rates were significantly higher for D-VTd versus VTd, confirming post-induction MRD-negativity rates



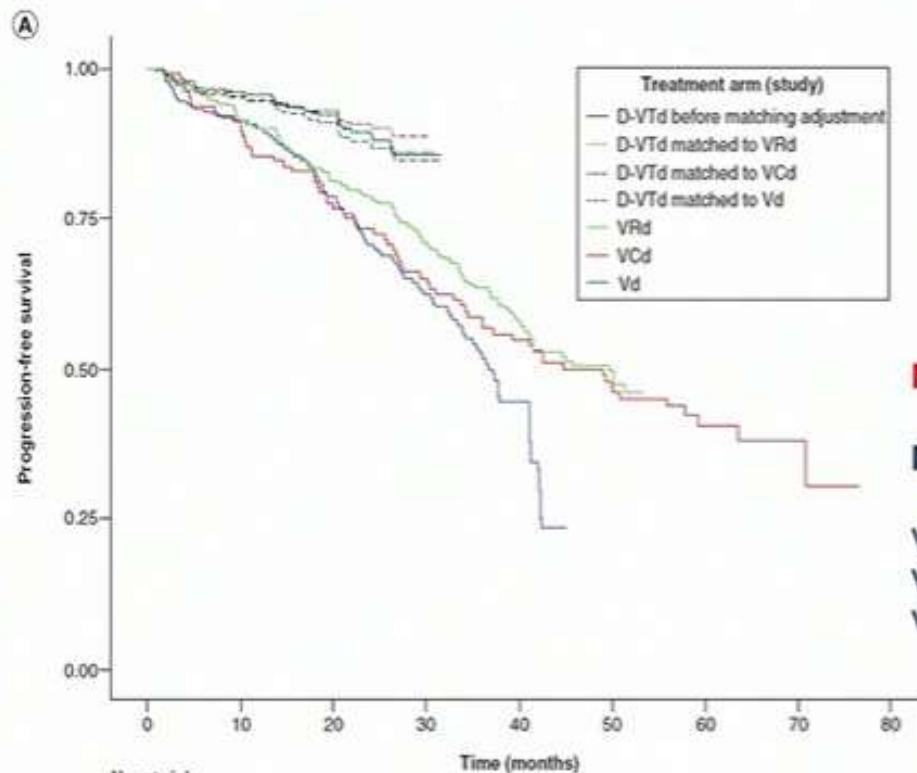
Updated Analyses From First Randomization Confirm Benefits of D-VTd vs VTd Induction/Consolidation



CI, confidence interval; D-VTd, daratumumab, bortezomib, thalidomide, and dexamethasone; HR, hazard ratio; OS, overall survival; PFS, progression-free survival; VTd, bortezomib, thalidomide, and dexamethasone.

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Moreau et al. Immunotherapy 2021

MAIC for PFS

VTD-dara vs VRD, HR 0.47
VTD-dara vs VCD, HR 0.35
VTD-dara vs VD, HR 0.42



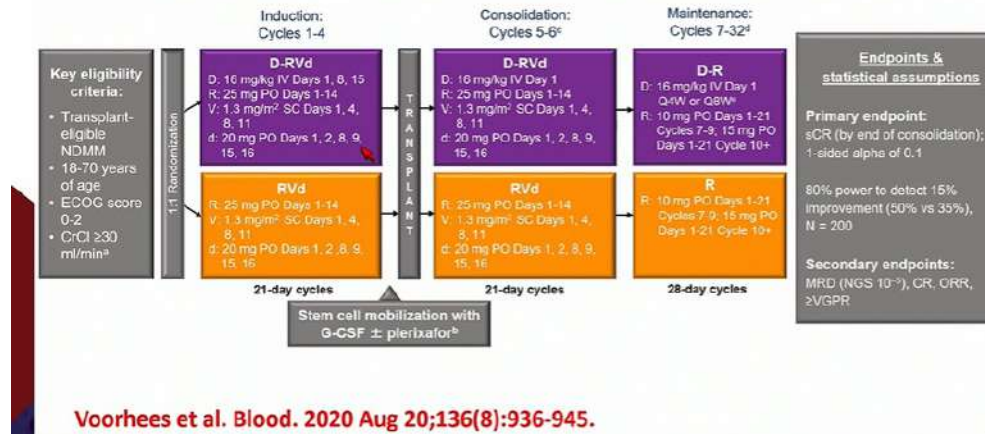
	No. at risk									
Treatment arm	0	10	20	30	40	50	60	70	80	
D-VTd before matching adjustment	543	486	206	14	0	0	0	0	0	
D-VTd matched to VRd	529	472	199	14	0	0	0	0	0	
D-VTd matched to VCd	206	185	89	5	0	0	0	0	0	
D-VTd matched to Vd	416	370	150	10	0	0	0	0	0	
VRd	350	314	275	229	151	47	0	0	0	
VCd	126	111	88	70	57	46	22	6	0	
Vd	240	195	144	91	43	0	0	0	0	

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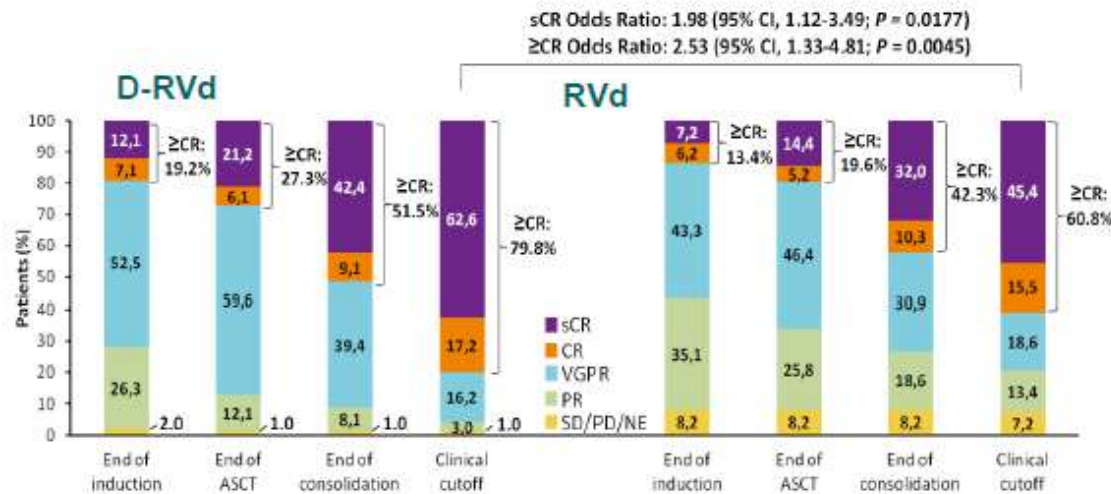
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GRIFIN

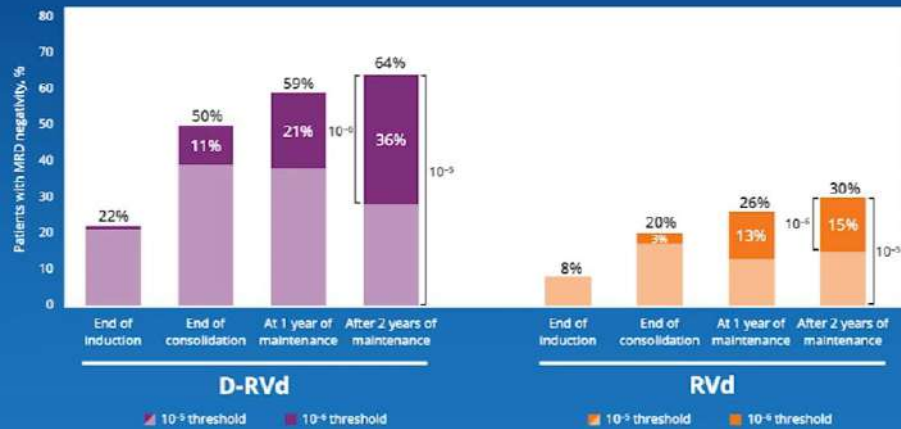


Voorhees et al. Blood. 2020 Aug 20;136(8):936-945.

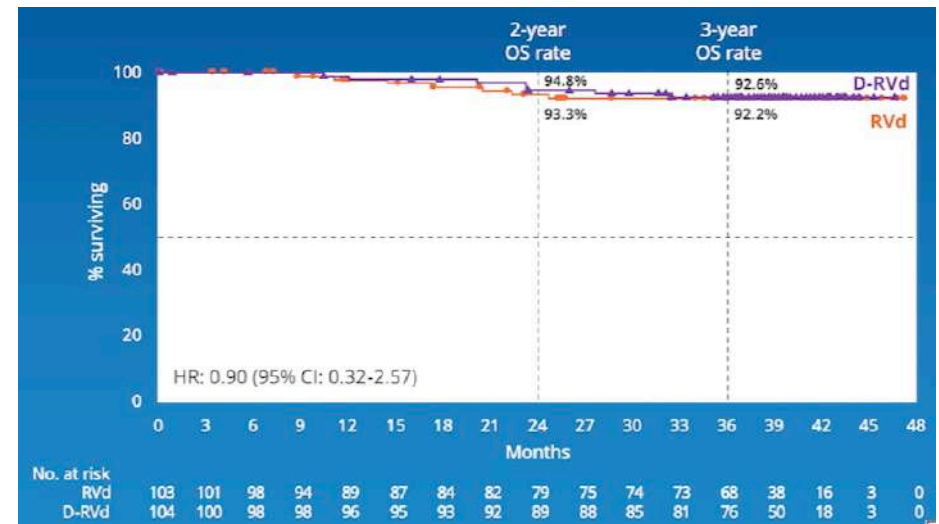
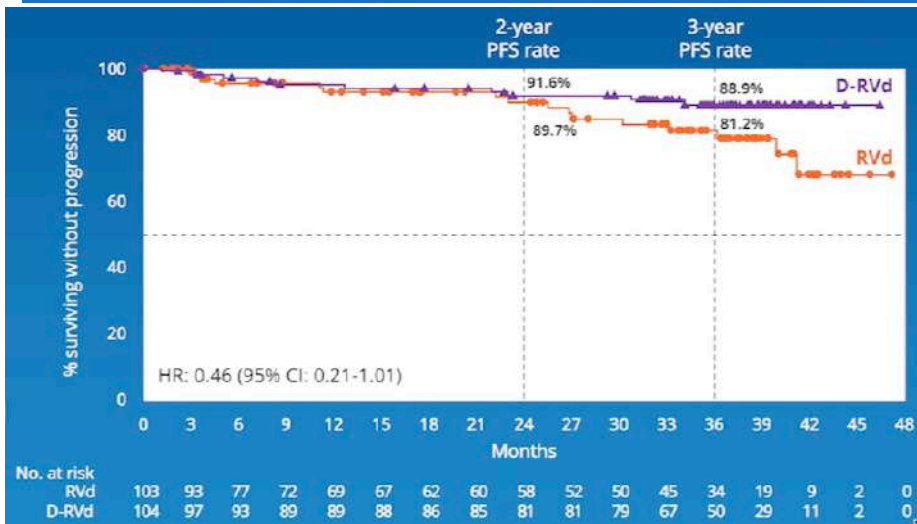
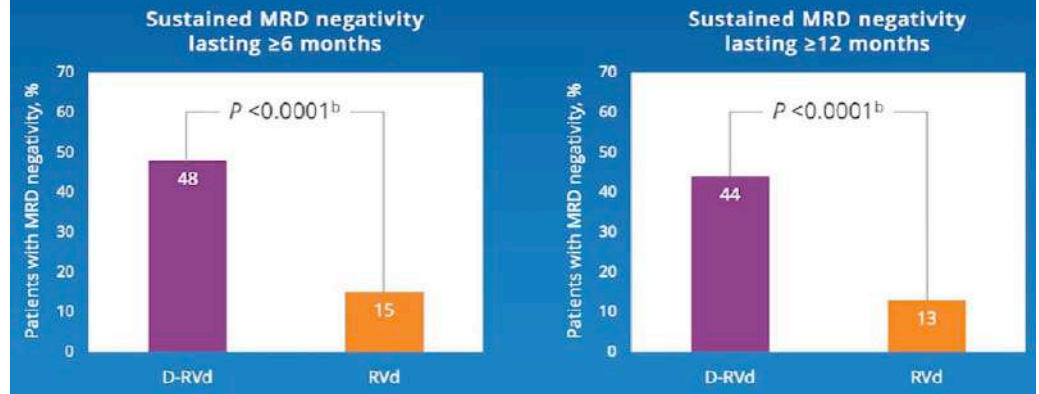


MRD-negativity (10⁻⁵)
post-induction:
21.2% vs 5.8%

GRIFIN: MRD-negativity^a Rates Improved Throughout the DR Maintenance Period



GRIFIN: D-RVd Improved Rates of Durable MRD Negativity^a (10⁻⁵) Lasting ≥6 Months or ≥12 Months Versus RVd



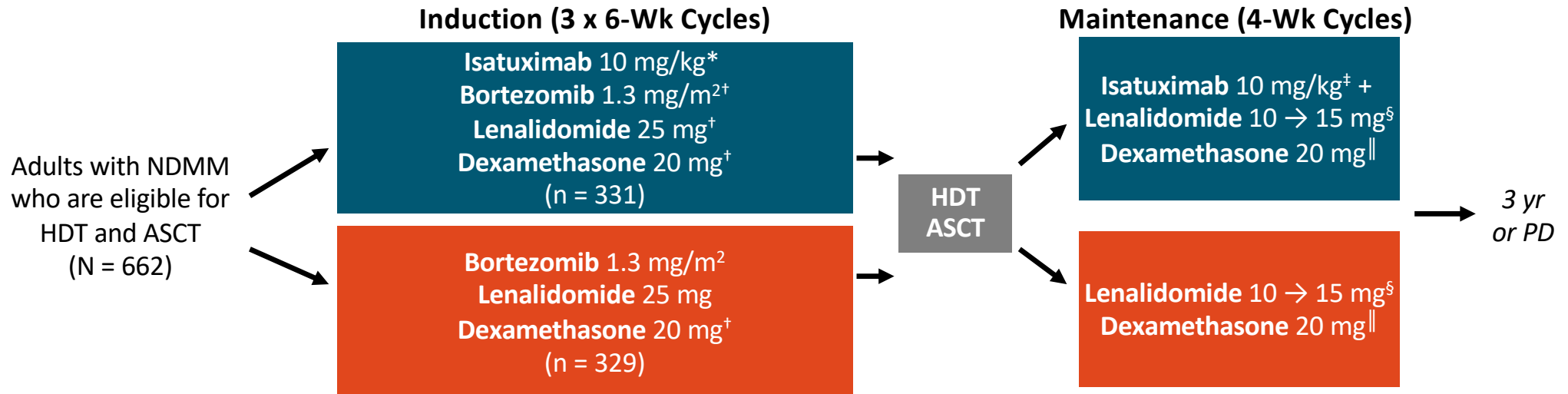
Median follow-up:
38.6 months

Laubach J et al, ASH 2021



GMMG-HD7: Study Design

- Open-label, randomized, multicenter phase III trial



*Cycle 1: D1, 8, 15, 22, 29; cycles 2-3: D1, 15, 29.

†Bortezomib D1, 4, 8, 11, 22, 25, 29, 32; lenalidomide Days 1-14 and 22-35; dexamethasone D1, 2, 4, 5, 8, 9, 11, 12, 15, 22, 23, 25, 26, 29, 30, 32, 33.

Data cutoff: April 2021.

‡Cycle 1: D1, 8, 15, 22;

Cycles 2-3: D1, 15; Cycle 4+: D1.

§Days 1-28. Increase dose to 15 mg after 3 mos

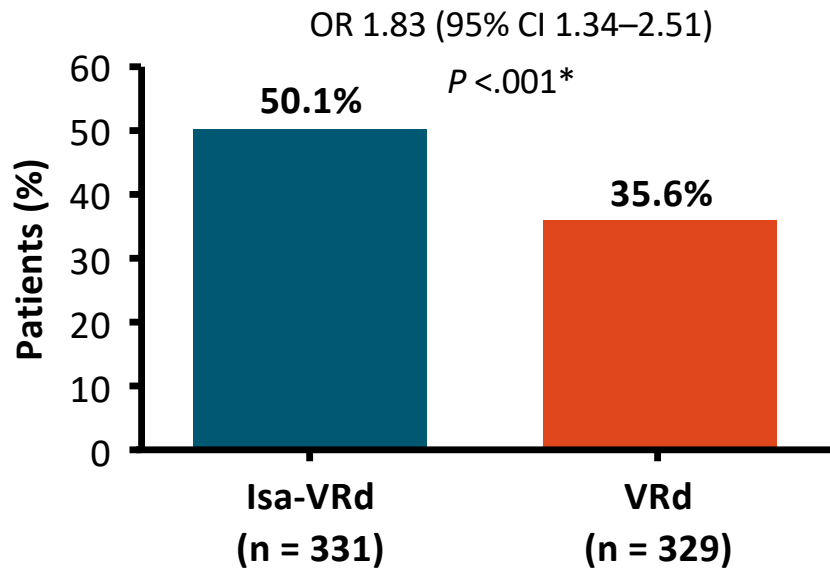
||Dexamethasone D1, 8, 15, 22 in C1.

- Primary endpoint: MRD negativity at end of induction (NGF, sensitivity 10⁻⁵) stratified according to R-ISS
- Secondary endpoints: CR after induction, safety
- MRD negativity assessed after cycle 3, HDT, 12 mos, and 24 mos as well as at end of study

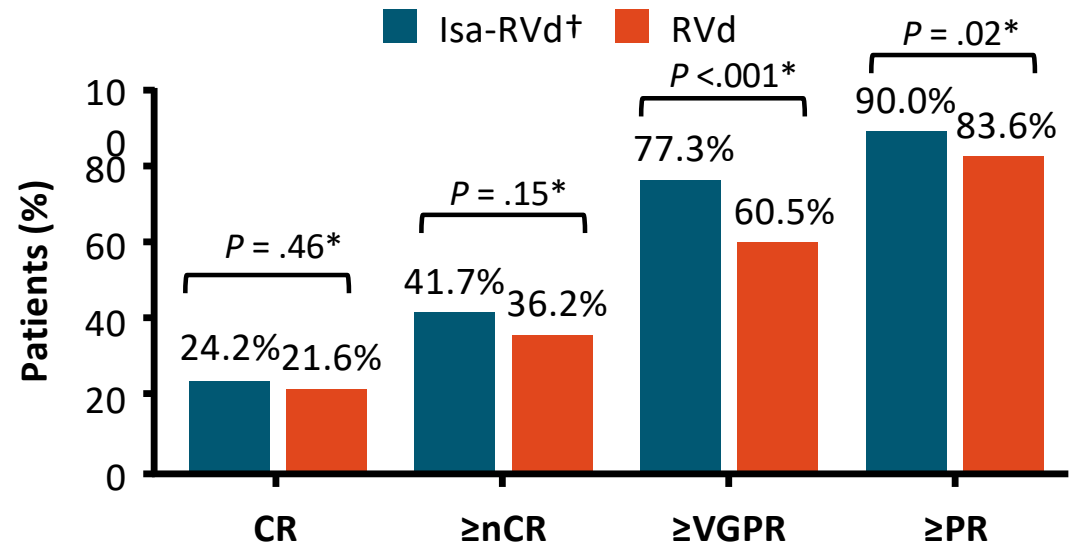


GMMG-HD7: MRD Negativity (Primary Endpoint) and Response Rates at End of Induction

Patients with MRD Negativity at End of Induction



Response Rates at End of Induction



- Not assessable/missing* MRD status low: Isa-VRd, 10.6%; VRd, 15.2%

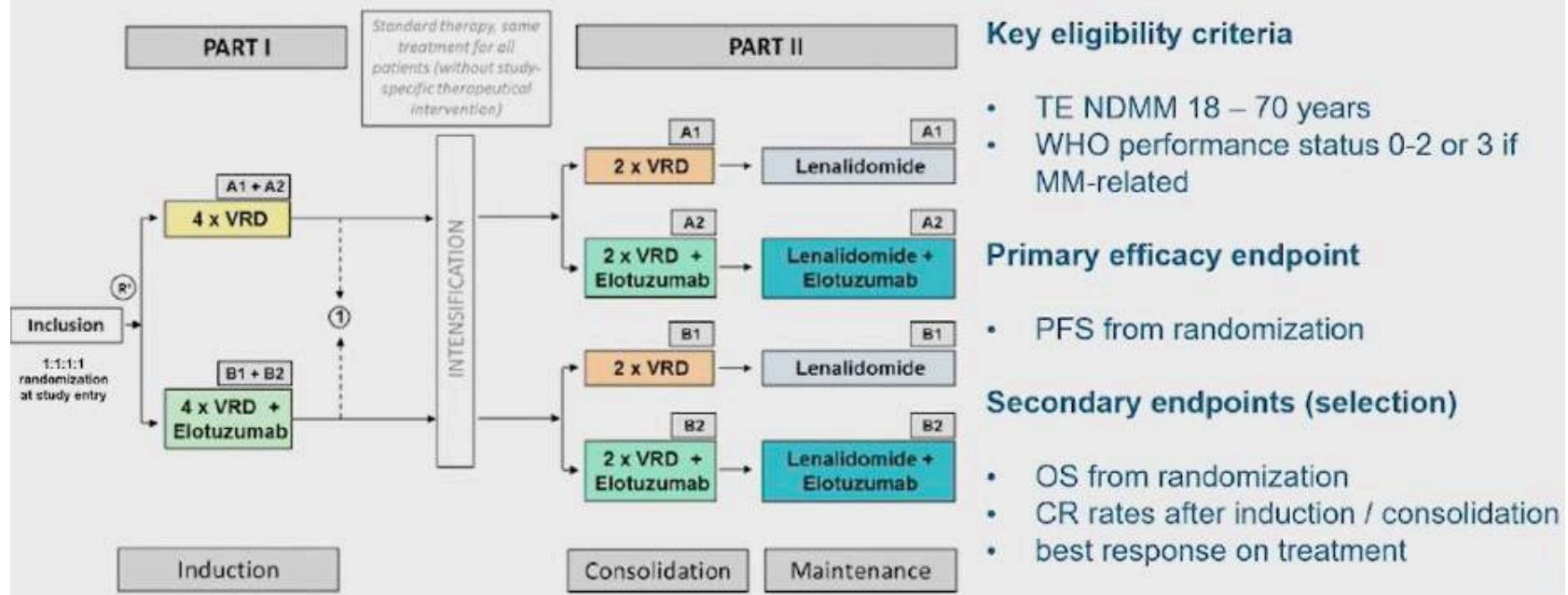
*Due either to loss to follow-up, missing bone marrow samples, or technical failures in measurement counted as nonresponders.

- Significant increase in ≥VGPR with Isa-VRd
- Significant increase in ORR



Elotuzumab in Combination with Lenalidomide, Bortezomib, Dexamethasone and Autologous Transplantation for Newly-diagnosed Multiple Myeloma: Results from the Randomized Phase III GMMG-HD6 Trial

GMMG-HD6: flow chart, eligibility criteria and endpoints



Response rates on study

(n / %)	RVD (N=278)	RVD + Elotuzumab (N=278)	p
> PR	237 / 85.2	230 / 82.7	0.54
≥ VGPR	147 / 52.9	163 / 58.6	0.14
CR	9 / 3.3	9 / 3.2	1.00
PD	8 / 2.9	6 / 2.2	0.79

post induction therapy

(n / %)	A1 (RVD+R) (n=123)	A2 (RVD+EloR) (n=124)	B1 (Elo-RVD+R) (n=119)	B2 (Elo-RVD+EloR) (n=124)	p
≥ VGPR	97 / 78.9	97 / 78.2	97 / 81.5	100 / 80.7	0.95
≥ PR	116 / 94.3	114 / 91.9	113 / 95.0	113 / 91.1	0.48

prior to consolidation therapy

Addition of elotuzumab to RVD did not increase high-quality responses (≥VGPR) after induction or consolidation compared to RVD alone

GMMG and Heidelberg University Hospital | ASH Annual Meeting 2021

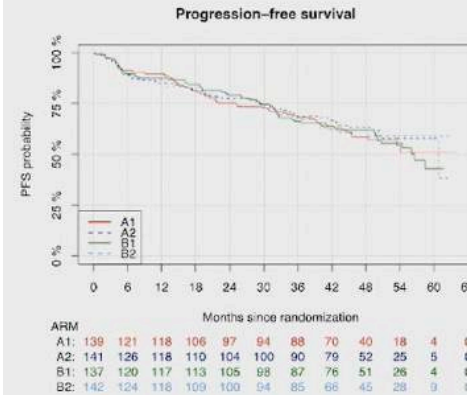
RVD, lenalidomide, bortezomib, dexamethasone; Elo, elotuzumab; R, lenalidomide; WHO, World Health Organization; PR, partial response; VGPR, very good partial response; CR, complete response; PD, progressive disease.



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Progression-free survival



3-year PFS rates

Overall: 67.7% (95% CI: 63.7-71.7%)

A1: 68.8% (95% CI: 60.9-76.8%)

A2: 68.5% (95% CI: 60.7-76.4%)

B1: 66.2% (95% CI: 58.2-74.3%)

B2: 67.2% (95% CI: 59.2-75.2%)

Primary endpoint „to detect a difference between the four treatment arms“ (adjusted logrank p value stratified by ISS at randomization, p=0.86)

GMMG and Heidelberg University Hospital | ASH Annual Meeting 2021

A1: RVD+R; A2: RVD+EloR; B1: Elo-RVD+R; B2: Elo-RVD+EloR; RVD, lenalidomide, bortezomib, dexamethasone; elo, elotuzumab; PFS, progression-free survival; ISS, International Staging System; 95% CI: 95% confidence interval.

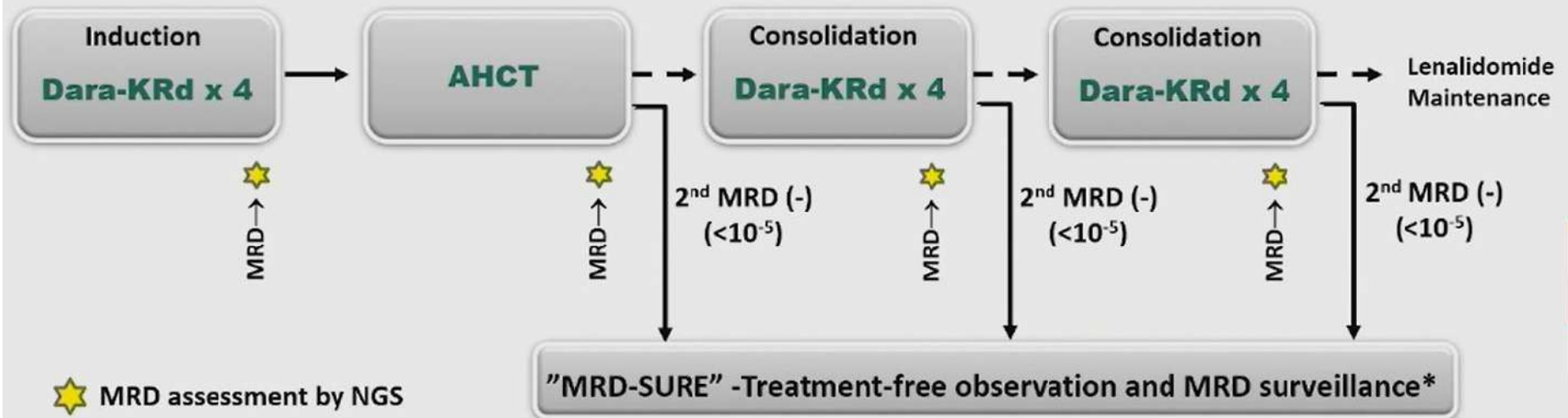




Treatment

Dara-KRd

- Daratumumab 16 mg/m² days 1,8,15,22 (days 1,15 C 3-6; day 1 C >6)
- Carfilzomib (20) 56 mg/m² Days 1,8,15
- Lenalidomide 25 mg Days 1-21
- Dexamethasone 40mg PO Days 1,8,15,22



*24 and 72 weeks after completion of therapy

MASTER trial

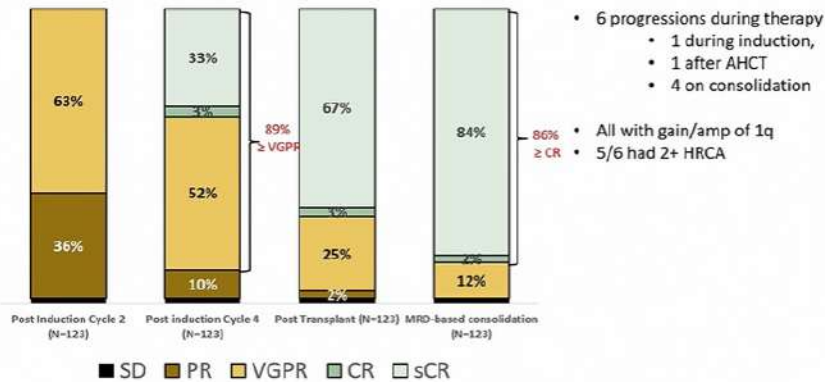
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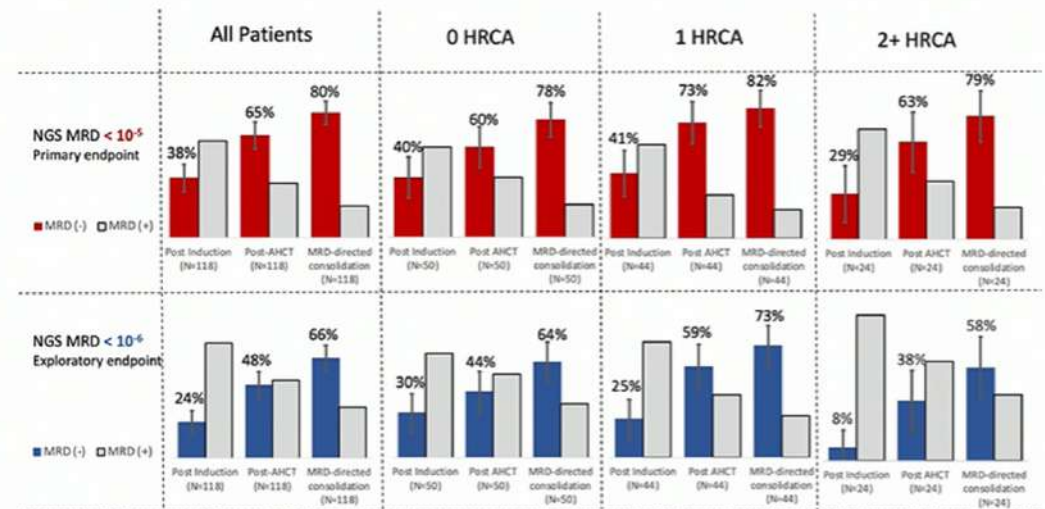
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Best IMWG response by phase of therapy



MASTER trial

Best MRD response by phase of therapy



HRCA = gain/amp 1q, t(4;14), t(14;16), t(14;20) or del(17p)

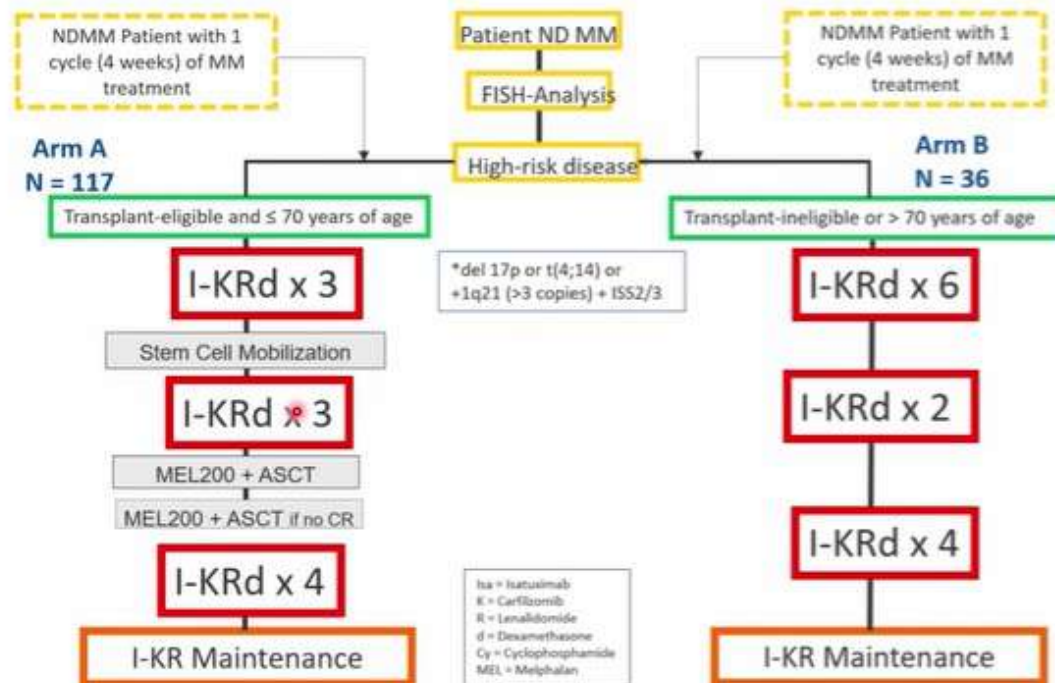
MASTER trial

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Study Design – GMMG CONCEPT (NCT03104842)



Isa-KRd Induction

Cycle 1

Isatuximab	10 mg/kg	day 1, 8, 15, 22
Carfilzomib	20 mg/m ²	day 1, 2
Carfilzomib	36 mg/m ²	day 8, 9, 15, 16
Lenalidomide *	25 mg	day 1-21
Dexamethasone**	40 mg*	day 1, 8, 15, 22
28-day-cycle		

Isa-KRd Induction

Cycle 2-6

Isatuximab	10 mg/kg	day 1, 15
Carfilzomib	36 mg/m ²	day 1, 2, 8, 9, 15, 16
Lenalidomide **	25 mg	day 1-21
Dexamethasone***	40 mg*	day 1, 8, 15, 22
28-day-cycle		

* Cy-based mobilization was moved in an amendment to time point after 3 induction cycles

**Dose adaption of lenalidomide according to renal function

***20 mg in patients ≥75 years

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Results: Best response to therapy, 6 induction cycles

All evaluable patients: n = 50

- Overall response rate (ORR, \geq PR): 100%
- \geq VGPR : 90%; CR/sCR: 46%
 - Arm A: 41/46 \geq VGPR
 - Arm B: all (n = 4) VGPR
- Arm A: MRD-assessment in 33 patients during induction
 - 20 patients MRD negative
 - 11 patients MRD positive
 - 2 not assessable

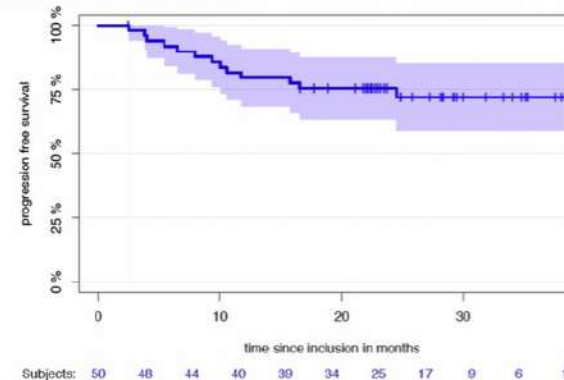


60% MRD neg

Results of MRD assessments after induction treatment are not reported and available yet



Progression-free Survival



Median follow-up: 24.9 months

- 12-month PFS: 79.6% (68.3%; 90.9%)
- 24-month PFS: 75.5% (63.5%; 87.6%)

Data cut-off: Jan. 26, 2021
(95%-confidence level)

Leipoldt LB et al, EHA 2021

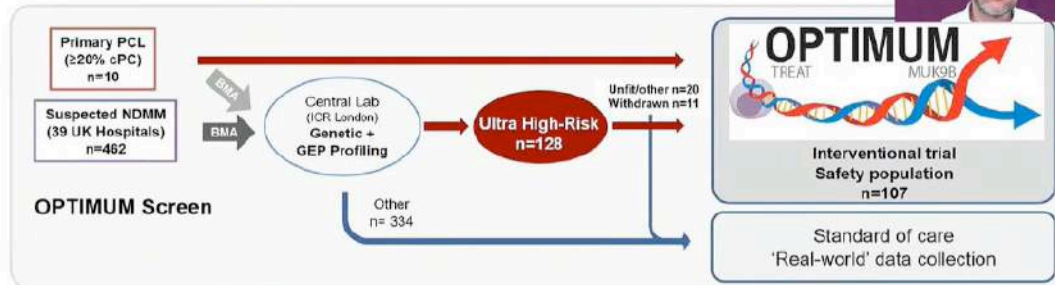
40/50 patients were relapse-free after 1 year

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OPTIMUM design



18th IMW

Patient population (Screen)

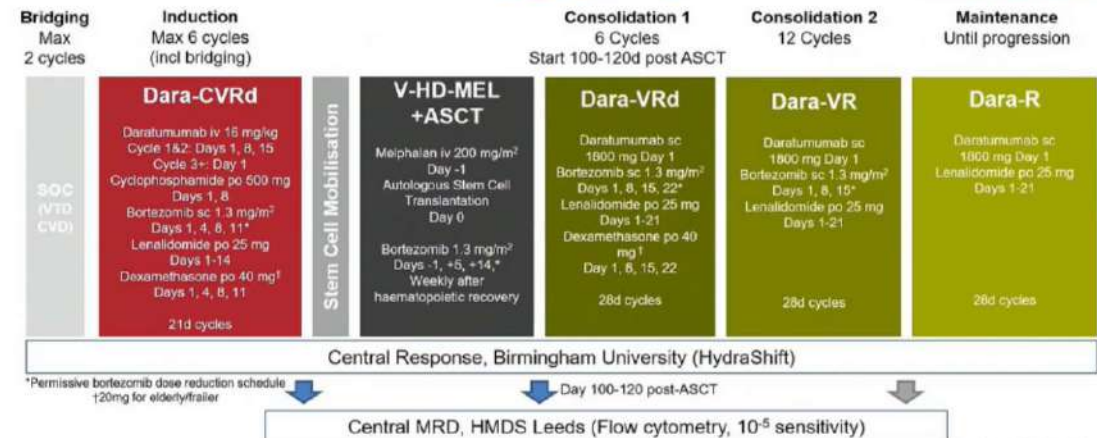
- Patients with (suspected) newly diagnosed myeloma (NDMM) or pPCL fit for intensive therapy

Trial objectives (Treat)

- Evaluate efficacy of Dara-CVRd combination therapy + ASCT in Ultra High-Risk MM and pPCL
 - Response and MRD after induction and ASCT
 - Progression free survival – compared to matched Ultra High-Risk control group from Myeloma XI
- Determine safety and toxicity of Dara-CVRd in Ultra High-Risk MM and pPCL

Brown S, et al., BMJ Open 2021

Trial therapy



Brown S, et al., BMJ Open 2021

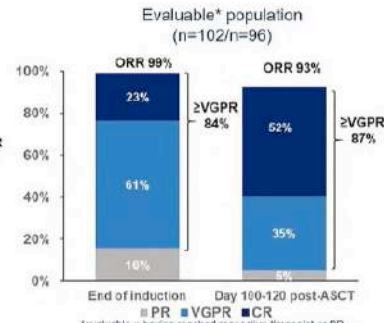
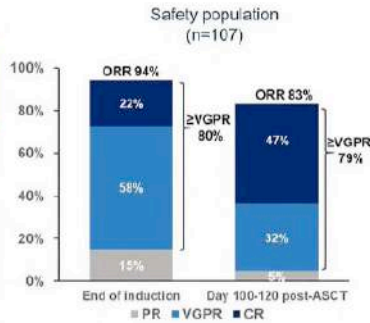
Central response results

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18th IMW

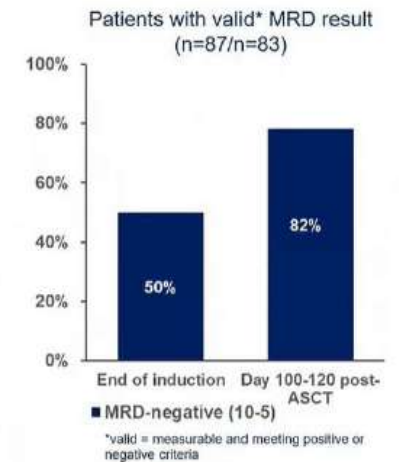
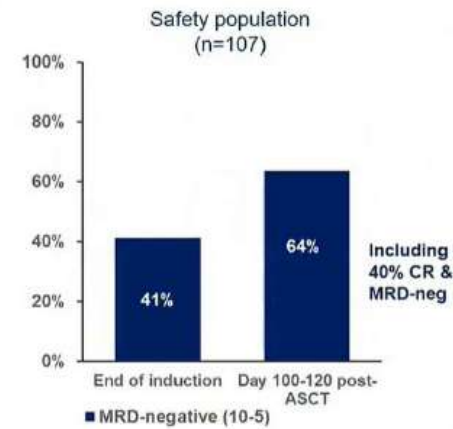
Response Safety Population (n=107)	End of Induction	100-120 days post-ASCT
CR	23 (21.5%)	50 (46.7%)
VGPR	62 (57.9%)	34 (31.8%)
PR	16 (15.0%)	5 (4.7%)
PD	1 (0.9%)	7 (6.5%)
Timepoint not reached	5 (4.7%)	11 (10.3%)



pPCL (evaluable D100-120; n=8)
 • CR: 2 (25%)
 • VGPR: 2 (25%)
 • PR: 2 (25%)
 • PD: 2 (25%)

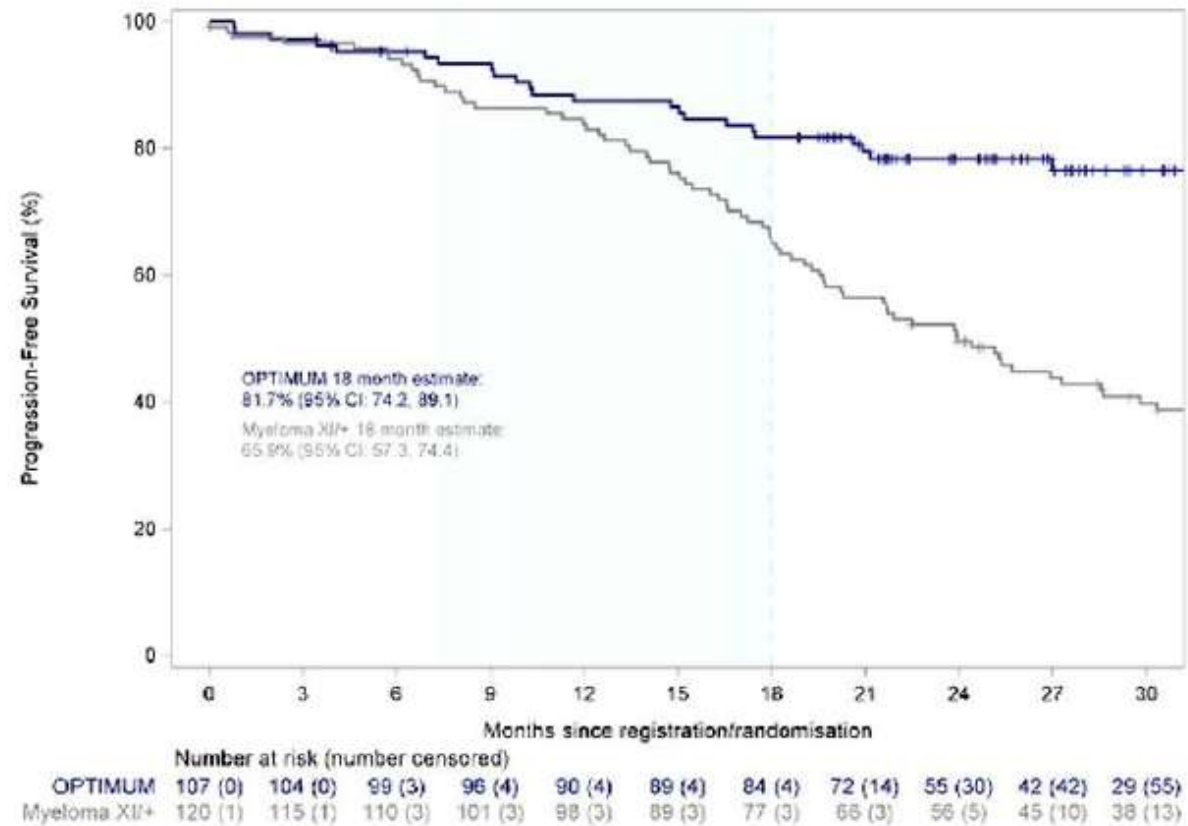
Central response results - MRD

MRD Safety Population (n=107)	End of induction	100-120 days post-ASCT
MRD-neg	44 (41.1%)	68 (63.6%)
MRD-pos	43 (40.2%)	15 (14.0%)
Inadequate or no sample	15 (14.0%)	13 (12.1%)
Timepoint not reached	5 (4.7%)	11 (10.3%)





OPTIMUM vs. Myeloma XI



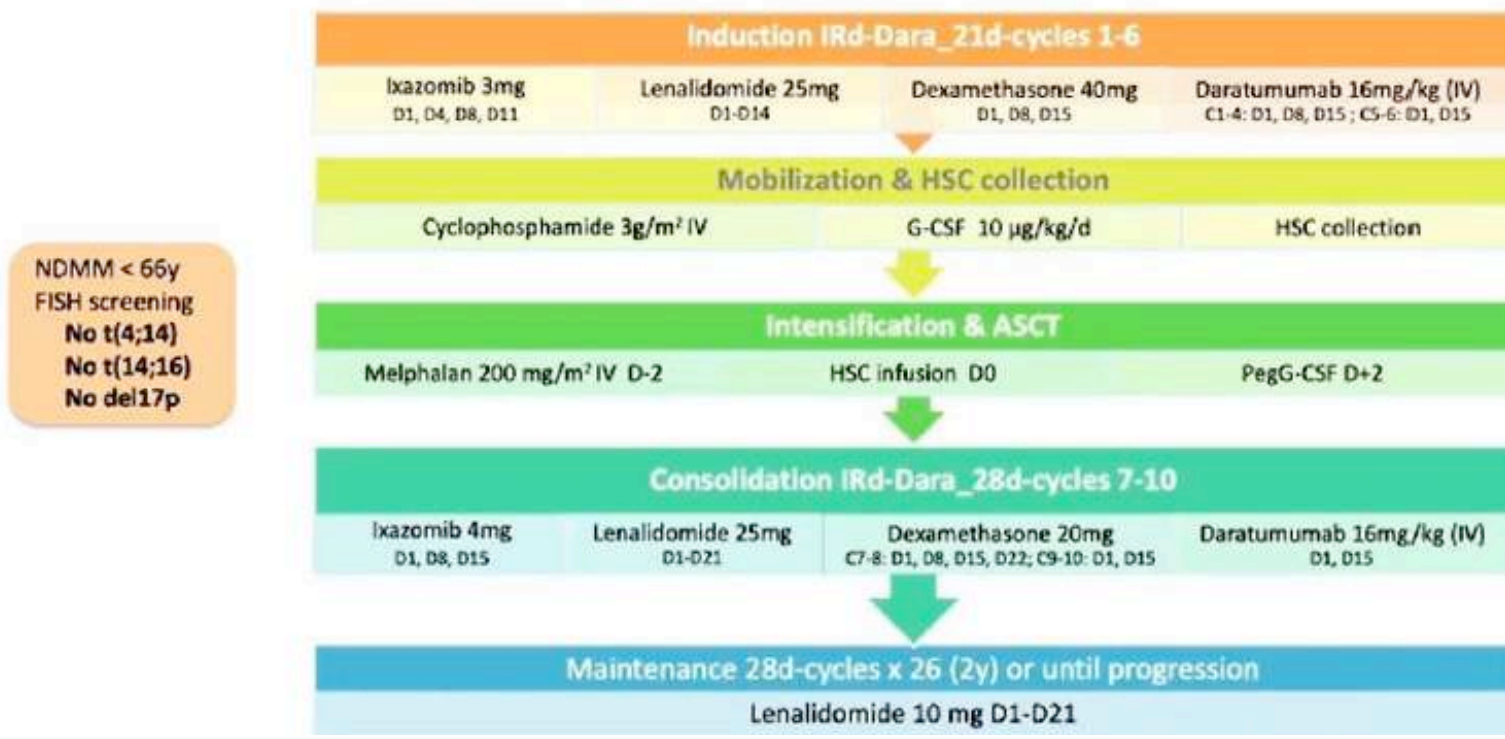
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Daratumumab Plus Ixazomib, Lenalidomide and Dexamethasone as Extended Induction and Consolidation Followed by Lenalidomide maintenance in Standard-Risk Transplant-Eligible Newly Diagnosed Multiple Myeloma Patients (IFM 2018-01): a phase II study of the IFM group

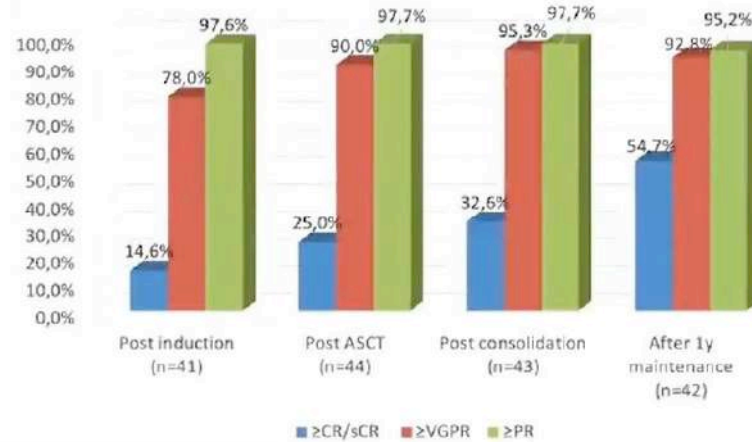
IFM 2018-01 study design



Highlights from IMWG Responses



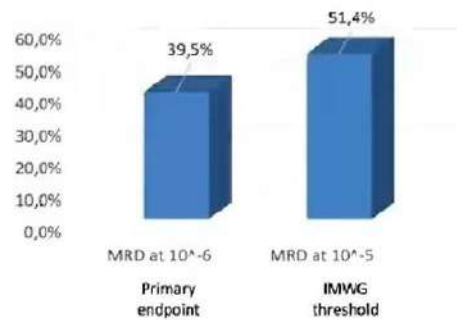
IMWG response rates



Primary endpoint: MRD-negativity rate before maintenance

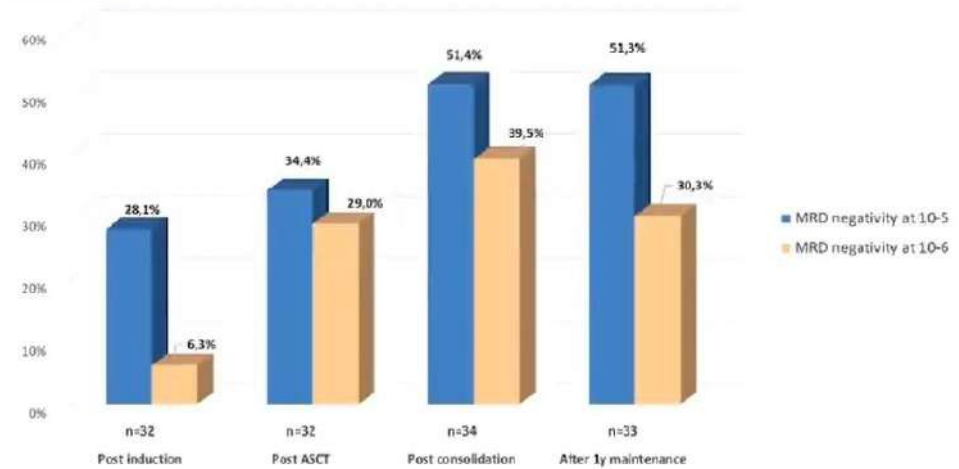
- MRD negativity was assessed using NGS method (sensitivity threshold up to 10^{-5})
- 38 patients were evaluable for the primary endpoint at 10^{-6}
- MRD negativity rate
 39.5% [CI 26.1-54.1] at 10^{-6}
 51.4% [CI 36.8-65.7] at 10^{-5}

MRD after consolidation/before maintenance



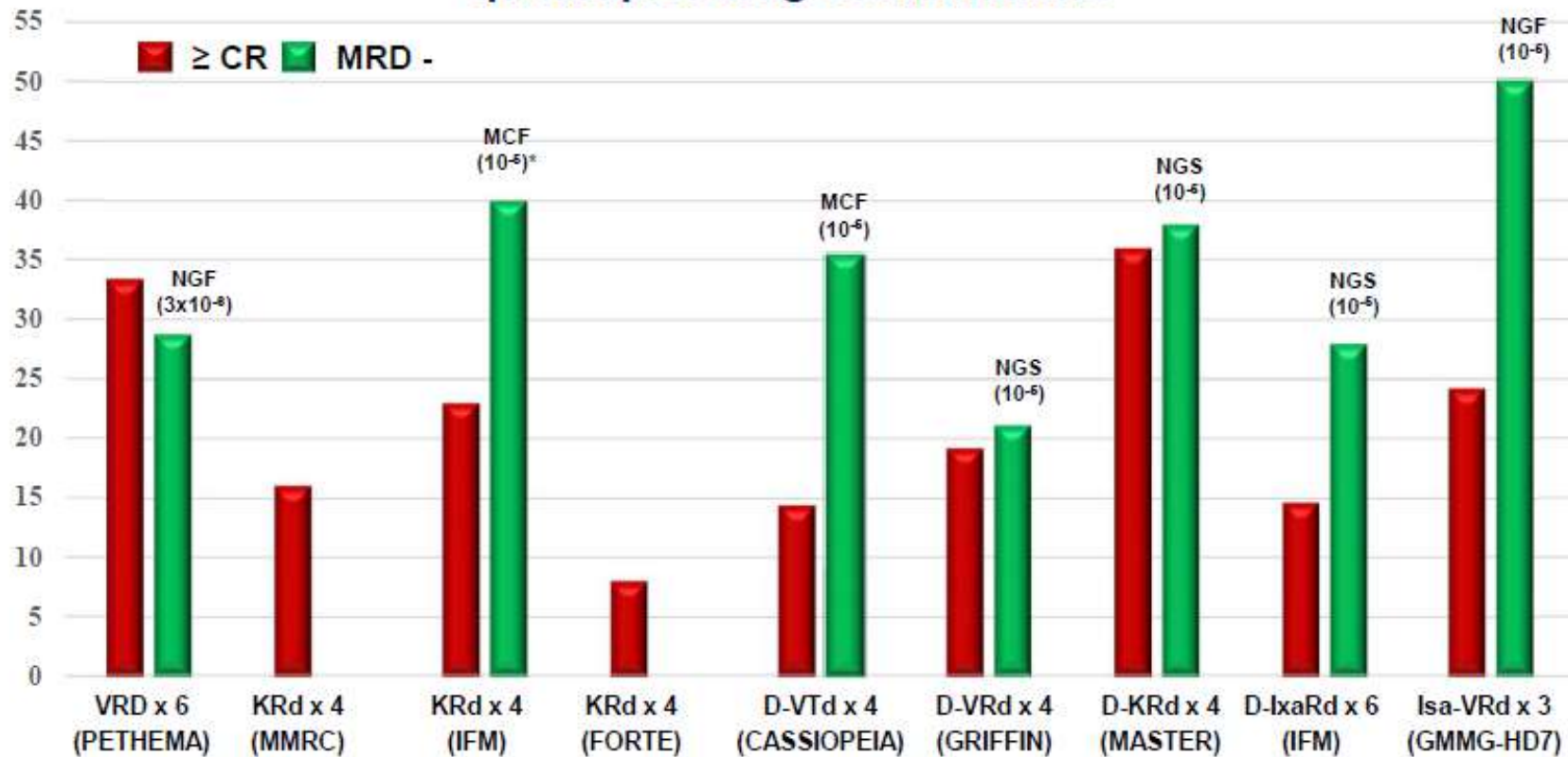
MRD kinetics

MRD negativity rates





Response rates after induction of the main triplet and quadruplet drug combinations

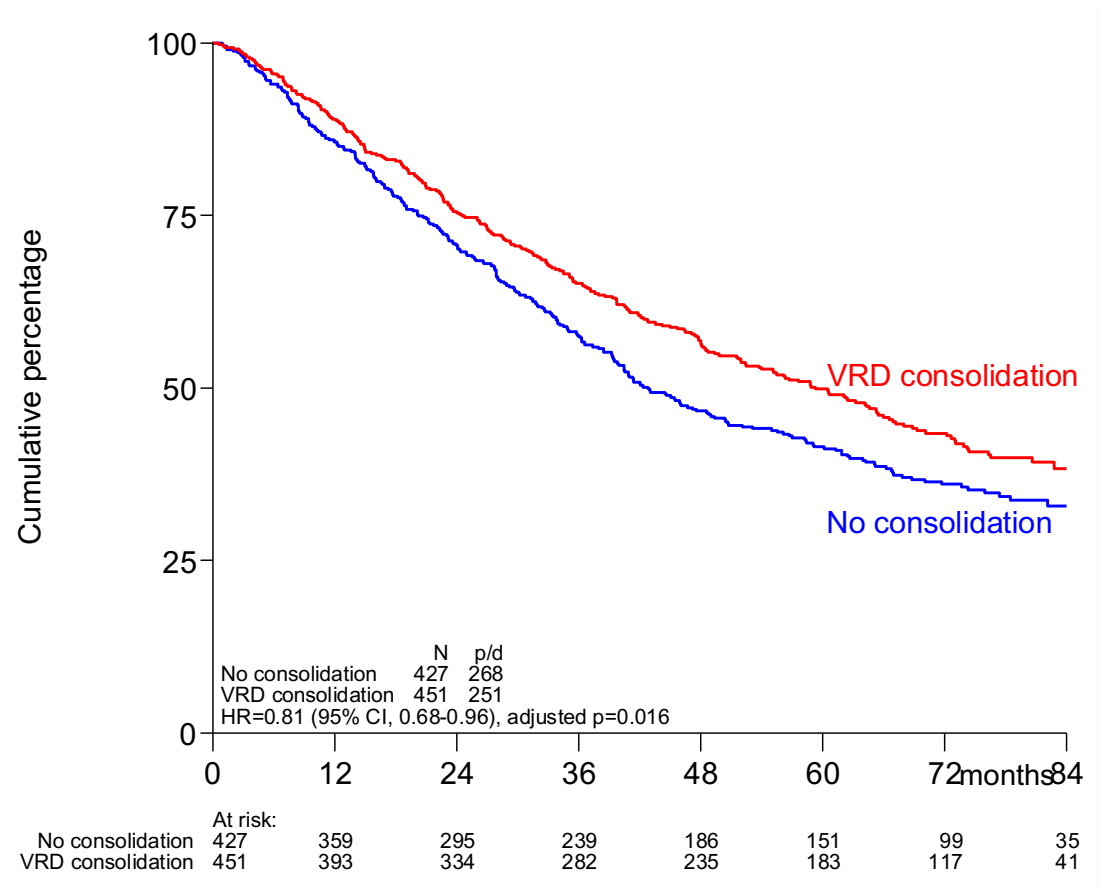
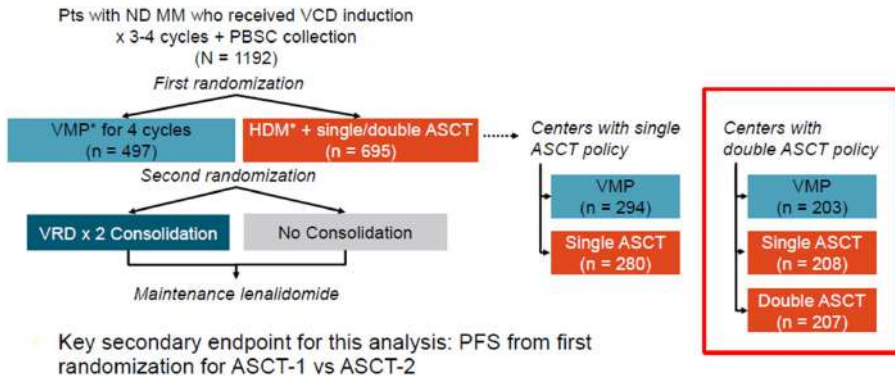


* Only patients with \geq CR



Consolidation

EMN02/HO95: Phase III Study Design

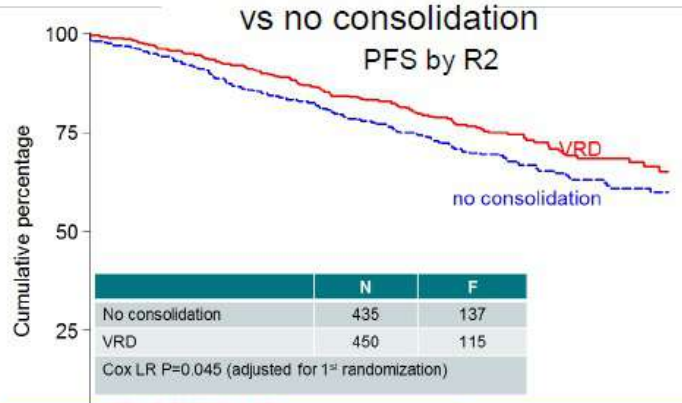




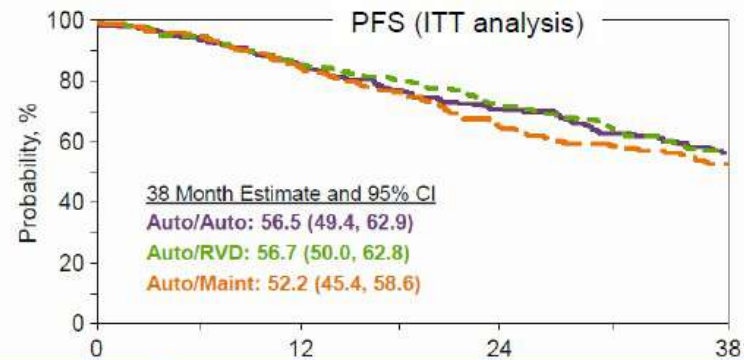
Consolidation

VTD: upgrade to CR by 30%
VRD: upgrade CR 38% vs 26%

EMN02 phase 3 study of VRD consolidation vs no consolidation



STaMINA phase 3 study of VRD consolidation vs no consolidation



	EMN02	STAMINA
Induction regimen (%)	VCD (100)	VCD (13.4): VRD (57)
Pre-planned induction thp (mths)	2-3	2-12
Failure to receive double ASCT (%)	19.8	32
Double ASCT plus Consolidation (%)	50	0
Maintenance therapy	Len (10 mg)	Len (10-15 mg)

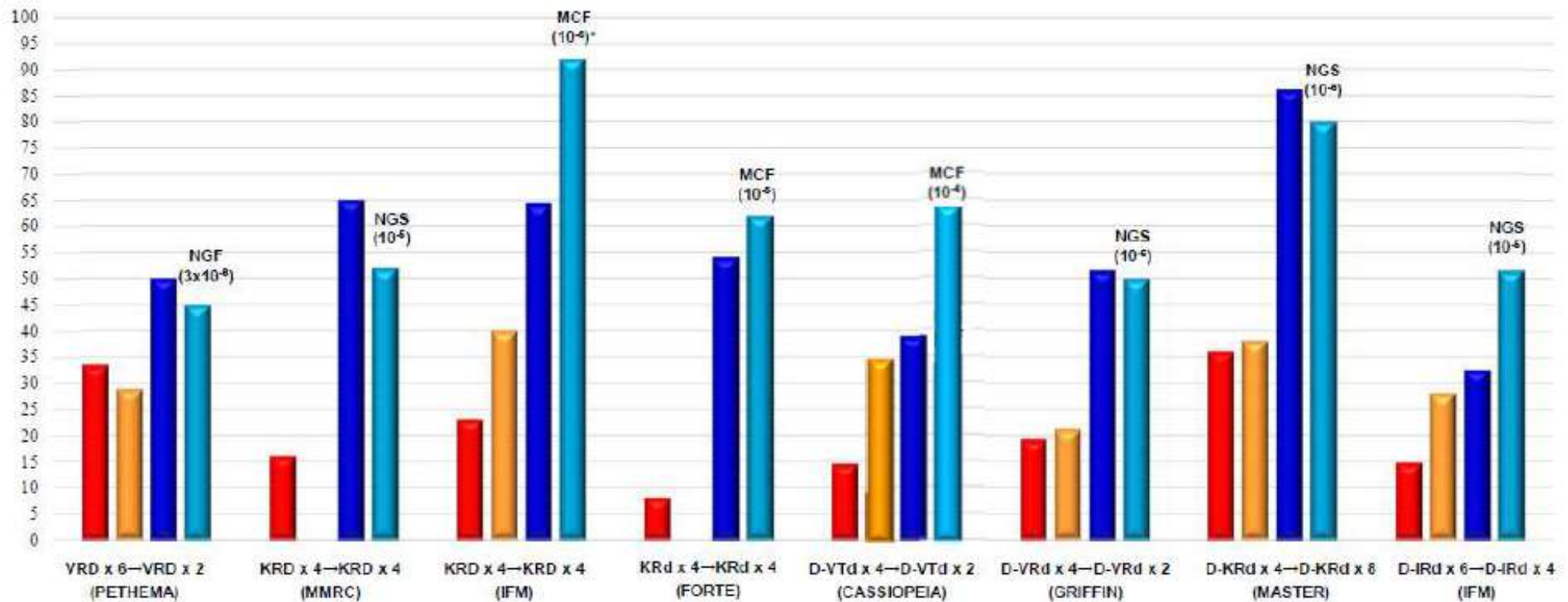
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Response rates after induction and consolidation of the main triplet and quadruplet drug combinations

■ \geq CR after induction ■ MRD- after induction ■ \geq CR after consolidation ■ MRD- after consolidation



* Only patients with \geq CR

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Future

