



Memorial Sloan Kettering
Cancer Center

Managing Newly Diagnosed Multiple Myeloma and Waldenstrom's Macroglobulinemia in 2022

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Disclosures

- Research funding: Amgen, Array Biopharma, BMS, Celgene, GSK, Janssen, Merck, Pharmacyclics, Sanofi, Seattle Genetics, SkylineDX, Takeda.
- Consulting: Abbvie, Amgen, BMS, Celgene, EdoPharma, Genentech, Gilead, GSK, Janssen, Oncoceptives, Sanofi, Seattle Genetics, SecuraBio, SkylineDX, Takeda, TeneoBio.
- Speaker: Amgen, BMS, Janssen, Sanofi.



Learning Objectives

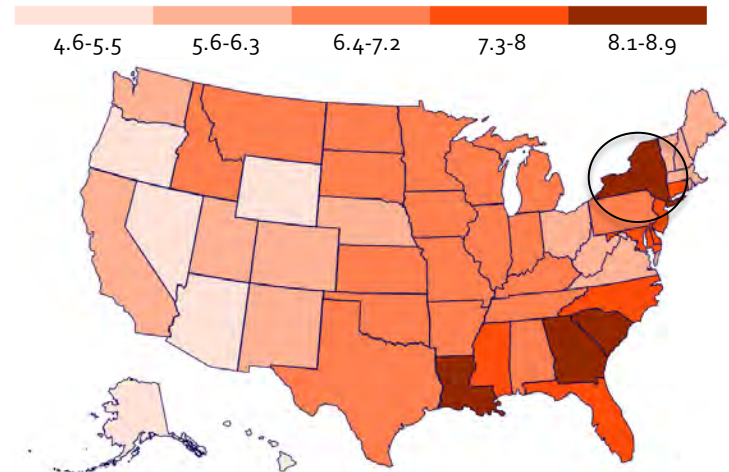
- Discuss recent updates to clinical practice guidelines reflecting changes in best practices for treatment of newly diagnosed Multiple Myeloma.
- Discuss recent updates to clinical practice guidelines reflecting changes in best practices for treatment of newly diagnosed Waldenstrom's Macroglobulinemia.



Multiple Myeloma: A Systemic Plasma Cell Malignancy

- Estimated new cases and deaths in 2021 in the United States¹
 - New cases: 34,920
 - Deaths: 12,410
- Percentage of patients surviving 5 years: 55.6%²
- Median age at diagnosis: 69 years²
- MM is most common in men and Black adults²

State-Level Incidence of MM per 100,000
Between 2012 and 2016³

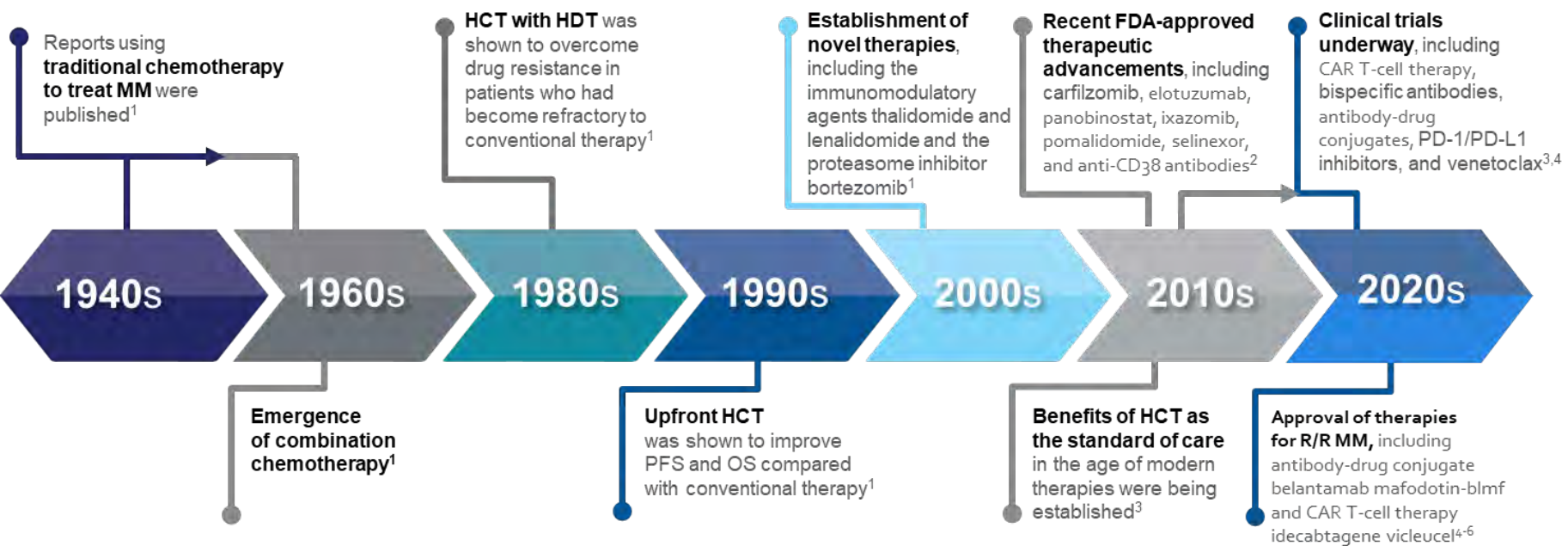


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1. Plasma cell neoplasms (including multiple myeloma) treatment (PDQ®)-Health Professional Version. National Cancer Institute website. http://www.cancer.gov/cancertopics/pdq/treatment/myeloma/healthprofessional#Section_4. Updated February 11, 2021. Accessed May 6, 2021. 2. SEER Cancer Stat Facts: Myeloma. National Cancer Institute website. <http://seer.cancer.gov/statfacts/html/mulmy.html>. Accessed May 6, 2021. 3. Myeloma at a glance. American Cancer Society Cancer Statistics Center. American Cancer Society website. https://cancerstatisticscenter.cancer.org/?_ga=2.47184933.325832967.1600196335-611855784.1581698489#/cancer-site/Myeloma. Accessed May 6, 2021.



History of MM Treatments



CAR, chimeric antigen receptor; HDT, high-dose therapy; OS, overall survival; PD-1, programmed cell death 1; PD-L1, programmed cell death-ligand 1; PFS, progression-free survival; R/R, relapsed/refractory.

1. Laubach J, et al. *Annu Rev Med.* 2011;62:249-264. 2. Rajkumar SV. *Am J Hematol.* 2020;95(5):548-567. 3. Palumbo A, et al. *N Engl J Med.* 2014;371(10):895-905. 4. Zanwar S, et al. *Blood Cancer J.* 2020;10(8):84. doi: 10.1038/s41408-020-00350-x. 5. US Food and Drug Administration. FDA granted accelerated approval to belantamab mafodotin-blmf for multiple myeloma. <https://www.fda.gov/drugs/drug-approvals-and-databases/fda-granted-accelerated-approval-belantamab-mafodotin-blmf-multiple-myeloma>. Updated August 6, 2020. Accessed May 6, 2021. 6. US Food and Drug Administration. FDA approves first cell-based gene therapy for adult patients with multiple myeloma. <https://www.fda.gov/news-events/press-announcements/fda-approves-first-cell-based-gene-therapy-adult-patients-multiple-myeloma>. Updated March 27, 2021. Accessed May 17, 2021.



Staging and Cytogenetic Risk-Assessment

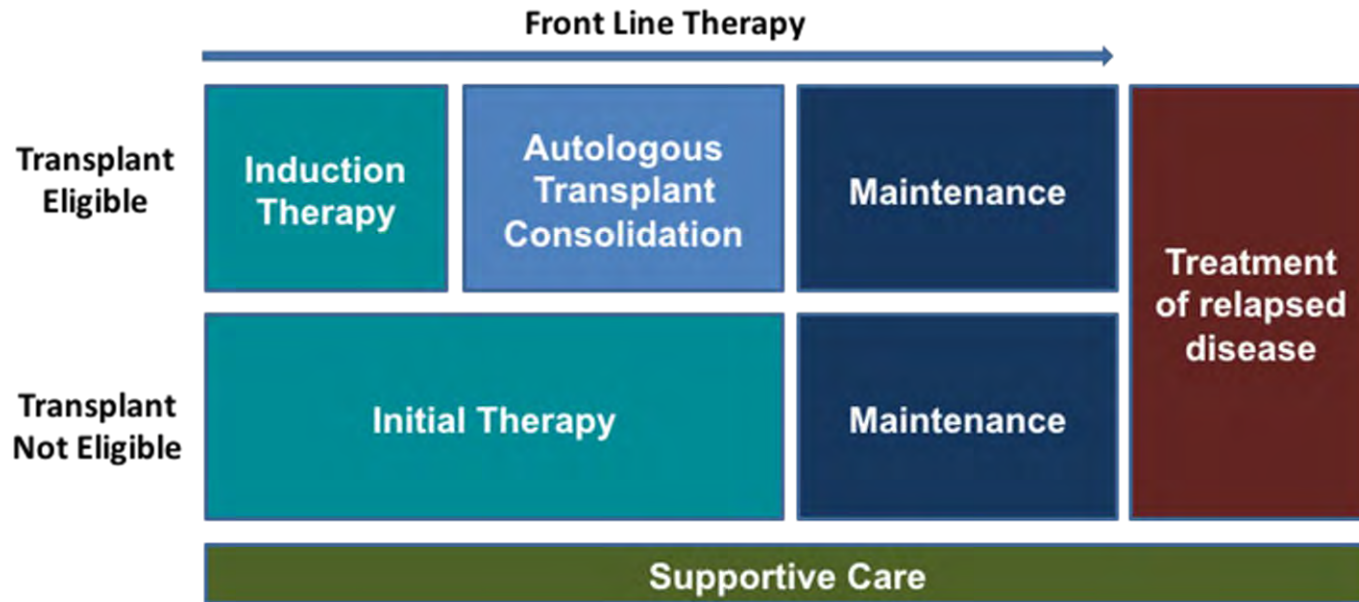
Stage ¹	R-ISS ¹
I	Serum albumin ≥ 3.5 g/dL ⁻¹ Serum $\beta 2M < 3.5$ mg/L ⁻¹ No high-risk cytogenetics Normal LDH level
II	Not stage I or III
III	Serum $\beta 2M > 5.5$ mg/L ⁻¹ High-risk cytogenetics: t(4;14), t(4;16), or del(17p) or elevated LDH

Risk ²	Features
Standard	Trisomies t(11;14) t(6;14)
High	t(4;14) t(14;16) t(14;20) Del(17p) p53 mutation Gain/Amp 1q High plasma cell S-phase GEP high-risk signatures Circulating Plasma Cells

1. Palumbo A, et al. *J Clin Oncol.* 2015;33:2863-2869; 2. Costa LJ, Usmani SZ. *J Natl Compr Canc Netw.* 2020;18(12):1730-1737.

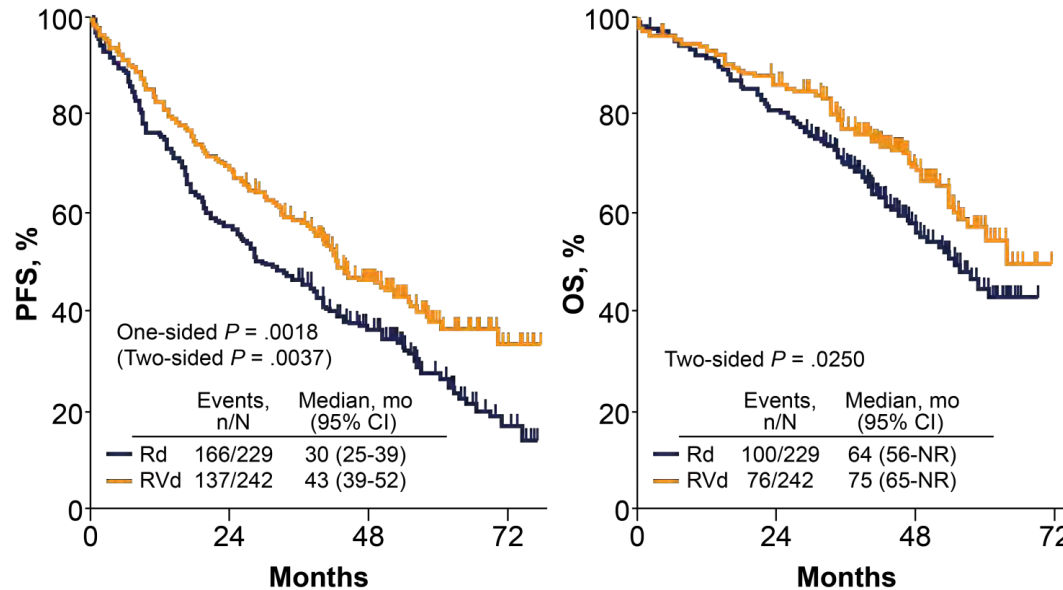


Treatment Paradigm For Newly Diagnosed Multiple Myeloma





SWOG S0777: RVd Versus Rd in Patients Without Immediate Intent for ASCT¹

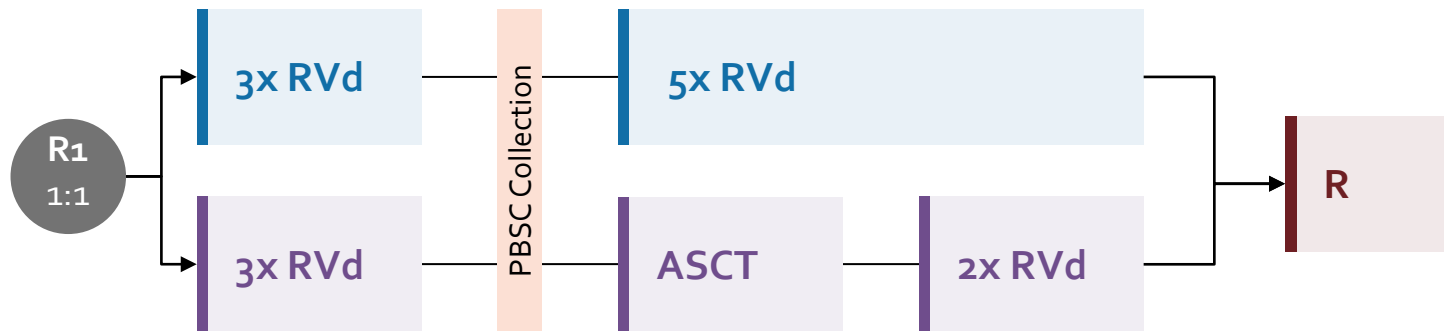


Initial Therapy

RVd for eight 21-d cycles vs Rd for six 28-d cycles in patients not intending to proceed to upfront transplant, followed by Rd in both arms (N = 525)



IFM 2009 Study: Early vs Late ASCT



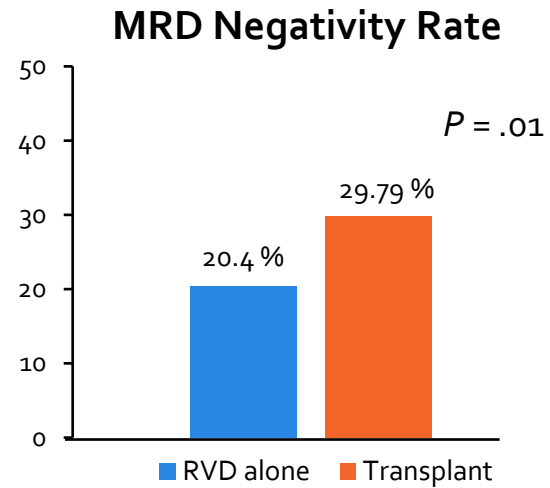
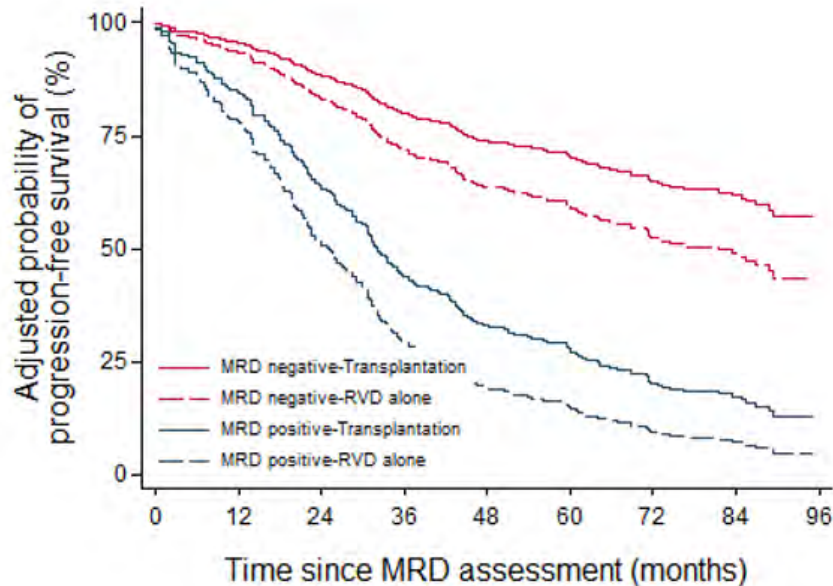
RVD 21-day Cycles
R: 25 mg d 1 – 14
V: 1.3 mg/m² d 1, 4, 8, 11
d: 20 mg d 1, 2, 4, 5, 8, 9, 11, 12

R Maintenance
R: 10-15 mg/d for 13 cycles

Primary endpoint: PFS
Secondary endpoints:
ORR, MRD, TTP, OS, safety



Superior PFS With ASCT vs RVD Alone



RVD + transplant was superior to RVD alone, even with undetectable MRD at 10^{-6}

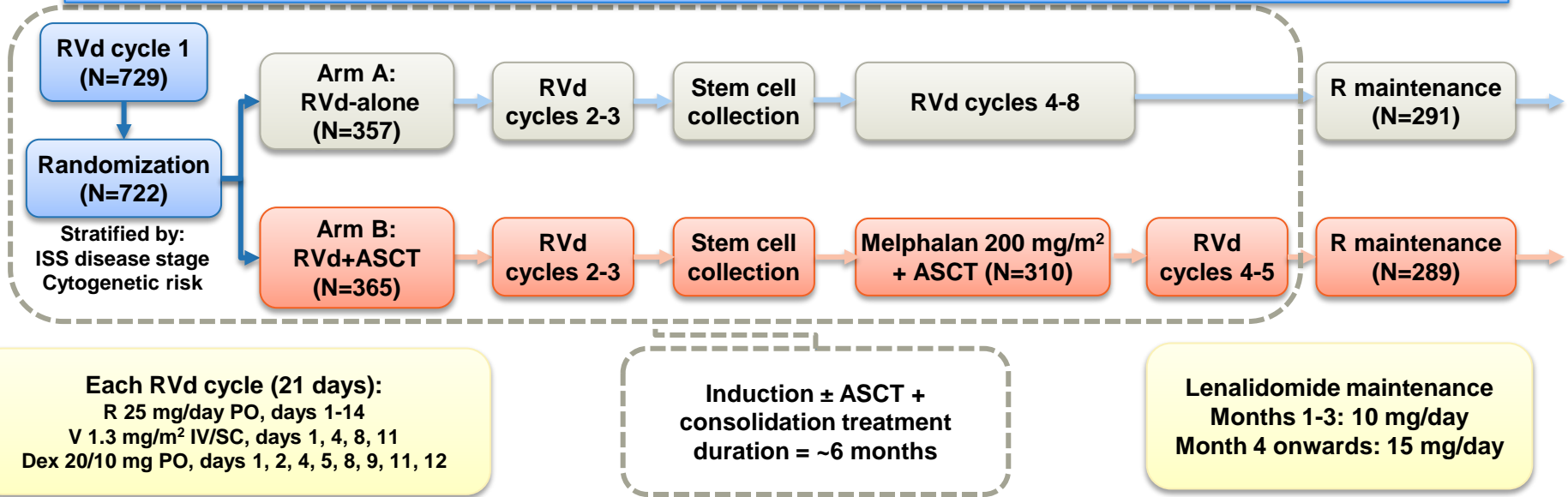
MRD, minimal residual disease.

Perrot A. Presented at: 62nd ASH Annual Meeting and Exposition; December 5-8, 2020; Abstract 143.



DETERMINATION: study design and patient disposition

DETERMINATION: Delayed vs Early Transplant with Revlimid Maintenance and Antimyeloma Triple Therapy



Primary endpoint: PFS

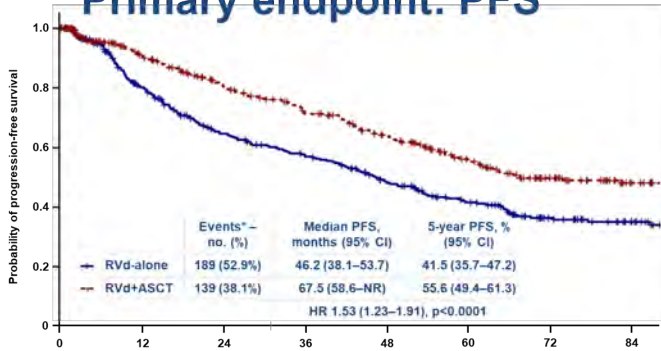
Secondary endpoints: response rates; DOR; TTP; OS; QoL; safety

d/Dex, dexamethasone; DOR, duration of response; ISS, International Staging System; IV, intravenous; PO, orally; R, lenalidomide; SC, subcutaneous; TTP, time to progression; V, bortezomib



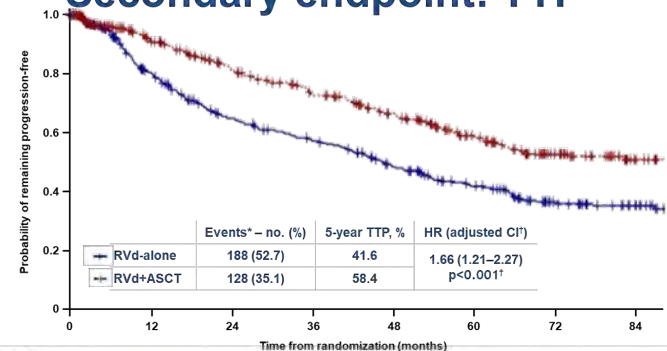
DETERMINATION: Endpoint Readouts (Median follow-up 70 months)

Primary endpoint: PFS



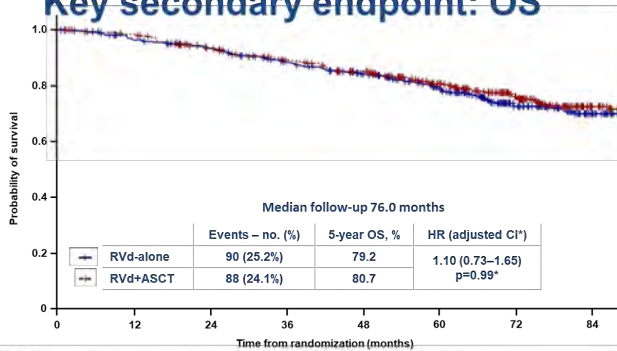
Patients at risk	0	12	24	36	48	60	72	84
RVD-alone	357	250	187	160	126	96	60	40
RVD+ASCT	365	276	226	191	160	118	77	42

Secondary endpoint: TTP



Patients at risk	0	12	24	36	48	60	72	84
RVD-alone	357	250	187	160	126	96	60	40
RVD+ASCT	365	276	226	191	160	118	77	42

Key secondary endpoint: OS



Patients at risk	0	12	24	36	48	60	72	84
RVD-alone	357	332	313	285	258	214	143	88
RVD+ASCT	365	353	324	300	275	228	165	95

Second primary malignancies

5-year cumulative incidence of SPMs (RVD-alone vs RVD+ASCT):

- All : 9.7% vs 10.8%
- Invasive: 4.9% vs 6.5%
- Hematologic: 1.59% vs 3.52%

At time of data cutoff, among patients on the RVD-alone and RVD+ASCT arms who had hematologic SPMs, respectively:

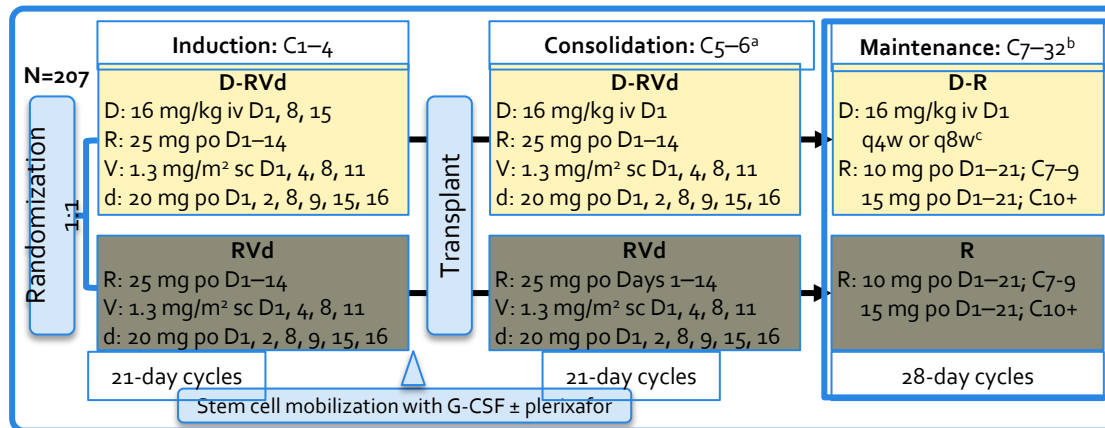
- 6/7 vs 2/3 patients with ALL alive
- 6/10 patients with AML/MDS alive
- 1/2 patients with CLL/CML alive
- Overall, 7/9 RVD-alone vs 8/13 RVD+ASCT alive

SPMs	RVD-alone (N=357)	RVD+ASCT (N=365)
Any, %	10.4	10.7
Any invasive SPM, %	5.3	6.8
Any hematologic SPM, %	2.5	3.6
ALL, n	7	3
AML/MDS, n	0	10
CLL/CML, n	2	0
Any solid tumor SPM, %	3.4	3.3
Any non-invasive solid tumor SPM, %	0	0.5
Any non-melanoma skin cancer, %	5.9	4.1

GRIFFIN: Daratumumab Plus Lenalidomide, Bortezomib, and Dexamethasone in Transplant-Eligible NDMM – 24 Months of Maintenance

Study design

Key eligibility criteria: TE NDMM; 18–70 years; ECOG PS 0–2; CrCl ≥ 30 mL/min²



- **Primary endpoint:** sCR by end of consolidation
- **Secondary endpoints:** MRD negativity (NGS 10⁻⁵), ORR, \geq VGPR, CR, PFS, OS

Patient disposition

n (%)	D-RVd (n=104)	RVd (n=103)
Treated with maintenance therapy	90 (87)	70 (68)
Completed maintenance therapy	67 (64)	44 (43)
Discontinued treatment during maintenance therapy	21 (20)	21 (20)
Adverse event	8 (8)	7 (7)
Progressive disease	3 (3)	7 (7)
Patient withdrawal	2 (2)	4 (4)
Lost to follow-up	2 (2)	0
Death	1 (1)	1 (1)
Other	5 (5)	2 (2)

^aConsolidation initiated 60–100 days post transplant; ^bPatients who complete maintenance cycles 7–32 may continue single-agent lenalidomide thereafter; ^cProtocol amendment allowed q4w dosing option. Phase 2 trial – patient enrollment between December 2016 and April 2018

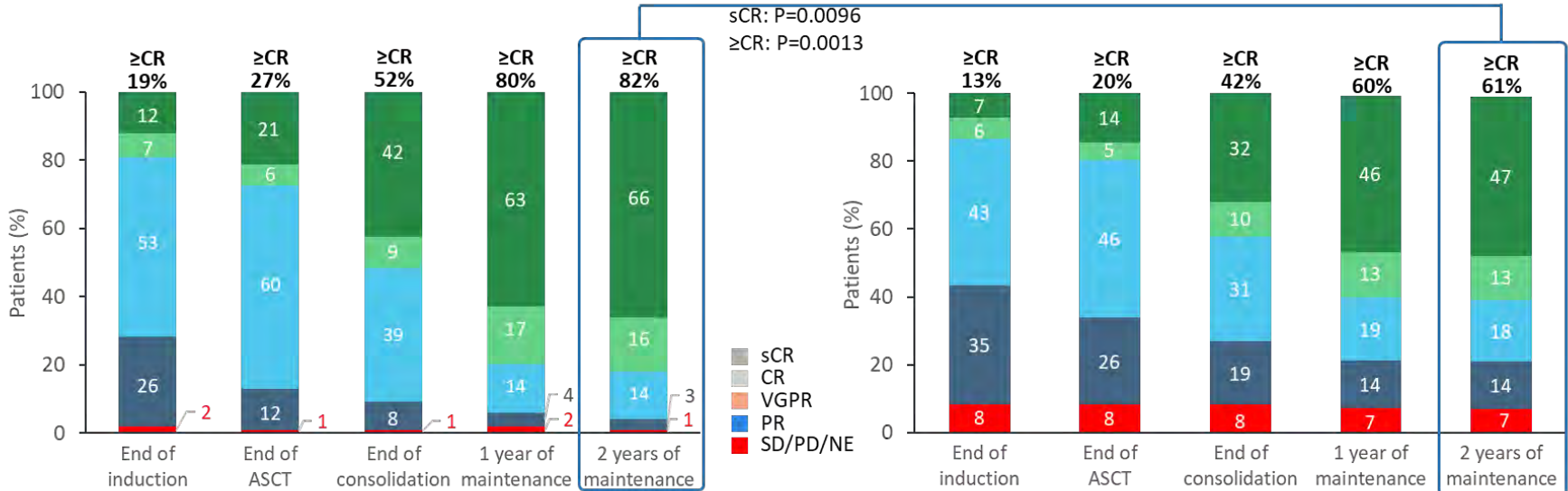
Laubach JP, et al. ASH 2021, Virtual Meeting. Abstract 79

GRIFFIN: Daratumumab Plus Lenalidomide, Bortezomib, and Dexamethasone in Transplant-Eligible NDMM – 24 Months of Maintenance

Clinical response

D-RVd

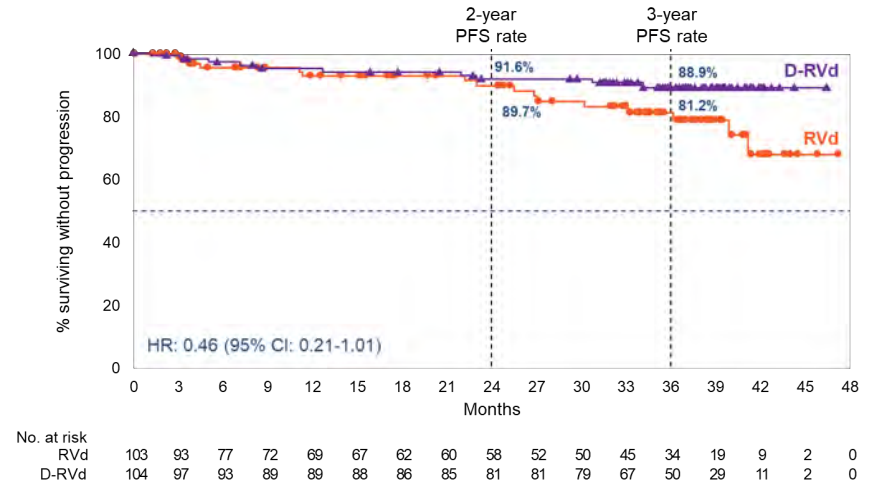
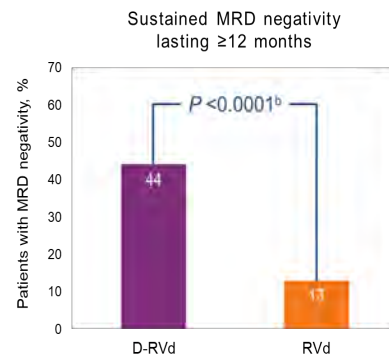
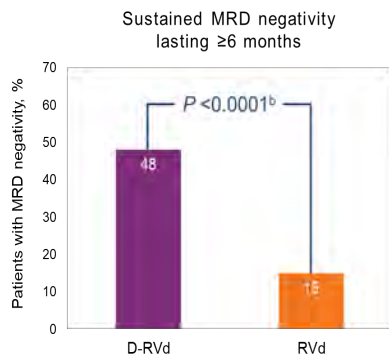
RVd





GRIFFIN Update: MRD and PFS Data

- 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
- Median PFS was not reached in either group
- There is a positive trend toward improved PFS for D-RVd/DR versus RVd/R
- The separation of the PFS curves begins beyond 1 year of maintenance and suggests a benefit of prolonged DR therapy

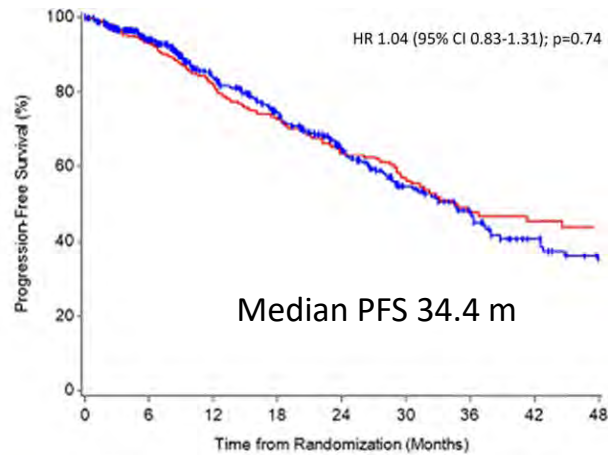
^aThe threshold of MRD negativity was defined as 1 tumor cell per 10^5 white cells. MRD status was based on BM aspirates by NGS per IMWG. ^bP values calculated by Fisher's exact test

Laubach et al. ASH 2021. Abstract 79.



Impact of PI/IMiD Maintenance in High-Risk MM

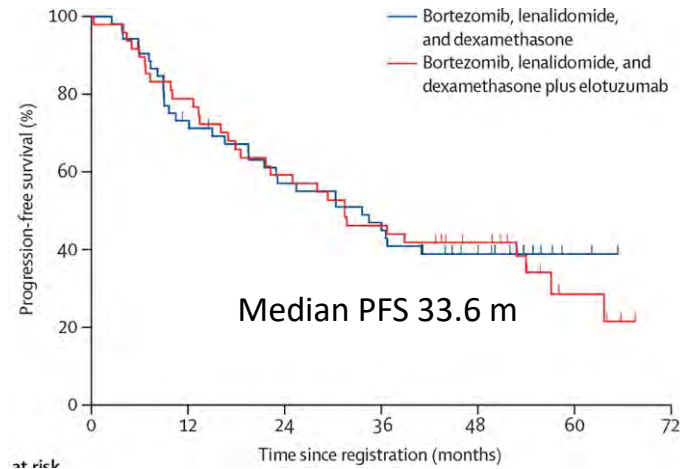
Standard Risk



KRd	545	(0)	401	(114)	252	(227)	187	(267)	127	(304)	83	(331)	59	(345)	38	(358)	25	(366)
VRd	542	(0)	376	(132)	243	(227)	183	(261)	114	(311)	73	(342)	43	(362)	31	(372)	26	(376)

ENDURANCE: VRd or KRd with len maintenance
Kumar S et al Lancet Oncol 2021

High Risk

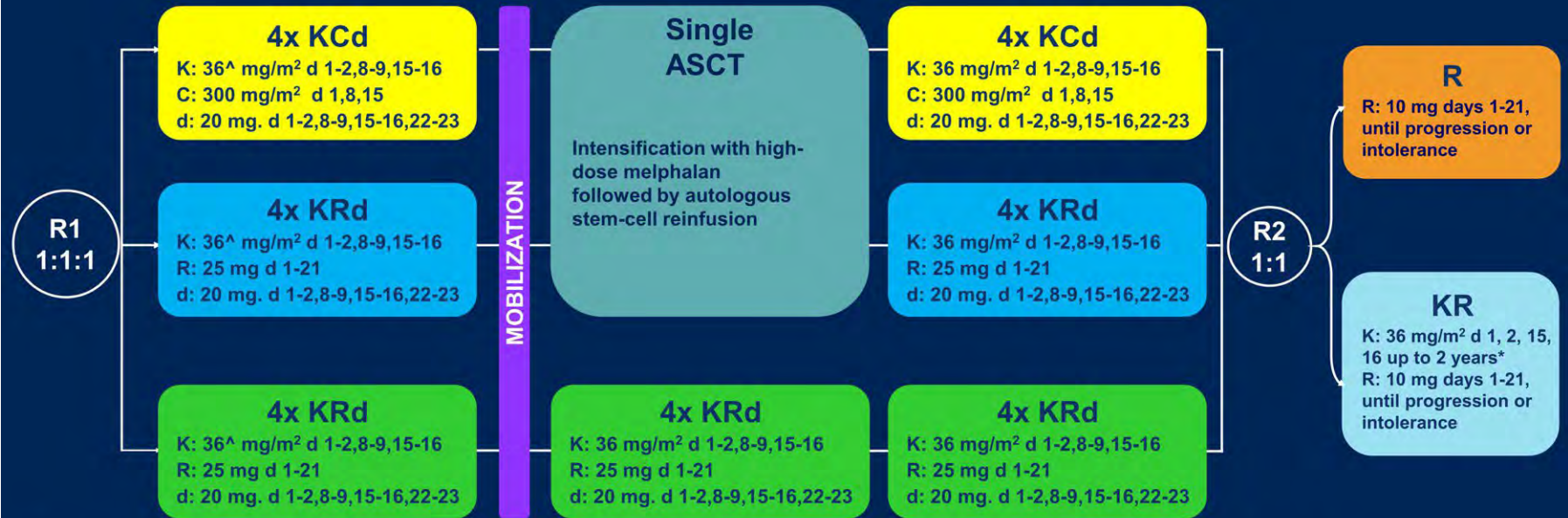


S1211: Elo VRd or VRd with VR maintenance
Usmani SZ et al Lancet Haematol 2021



Trial design

474 NDMM patients, transplant-eligible and younger than 65 years



[^]20 mg/m² on days 1-2, cycle 1 only. *Carfilzomib 70 mg/m² days 1, 15 every 28 days up to 2 years for patients that have started the maintenance treatment from 6 months before the approval of Amendment 5.0 onwards.

NDMM, newly diagnosed multiple myeloma; R1, first randomization (induction/consolidation treatment); R2, second randomization (maintenance 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.

Presented By: **Francesca Gay**

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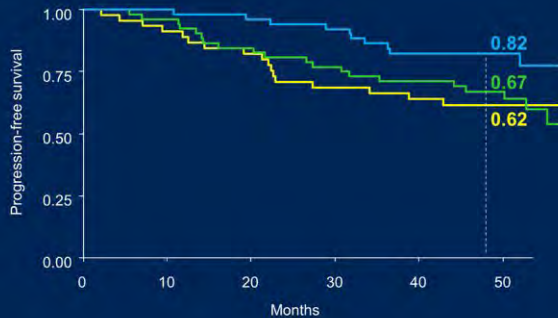


Progression-free survival: Random 1

KRd_ASCT vs. KRd12 vs. KCd_ASCT

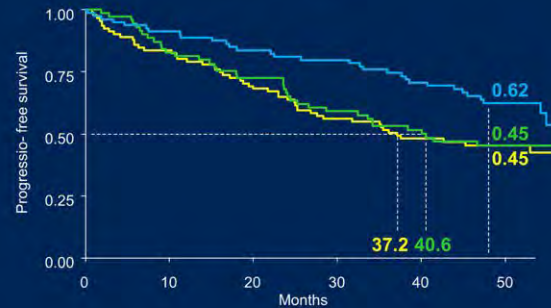
Median follow-up from Random 1: 51 months (IQR 46-55)

Standard risk
(N=153)



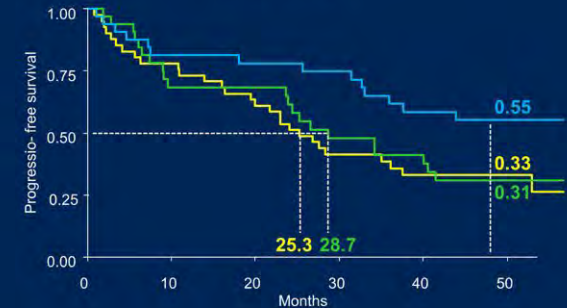
KRd_ASCT vs. KCd_ASCT: HR 0.44, p=0.04
 KRd_ASCT vs. KRd12: HR 0.46, p=0.04
 KRd12 vs. KCd_ASCT: HR 0.96, p=0.9

High risk
(N=243)



KRd_ASCT vs. KCd_ASCT: HR 0.57, p=0.01
 KRd_ASCT vs. KRd12: HR 0.6, p=0.04
 KRd12 vs. KCd_ASCT: HR 0.95, p=0.8

Double hit
(N=105)



KRd_ASCT vs. KCd_ASCT: HR 0.49, p=0.03
 KRd_ASCT vs. KRd12: HR 0.53, p=0.07
 KRd12 vs. KCd_ASCT: HR 0.91, p=0.75

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.

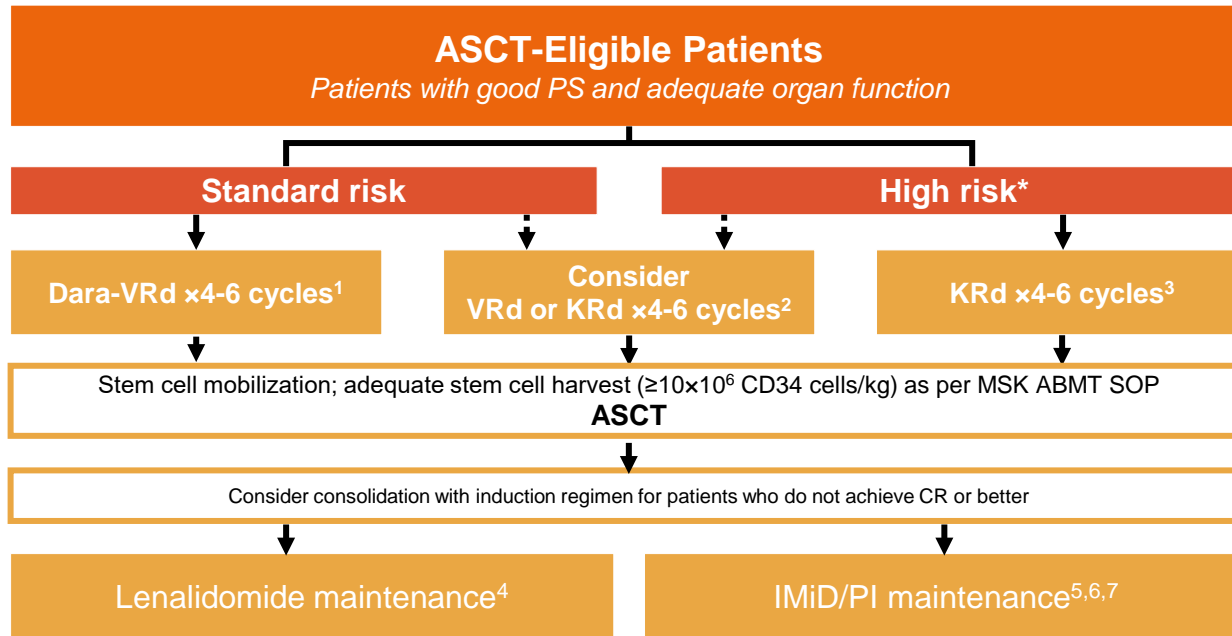
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MSK Approach to Transplant Eligible NDMM

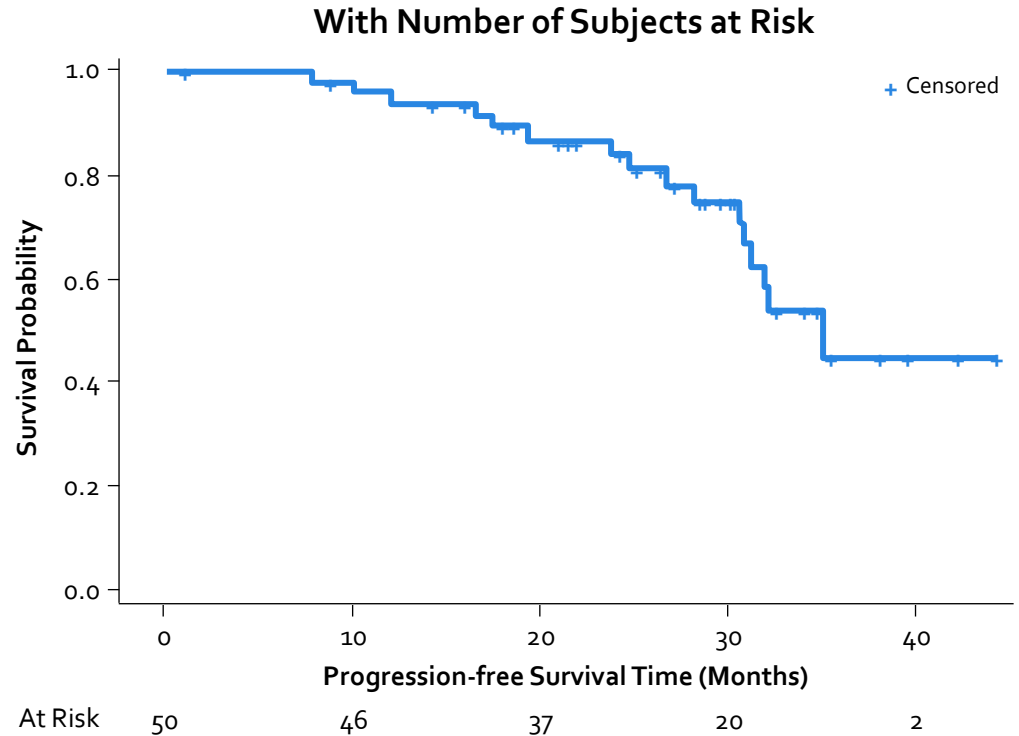


- ASCT, autologous stem cell transplant; CR, complete response; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; IMiD, immunomodulatory drug; PI, proteasome inhibitor; PS, performance status; Tx, treatment.
- *By R-ISS staging (R-ISS II/III) and/or cytogenetics (t(4;14), t(14;16), or del[17p]), elevated LDH, primary plasma cell leukemia
- 1. Attal. *NEJM*. 2017;376:1311. 2. Voorhees PM. *Blood* 2020. Gay. *ASH* 2020. Abstr 294. 4. McCarthy. *J Clin Oncol*. 2017;35:3279. 5. Nooka. *Leukemia*. 2014;28:690. 6. Dimopoulos. *ASH* 2018. Abstr 301. 7. Usmani. *Lancet Haematol*. 2021 Jan;8(1):e45-e54.



RVd-Lite

- Regimen (N=53)
 - Lenalidomide: 15 mg po days 1 to 21
 - Bortezomib: 1.3 mg/m² SC 1x weekly on days 1, 8, 15, 22
 - Dexamethasone
 - If ≤75 years, 20 mg 2x weekly
 - If >75 years, 20 mg 1x weekly
- Results
 - 86% ORR
 - 66% ≥VGPR
 - Median PFS: 35.1 months
 - Median OS: NR
 - Median follow-up: 30 months
 - Median age: 73 years (range: 65-91)
 - PN: 62%
 - Only 1 patient had grade 3 symptoms

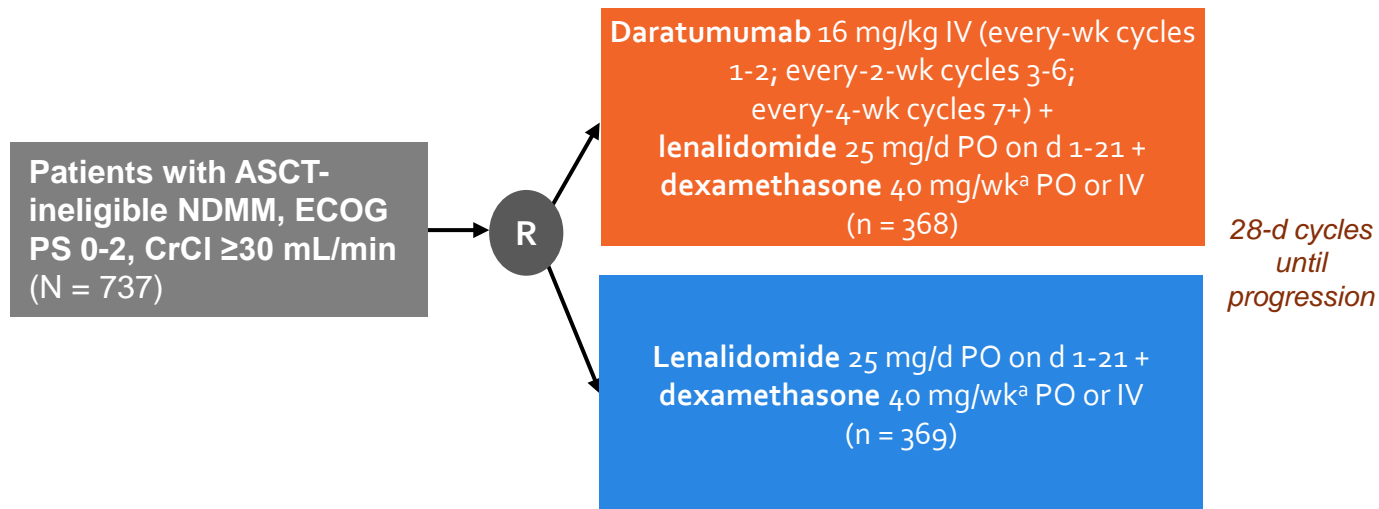


• PN, peripheral neuropathy.
O'Donnell et al. *Br J Haematol.* 2018;182:222-230.



Phase 3 MAIA Study: Daratumumab Plus Rd in NDMM

- Stratified by ISS (I vs II vs III), region (North America vs other), and age (<75 vs ≥75 y)
- **Primary endpoint:** PFS
- **Secondary endpoints:** ≥ CR rate, ≥ VGPR rate, MRD negativity, ORR, OS, and safety



^a Reduced to 20 mg/wk if aged >75 y or BMI <18.5.
Facon T et al. *N Engl J Med.* 2019;380:2104-2115.

Demographics and Baseline Characteristics (ITT)

	D-Rd (n = 368)	Rd (n = 369)
Age		
Median (range), y	73 (50-90)	74 (45-89)
Distribution, n (%)		
<65 y	4 (1)	4 (1)
65-<70 y	74 (20)	73 (20)
70-<75 y	130 (35)	131 (36)
≥75 y	160 (43)	161 (44)
Male, n (%)	189 (51)	195 (53)
ECOG PS score,^a n (%)		
0	127 (35)	123 (33)
1	178 (48)	187 (51)
2 ^b	63 (17)	59 (16)
ISS stage,^c n (%)		
I	98 (27)	103 (28)
II	163 (44)	156 (42)
III	107 (29)	110 (30)

	D-Rd (n = 368)	Rd (n = 369)
Type of measurable disease, n (%)		
IgG	225 (61)	231 (63)
IgA	65 (18)	66 (18)
Other ^d	9 (2)	10 (3)
Detected in urine only	40 (11)	34 (9)
Detected as serum-free light chain only	29 (8)	28 (8)
Cytogenetic profile,^e n/total n (%)		
Standard risk	271/319 (85)	279/323 (86)
High risk	48/319 (15)	44/323 (14)
Median time since initial diagnosis of MM (range), months	0.95 (0.1-13.3)	0.89 (0-14.5)

Demographics and baseline characteristics were well balanced between arms

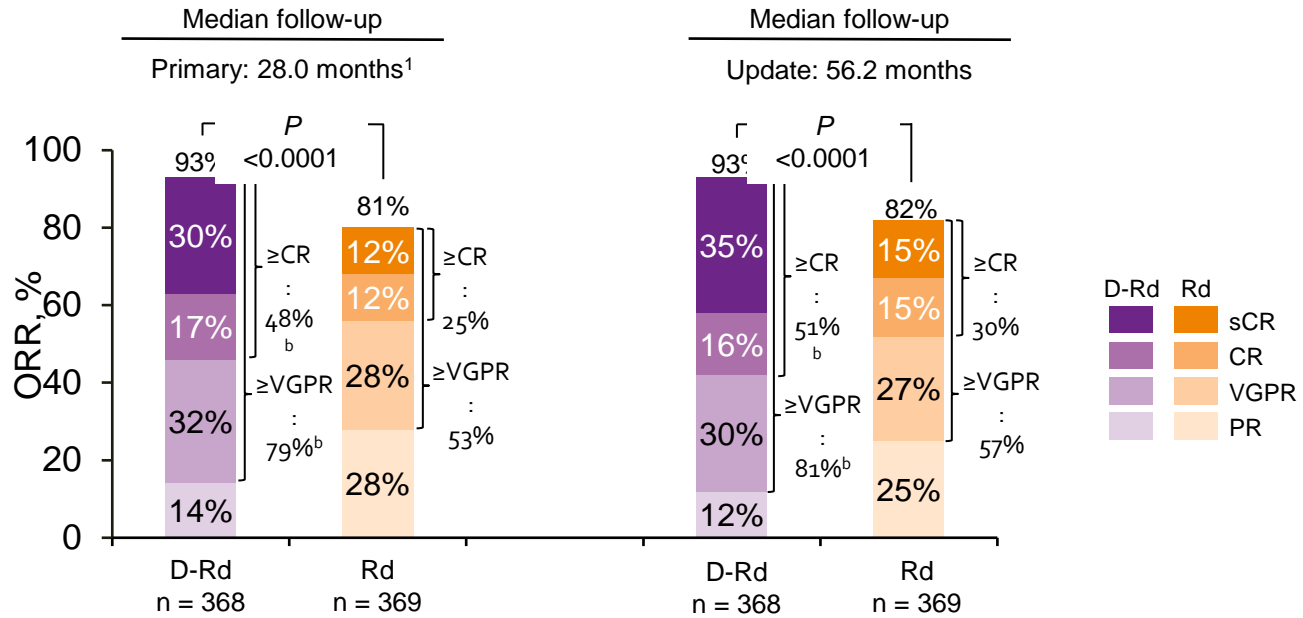
ITT, intention-to-treat.

^aECOG PS is scored on a scale from 0 to 5, with 0 indicating no symptoms and higher scores indicating increasing disability. ^b2 patients had an ECOG PS score >2 (1 patient each with an ECOG PS score of 3 and 4). ^cISS stage is derived based on the combination of serum β_2 -microglobulin and albumin; higher stages indicate more severe disease. ^dIncludes IgD, IgE, IgM, and biclonal. ^eCytogenetic abnormalities were identified by fluorescence in situ hybridization or karyotype testing; high risk was defined as having a t(4;14), t(14;16), and/or del17p abnormality.

Note: percentages may not add up to 100% due to rounding.



MAIA Phase III ORR^a

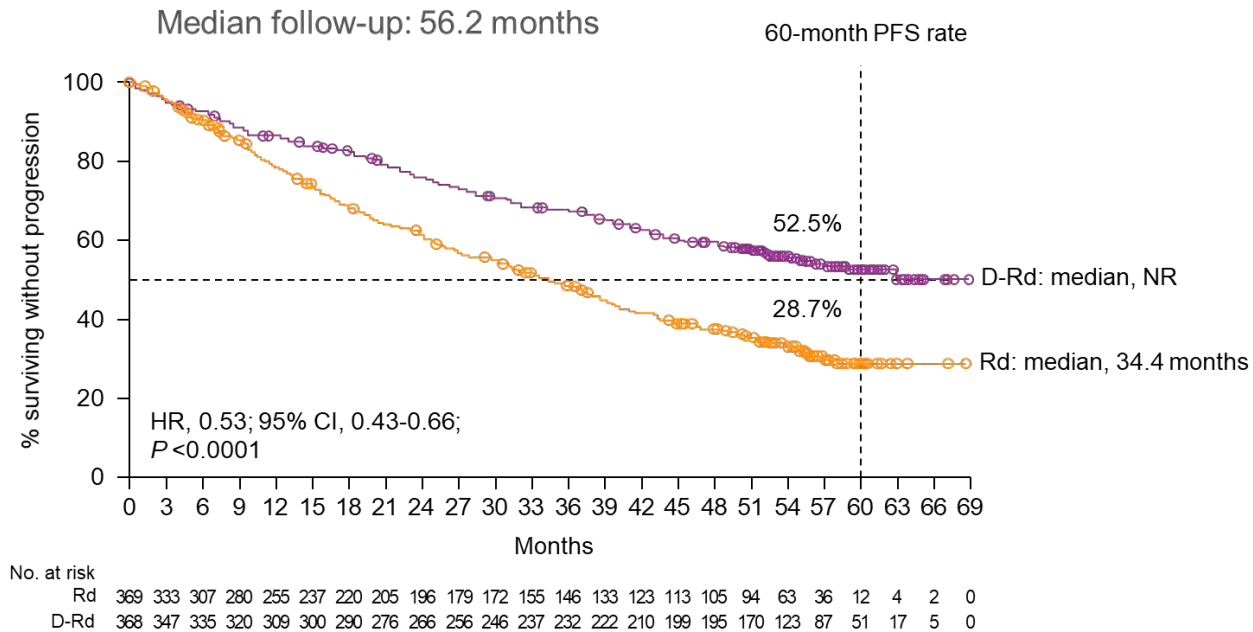


- D-Rd induced deeper responses, with significantly higher rates of ≥CR and ≥VGPR, compared with Rd
- With >28 months of additional follow-up, responses deepened with continued daratumumab therapy

VGPR, very good partial response; PR, partial response; OR, odds ratio.
^aITT population. ^bP < 0.0001; P values were calculated from the Cochran-Mantel-Haenszel Chi-Squared test.
 1. Facon T, et al. *N Engl J Med.* 2019;380(22):2104-2115.
 Note: percentages may not add up to the total due to rounding.



MAIA Phase III Updated PFS

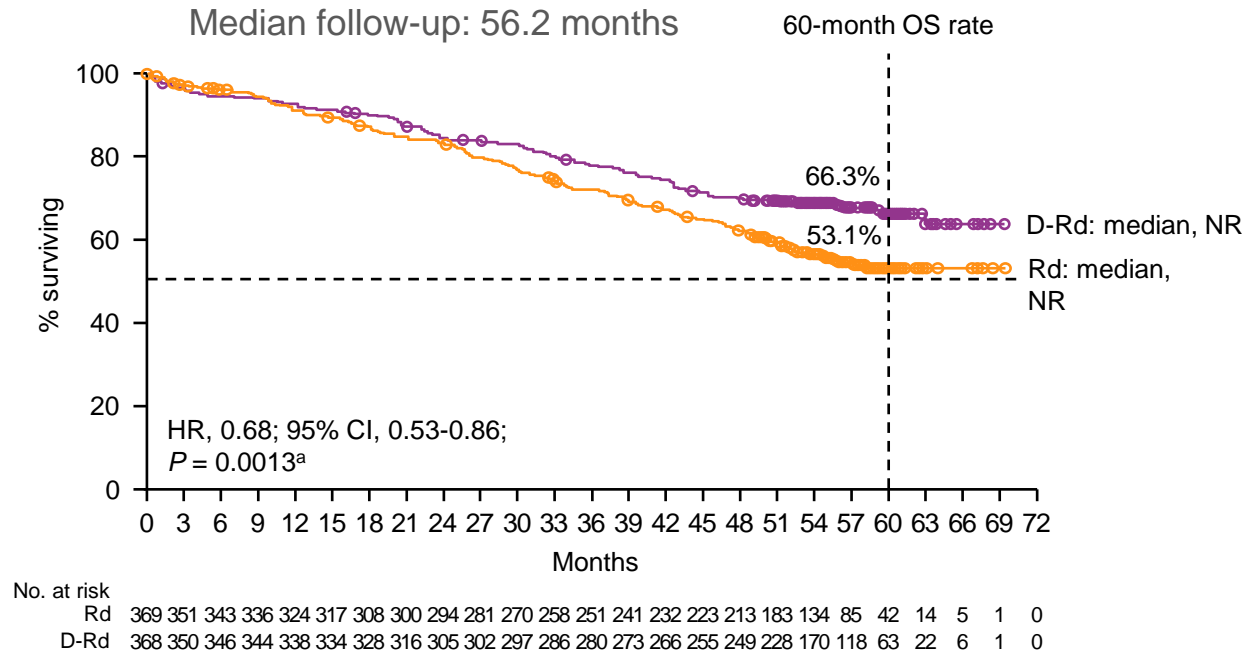


NR, not reached; CI, confidence interval.

- D-Rd continued to demonstrate a significant PFS benefit, with median PFS not reached with D-Rd
- These data provide a new PFS benchmark in patients with NDMM who are transplant ineligible



MAIA Phase III OS

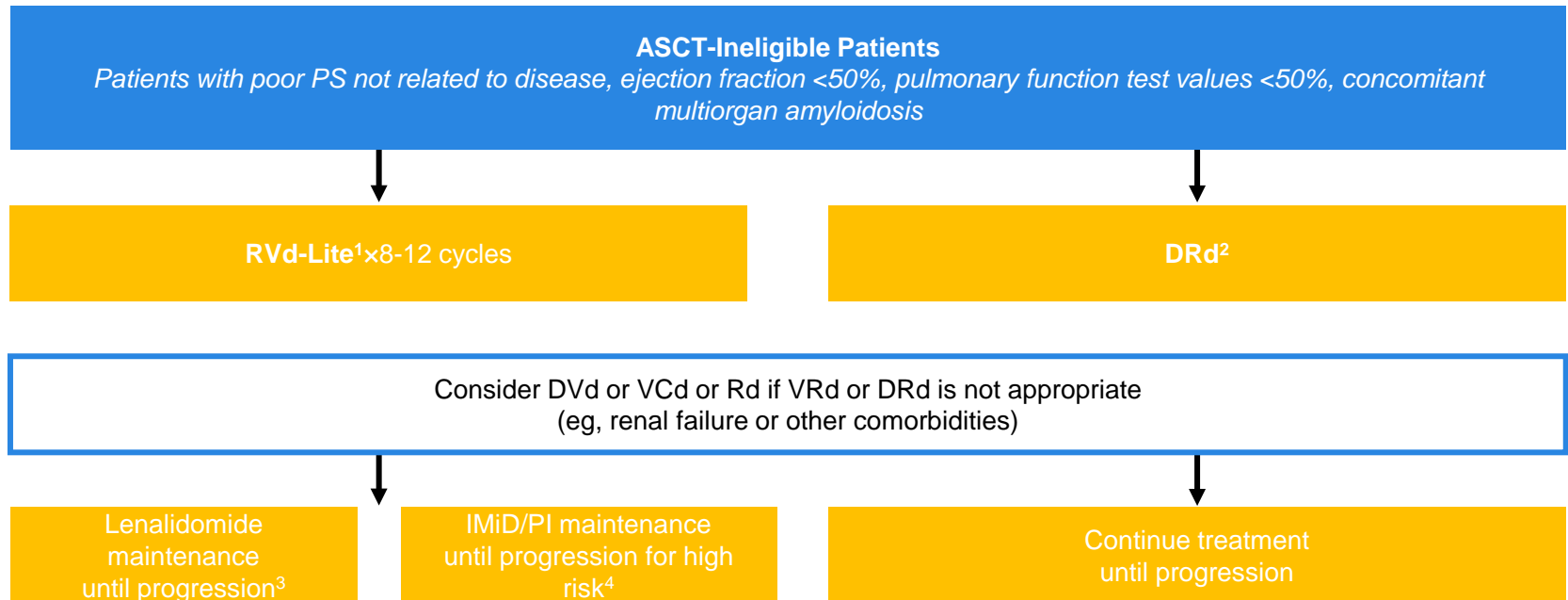


D-Rd demonstrated a significant benefit in OS, with a 32% reduction in the risk of death, in patients with NDMM who are transplant ineligible

^a $P = 0.0013$ is statistically significant, crossing the prespecified stopping boundary of $P = 0.0414$.



MSK Approach to Transplant Ineligible NDMM



- DRd, daratumumab, lenalidomide, and dexamethasone; DVd, daratumumab, bortezomib, and dexamethasone; VRd-Lite, modified VRd regimen.
- Adjust dosing of lenalidomide based on renal function. Consider empiric age-adjusted dose reductions for all regimens, as needed.⁴
- 1. O'Donnell. *Br J Haematol.* 2018;182:222. 2. Facon. *ASH* 2018. Abstr LBA-2. 3. Larocca. *ASH* 2018. Abstr 305. 4. Usmani. *Lancet Haematol.* 2021 Jan;8(1):e45-e54.



Waldenstrom's Macroglobulinemia



Incipient myelomatosis or «essential» hyperglobulinemia with fibrinogenopenia — a new syndrome?

By

JAN WALDENSTRÖM.

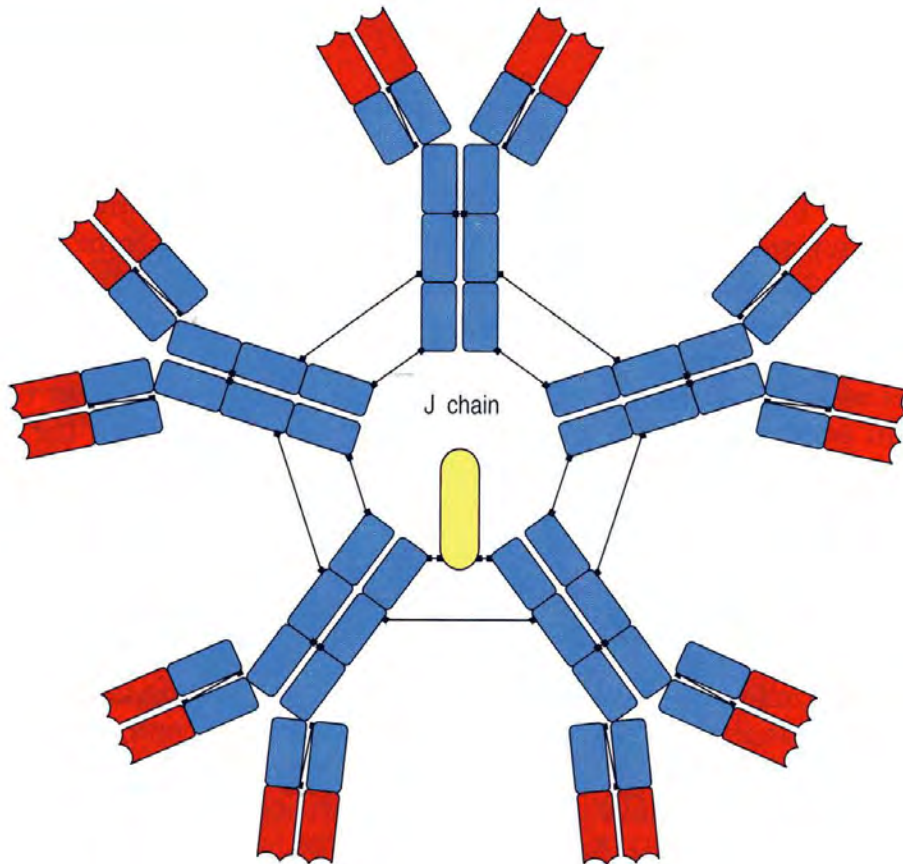
Submitted for publication September 2, 1943.

The real nature of myelomatosis.

The title of this paper may at first seem somewhat surprising. The myeloma has of old had a reputation as a well defined clinical entity. With the aid of the typical changes on the X-ray film and guided by the examination of the cells from a sternal puncture the diagnosis should therefore be easy and there ought not to be found any serious diagnostical troubles. In the following I am going to give a description of two cases, who have several symptoms suggesting myelomatosis but also show decided differences. They are very much alike even as regards details in the chemistry of the blood proteins and it seems probable according to my opinion, that they suffer from the same malady. A third case very much resembles these two patients but also shows other signs. that do not fit in



Pentameric IgM



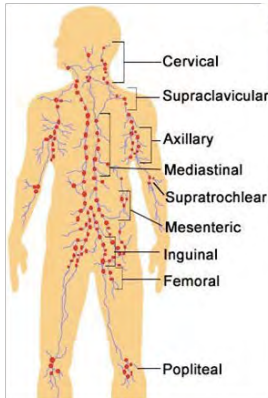
80-90% sIgM
retained in
intravascular space



Manifestations of WM Disease



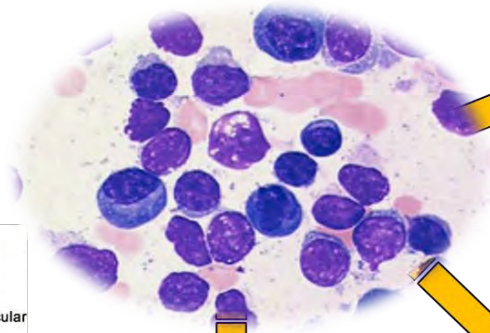
Bing Neel
Syndrome



≤20% at diagnosis;
50-60% at relapse.

Bone Marrow

↓Hb>>> ↓PLT> ↓WBC




Hepcidin
↓Fe Anemia



Hyperviscosity Syndrome:
Epistaxis, Headaches
Impaired vision
>6,000 mg/dL or >4.0 CP



Cold Agglutininemia (5%)
Cryoglobulinemia (10%)
IgM Neuropathy (22%)
Amyloidosis (10-15%)

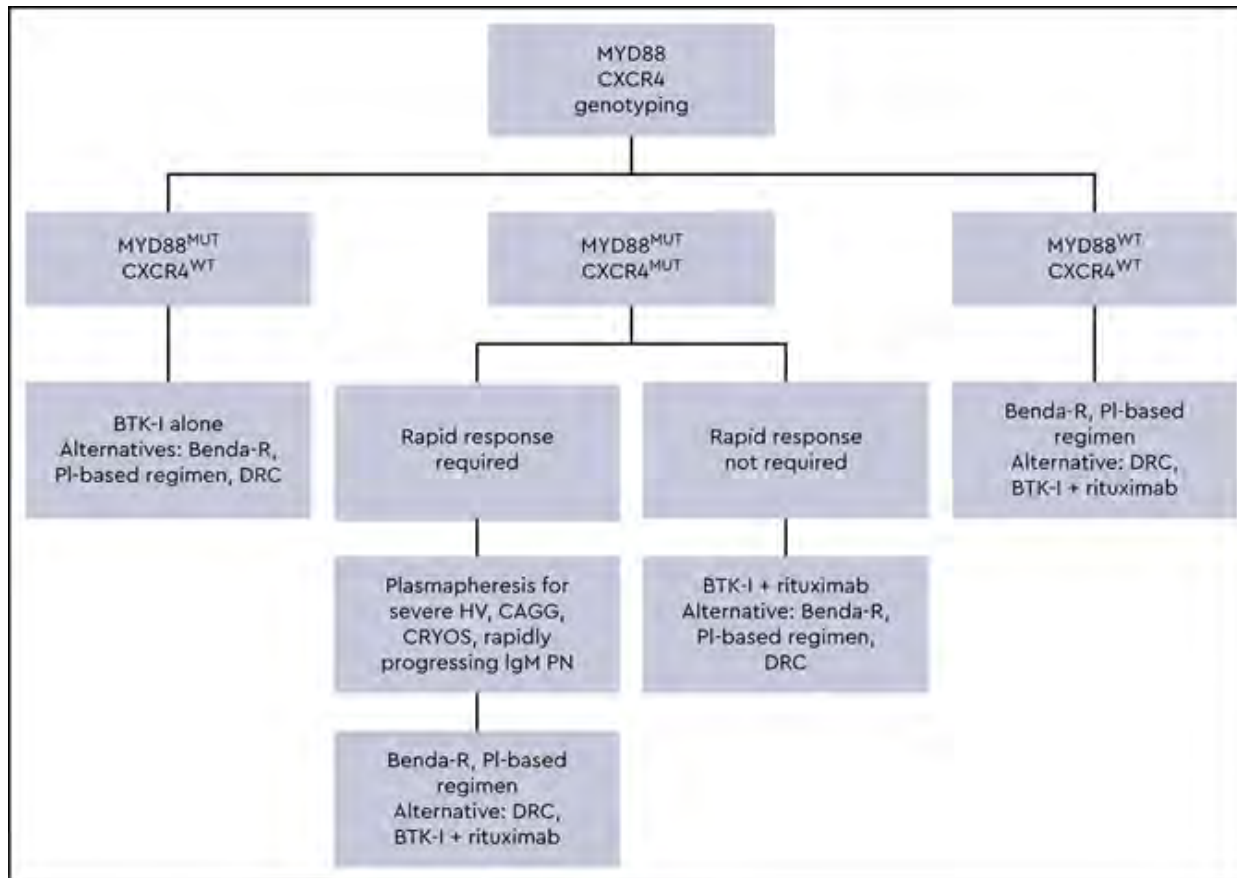


NCCN Guidelines for Initiation of Therapy in WM

- Hb \leq 10 g/dL on basis of disease
- PLT $<$ 100,000 mm³ on basis of disease
- Symptomatic hyperviscosity
- Moderate/severe peripheral neuropathy
- Symptomatic cryoglobulins, cold agglutinins, auto-immune related events, amyloid.

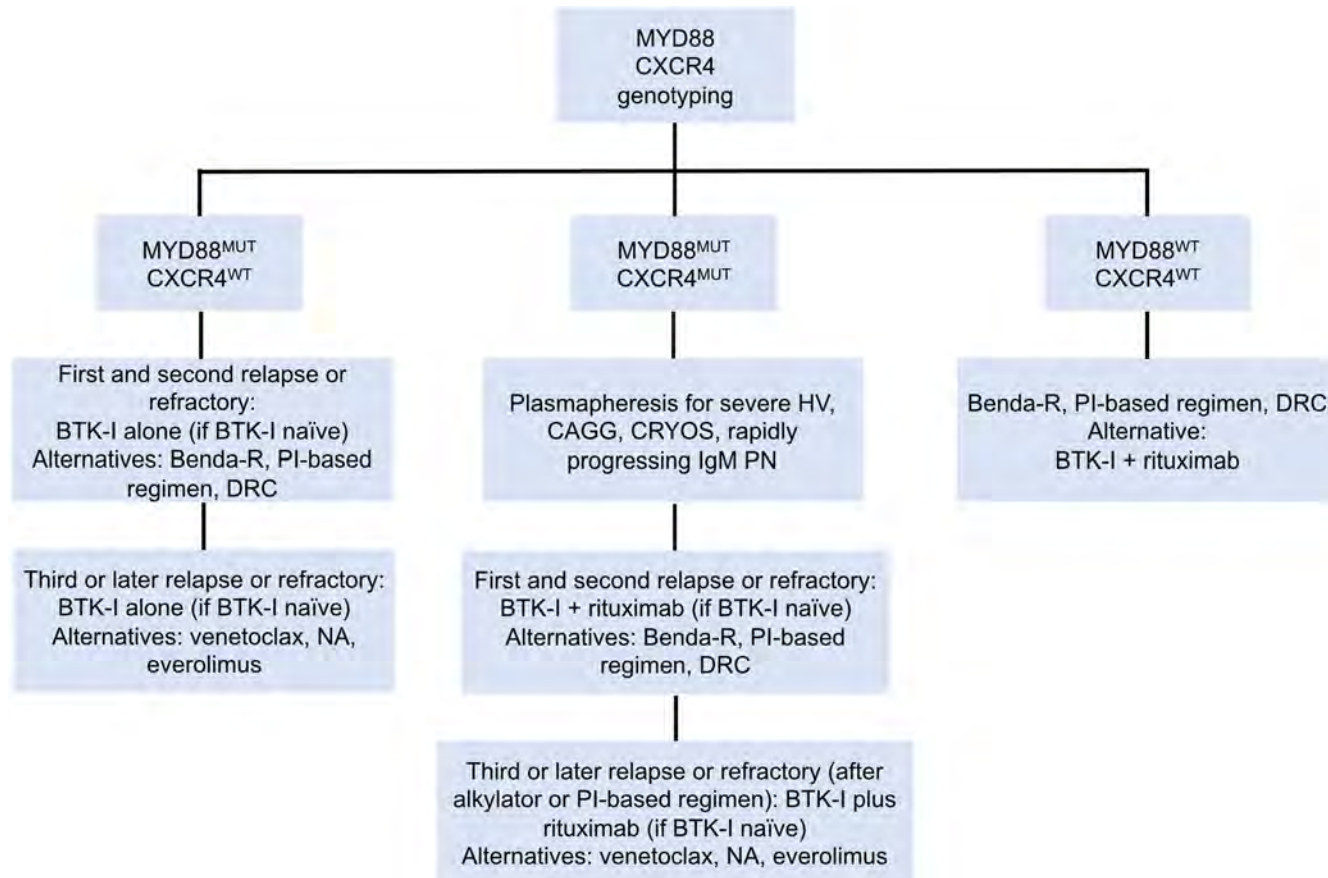


Front Line Therapy





Therapy at Relapse



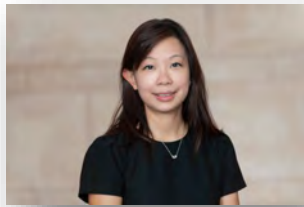


Memorial Sloan Kettering
Cancer Center

MSKCC Myeloma Service



Saad Z. Usmani (Chief)
High-Risk Disease , Disparities
TCE, CAR T Cells
Checkpoint Inhibitors
Developmental Therapeutics



Carlyn Tan
MM Precursor diseases
Supportive Care
Bone Health



Urvi Shah
MM Precursor Disease
Nutrition & Modifiable
Risk Factors
Early Relapse



Kylee Maclachlan
MM Precursor Disease,
NDMM Trials
Genomics, Immune
Profiling



Neha Korde
NDMM Clinical Trials
Digital Wearables
Supportive Care



Alex Lesokhin
RRMM Immunotherapy
TCE, Checkpoints Inhibitors
Neoantigens
Microbiota, Immune
Profiling



Hani Hassoun
MM Supportive Care
Alliance Liaison
NDMM/RRMM Trials
Elderly and Frail



Sham Mailankody
RRMM Trials with
CAR T Cells
High-Risk Disease



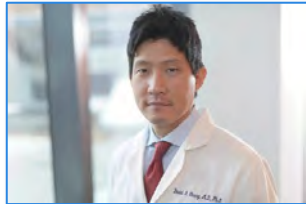
Malin Hultcrantz
RRMM Trials in TCR
Antibody drug conjugates
Epidemiology



MSKCC Myeloma TCT Program



Sergio Giralt
Allo/Auto HCT for
MM
New Regimens
CAR T Cells



David Chung
T Cell exhaustion
Auto HCT + Vaccines
MM Immunotherapies



Gunjan Shah
HCT Toxicities
Precision Drug Dosing
CAR T Cells
Salvage Auto and Allo HCT



Saad Z. Usmani
High-Risk Disease Biology/Trials
CAR T Cells
Auto HCT for MM



Michael Scordo
HCT Toxicities
Precision Drug Dosing
CAR T Cells



Heather Landau
Amyloidosis
HCT Toxicities
Homebound HCT
Precision Drug Dosing
Novel Regimens for Salvage
Auto



Oscar Lahoud
Auto HCT and CAR T Cells
Post HCT Therapies