

Long-Term Outcomes With Daratumumab, Bortezomib, Lenalidomide, and Dexamethasone (DVRd) Versus VRd in Transplant-Eligible Newly Diagnosed Multiple Myeloma (TE-NDMM) in the Phase 3 PERSEUS Study

Pieter Sonneveld,^{1,2} Mario Boccadoro,³ Meletios A. Dimopoulos,^{4,5} Hermann Einsele,⁶ Hang Quach,⁷ P. Joy Ho,⁸ Meral Beksac,⁹ Cyrille Hulin,¹⁰ Elisabetta Antonioli,¹¹ Xavier Leleu,¹² Silvia Mangiacavalli,¹³ Aurore Perrot,¹⁴ Michele Cavo,¹⁵ Angelo Belotti,¹⁶ Francesca Gay,¹⁷ Roberto Mina,¹⁸ Inger S. Nijhof,^{19,20} Niels W.C.J. van de Donk,¹⁹ Eirini Katodritou,²¹ Fredrik Schjesvold,²² Anna Sureda Balari,²³ Laura Rosiñol,²⁴ Michel Delforge,²⁵ Wilfried Roeloffzen,²⁶ Tobias Silzle,²⁷ Annette Vangsted,²⁸ Andrew Spencer,²⁹ Roman Hajek,³⁰ Artur Jurczyszyn,³¹ Yanfang Liu,³² Diego Vieyra,³³ Alba Touzzo,³³ Carla J. de Boer,³⁴ Fredrik Borgsten,³⁵ Anna Sitthi-Amorn,³³ Melissa Rowe,³⁶ Robin Carson,³³ Paula Rodriguez-Otero,³⁷ Joan Bladé,²⁴ Philippe Moreau³⁸

¹Department of Hematology, Erasmus MC Cancer Institute, Rotterdam, the Netherlands; ²European Myeloma Network, Rotterdam, the Netherlands; ³European Myeloma Network, Italy; ⁴Department of Clinical Therapeutics, School of Medicine, National and Kapodistrian University of Athens; Athens, Greece; ⁵Department of Medicine, Korea University, Seoul, Republic of Korea; ⁶University Hospital Würzburg, Department of Internal Medicine II, Würzburg, Germany; ⁷University of Melbourne, St Vincent's Hospital, Melbourne, Australia; ⁸Institute of Haematology, Royal Prince Alfred Hospital & University of Sydney, Camperdown, Australia; ⁹Department of Hematology, Ankara Liv Hospital, Istinye University, Ankara, Turkey; ¹⁰Hôpital Haut Lévéque, University Hospital, Pessac, France; ¹¹Department of Hematology, Careggi Hospital and University of Florence, Florence, Italy; ¹²University of Poitiers, CHU and Inserm 1313, Poitiers, France; ¹³Hematology Division, IRCCS Fondazione Policlinico San Matteo, Pavia, Italy; ¹⁴Université de Toulouse, CHU de Toulouse Hématologie, IUCT-Oncopole, Toulouse, France; ¹⁵IRCCS Azienda Ospedaliero-Universitaria di Bologna, Istituto di Ematologia "Seràgnoli", Dipartimento di Medicina Specialistica, Diagnostica e Sperimentale, Università di Bologna, Bologna, Italy; ¹⁶Department of Hematology, ASST Spedali Civili di Brescia, Brescia, Italy; ¹⁷Division of Hematology, AOU Città della Salute e della Scienza di Torino, University of Torino and Department of Molecular Biotechnology and Health Sciences, University of Torino, Torino, Italy; ¹⁸Department of Hematology and Medical Oncology, Winship Cancer Institute, Emory University, Atlanta, GA, USA; ¹⁹Department of Hematology, Amsterdam University Medical Center, Vrije Universiteit Amsterdam, Amsterdam, the Netherlands; ²⁰Department of Hematology, St Antonius Hospital, Nieuwegein, the Netherlands; ²¹Department of Hematology, Theagenion Cancer Hospital, Thessaloniki, Greece; ²²Department of Hematology, Oslo University Hospital, Oslo, Norway; ²³Clinical Hematology Department, Institut Català d'Oncologia (ICO) – Hospitalet / Hospital Duran i Reynals, Barcelona, Spain; ²⁴Myeloma & Amyloidosis Unit, Hospital Clinic of Barcelona, Barcelona, Spain; ²⁵Department of Hematology, UZ Leuven/KU Leuven, Leuven, Belgium; ²⁶Hematology, University Medical Center Groningen (UMCG), Groningen, the Netherlands; ²⁷Medical Oncology & Hematology, Cantonal Hospital St. Gallen (KSSG), St. Gallen, Switzerland; ²⁸Department of Hematology, Rigshospitalet, Copenhagen University Hospital, University of Copenhagen, Copenhagen, Denmark; ²⁹Malignant Haematology and Stem Cell Transplantation Service, Alfred Health-Monash University, Melbourne, Australia; ³⁰Department of Hematooncology, University Hospital Ostrava and Faculty of Medicine, University of Ostrava, Ostrava, Czech Republic; ³¹Plasma Cell Dyscrasias Center, Department of Hematology, Jagiellonian University Medical College, Kraków, Poland; ³²Johnson & Johnson, Beijing, China; ³³Johnson & Johnson, Spring House, PA, USA; ³⁴Johnson & Johnson, Leiden, the Netherlands; ³⁵Johnson & Johnson, Raritan, NJ, USA; ³⁶Johnson & Johnson, High Wycombe, UK; ³⁷Departamento de Hematología, Clínica Universidad de Navarra; ³⁸Hematology Department, University Hospital of Nantes, Nantes, France

<https://www.congresshub.com/Oncology/IMS2026/Daratumumab/Sonneveld>

Scan the QR code

The QR code is intended to provide scientific information for individual reference, and the information should not be altered or reproduced in any way.



Disclosures

COI statement of the presenting author

- **Research funding:** Amgen, BMS, Celgene, Johnson & Johnson, Karyopharm Therapeutics
- **Consulting/advisory role:** Amgen, BMS, Celgene, Johnson & Johnson, Karyopharm Therapeutics, Pfizer



PERSEUS: Introduction

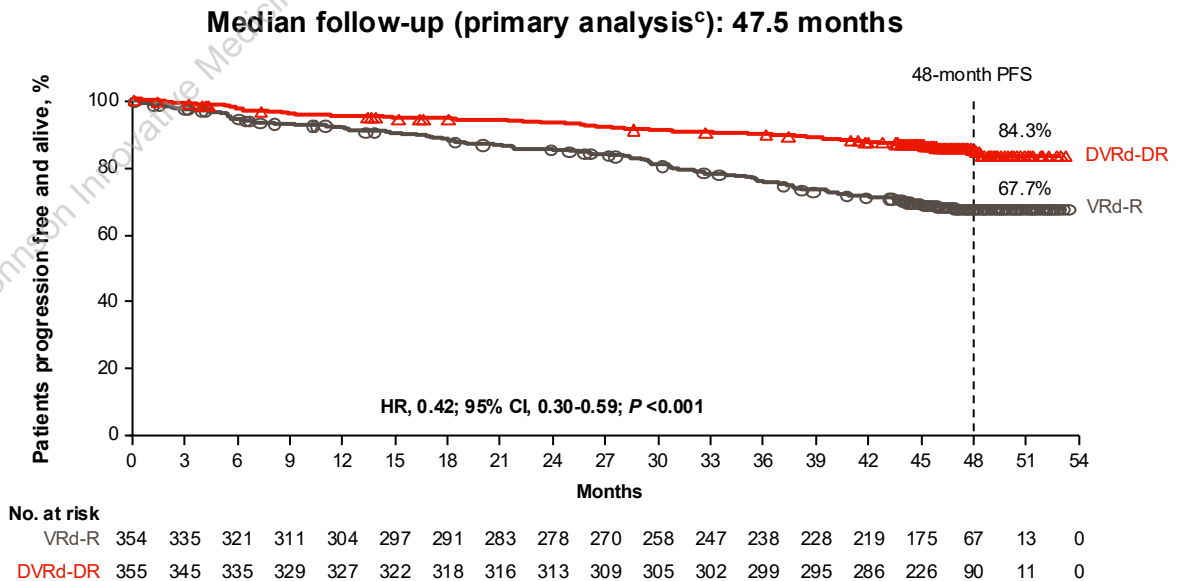
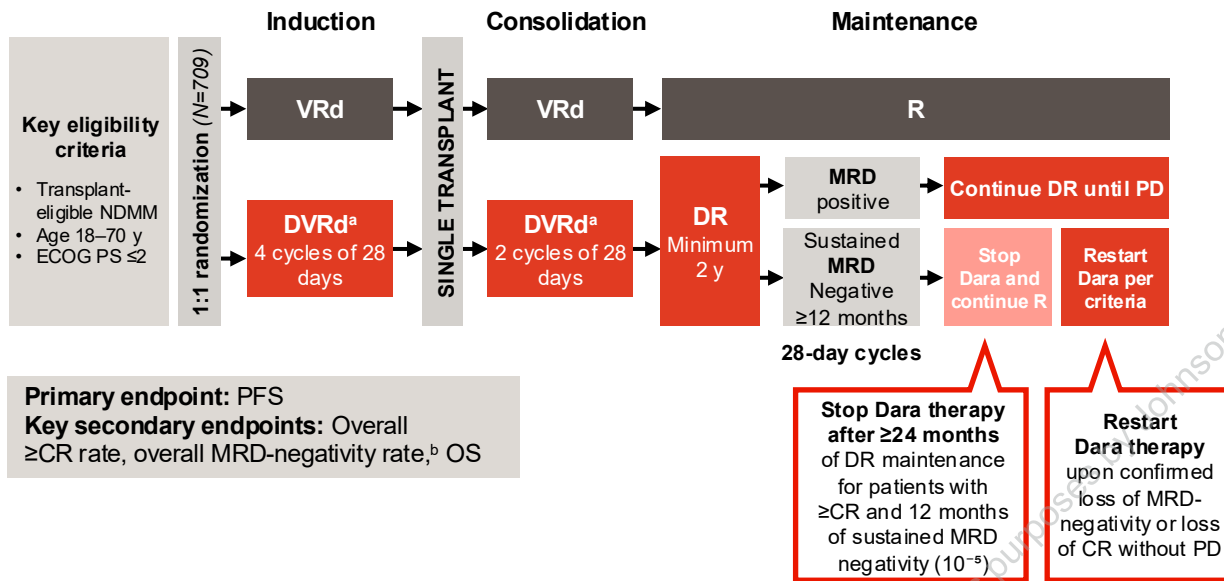
- PERSEUS established DVRd induction/consolidation followed by DR maintenance as a standard of care in TE-NDMM, improving depth of response and PFS versus VRd followed by R maintenance¹
- A projected PFS of 17.1 years (range, 13.2–21.2) with DVRd-DR suggests some patients may remain progression-free for prolonged periods; projections used NICE survival extrapolation guidance, capped by general population mortality data
- This long-term analysis provides almost 7 years of median follow-up and evaluates whether deeper and more sustained MRD-negativity rates translate into durable PFS and PFS2 benefit after protocol-defined MRD-guided daratumumab discontinuation

DR, daratumumab and lenalidomide; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; MRD, minimal residual disease; NICE, National Institute for Health and Care Excellence; PFS, progression-free survival; PFS2, progression-free survival on next line of therapy; R, lenalidomide; VRd, bortezomib, lenalidomide, and dexamethasone; TE-NDMM, transplant-eligible newly diagnosed multiple myeloma.

1. Sonneveld P, et al. *N Engl J Med*. 2024;390(4):301-313.



PERSEUS: DVRd-ASCT-DR as Standard of Care



58% reduction in the risk of progression or death in patients receiving DVRd

This long-term PFS analysis reports outcomes with ~3 years (34 months) of additional follow-up

^aDara 1,800 mg co-formulated with rHuPH20 (2,000 U/mL; ENHANZE® drug delivery technology, Halozyme, Inc., San Diego, CA, USA). ^bMRD was assessed using the clonoSEQ assay (v.2.0; Adaptive Biotechnologies, Seattle, WA, USA) in patients with ≥VGPR post-consolidation and at the time of suspected ≥CR. Overall MRD-negativity rate: proportion of patients who achieved both MRD negativity (10⁻⁵ threshold) and ≥CR at any time. ^cPrimary analysis clinical cutoff was August 1, 2023. ≥CR, complete response or better; Dara, daratumumab; DR, daratumumab and lenalidomide; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; ECOG PS, Eastern Cooperative Oncology Group performance status; IMS/IMWG, International Myeloma Society/International Myeloma Working Group; ISS, International Staging System; IV, intravenous; MRD, minimal residual disease; NDMM, newly diagnosed multiple myeloma; NGS, next-generation sequencing; OS, overall survival; PD, progressive disease; PFS, progression-free survival; PO, oral; QW, weekly; Q2W, every 2 weeks; Q4W, every 4 weeks; ≥VGPR, very good partial response or better; VRd, bortezomib, lenalidomide, and dexamethasone; y, years. Sonneveld P, et al. *N Engl J Med*. 2024;390(4):301-313.



PERSEUS: Disposition and Treatment Exposure

Disposition

n (%)	DVRd-DR (n=355)	VRd-R (n=354)
End of study		
Discontinued study	71 (20.0)	106 (29.9)
Reason for discontinuation (≥5%)		
Death	51 (14.4)	84 (23.7)
End of treatment^a		
Still on treatment ^a	216 (61.5)	88 (25.4)
Discontinued treatment ^a	135 (38.5)	259 (74.6)
Reason for discontinuation (≥5%)		
Adverse event	47 (13.4)	109 (31.4)
Progressive disease	43 (12.3)	94 (27.1)
Subject refused further study treatment	19 (5.4)	23 (6.6)

Treatment exposure

	DVRd-DR (n=355)	VRd-R (n=354)
Treatment duration, months, median (range)		
Total	68.7 (0.49–88.25)	42.2 (0.07–87.72)
Maintenance	63.8 (0.03–78.98)	39.8 (0.16–78.26)
Treatment cycles, n, median (range)		
Total	67.0 (1–92)	39.0 (1–91)
Maintenance	61.5 (1–86)	42.0 (1–85)

After almost 7 years of median follow-up, median duration of exposure was over 2 years longer in the DVRd-DR arm

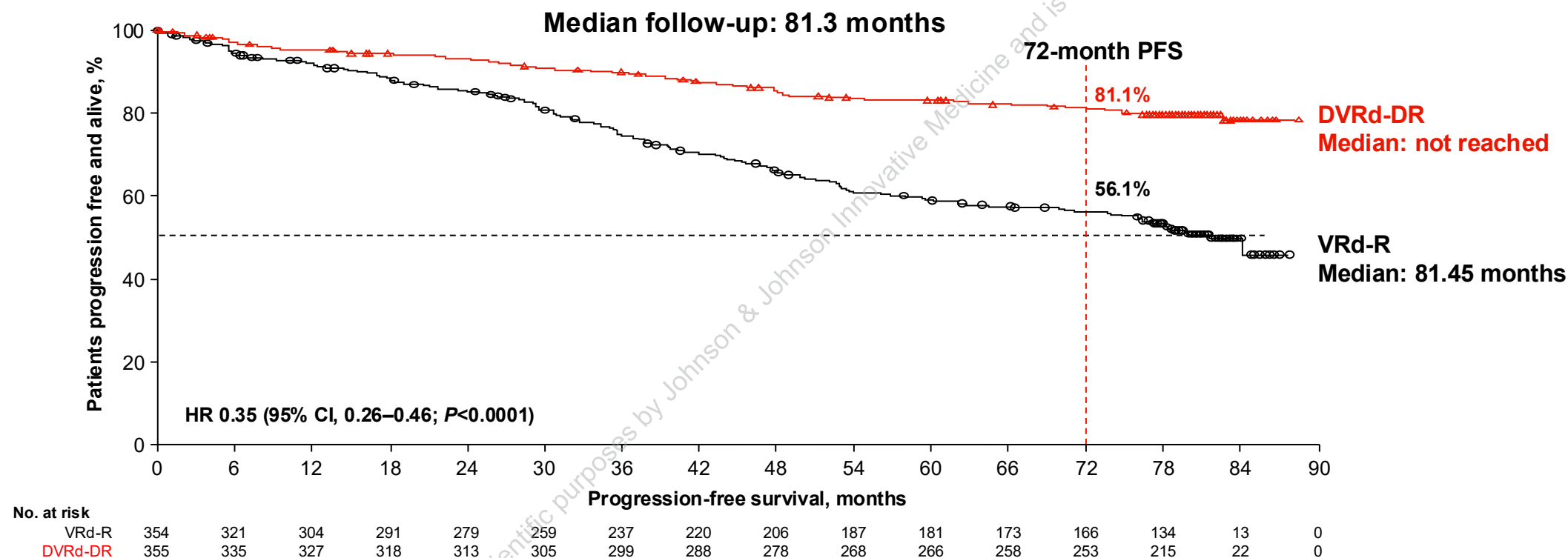
^aPercentages are calculated based on the number of subjects treated: DVRd-DR, n=351; VRd-R, n=347.

Median follow-up: 81.3 (0.03–88.3) months.

DR, daratumumab and lenalidomide; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; R, lenalidomide; VRd, bortezomib, lenalidomide, and dexamethasone.



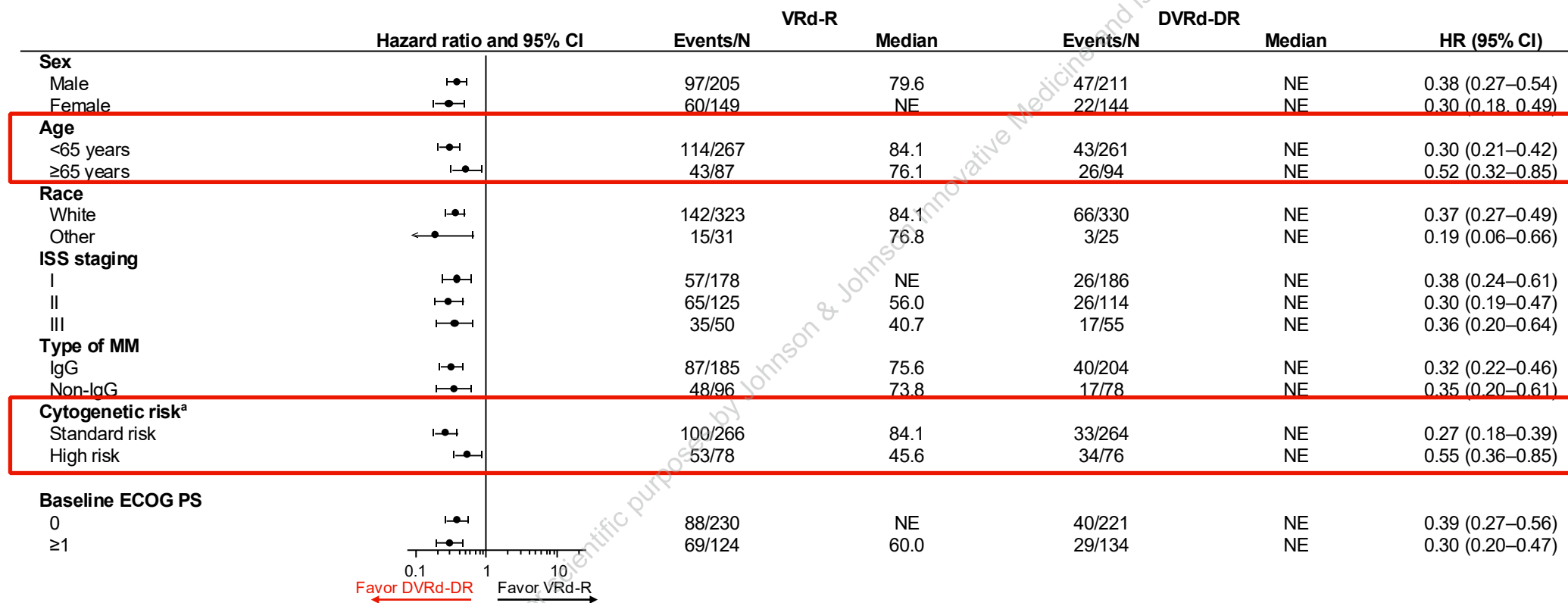
PERSEUS: Long-Term Progression-Free Survival



PFS benefit continued to favor DVRd-DR versus VRd-R; 72-month PFS rates were higher with DVRd-DR vs VRd-R (81.1% vs 56.1%)



PERSEUS: Progression-Free Survival in Clinically Relevant Subgroups

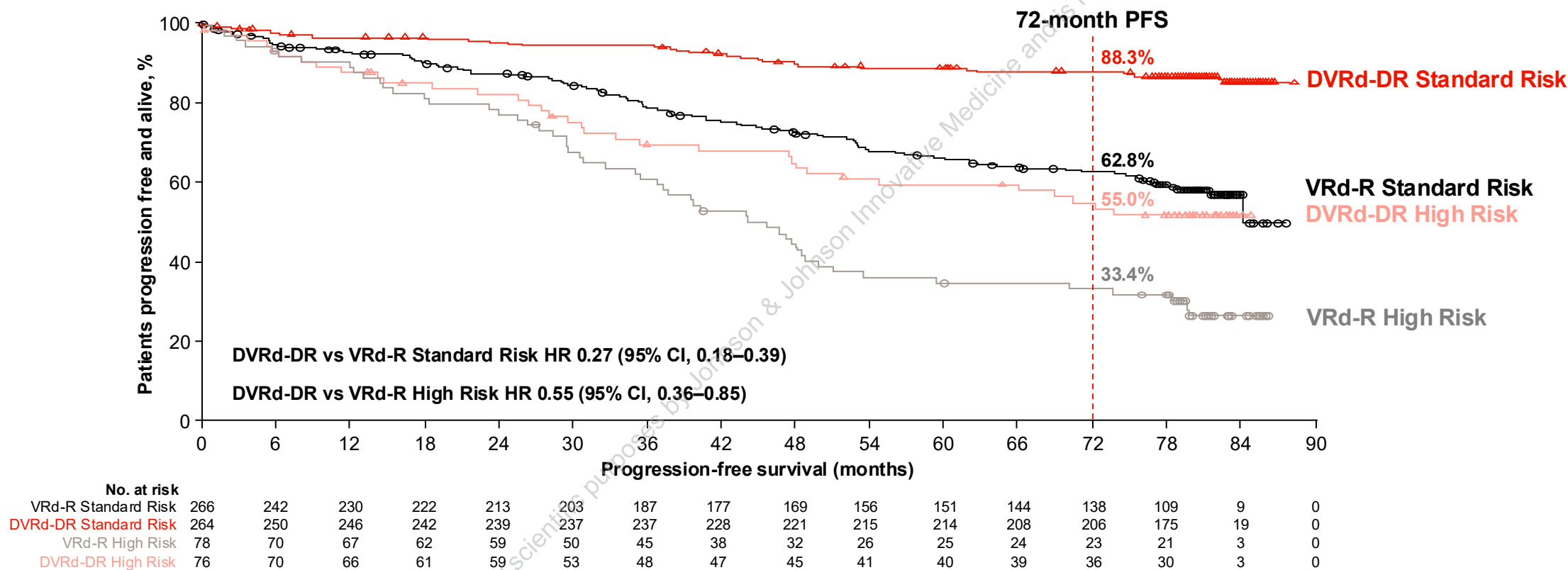


With a PFS hazard ratio of 0.27 in the standard-risk subpopulation, PFS benefit continued to favor DVRd-DR versus VRd-R across clinically relevant subgroups

^aCytogenetic risk was assessed by means of fluorescence in situ hybridization; high risk was defined as the presence of del(17p), t(4;14), or t(14;16). Indeterminate cytogenetic risk was 2/15 in DVRd-DR and 4/10 in VRd-R, with no effect in either group. DR, daratumumab and lenalidomide; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; ECOG PS, Eastern Cooperative Oncology Group performance status; ISS, International Staging System; MM, multiple myeloma; PFS, progression-free survival; R, lenalidomide; VRd, bortezomib, lenalidomide, and dexamethasone.



PERSEUS: Progression-Free Survival in Standard and High-Risk^a Subgroups

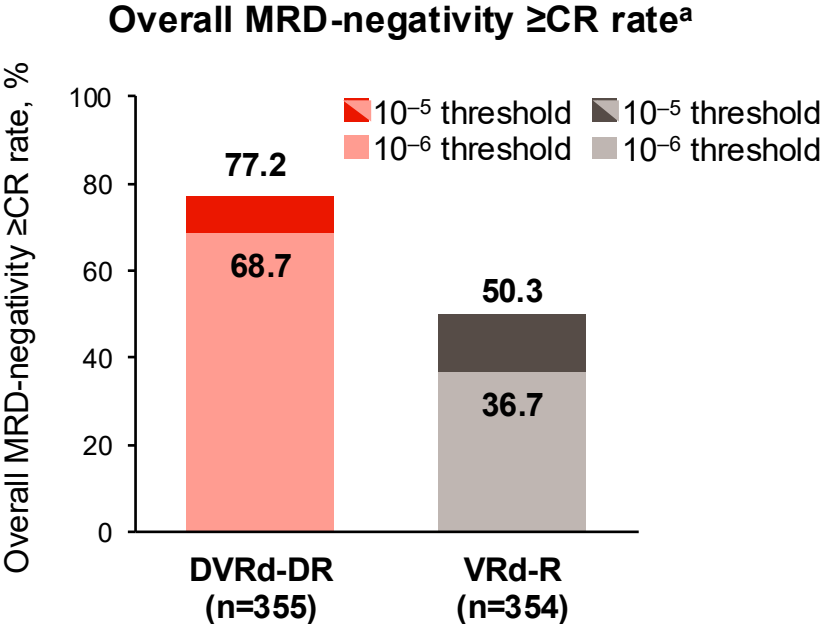


PFS benefit continued to favor DVRd-DR versus VRd-R; 72-month PFS rates were higher with DVRd-DR vs VRd-R in standard (88.3% vs 62.8%) and high-risk subgroups (55.0% vs 33.4%)

^aHigh-risk as the presence of ≥1 of the following: del17p, t[4;14], or t[14;16] by fluorescence in situ hybridization [FISH].
 DR, daratumumab and lenalidomide; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; PFS, progression-free survival; R, lenalidomide; VRd, bortezomib, lenalidomide, and dexamethasone.



PERSEUS: Overall MRD-Negativity ≥CR Rates



At 10⁻⁵: OR 3.41; 95% CI 2.46–4.73; *P*<0.0001
 At 10⁻⁶: OR 3.88; 95% CI 2.83–5.31; *P*<0.0001

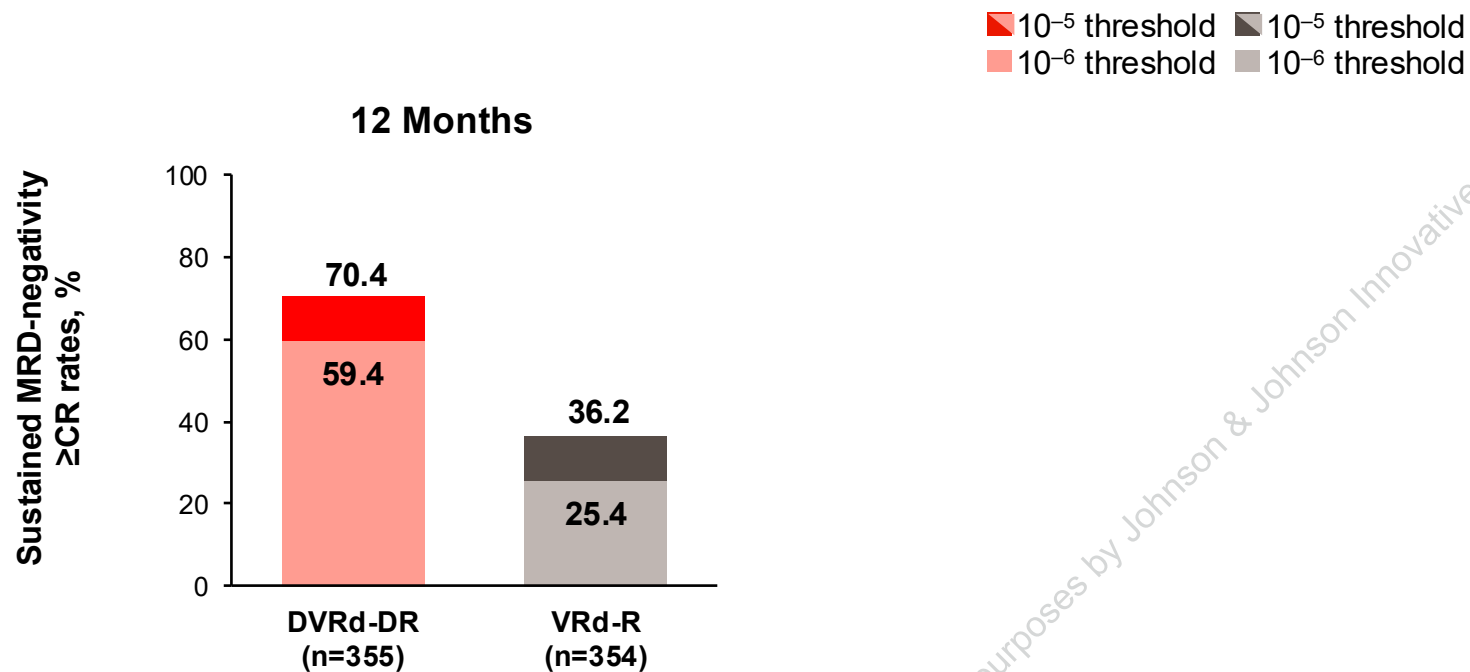
Rates of MRD conversion from end of consolidation to negative during maintenance				
	DVRd-DR	VRd-R	DVRd-DR	VRd-R
Sensitivity threshold	10 ⁻⁵		10 ⁻⁶	
Subjects without MRD negativity and ≥CR at the end of consolidation ^b				
Achieved MRD negativity and ≥CR during maintenance, n (%)	85/134 (63.4)	72/149 (48.3)	136/212 (64.2)	81/206 (39.3)
Odds ratio (95% CI); <i>P</i> -value	1.86 (1.15–2.99); <i>P</i> =0.0108		2.76 (1.86–4.10); <i>P</i> <0.0001	

Overall MRD-negativity ≥CR rates favored DVRd-DR versus VRd-R, and there were higher rates of MRD conversion during maintenance at both 10⁻⁵ and 10⁻⁶

^aProportion of patients who achieved MRD-negativity and ≥CR. Nominal 2-sided *P*-values reported are not adjusted for multiplicity ^bIncludes patients who tested MRD positive, patients with indeterminate results, patients without NGS index clone, patients with <CR, and patients who did not provide samples. ≥CR, complete response or better; DR, daratumumab and lenalidomide; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; MRD, minimal residual disease; NGS, next-generation sequencing; PFS, progression-free survival; OR, odds ratio; R, lenalidomide; VRd, bortezomib, lenalidomide, and dexamethasone.



PERSEUS: Sustained MRD-Negativity $\geq$ CR Rates



10⁻⁵: OR 4.29; 95% CI 3.12–5.89; $P < 0.0001$

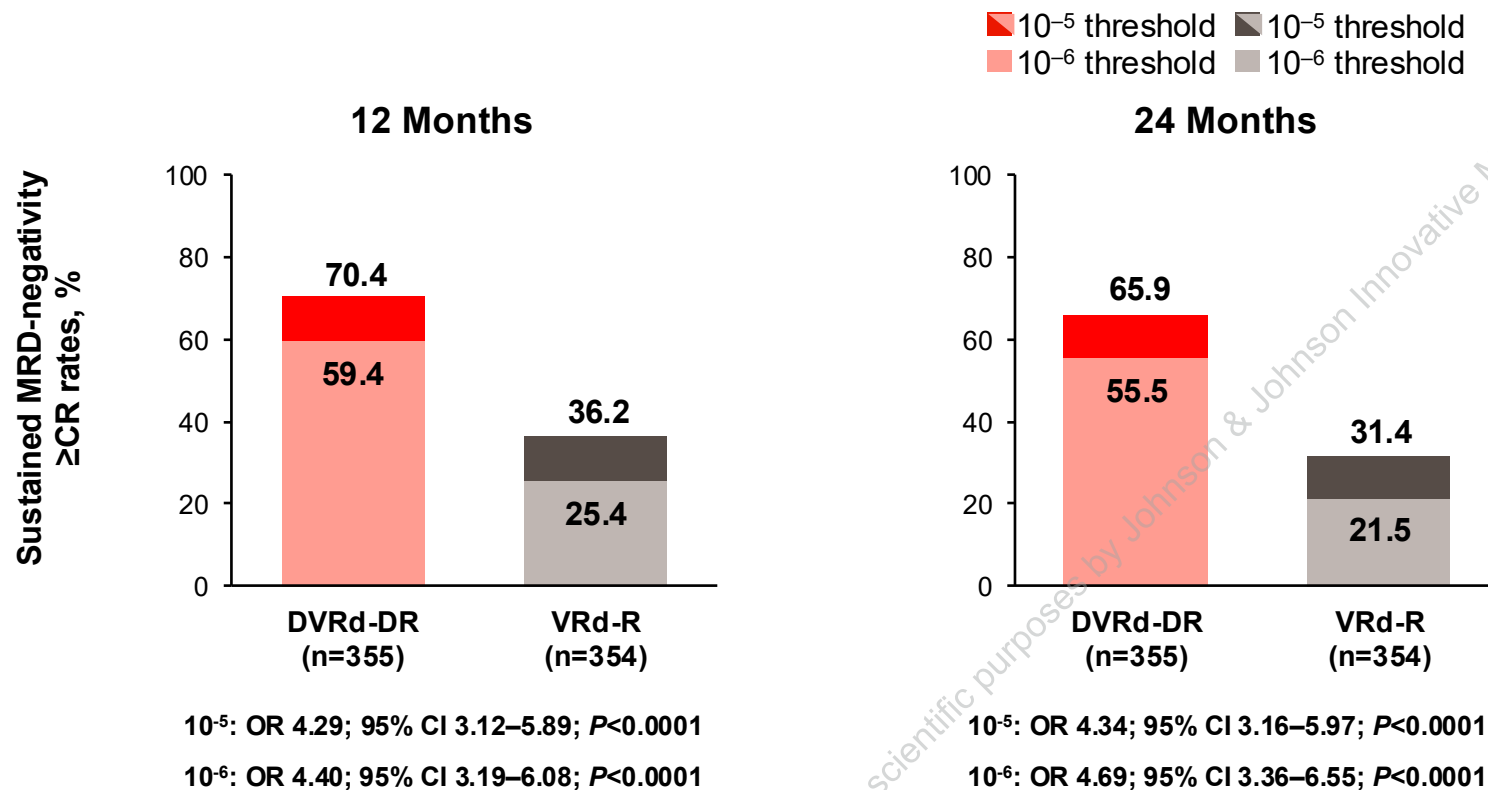
10⁻⁶: OR 4.40; 95% CI 3.19–6.08; $P < 0.0001$

Sustained MRD-negativity $\geq$ CR rates for ≥ 12 , 24, or 36 months were consistently higher with DVRd-DR versus VRd-R at both 10⁻⁵ and 10⁻⁶

Sustained MRD-negativity $\geq$ CR was defined as 2 consecutive MRD negative reads ≥ 12 months (± 1) or ≥ 24 or ≥ 36 months (± 3) apart with no MRD-positive result in between and $\geq$ CR. Nominal 2-sided P -values reported are not adjusted for multiplicity. $\geq$ CR, complete response or better; DR, daratumumab and lenalidomide; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; MRD, minimal residual disease; OR, odds ratio; VRd, bortezomib, lenalidomide, and dexamethasone.



PERSEUS: Sustained MRD-Negativity $\geq$ CR Rates

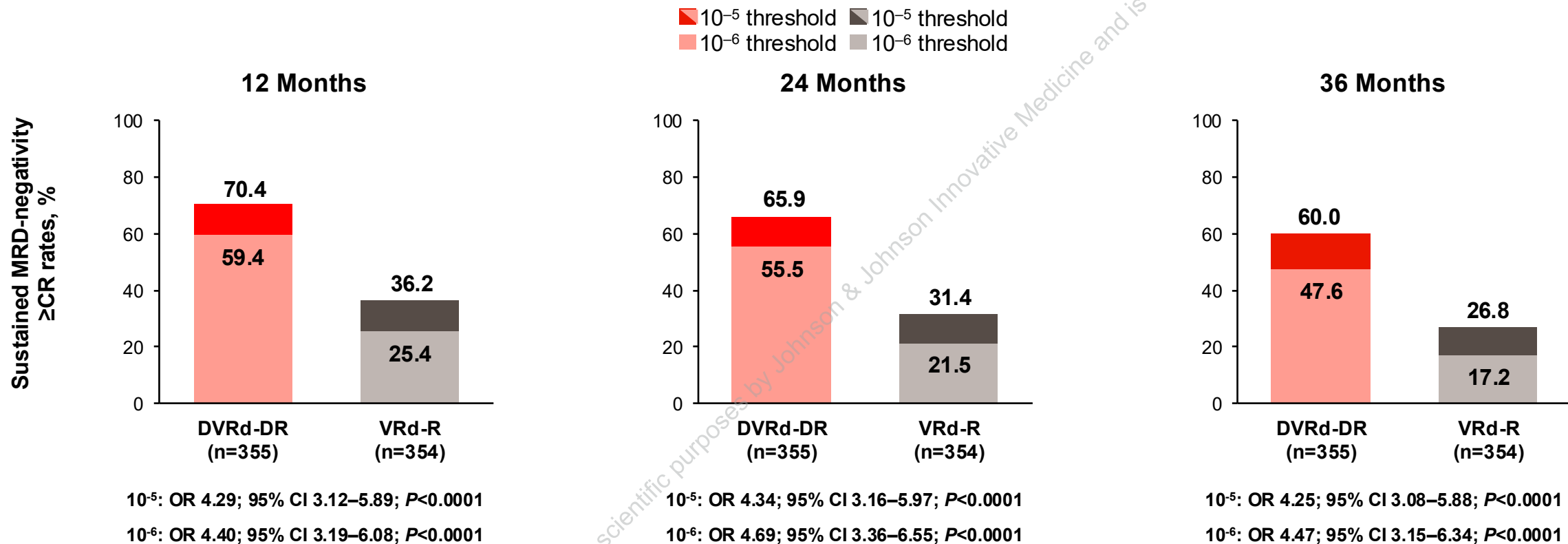


Sustained MRD-negativity $\geq$ CR rates for ≥ 12 , 24, or 36 months were consistently higher with DVRd-DR versus VRd-R at both 10⁻⁵ and 10⁻⁶

Sustained MRD-negativity $\geq$ CR was defined as 2 consecutive MRD negative reads ≥ 12 months (± 1) or ≥ 24 or ≥ 36 months (± 3) apart with no MRD-positive result in between and $\geq$ CR. Nominal 2-sided P -values reported are not adjusted for multiplicity. $\geq$ CR, complete response or better; DR, daratumumab and lenalidomide; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; MRD, minimal residual disease; OR, odds ratio; VRd, bortezomib, lenalidomide, and dexamethasone.



PERSEUS: Sustained MRD-Negativity $\geq$ CR Rates



Sustained MRD-negativity $\geq$ CR rates for $\geq$ 12, 24, or 36 months were consistently higher with DVRd-DR versus VRd-R at both 10⁻⁵ and 10⁻⁶

Sustained MRD-negativity $\geq$ CR was defined as 2 consecutive MRD negative reads $\geq$ 12 months ($\pm$ 1) or $\geq$ 24 or $\geq$ 36 months ($\pm$ 3) apart with no MRD-positive result in between and $\geq$ CR. Nominal 2-sided *P*-values reported are not adjusted for multiplicity. $\geq$ CR, complete response or better; DR, daratumumab and lenalidomide; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; MRD, minimal residual disease; OR, odds ratio; VRd, bortezomib, lenalidomide, and dexamethasone.



PERSEUS: MRD-Guided Daratumumab Discontinuation During Maintenance

n (%)	DVRd-DR (n=351)
Subjects received maintenance treatment	322 (91.7)
Subjects who have stopped daratumumab ^{a,b}	236 (73.3)
Subjects who have not restarted daratumumab ^{c,d}	175 (74.2)
Median duration of maintenance prior to stop ^e , months (range)	26.83 (24.5–68.5)
Median duration from daratumumab stop to CCO ^f , months (range)	44.06 (1.3–52.9)

These data reinforce the feasibility of sustained MRD-guided daratumumab discontinuation during maintenance

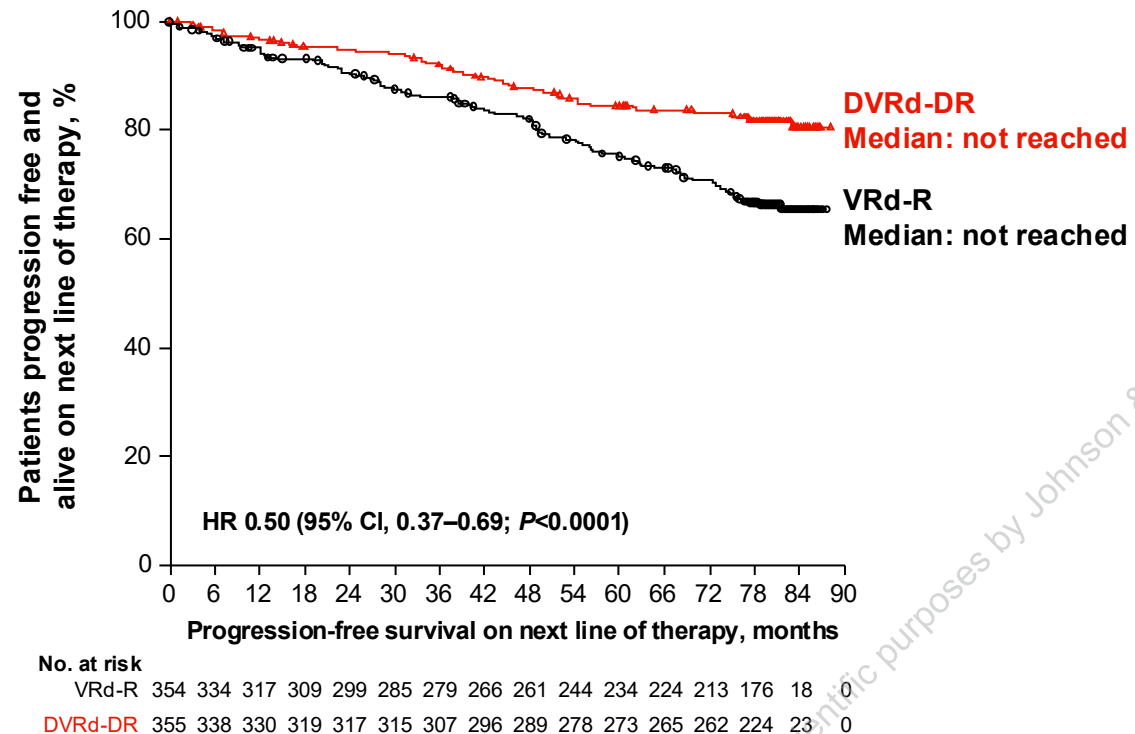
^aSustained 12 months MRD negativity and $\geq$ CR and at least 24 months maintenance treatment, percentages are calculated with the number of subjects in DVRd arm as denominator. ^bPercentages are calculated with the number of subjects who receive maintenance as denominator. ^cPercentages are calculated with the number of subjects who stopped daratumumab and continued maintenance therapy as denominator.

^d"still on treatment", e.g., without end of treatment. ^eDuration of daratumumab exposure during maintenance prior to daratumumab stop. ^fCCO for analysis is 1 June 2026.

CCO, clinical cutoff; DVRd-DR, daratumumab, bortezomib, lenalidomide, and dexamethasone induction/consolidation plus DR maintenance; MRD, minimal residual disease.



PERSEUS: Progression-Free Survival on Next Line of Therapy (PFS2)



n (%)	DVRd-DR (n=355)	VRd-R (n=354)
Patients receiving 2L therapy	50 (14.2)	136 (39.2)
Anti-CD38 ^a	8 (16.0)	99 (72.8)

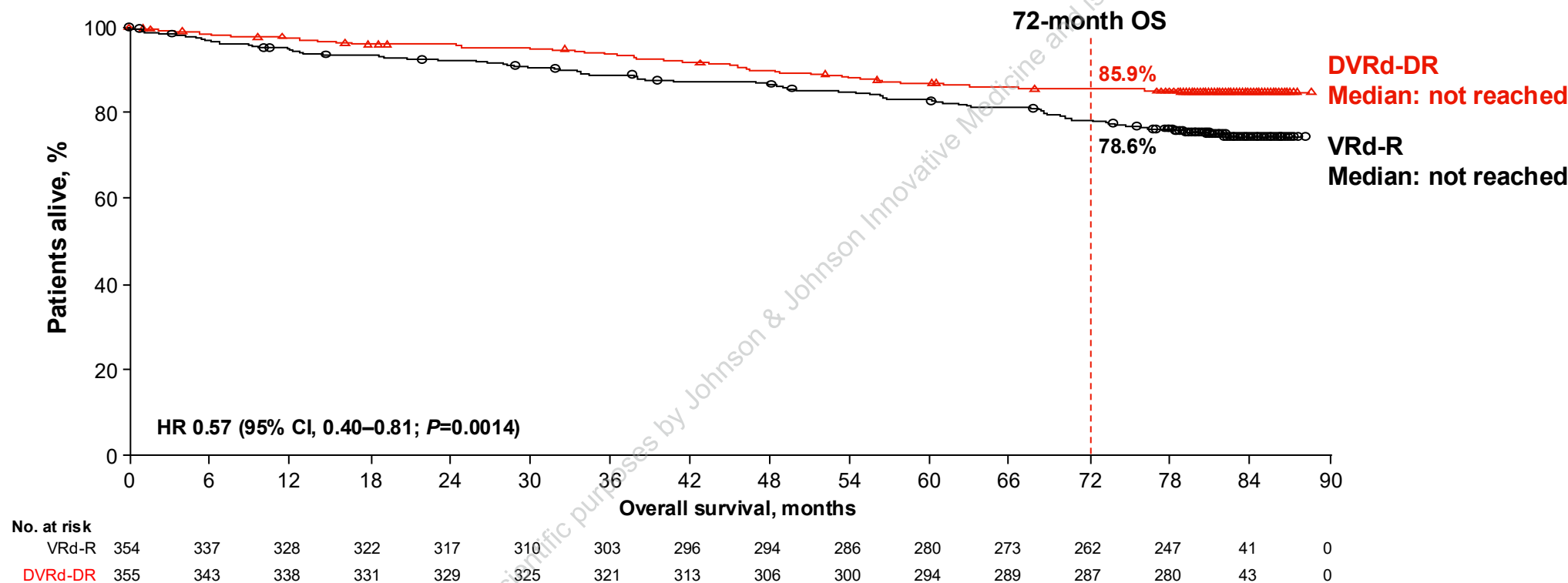
PFS2 favored DVRd-DR versus VRd-R despite most VRd-R patients receiving an anti-CD38 as second-line treatment (99/136 [72.8%])

^aPercentages are calculated with the number of subjects who received 2L therapy as denominator.

Nominal 2-sided P -values reported are not adjusted for multiplicity. DR, daratumumab and lenalidomide; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; R, lenalidomide; VRd, bortezomib, lenalidomide, and dexamethasone.



PERSEUS: Overall Survival



OS remains immature; median OS was not reached in either arm, with 51 (DVRd-DR) and 84 (VRd-R) deaths observed

Overall survival in the ITT population.
DR, daratumumab and lenalidomide; DVRd, daratumumab, bortezomib, lenalidomide, and dexamethasone; R, lenalidomide; VRd, bortezomib, lenalidomide, and dexamethasone.



PERSEUS: Conclusions

After ~7 years (81.3 months) median follow-up, the PERSEUS regimen confirmed deep and durable benefit of daratumumab-based treatment across induction/consolidation and maintenance settings

- DVRd-DR improved long-term PFS versus VRd-R, with 72-month PFS rates of 81.1% vs 56.1% (HR 0.35), respectively
- Deeper and more durable responses were seen with DVRd-DR vs VRd-R
 - Sustained MRD-negativity $\geq$ CR rates for ≥ 36 months were consistently higher at both 10^{-5} and 10^{-6} sensitivity thresholds
 - Nearly 3 out of 4 (73%) DVRd-DR patients receiving maintenance achieved 12-month sustained MRD negativity, enabling them to discontinue daratumumab per protocol^a
 - A higher percentage of patients achieved MRD negativity $\geq$ CR (10^{-5} and 10^{-6}) with DR vs R maintenance
- No new safety signals were observed with an additional ~3 years (34 months) of follow-up

DVRd-DR demonstrated among the deepest and most durable responses in NDMM, even after per-protocol MRD-guided discontinuation of daratumumab maintenance

^a29 patients restarted daratumumab, and 19 remain on daratumumab.

DR, daratumumab and lenalidomide; DVRd, daratumumab plus bortezomib, lenalidomide, and dexamethasone; MRD, minimal residual disease; NDMM, newly diagnosed multiple myeloma; R, lenalidomide; TE, transplant eligible.



PERSEUS: Acknowledgments

- Patients who participated in this study and their families and caregivers
- Staff members at the study sites
- Data and safety monitoring committee
- Staff members involved in data collection and analyses
- The European Myeloma Network (EMN) and Johnson & Johnson
- The EMN acknowledges the valuable contributions and participation of the National Myeloma Study Groups of all participating countries in Europe and Australia
- This study was sponsored by the European Myeloma Network in collaboration with Johnson & Johnson



<https://www.congresshub.com/Oncology/IMS2026/Daratumumab/Sonneveld>

Scan the QR code

The QR code is intended to provide scientific information for individual reference, and the information should not be altered or reproduced in any way.

