

# Daratumumab (DARA) + Bortezomib/Lenalidomide/ Dexamethasone (VRd) With DARA-R (D-R) Maintenance in Transplant- eligible Patients With Newly Diagnosed Multiple Myeloma (NDMM): Minimal Residual Disease (MRD) Analysis in the PERSEUS Trial\*

\*ClinicalTrials.gov Identifier: NCT03710603; sponsored by EMN in collaboration with Janssen Research & Development, LLC.

**Paula Rodriguez-Otero<sup>1</sup>, Philippe Moreau<sup>2</sup>, Meletios A Dimopoulos<sup>3</sup>, Meral Beksac<sup>4</sup>, Aurore Perrot<sup>5</sup>, Annemiek Broijl<sup>6</sup>, Francesca Gay<sup>7</sup>, Roberto Mina<sup>7</sup>, Niels WCJ van de Donk<sup>8</sup>, Fredrik Schjesvold<sup>9</sup>, Michel Delforge<sup>10</sup>, Hermann Einsele<sup>11</sup>, Andrew Spencer<sup>12</sup>, Sarah Lonergan<sup>6</sup>, Diego Vieyra<sup>13</sup>, Anna Sitthi-Amorn<sup>13</sup>, Robin Carson<sup>13</sup>, Joan Bladé<sup>14</sup>, Mario Boccadoro<sup>15</sup>, Pieter Sonneveld<sup>6</sup>**

<sup>1</sup>Department of Hematology, Cancer Center Clínica Universidad de Navarra, Pamplona, Navarra, Spain; <sup>2</sup>Hematology Department, University Hospital Hôtel-Dieu, Nantes, France; <sup>3</sup>National and Kapodistrian University of Athens, Athens, Greece; <sup>4</sup>Ankara University, Ankara, Turkey; <sup>5</sup>CHU de Toulouse, IUCT-O, Université de Toulouse, UPS, Service d'Hématologie, Toulouse, France; <sup>6</sup>Department of Hematology, Erasmus MC Cancer Institute, Rotterdam, The Netherlands; <sup>7</sup>Division of Hematology 1, AOU Città della Salute e della Scienza di Torino, and Department of Molecular Biotechnology and Health Sciences, University of Torino, Torino, Italy; <sup>8</sup>Department of Hematology, Amsterdam University Medical Center, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands; <sup>9</sup>Oslo Myeloma Center, Department of Hematology, and KG Jebsen Center for B-cell Malignancies, University of Oslo, Oslo, Norway; <sup>10</sup>University of Leuven, Leuven, Belgium; <sup>11</sup>Department of Internal Medicine II, University Hospital Würzburg, Würzburg, Germany; <sup>12</sup>Malignant Haematology and Stem Cell Transplantation Service, Alfred Health-Monash University, Melbourne, Australia; <sup>13</sup>Janssen Research & Development, LLC, Spring House, PA, USA; <sup>14</sup>Hospital Clínic de Barcelona, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), University of Barcelona, Barcelona, Spain; and GEM/PETHEMA; <sup>15</sup>Myeloma Unit, Division of Hematology, University of Torino, Azienda Ospedaliero-Universitaria Città della Salute e della Scienza di Torino, Torino, Italy

<https://www.congresshub.com/Oncology/AM2024/Daratumumab/Rodriguez-Otero>

Copies of this presentation obtained through Quick Response (QR) Code are for personal use only and may not be reproduced without permission from ASCO® or the author of this presentation.



# PERSEUS: Key Takeaways

- Significantly higher rates of deep ( $10^{-6}$ ) MRD negativity achieved with D-VRd + D-R versus VRd + R
- Significantly higher rates of sustained MRD negativity achieved with D-VRd + D-R versus VRd + R
- Significantly greater proportions of patients with MRD-positive status after consolidation achieved MRD negativity and sustained MRD negativity with D-R versus R maintenance
- The higher rates of deep ( $10^{-6}$ ) MRD negativity with D-VRd + D-R translated to clinically meaningful benefit of improved PFS
- MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity by NGS and  $\geq$ CR in the ITT population

MRD, minimal residual disease; D-VRd, daratumumab plus bortezomib/lenalidomide/dexamethasone; D-R, daratumumab plus lenalidomide; VRd, bortezomib/lenalidomide/dexamethasone; R, lenalidomide; PFS, progression-free survival; NGS, next-generation sequencing; CR, complete response; ITT, intent-to-treat.



# PERSEUS: Introduction

- In NDMM, MRD negativity has been associated with longer PFS and OS, and deeper responses ( $10^{-6}$ ) have been associated with superior PFS compared with MRD negativity at  $10^{-5}$  or  $10^{-4}$  sensitivity<sup>1,2</sup>
- An increasing number of patients are achieving OS of 10 years or longer. Current MRD testing at a sensitivity level of  $10^{-6}$  and sustained MRD at this level for over 5 years translates into very long survival and potentially a “cure” for patients with standard-risk features<sup>3-5</sup>
- In the PERSEUS primary analysis, D-VRd induction/consolidation + D-R maintenance improved depth of response and PFS versus VRd induction/consolidation + R maintenance in transplant-eligible NDMM<sup>6</sup>
  - 64% of patients receiving D-R maintenance stopped DARA after  $\geq 2$  years due to achieving sustained MRD negativity ( $10^{-5}$ )<sup>a</sup>
- **We report further results from PERSEUS on deepening of response and MRD negativity during maintenance therapy**

NDMM, newly diagnosed multiple myeloma; DARA, daratumumab. <sup>a</sup>MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity and  $\geq$ CR in the ITT population.

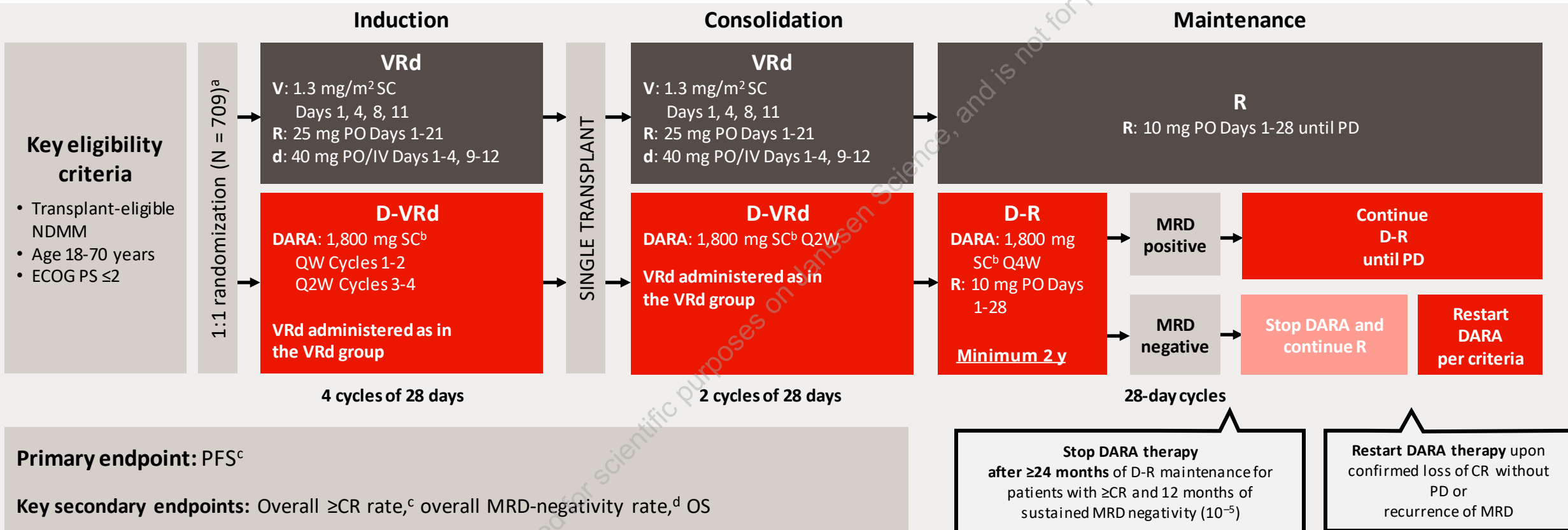
MRD was assessed using bone marrow aspirates and evaluated via NGS (clonoSEQ assay, version 2.0; Adaptive Biotechnologies, Seattle, WA, USA).

1. Munshi NC, et al. *Blood Adv.* 2020;4(23):5988-5999. 2. Perrot A, et al. *Blood.* 2018;132(23):2456-2464. 3. International Myeloma Foundation. A deeper understanding of ‘cure’ in multiple myeloma. <https://www.myeloma.org/blog/dr-duries/deeper-understanding-of-cure-in-myeloma>. Accessed May 14, 2024. 4. Engelhardt M, et al. *Haematologica.* 2024. doi:10.3324/haematol.2023.283058.

5. Rodriguez-Otero P, et al. *Cancer Treat Rev.* 2021;100:102284. 6. Sonneveld P, et al. *N Engl J Med.* 2024;390(4):301-313.



# PERSEUS: Study Design



MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity and ≥CR in the ITT population. Patients who were not evaluable or had indeterminate results were considered MRD positive.

ECOG PS, Eastern Cooperative Oncology Group performance status; V, bortezomib; SC, subcutaneous; PO, oral; d, dexamethasone; IV, intravenous; QW, weekly; Q2W, every 2 weeks; PD, progressive disease; Q4W, every 4 weeks; ISS, International Staging System; rHuPH20, recombinant human hyaluronidase PH20; IMWG, International Myeloma Working Group; VGPR, very good partial response. <sup>a</sup>Stratified by ISS stage and cytogenetic risk. <sup>b</sup>DARA 1,800 mg co-formulated with rHuPH20 (2,000 U/mL; ENHANZE<sup>®</sup> drug delivery technology, Halozyme, Inc., San Diego, CA, USA). <sup>c</sup>Response and disease progression were assessed using a computerized algorithm based on IMWG response criteria. <sup>d</sup>MRD 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, the MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity (10<sup>-5</sup> threshold) and ≥CR at any time.



# PERSEUS: Endpoints and Statistical Analyses

- **Endpoints**

- The primary endpoint was PFS
- Overall  $\geq$ CR rate and overall MRD-negativity ( $10^{-5}$ ) rate were key secondary endpoints

- **MRD endpoint definitions**

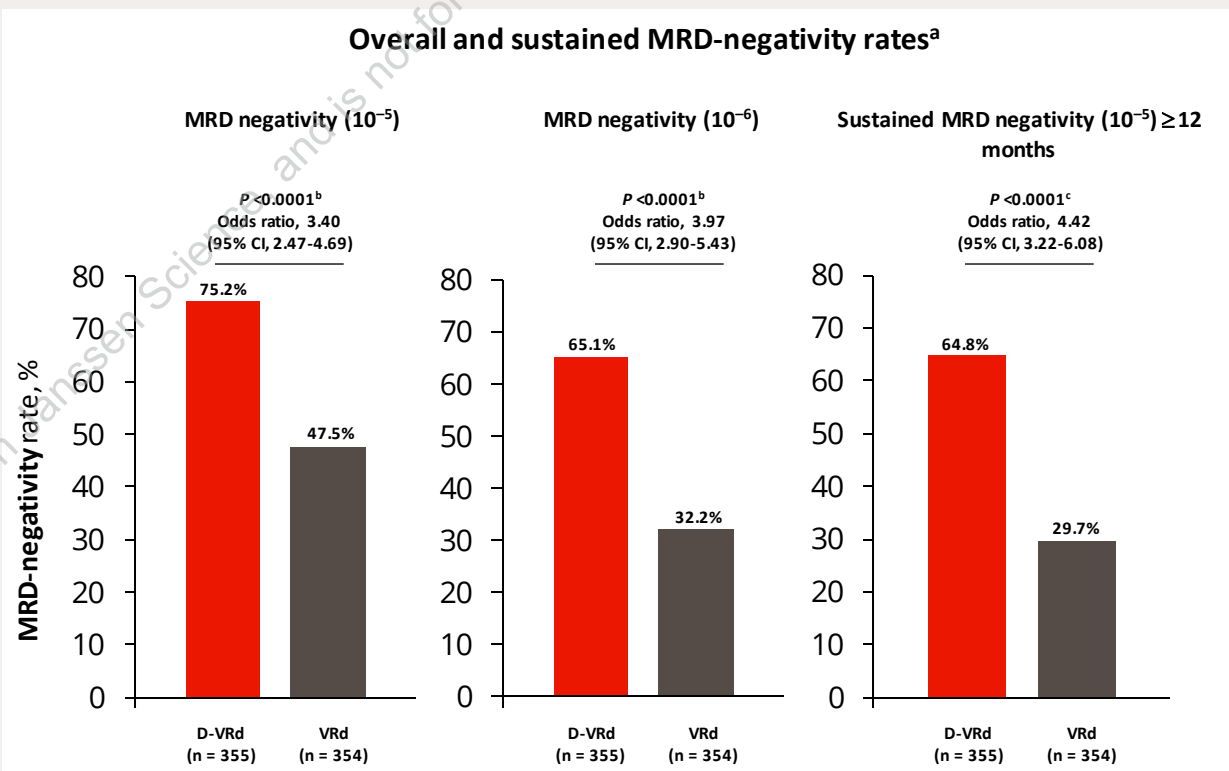
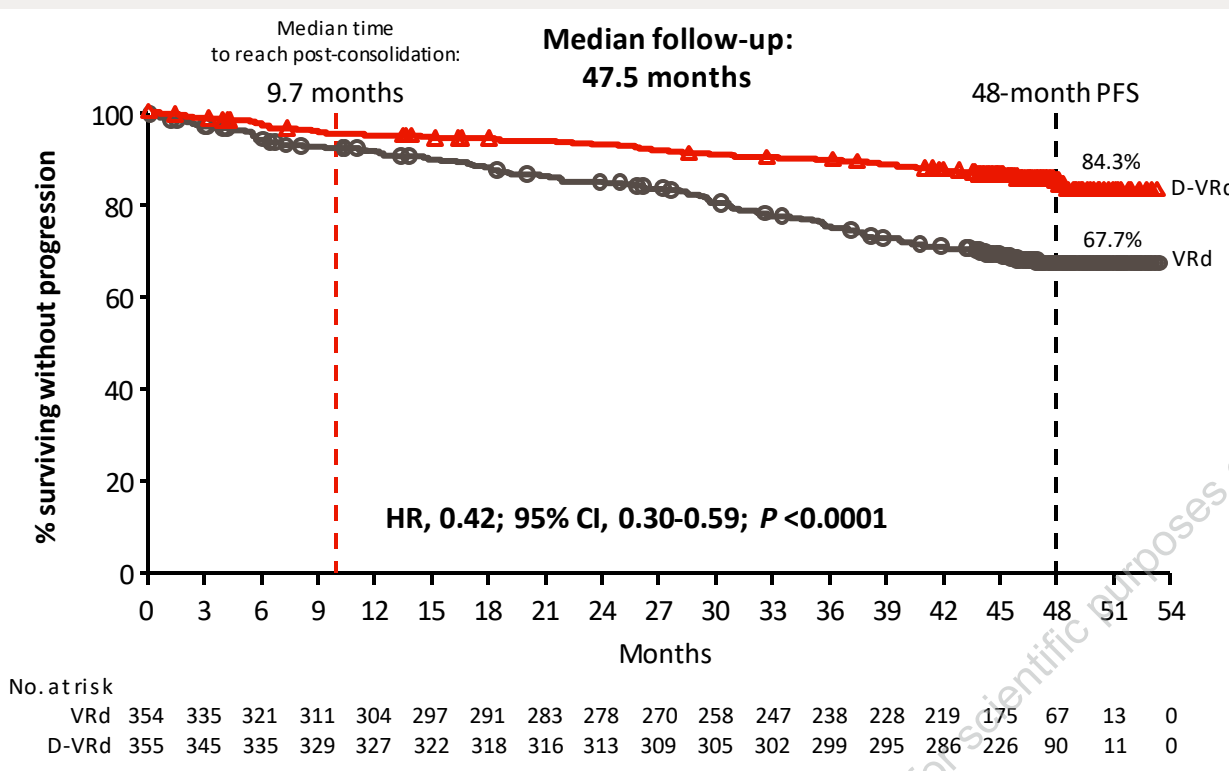
- MRD negativity was defined as the patients who achieved both MRD negativity and  $\geq$ CR response
  - Patients who were not evaluable or had indeterminate results were considered MRD positive
- Overall MRD-negativity rate was defined as the proportion of patients in the ITT population who achieved both MRD negativity and  $\geq$ CR
- Sustained MRD-negativity ( $\geq 12$  months) rate was defined as the proportion of patients in the ITT population with 2 consecutive MRD-negative results  $\geq 12$  months apart, without any MRD-positive results in between

- **Statistical analyses**

- Odds ratios and *P* values for the difference between the 2 treatment groups were calculated for overall MRD-negativity rate and sustained MRD-negativity rate
  - Stratified Mantel–Haenszel odds ratios and stratified *P* values were calculated for the ITT population
  - Unstratified Mantel–Haenszel odds ratios and unstratified *P* values were calculated for subgroup analyses
  - Stratification factors were ISS disease stage (I, II, vs III) and cytogenetic risk (high risk vs standard risk or indeterminate)
  - *P* values were based on the Cochran–Mantel–Haenszel chi-square test



# PERSEUS Primary Analysis: D-VRd Followed by D-R Maintenance Significantly Improved PFS and Depth of Response Versus VRd Followed by R Maintenance<sup>1</sup>



**58% reduction in the risk of progression or death in patients receiving D-VRd**

**Deep and durable MRD negativity achieved with D-VRd**

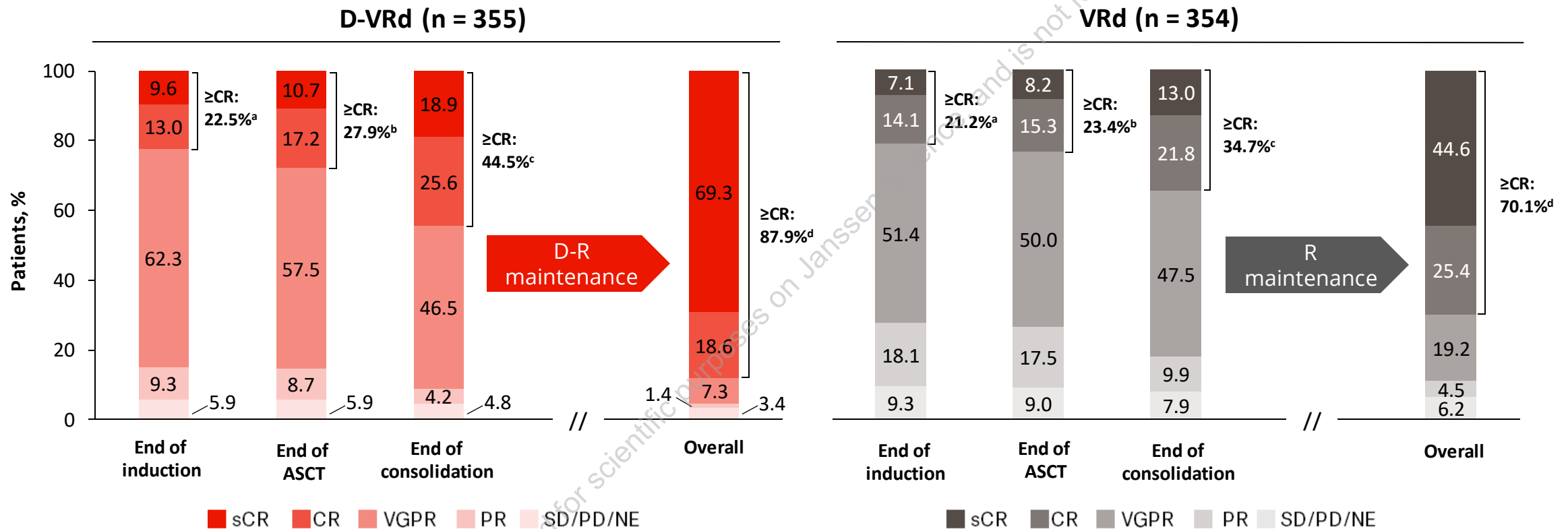
HR, hazard ratio; CI, confidence interval. <sup>a</sup>MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity and  $\geq CR$ . MRD was assessed using bone marrow aspirates and evaluated via NGS (clonoSEQ assay, version 2.0; Adaptive Biotechnologies, Seattle, WA, USA). <sup>b</sup>P values were calculated with the use of the stratified Cochran–Mantel–Haenszel chi-square test.

<sup>c</sup>P value was calculated with the use of Fisher's exact test.

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



# PERSEUS: Responses Over Time (ITT)

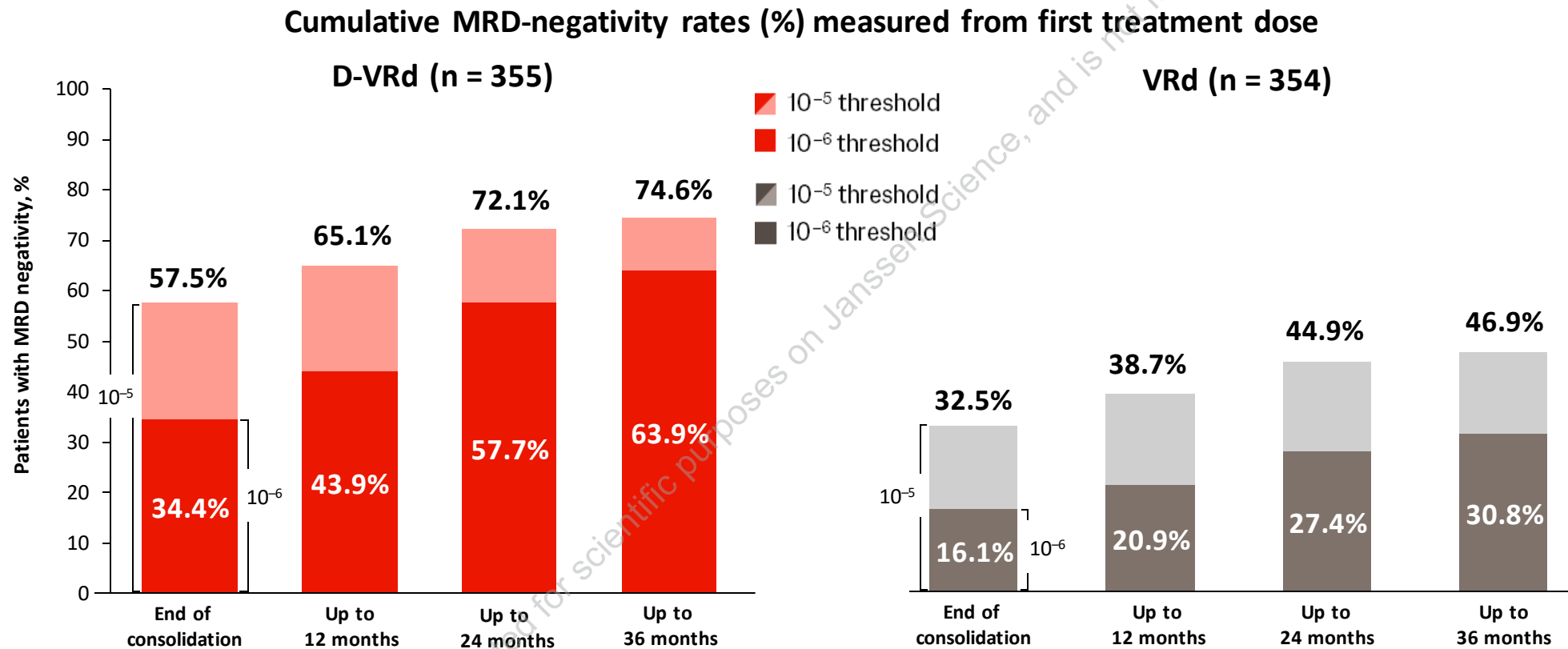


**Responses deepened to a greater extent with D-VRd + D-R versus VRd + R**

ASCT, autologous stem cell transplant; sCR, stringent complete response; PR, partial response; SD/PD/NE, stable disease/progressive disease/not evaluable. P values were calculated using the stratified Cochran–Mantel–Haenszel chi-square test. <sup>a</sup>P = 0.6680. <sup>b</sup>P = 0.1774. <sup>c</sup>P = 0.0078. <sup>d</sup>P < 0.0001.



# PERSEUS: MRD-negativity Rates $10^{-5}$ and $10^{-6}$ (ITT)



- D-VRd + D-R doubled the rates of deeper MRD negativity at  $10^{-6}$  versus VRd + R
- MRD negativity at  $10^{-6}$  increased by approximately 30% during maintenance with D-R

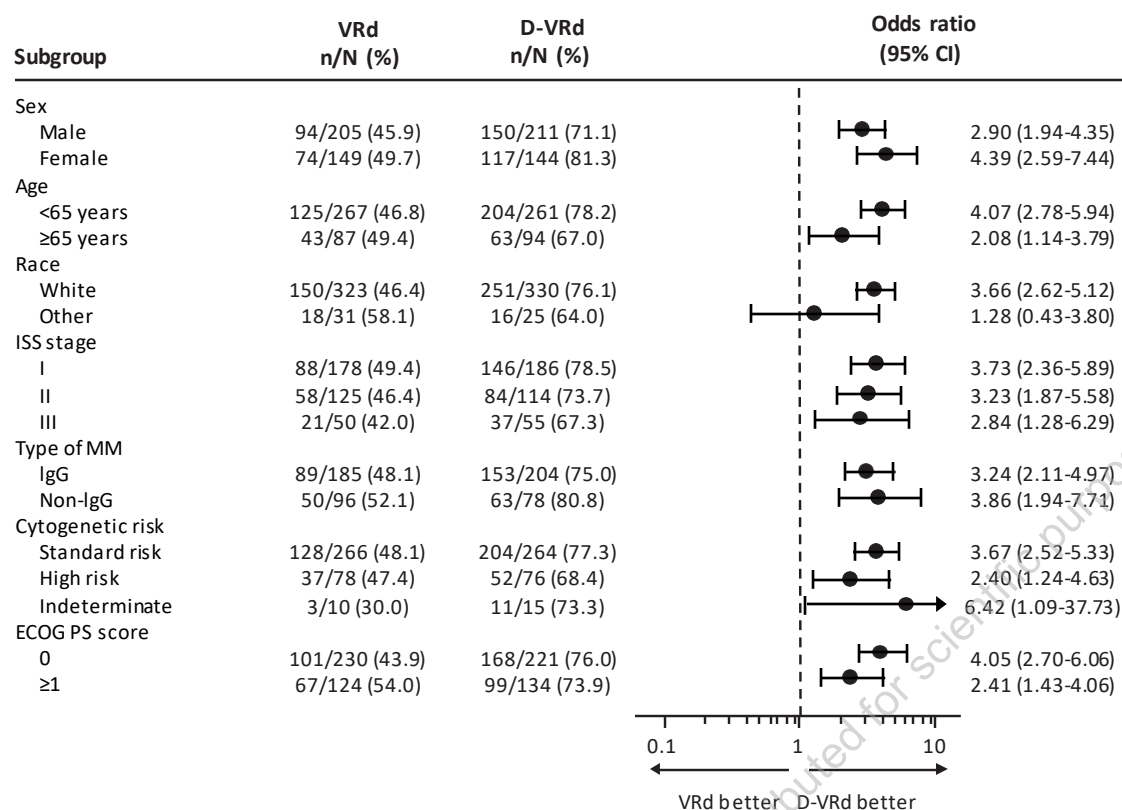
MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity and  $\geq$ CR in the ITT population. Patients who were not evaluable or had indeterminate results were considered MRD positive. P values were calculated using the stratified Cochran-Mantel-Haenszel chi-square test.  $P < 0.0001$  for all comparisons of D-VRd versus VRd.



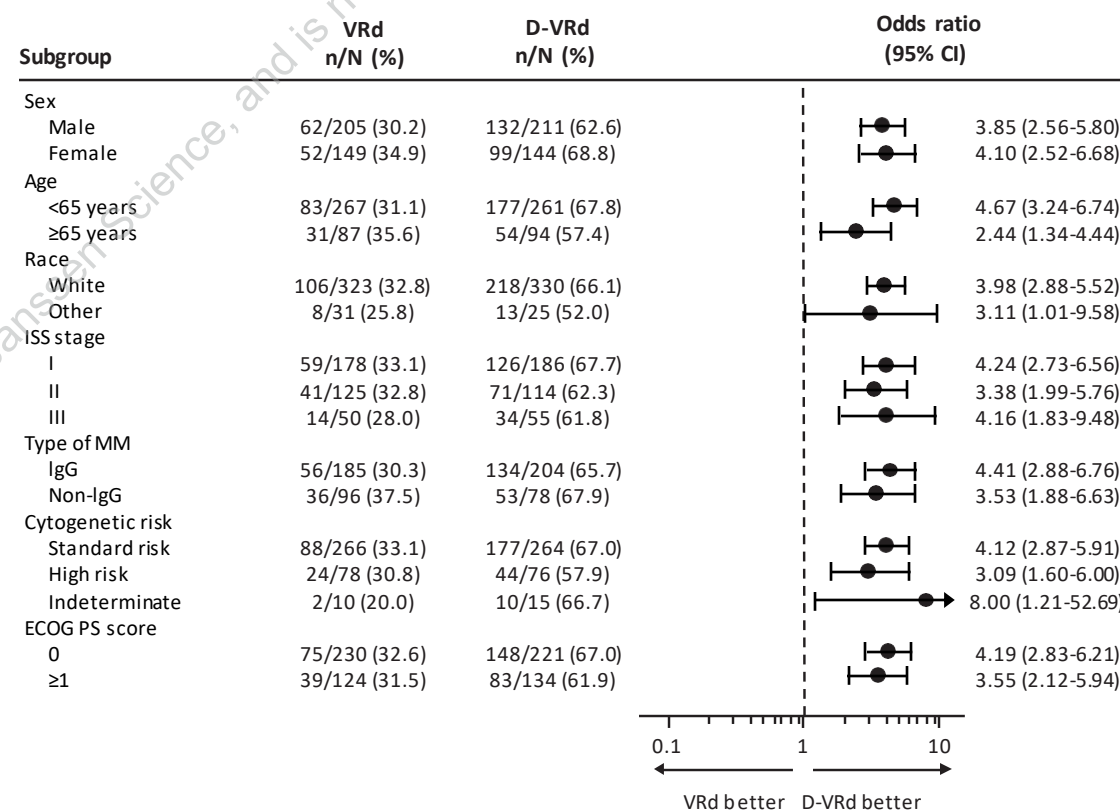


# PERSEUS: MRD-negativity Rates in Prespecified Subgroups (ITT)

## Overall MRD negativity ( $10^{-5}$ )



## Overall MRD negativity ( $10^{-6}$ )

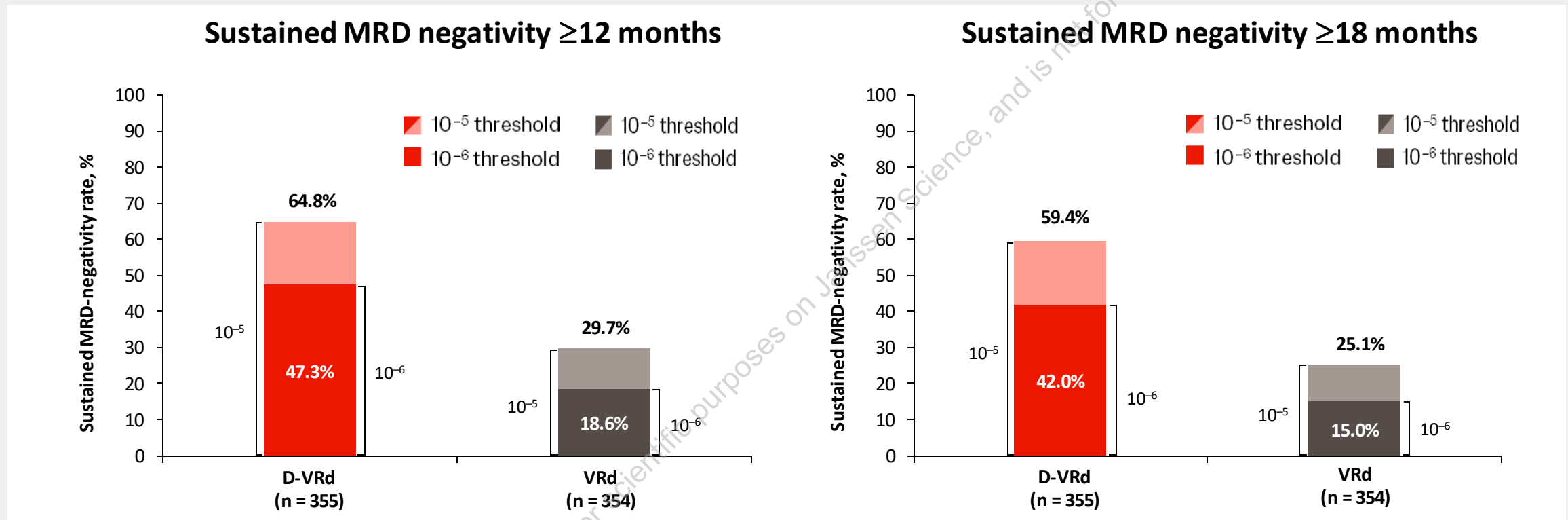


**MRD-negativity rates were improved with D-VRd + D-R versus VRd + R across subgroups**

MM, multiple myeloma. MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity and  $\geq$ CR in the ITT population. Patients who were not evaluable or had indeterminate results were considered MRD positive. The subgroup analysis for type of MM was performed on data from patients who had measurable disease in serum. Cytogenetic risk was assessed by fluorescence in situ hybridization; high risk was defined as the presence of del(17p), t(4;14), and/or t(14;16).



# PERSEUS: Sustained MRD-negativity Rates ( $10^{-5}$ and $10^{-6}$ ; ITT)

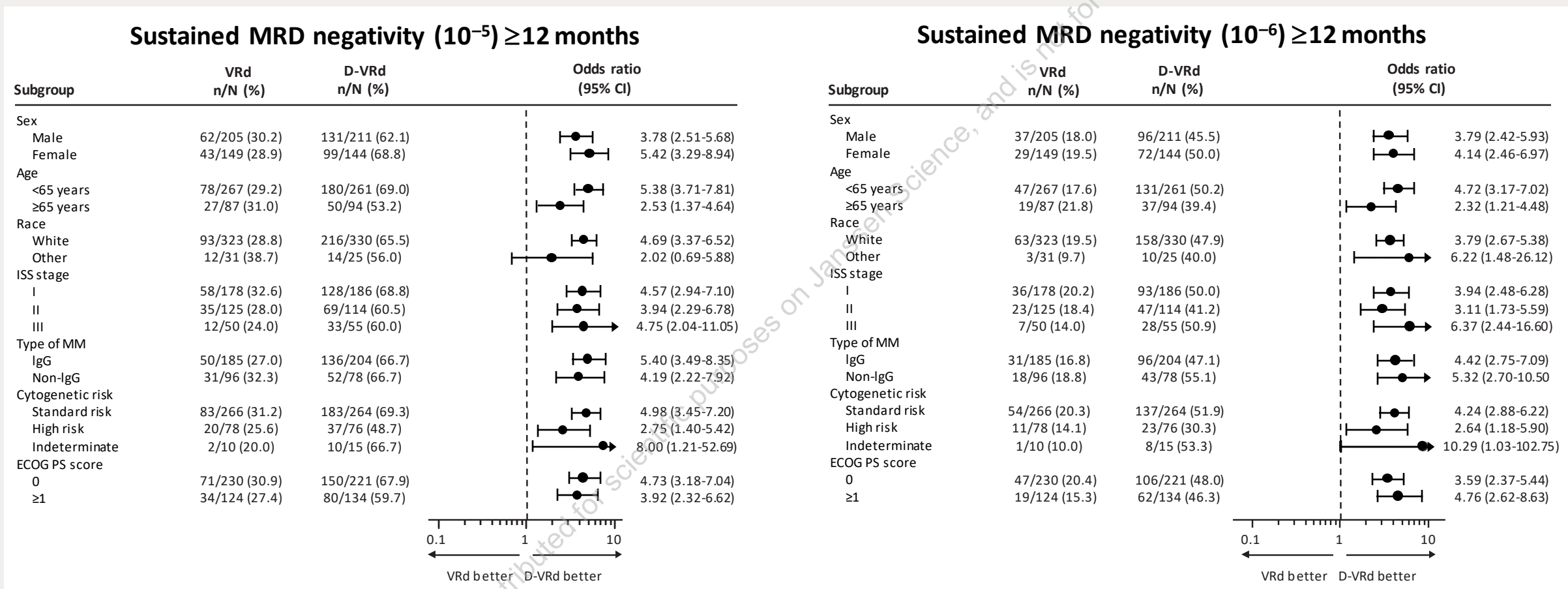


- Rates of sustained MRD negativity at  $10^{-6}$  were 2.5-fold higher for D-VRd + D-R versus VRd + R
- More than 40% of patients had sustained MRD negativity at  $10^{-6}$  for  $\geq 18$  months with D-VRd + D-R

MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity and  $\geq CR$  in the ITT population. Patients who were not evaluable or had indeterminate results were considered MRD positive. P values were calculated using the stratified Cochran–Mantel–Haenszel chi-square test.  $P < 0.0001$  for all comparisons of D-VRd versus VRd.



# PERSEUS: Sustained MRD Negativity by Prespecified Subgroups (ITT)

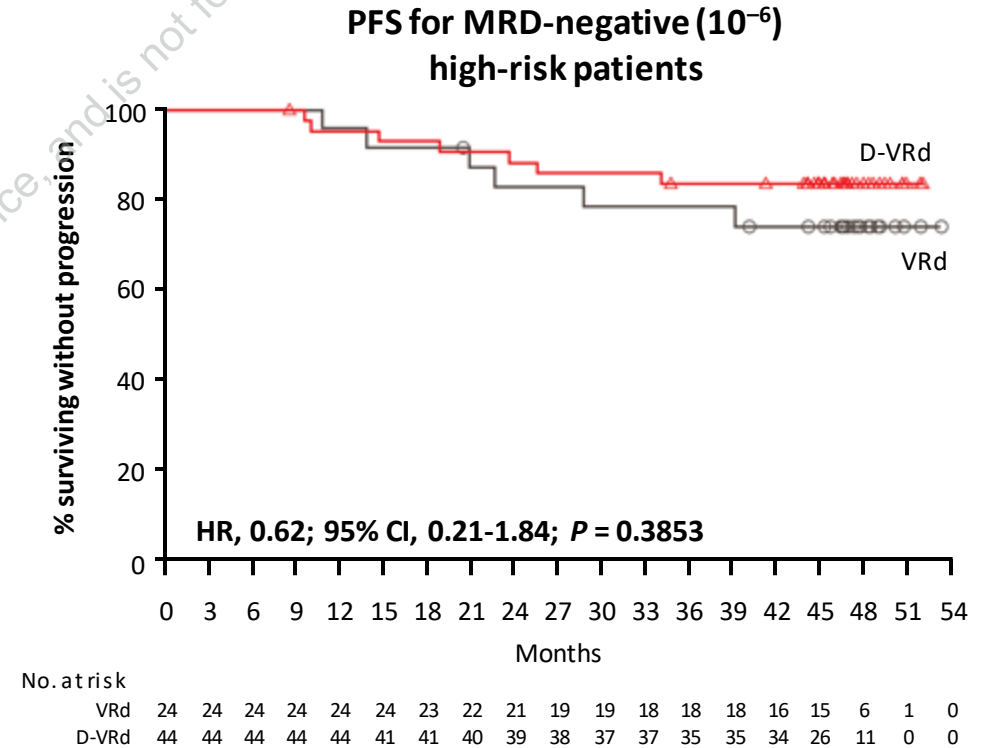
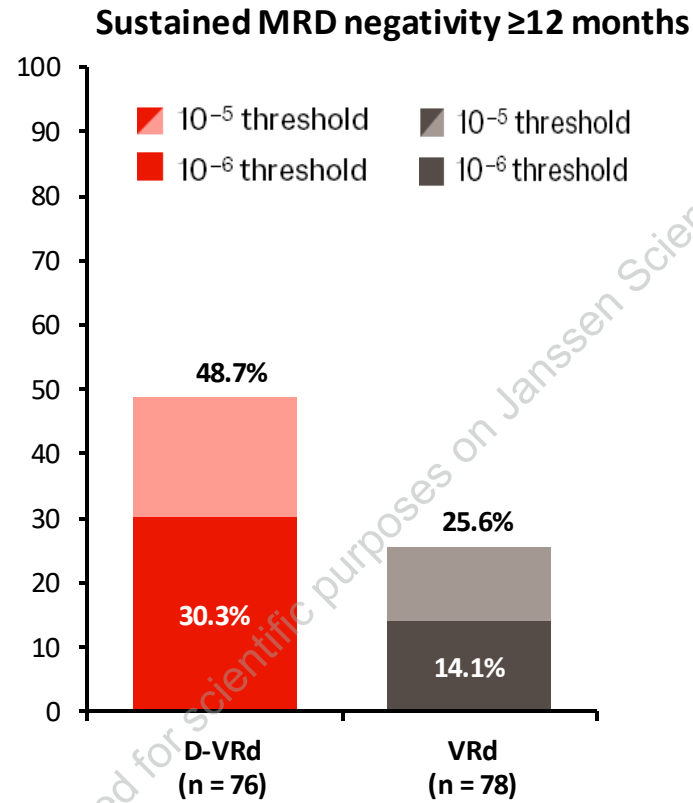
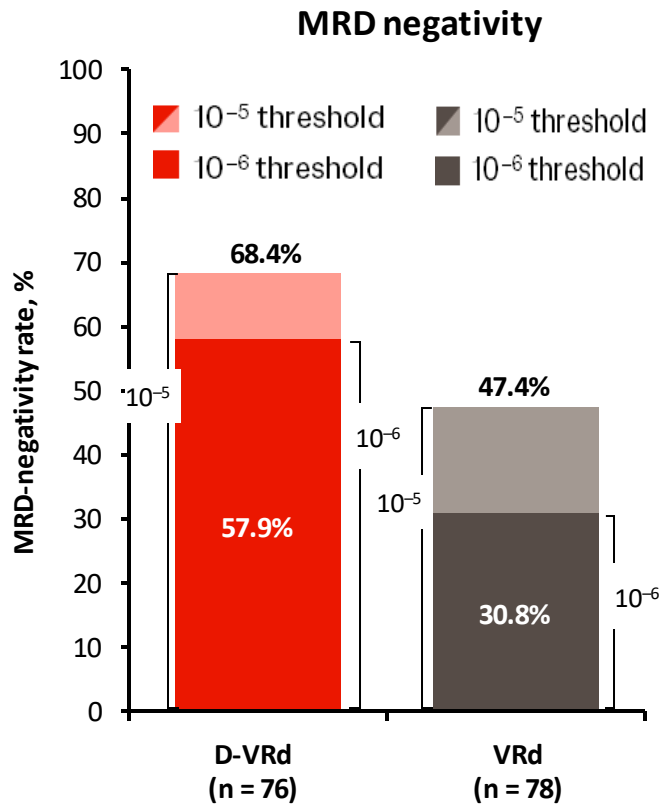


**Sustained MRD-negativity rates were improved with D-VRd + D-R versus VRd + R across subgroups**

MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity and  $\geq CR$  in the ITT population. Patients who were not evaluable or had indeterminate results were considered MRD positive. The subgroup analysis for type of MM was performed on data from patients who had measurable disease in serum. Cytogenetic risk was assessed by fluorescence in situ hybridization; high risk was defined as the presence of del(17p), t(4;14), and/or t(14;16).



# PERSEUS: MRD Negativity in Patients With High-risk MM (ITT)

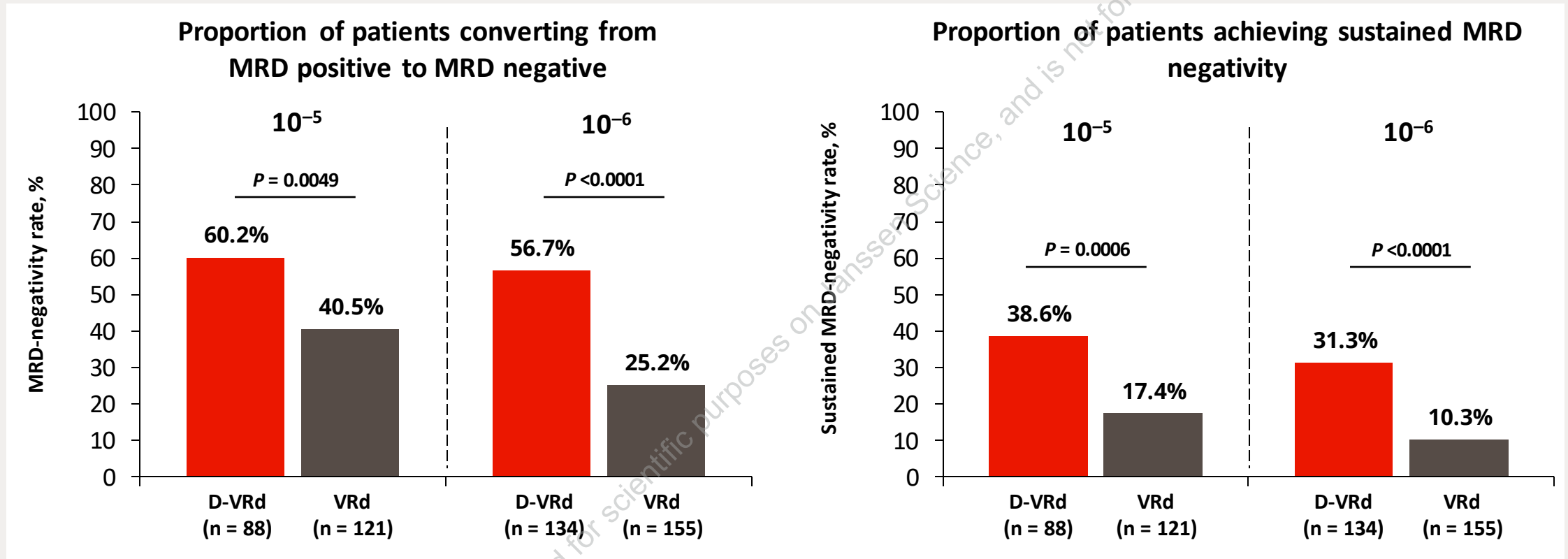


- Rates of MRD negativity at 10<sup>-6</sup> and sustained MRD negativity ≥12 months were approximately doubled with D-VRd versus VRd
- PFS was improved with D-VRd versus VRd in MRD-negative high-risk patients

MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity and ≥CR in the ITT population. Patients who were not evaluable or had indeterminate results were considered MRD positive. Cytogenetic risk was assessed by fluorescence in situ hybridization; high risk was defined as the presence of del(17p), t(4;14), and/or t(14;16).



# PERSEUS: MRD Conversion During Maintenance for Patients Remaining MRD Positive at the End of Consolidation



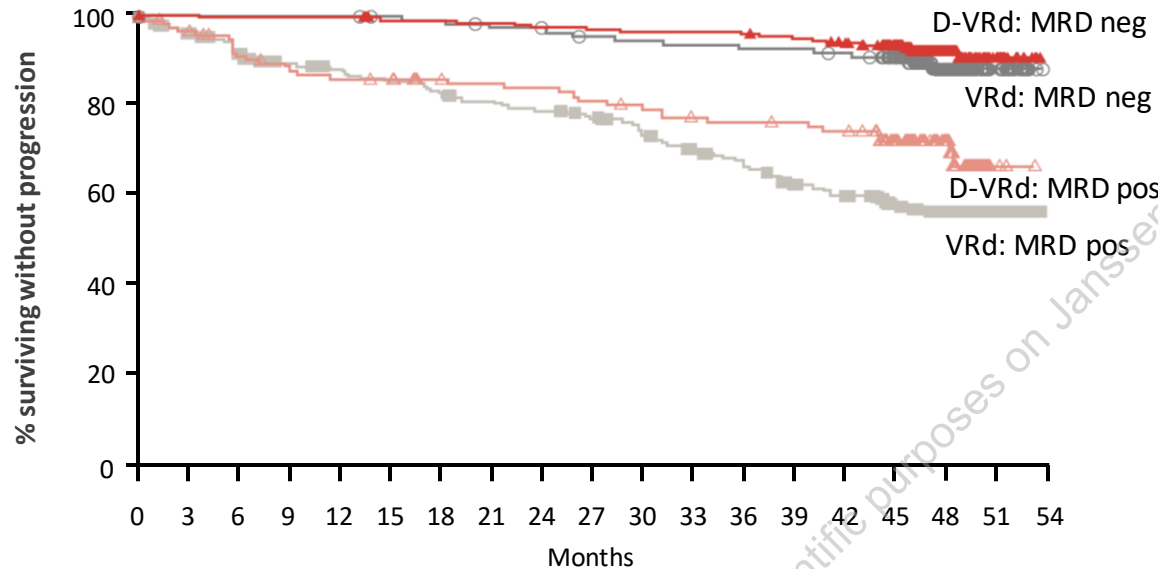
During maintenance, conversion to MRD negativity ( $10^{-6}$ ) was doubled, and conversion to sustained MRD negativity was tripled, with D-R versus R

MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity and  $\geq$ CR. P values were calculated using the unstratified Cochran-Mantel-Haenszel chi-square test.



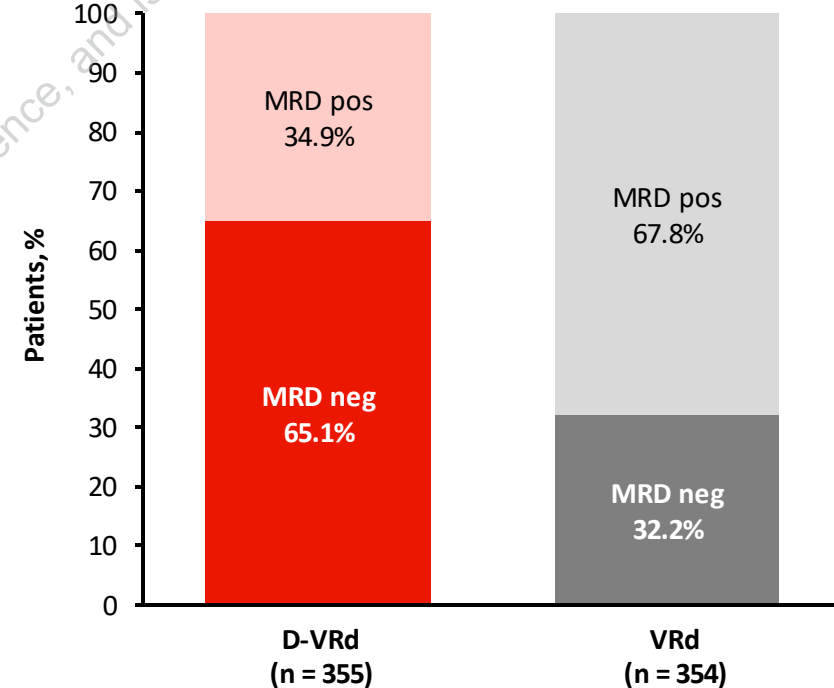
# PERSEUS: PFS by MRD-negativity Status ( $10^{-6}$ ; ITT)

PFS according to MRD status ( $10^{-6}$ )



No. at risk	0	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54
VRd: MRD neg	114	114	114	114	114	112	111	108	107	104	103	102	101	101	98	87	34	9	0
D-VRd: MRD neg	231	231	230	230	230	226	226	225	223	222	221	221	219	216	210	169	70	10	0
VRd: MRD pos	240	221	207	197	190	185	180	175	171	166	155	145	137	127	121	88	33	4	0
D-VRd: MRD pos	124	114	105	99	97	96	92	91	90	87	84	81	80	79	76	57	20	1	0

Overall MRD negativity ( $10^{-6}$ )



- MRD negativity at  $10^{-6}$  was associated with improved long-term outcomes
- Twice as many patients achieved MRD negativity at  $10^{-6}$  with D-VRd + D-R versus VRd + R
- Patients remaining MRD positive had improved PFS with D-R maintenance versus R alone

MRD-negativity rate was defined as the proportion of patients who achieved both MRD negativity and  $\geq$ CR in the ITT population. Patients who were not evaluable or had indeterminate results were considered MRD positive.



# PERSEUS: Conclusions From Analysis of MRD

- The potential for a cure in NDMM is predicated on reaching sustained MRD negativity at  $10^{-6}$
- In the PERSEUS study, for D-VRd + D-R:
  - 47% of patients achieved sustained MRD negativity ( $10^{-6}$ ) for 12 months versus 19% with VRd + R
  - In high-risk patients: 58% of patients achieved MRD negativity ( $10^{-6}$ ) and 30% achieved sustained MRD negativity ( $10^{-6}$ ) versus 31% and 14%, respectively, with VRd + R
- During D-R maintenance:
  - The rate of MRD negativity ( $10^{-6}$ ) increased by 30% versus 15% with R alone
  - 31% of MRD-positive patients converted to sustained MRD negativity ( $10^{-6}$ ) versus 10% with R alone
  - 64% of patients stopped DARA after achieving sustained MRD negativity ( $10^{-5}$ )<sup>1</sup>

**These data further highlight the benefit of D-VRd and D-R maintenance as a new standard of care for transplant-eligible patients with NDMM**

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



# PERSEUS: Future Directions

- PERSEUS evaluated the totality of a DARA-containing regimen, from induction through maintenance
  - CASSIOPEIA (double randomization) final analysis demonstrated that DARA maintenance post–D-VTd or VTd significantly improved PFS versus observation; the highest rates of MRD negativity were seen with D-VTd followed by DARA<sup>1</sup>
  - AURIGA is evaluating conversion from MRD positive to MRD negative with DARA + R versus R maintenance post-ASCT<sup>2</sup>
  - DRAMMATIC (SWOG) is evaluating DARA + R versus R maintenance post-ASCT, with data expected in 2028+<sup>3</sup>
- Longer follow-up for PFS and OS in PERSEUS will confirm if sustained MRD negativity at  $10^{-6}$  for  $\geq 5$  years translates to functional cure, and in what proportion of patients
  - Potential to evaluate patient subgroups or clinical responses associated with greatest benefit
- PERSEUS sets a new benchmark for depth of response and PFS in transplant-eligible NDMM and should be considered a standard comparator for future frontline studies of novel approaches with CAR-T and bispecific antibodies

D-VTd, daratumumab plus bortezomib/thalidomide/dexamethasone; VTd, bortezomib/thalidomide/dexamethasone; SWOG, Southwest Oncology Group; CAR-T, chimeric antigen receptor T cell.

1. Moreau P, et al. To be presented at: European Hematology Association (EHA) Hybrid Congress; June 13-16, 2024; Madrid, Spain. Abstract S204. 2. ClinicalTrials.gov Identifier: NCT03901963.

3. ClinicalTrials.gov Identifier: NCT04071457.





# PERSEUS: Acknowledgments

- Patients who participated in this study and their families
- Staff members at the study sites
- Data and safety monitoring committee
- The European Myeloma Network (EMN) and Janssen
- 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 (EMN) in collaboration with Janssen Research & Development, LLC



Medical writing and editorial support were provided by Lisa Shannon, PharmD, and Kimberly Carmony, PhD (Lumanity Communications Inc.), and were funded by Janssen Global Services, LLC.



[https://www.congresshub.com/Oncology/AM2024/  
Daratumumab/Rodriguez-Otero](https://www.congresshub.com/Oncology/AM2024/Daratumumab/Rodriguez-Otero)

Copies of this presentation obtained through Quick Response (QR) Code are for personal use only and may not be reproduced without permission from ASCO® or the author of this presentation.

