Health-related quality of life with idecabtagene vicleucel in relapsed and refractory multiple myeloma

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Abstract:
Idecabtagene vicleucel (ide-cel), a B-cell maturation antigen (BCMA)-directed chimeric antigen receptor (CAR) T cell therapy, showed deep, durable responses in patients with triple-class exposed (TCE) relapsed and refractory multiple myeloma (RRMM) in the phase 2 KarMMa trial. We assessed health-related quality of life (HRQoL) among KarMMa patients. EORTC QLQ-C30, EORTC QLQ-MY20, and EQ-5D-5L were given at screening, baseline (≤ 72 hours prior to or on same day as lymphodepletion), day of ide-cel treatment, and after ide-cel treatment. Mean changes from baseline that exceeded the predetermined threshold of minimally important difference were deemed clinically meaningful. Proportions of patients experiencing clinically meaningful changes in HRQoL were assessed using within-patient change thresholds. Time to stable improvement (≥ 2 consecutive visits with clinically meaningful HRQoL improvements) was analyzed using the Kaplan-Meier method. 126/128 (98%) patients treated with ide-cel were included in the HRQoL analysis. Pretreatment baseline RRMM burden was high and meaningfully worse than the age- and sex-weighted general population. Statistically significant and clinically meaningful improvements from baseline were observed by month 1 for pain (~8.9) and disease symptoms (~10.2), and by month 2 for fatigue (~7.2), physical functioning (~6.1), cognitive functioning (+6.7), and global health status/QoL (+8.0). Clinically meaningful improvements in fatigue, pain, and physical functioning were most prominent at months 9, 12, and 18, respectively, and were sustained through 15 to 18 months after ide-cel treatment. For TCE patients with RRMM with a poor prognosis and few treatment options, a single ide-cel infusion provides early, sustained, statistically significant, and clinically meaningful improvements in HRQoL.

Conflict of interest: COI declared – see note

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- A single infusion of ide-cel improved QoL for triple-class exposed patients with RRMM. [88/140 char incl. spaces]

- Post-ide-cel treatment patients had improved pain, fatigue, physical functioning, and overall QoL that was sustained through 15–18 months. [140/140 chars incl. spaces]
Abstract [250/250 words]

Idecabtagene vicleucel (ide-cel), a B-cell maturation antigen (BCMA)-directed chimeric antigen receptor (CAR) T cell therapy, showed deep, durable responses in patients with triple-class exposed (TCE) relapsed and refractory multiple myeloma (RRMM) in the phase 2 KarMMa trial. We assessed health-related quality of life (HRQoL) among KarMMa patients. EORTC QLQ-C30, EORTC QLQ-MY20, and EQ-5D-5L were given at screening, baseline (≤72 hours prior to or same day as lymphodepletion), day of ide-cel treatment, and after ide-cel treatment. Mean changes from baseline that exceeded the predetermined threshold of minimally important difference were deemed clinically meaningful. Proportions of patients experiencing clinically meaningful changes in HRQoL were assessed using within-patient change thresholds. Time to stable improvement (≥2 consecutive visits with clinically meaningful HRQoL improvements) was analyzed using the Kaplan-Meier method. 126/128 (98%) patients treated with ide-cel were included in the HRQoL analysis. Pretreatment baseline RRMM burden was high and meaningfully worse than the age- and sex-weighted general population. Statistically significant and clinically meaningful improvements from baseline were observed by month 1 for pain (−8.9) and disease symptoms (−10.2), and by month 2 for fatigue (−7.2), physical functioning (+6.1), cognitive functioning (+6.7), and global health status/QoL (+8.0). Clinically meaningful improvements in fatigue, pain, and physical functioning were most prominent at months 9, 12, and 18, respectively, and were sustained through 15 to 18 months after ide-cel treatment. For TCE patients with RRMM with a poor prognosis and few treatment options, a single ide-cel infusion provides

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early, sustained, statistically significant, and clinically meaningful improvements in HRQoL. The study is registered to https://clinicaltrials.gov/ as NCT03361748.
Introduction

Therapeutic advances in multiple myeloma over the past 10 to 15 years have resulted in notable improvements in treatment response and survival, which are largely attributable to treatment with combination regimens of immunomodulatory drugs, proteasome inhibitors, and anti-CD38 antibodies.\textsuperscript{1-3} Despite this, patients with relapsed and refractory multiple myeloma (RRMM) have limited therapeutic options, with poor prognosis and outcomes even after treatment with these agents, defined as triple-class exposed (TCE).\textsuperscript{4-7} The burden of disease for patients with MM is high, with persistent pain, fatigue, and functionality substantially reducing health-related quality of life (HRQoL).\textsuperscript{8,9} Patients report further deterioration of physical and social functioning as they advance through to second-, third-, and fourth-line therapy.\textsuperscript{10,11}

Idecabtagene vicleucel (ide-cel, bb2121), a B-cell maturation antigen (BCMA)-directed chimeric antigen receptor (CAR) T cell therapy, demonstrated deep, durable responses in TCE patients with RRMM in the pivotal, phase 2, single-arm KarMMa clinical trial and is approved in the United States for adults with RRMM after ≥4 lines of therapy, including TCE patients.\textsuperscript{12,13} Patients receiving ide-cel demonstrated an overall response rate (ORR) of 73%, median progression-free survival (PFS) of 8.8 months, and 33% of patients had a complete response (CR) or better.\textsuperscript{12} Of note, 26% of treated patients and 79% of those with CR or stringent CR had minimal residual disease (MRD)-negative status after ide-cel treatment. Ide-cel showed a manageable tolerability profile with a 5% incidence of grade ≥3 cytokine release syndrome and 3% incidence of investigator-identified neurotoxicity.\textsuperscript{12}
As therapeutic advances extend survival and improve clinical outcomes for patients with RRMM, increased attention to the quality of these additional life-years for patients is warranted. The novelty of CAR T cell therapy in RRMM, given its clinical efficacy, unique toxicity profile, one-time administration, and potential for reduced treatment burden, underscores the importance of exploring its potential impact on HRQoL.\textsuperscript{14,15} As compared with the chronic administration schedules of historical treatment options, a single infusion could be meaningful for TCE patients who are heavily treated prior to receiving CAR T cell therapy, and longer treatment-free periods have been associated with improved HRQoL.\textsuperscript{16} To assess if treatment with ide-cel provides any HRQoL benefits in addition to the observed improvements in clinical outcomes, we evaluated patient-reported HRQoL among TCE patients with RRMM in the KarMMa clinical trial.
Methods

Patient-reported HRQoL in KarMMa

In the KarMMa trial (NCT03361748), HRQoL assessments were conducted at screening, baseline (within 72 hours prior to, or on the same day as, lymphodepleting [LD] chemotherapy day), at ide-cel infusion (day 1), monthly during months 1 to 6 of follow-up, and every 3 months up to 24 months or until study completion (additional information provided in the supplemental data). This analysis included patients with ≥12 months of post-treatment follow-up at the time of data cutoff for this report (January 14, 2020).

HRQoL measures included the European Organization for Research and Treatment of Cancer (EORTC) Quality of Life C30 Questionnaire (QLQ-C30 v3.0), the QLQ-C30 supplementary 20-item multiple myeloma module (QLQ-MY20), and the general health EuroQoL 5-dimension 5-level (EQ-5D-5L) instrument. The QLQ-C30 has 30 items addressing 5 multi-item functional domains (physical, social, role, cognitive, emotional), 3 multi-item symptom scales (fatigue, nausea and vomiting, and pain), 6 single-item symptom domains (dyspnea, insomnia, appetite loss, constipation, diarrhea, financial difficulties), and global health status/quality of life (QoL).\(^1^7\) The QLQ-MY20 is a validated supplement to the QLQ-C30 with 20 questions addressing 4 myeloma-specific HRQoL domains (disease symptoms, 6 items; side effects of treatment, 10 items; body image, 1 item; future perspective, 3 items).\(^1^8\) For both the QLQ-C30 and QLQ-MY20, raw scores are transformed to a score between 0 and 100. Higher functional domain scores indicate better functioning and QoL, whereas higher symptom or side effect scores indicate worsening symptoms or side effect burden.\(^1^9\)
The EQ-5D-5L is a validated self-reported preference-based measure meant to provide a single value representing overall health status. The EQ-5D-5L health utility index is a self-reported measure of functioning and well-being across 5 dimensions: mobility, self-care, pain, usual activities, and anxiety/depression, with 5 levels of severity. Responses to the 5 items are converted to a weighted health state index utility score by cross-walking to country-specific EQ-5D 3-level (EQ-5D-3L) value sets or based on values derived directly from country-specific general population samples. This analysis used the cross-walk method to the EQ-5D-3L value set from the United Kingdom, where population weights can range from −0.594 to 1.0, with a score of 0 indicating death, 1.0 indicating “full health,” and negative scores reflecting states perceived to be worse than death. The EQ-5D visual analog scale (VAS) records self-rated current health status on a vertical scale from 0 (“Worst imaginable health state”) to 100 (“Best imaginable health state”).

**Clinically meaningful response thresholds**

The clinical relevance of HRQoL changes from baseline were determined for individual patients as within-patient changes, and for groups of patients as within-group changes from baseline. Changes in instrument scores for individual patients were categorized as “improvement”, “no change”, or “deterioration”, indicating clinically meaningful changes from baseline according to the prespecified within-patient responder definition (RD). The minimally important difference (MID), defined as the smallest difference in mean score within a group, was used to interpret whether a within-group change was clinically meaningful. RDs and MID thresholds for the QLQ-C30 and QLQ-MY20 were previously published and were based on clinical trial data and prospective patient interviews.
(supplemental Tables S1 and S2).\textsuperscript{22,23} In the absence of established RDs for the EQ-5D-5L, we used the RD and MID values for the EQ-5D-3L health utility index of +0.08 for improvement and −0.08 for deterioration.\textsuperscript{24,25} For the EQ-5D VAS, we used the oncology-specific cutoff values of +7.0 for improvement and −7.0 for deterioration, for both the RD and MID.\textsuperscript{25,26}

**Statistical analysis**

The primary objective of this analysis was to examine the effects of ide-cel treatment on fatigue, pain, physical and cognitive functioning, and global health status/QoL from QLQ-C30, and disease symptoms and treatment side effects from QLQ-MY20. Secondary objectives analyzed all other domains and scales from QLQ-C30 and QLQ-MY20, and patient-reported health status and well-being from EQ-5D. Primary analyses included changes from baseline and the proportions of patients experiencing clinically meaningful changes from baseline according to the prespecified RD thresholds for each instrument. Secondary analysis included time to stable improvement, defined as having ≥2 consecutive visits with clinically meaningful HRQoL improvements. Primary and secondary analyses included all patients who were treated with ide-cel, regardless of their clinical response. A subgroup analysis was performed for mean change in the EORTC QLQ-C30 primary domain scores from baseline based on target ide-cel dose levels (150 × \(10^6\), 300 × \(10^6\), and 450 × \(10^6\) CAR+ T cells). An exploratory analysis was also conducted to examine the effect of ide-cel treatment on the primary QLQ-C30 scales among patients who achieved a very good partial response or better (≥VGPR), defined as a VGPR, CR, or stringent CR.
Analyses were conducted in the HRQoL- evaluable population of patients treated with ide-cel who had an evaluable assessment at baseline and ≥1 post-baseline assessment. Baseline was defined as the last non-missing assessment on or prior to LD chemotherapy day. An evaluable assessment for each instrument was defined as completion of ≥15 of the 30 QLQ-C30 items, ≥10 of the 20 QLQ-MY20 items, all 5 of the EQ-5D-5L items, and no missing value for the EQ-5D VAS. Completion rates for each instrument were indicated by the number of patients providing an evaluable assessment at each visit out of the number of patients treated with ide-cel who were expected to complete HRQoL questionnaires (i.e., alive, on study, and not receiving re-treatment with ide-cel yet). Mean baseline HRQoL scores from KarMMa were assessed alongside published normative data from the general population that were re-weighted by the age and sex distributions of the KarMMa HRQoL-evaluable population. Published scores from the general European population (11 EU countries, n = 11,343) were used for the QLQ-C30, and from the United Kingdom (n = 3,395) for the EQ-5D. No normative data were available for the QLQ-MY20.

For each HRQoL instrument, changes in scores from baseline to each post-treatment visit were summarized using descriptive statistics. Line graphs were used to examine mean changes (95% confidence interval [CI]) from baseline at each post-baseline visit for all domains compared with the MID reference lines. For each instrument, the number and proportion of patients with clinically meaningful changes relative to the clinically meaningful response thresholds (improvement, no change, or worsening) in each domain were calculated based on changes from baseline at each post-baseline scheduled visit. Time to stable improvement in each of the QLQ-C30 domains was...
analyzed using the Kaplan-Meier (KM) product limit method for the QLQ-C30-evaluable population. Time to stable improvement or censoring was calculated and summarized in months as \((\text{date of stable improvement/censoring} - \text{date of ide-cel infusion}) + 1)/30.4375. No imputation was performed for missing post-baseline values. Since the HRQoL assessments may have been impacted by bridging therapy, we conducted a sensitivity analysis using the screening visit assessment (or the baseline visit assessment if the screening assessment was missing) as the “baseline” value to evaluate the consistency of findings with the primary analysis. All analyses were conducted using SAS® version 9.4 (SAS Institute, Cary, NC).
Results

A total of 126 (98%) patients treated with ice-cel were included in the HRQoL-evaluable population (2/128 eligible patients had missing baseline or post-baseline assessments). Completion rates were nearly identical across HRQoL instruments, from 98% at baseline to 70% to 90% through month 6 and slightly lower (60% to 70%) through month 12 (Figure 1). The baseline burden of RRMM was high among patients enrolled in the KarMMa trial, whose mean baseline QLQ-C30 scores were meaningfully worse alongside those of the re-weighted general population (Figure 2). Baseline EQ-5D scores were also meaningfully worse for KarMMa patients versus the UK normative population, exceeding the MID thresholds for both the EQ-5D-5L health utility index (mean, 0.67 vs 0.81; difference, −0.14) and the EQ-5D VAS (mean, 67.5 vs 80.7; difference, −13.2).

In the exploratory analysis of patients who achieved ≥VGPR, (66 of 126 [52%] HRQoL-evaluable patients for QLQ-C30), patients had worse mean baseline scores of ≥10 points for pain, fatigue, and physical functioning compared with the general population, and slightly worse global health status/QoL and cognitive functioning (supplemental Figure S1).

Primary HRQoL analysis

Patients receiving ide-cel treatment demonstrated meaningful improvements in all primary HRQoL analysis measures, most as early as months 1 or 2. Improvements were generally sustained over time though decreasing sample sizes by months 12 through 18 were observed. Statistically significant and clinically meaningful
improvements in QLQ-C30 measures of pain and physical functioning were observed by month 1, and of fatigue, cognitive functioning, and global health status/QoL by month 2 (Figure 3). Clinically meaningful improvements in fatigue, pain, and physical functioning were sustained through 18 months after ide-cel treatment. Cognitive functioning remained generally stable, with statistically significant and clinically meaningful improvements observed from months 2 through 9. The QLQ-MY20 primary analysis measure of disease symptoms showed statistically significant and clinically meaningful improvements by month 3 that were observed through month 15 after ide-cel treatment ($P < .05$) (Figure 3). Since patients were not receiving active anticancer treatment at the baseline assessment, no substantial improvement in the treatment side effects measure was expected, but statistically significant improvements were observed from month 2 through month 15 after treatment ($P < .05$). This may be explained by patients reporting the side effects of bridging therapy or prior therapy at baseline. Similar patterns were observed in patients who achieved $\geq$VGPR (supplemental Figure S2). When analyzed by ide-cel dose level, the overall magnitude of improvement was greater for patients who received $300 \times 10^6$ or $450 \times 10^6$ CAR+ T cells (data not shown). These patients had significant and meaningful improvements from baseline in all primary domains of interest (except for side effects of treatment) across most follow-up visits.

The improvements in QLQ-C30 pain, fatigue, physical functioning, and global health status/QoL observed among patients treated with ide-cel made their post-treatment HRQoL scores comparable to those of the general population within 1 to 3 months, and the scores remained generally comparable through month 18. Since the cognitive functioning score was similar to the general population at baseline, scores were
comparable from day 1 and showed modest relative improvement over time (supplemental Figure S3). As no normative population data for the QLQ-MY20 were available, visual inspection against a normative population was not feasible.

We also evaluated individual-level changes for the primary HRQoL measures (Figure 4). For all measures, the proportion of patients who experienced clinically meaningful improvements increased over time from day 1 to month 12. The proportions of patients with clinically meaningful improvements over time increased from day 1 for fatigue, pain, physical functioning, and global health status/QoL on the QLQ-C30 (supplemental Figure S4). The majority of patients (~80%) experienced no change or improvement in cognitive functioning across visits, most of whom had no change (≥50%), though this group had comparable scores to the general population at baseline with less room for improvement than in other measures. For the QLQ-MY20, the proportions of patients experiencing clinically meaningful improvements in disease symptoms and side effects increased over time as those with clinically meaningful worsening decreased from day 1. Approximately half of all patients (50%–60%) showed no change in these 2 QLQ-MY20 measures across most of the follow-up visits.

Improvements in primary HRQoL domains were observed in similar proportions of patients who achieved ≥VGPR (supplemental Figure S5). In this population, the proportion of patients who experienced clinically meaningful improvement in global health status/QoL increased from 16% at day 1 to 76% at month 12, while the proportion of patients who experienced clinically meaningful worsening decreased from 50% at day 1 to 15% at month 12.
Median time to stable improvement in QLQ-C30 fatigue, pain, physical functioning, and global health status/QoL was approximately 4 months after ide-cel treatment, whereas the median time to stable improvement was not reached for cognitive functioning by the end of the data cutoff (supplemental Table S3). In patients who achieved ≥VGPR, similar patterns were observed across all domains (supplemental Table S4).

**Secondary HRQoL analysis**

Mean changes from baseline in most of the secondary HRQoL functional and symptom measures showed trends of improvement over time following ide-cel treatment (described in the supplemental data; supplemental Figure S6). Mean changes from baseline in both the EQ-5D-5L health utility index scores and the EQ-5D VAS showed statistically significant and consistent, clinically meaningful improvements from baseline by month 3 through month 18 (supplemental Figure S6).

**Sensitivity analysis**

The sensitivity analysis using the screening visit assessment as the “baseline” score (prior to bridging therapy) showed overall trends of improvement consistent with those of the base case analysis (data not shown). Since many of the HRQoL scores were slightly more favorable at the screening visit than at the baseline visit (which occurred just before LD chemotherapy) in both the group-level and individual-level assessments, the magnitude of changes from "baseline" were numerically less than in the base case scenarios. The base case analysis showed clinically meaningful improvements in all primary HRQoL measures at months 1 or 2 with the exception of the QLQ-MY20 side
effect of treatment measure. The sensitivity analysis also showed clinically meaningful improvements in all QLQ-C30 primary measures, but mostly at month 3 or thereafter (data not shown). The QLQ-MY20 primary measures (disease symptoms and side effects of treatment) showed trends toward improvement but did not achieve clinically meaningful improvements for most of the follow-up visits in the sensitivity analysis. Findings from the sensitivity analysis of secondary HRQoL measures were also generally consistent with those of the base case analysis, with slightly better “baseline” scores at the screening visit yielding slightly lower magnitude of changes thereafter (data not shown).
Discussion

This analysis of HRQoL outcomes from the KarMMA trial demonstrated that the baseline HRQoL of patients enrolled in KarMMA was substantially worse than that of the general population. Within the first few months of ide-cel treatment, statistically significant and clinically meaningful improvements were observed in most HRQoL measures, including pain and disease symptoms by month 1, and fatigue, physical functioning, cognitive functioning, global health status/QoL, and side effects by month 2. These improvements in HRQoL generally persisted through 15 to 18 months. Results were consistent in the sensitivity analysis using scores from the screening assessment visit as “baseline” values.

In the KarMMA trial, ORR was observed in 73% of patients and CR or better was observed in 33% of patients treated with ide-cel. A matching-adjusted comparisons analysis also suggested that ide-cel provides efficacy benefits over conventional care regimens in TCE patients with RRMM. The findings presented in this analysis suggest that, in addition to the observed clinical benefits, ide-cel treatment is also associated with sustained and clinically meaningful improvements in HRQoL. The relatively rapid post-treatment changes in nearly all functional domains and symptom scales suggest meaningful early and sustained improvements in the quality of the additional life-years gained from ide-cel treatment for TCE patients with RRMM. These HRQoL benefits were also observed among patients who achieved ≥VGPR. These findings are consistent with the ongoing analysis of qualitative data from patient interviews conducted throughout the KarMMA trial. Patients reported high levels of pretreatment disease burden, with prominent hopes for remission (34/40, 85% of
pretreatment interview participants) and improved HRQoL (16/40, 40%).\textsuperscript{31} Post-treatment interviews showed prominent patient-reported fatigue through screening and early post-treatment time points that tended to resolve within 1 month of ide-cel treatment, and 62% of patients reported improvement in physical well-being by 3 months post-infusion.\textsuperscript{30}

Due to many emerging novel therapeutic options for TCE patients with RRMM, HRQoL data in this population are scarce. While cross-trial comparisons should not be given undue influence, our findings among TCE patients with RRMM are encouraging in the context of those from other RRMM treatments. For example, in the TCE RRMM patient population, HRQoL was shown to be stabilized after treatment with selinexor plus dexamethasone (STORM part 2)\textsuperscript{32} or belantamab mafodotin (DREAMM-2).\textsuperscript{33} In other heavily pretreated RRMM patient populations trends of improvement in HRQoL scores were observed at some time points for patients who received isatuximab plus pomalidomide and dexamethasone (ICARIA)\textsuperscript{34}, and for those who received pomalidomide and low-dose dexamethasone (MM-003).\textsuperscript{35} Similar trends were reported for the ARROW and PANORAMA-1 trials.\textsuperscript{36,37} Another emerging CAR T cell therapy for patients with RRMM is ciltacabtagene autoleucel (cilta-cel). In the CARTITUDE-1 trial patients treated with cilta-cel showed early post-treatment improvements in HRQoL with supportive qualitative interview data.\textsuperscript{38,39} Investigation of CAR T cell therapy candidates for patients with relapsed or refractory B-cell acute lymphoblastic leukemia,\textsuperscript{40} large B-cell lymphoma,\textsuperscript{41} aggressive B-cell non-Hodgkin lymphoma,\textsuperscript{42} or mantle cell lymphoma\textsuperscript{43} have also shown substantial baseline burden of disease in heavily pretreated patients with meaningful post-CAR T cell treatment improvements in HRQoL.
over time. These improvements in HRQoL are consistent with those reported here after a single infusion of ide-cel in the KarMMa trial.

Our findings should be considered in the context of certain strengths and limitations. This study is one of the first to report a positive impact on HRQoL among TCE patients with RRMM treated with CAR T cell therapy. In this analysis, the use of electronic data collection may have contributed to the high completion rates observed for HRQoL instruments (> 70% in months 1–6, and approximately 60%–70% thereafter), increasing the reliability and validity of the data. Functional and overall HRQoL in patients treated with ide-cel reached levels comparable to those of the age- and sex-matched general population, supporting a beneficial improvement in holistic treatment outcomes for a patient population with historically high disease and treatment burden, and poor prognosis and treatment options. Although HRQoL data were collected monthly during months 1 to 6 and every 3 months thereafter in the KarMMa trial, the most recent recommendations for CAR T trials suggest collecting HRQoL data as frequently as once a week during the first month post-infusion. While not assessed in the current study, HRQoL may have been negatively impacted by adverse events such as cytokine release syndrome immediately following ide-cel infusion. However, meaningful improvements were observed in most HRQoL measures as early as months 1 or 2 post-infusion, suggesting that patients quickly recovered from any early potential decreases in HRQoL. It should also be noted that the QLQ-MY20 instrument was developed in the context of traditional antimyeloma treatments and may not have captured the impact of side effects. Finally, the size of the HRQoL-evaluable population gradually decreased over time and the extent of missing data was high among those remaining in the study.
at later follow-up visits. As no imputation of missing HRQoL data was performed, patients with no data at later time points may have had different experiences than those who remained in the study. Therefore, data from later time points should be interpreted with caution due to the possibility that HRQoL scores could be overestimated if patients with better HRQoL were more likely to complete the questionnaires.\textsuperscript{45,46} These findings have demonstrated HRQoL improvements complementary to the positive survival and clinical response outcomes observed with a single infusion of ide-cel in the KarMMa trial. Early and sustained improvements in pain, fatigue, and functionality were commensurate with improved overall HRQoL over time. For heavily pretreated TCE patients with RRMM who have had a poor prognosis and few treatment options, a single ide-cel infusion offered meaningful improvements in clinical and humanistic outcomes, providing patient-reported HRQoL ultimately comparable to the general population.
Data sharing statement

The BMS policy on data sharing may be found at https://www.bms.com/researchers-and-partners/independent-research/data-sharing-request-process.html.

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Authorship

Contribution: J.B., D.D., L.S., S.G., P.Y., W.L., and T.C. analyzed the data. All authors contributed to the design of the study, data acquisition, and data interpretation. All authors participated in drafting the manuscript, provided feedback, and approved the final version ahead of submission.

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Figure legends

Figure 1. Instrument completion rates in the KarMMa population treated with idecel.

BL, baseline; EQ-5D, EuroQoL 5-dimension; idecel, idecabtagene vicleucel; QLQ-C30, Quality of Life C30 Questionnaire; QLQ-MY20, QLQ-C30 supplementary 20-item multiple myeloma module.

Figure 2. Mean QLQ-C30 scores: baseline KarMMa HRQoL patients and EU normative population. Re-weighted normative population scores for the QLQ-C30 were from 11 countries in the EU27.

* Denotes ≥10-point difference.

EU, European Union; HRQoL, health-related quality of life; QLQ-C30, Quality of Life C30 Questionnaire.

Figure 3. Mean changes from baseline, primary HRQoL analysis measures.

Reference lines indicate prespecified group-level MID thresholds for clinically meaningful improvement or deterioration. Patients were included in this analysis regardless of their clinical response. The number of non-responders are as follows: 31 non-responders at day 1, 27 non-responders at month 1, 17 non-responders at month 2, and 10 non-responders at month 3. Non-responders were not considered after this time due to the small sample size (<10 patients).

*P < .05 based on two-sided Wilcoxon signed rank test compared to 0.

HRQoL, health-related quality of life; MID, minimally important difference; SE, standard error.
Figure 4. Primary HRQoL assessments at day 1 and month 12 after ide-cel treatment. Patients with evaluable assessments at day 1 (n = 114 for all groups), at month 12 (n = 54 for all groups).

D, day; M, month; QLQ-C30, Quality of Life C30 Questionnaire; QLQ-MY20, QLQ-C30 supplementary 20-item multiple myeloma module; QoL, quality of life.
Completion rate (% patients)

Completion rate (%)

QLQ-C30 (n) 126 114 109 99 86 80 77 76 59 54 15 12
QLQ-MY20 (n) 125 114 109 98 86 80 76 75 58 54 15 12
EQ-5D (n) 126 115 110 99 86 80 77 76 59 54 15 12

Ide-cel population (N) 128 128 127 122 117 110 106 102 92 78 33 20

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Figure 2

KarMMa baseline (n = 126) vs Normative population (n = 11,343)

Mean QLQ-C30 score

QLQ-C30 primary HRQoL analysis measures

- Fatigue
- Pain
- Physical functioning
- Cognitive functioning
- Global health status/QoL
- Role functioning
- Emotional functioning
- Social functioning

QLQ-C30 secondary HRQoL analysis measures

- Nausea/vomiting
- Dyspnea
- Insomnia
- Appetite loss
- Constipation
- Diarrhea
- Financial difficulties

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Figure 3

Mean change from baseline score

MID for improvement

MID for deterioration

A. Fatigue (QLQ-C30)

B. Pain (QLQ-C30)

C. Physical functioning (QLQ-C30)

D. Cognitive functioning (QLQ-C30)

E. Global health status/QoL (QLQ-C30)

F. Disease symptoms (QLQ-MY20)

G. Side effects of treatment (QLQ-MY20)
