Impact of Novel Therapies on Multiple Myeloma Survival – Current and Future Outcomes

Amar Drawid, PhD¹, Satyin Kaura, MSci, MBA², Daniel Kiely, MS³, Mohamad A. Hussein, MD², Malik Kaman, MBA¹, Nisha Gilra, PhD¹, Brian G. M. Durie, MD⁴

1ZS Associates, Princeton, NJ; 2Celgene Corporation, Summit, NJ; 3Celgene, Summit, NJ; 4Cedars-Sinai Outpatient Cancer Center at the Samuel Oschin Comprehensive Cancer Institute, Los Angeles, CA

BACKGROUND

- Multiple myeloma (MM) survival improved dramatically with the introduction of new therapies in the mid-late 2000s.
- The impact of further advances in MM therapy is uncertain.

OBJECTIVE

- The objective of the study was to estimate the current and future outcomes for all patients with MM in the US, in terms of cohort overall survival (OS).

METHODS

- Patient cohorts include all MM patients in the US (i.e., including high / low risk patients, elderly / young patients, patients with all comorbidities, etc.).

Historical Analysis

- Cohort OS in the US (1990-2008) was calculated by analyzing data from Surveillance, Epidemiology, and End Results (SEER)¹

Predictive Analysis

- For the predictive analysis, annual cohort OS (survival of all multiple myeloma patients diagnosed in a given year) was calculated using a patient flow model.

Historical Median Cohort OS

- Cohort OS was assumed to be the sum of time spent by patients across all lines of therapy (LoT).
- Within each LoT, treatment rate and median time on therapy were used to create an average Time to Next Treatment (TTNT) curve for each cohort (Figure 2).

TTNT Curves

- TTNT curves for each LoT were combined longitudinally and smoothed to project the average progression of the patient cohort throughout all LoTs. This resulted in a composite cohort OS curve for each diagnosis year.
- Each composite curve was calibrated to match the median and distribution for the corresponding historical cohort OS curve. Future projections were adjusted to fit real-world cohort OS trends.

Assumptions on treatment rates and TTNT were derived from 150+ completed and ongoing clinical trials and primary market research with key opinion leaders (KOLs).

- In the market research, KOLs shared expectations on the future advances in multiple myeloma based on their assessment of the future landscape.
- Assumptions on TTNT were made at the annual patient cohort level and did not include any regimen-specific assumptions.

RESULTS

- In the US, the median cohort OS remained relatively unchanged from 1990–2001 at ~30 months, but increased by ~43% to 43 months by 2008.
- The median cohort OS in the US is expected to increase to ~72 months by 2022, which represents a 67% improvement from 2008 and ~140% improvement from 2001 (Figure 3).
- Overall cohort OS curves are projected to improve, with increases in both the median and the tail of the curves (Figure 4).
- The life expectancy of patients diagnosed with MM in 2022 is expected to be ~75 years. This will still be ~10 years shorter than the current life expectancy of the general population (~85 years) at the median age of diagnosis of 69 years.
- In European geographies, we expect to see similar survival trends but with a slight delay that reflect adoption patterns of novel therapies across the EU.

CONCLUSIONS

- This analysis highlights the dramatic improvements in MM survival since 2000 in the US and the expected improvement in the future, demonstrating the transformative impact and value of novel therapies.
- Over the next few years, with better scientific understanding of MM and the use of novel drug regimens, we expect to see an additional improvement of ~67% in cohort OS in the US for MM patients by 2022.
- Nevertheless, there remains opportunity to further bridge the life expectancy gap between the general population and MM patients.

LIMITATIONS

- Main limitations to this study are:
  - Factors other than treatment rate and time to next treatment (e.g., use of best supportive care, enrollment in clinical trials) were not considered explicitly.
  - Future assumptions were based on opinions of key opinion leaders.
  - Calculations for each LoT were performed at the aggregate level rather than the individual regimen level.

References:


Acknowledgements: This work was sponsored by Celgene. We would like to thank Martin Smith, PhD; Anvesh Pinninti; Raghavendran J.; Maxim Lewin; and Isaac Cheng for their contributions.