The Societal Impact of Lenalidomide

PCN 216

Health effects and the wider economic and social effects of a medical innovation in Germany

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Background and research aim

- Health benefits in CE-studies for multiple myeloma (MM) therapies are generally depicted in PFS or OS.
- **Positive economic and societal effects** are rarely considered in value assessments of medical innovations in Germany.
- This study provides **a novel approach to value health gains in monetary terms** and to estimate the **societal and economic benefits** of lenalidomide therapy for MM patients in Germany since its approval in 2007 until 2030 (retrospective and prospective simulation).

Methodology

The Health Footprint

Calculation of **health benefits** in different treatment lines using a Markov model:

- Clinical inputs derived from published trial data
- Comparator: A "world without lenalidomide"
- Outcome: Aggregated Progression Free Survival **(PFS)** and Overall Survival **(OS)** patient-years.

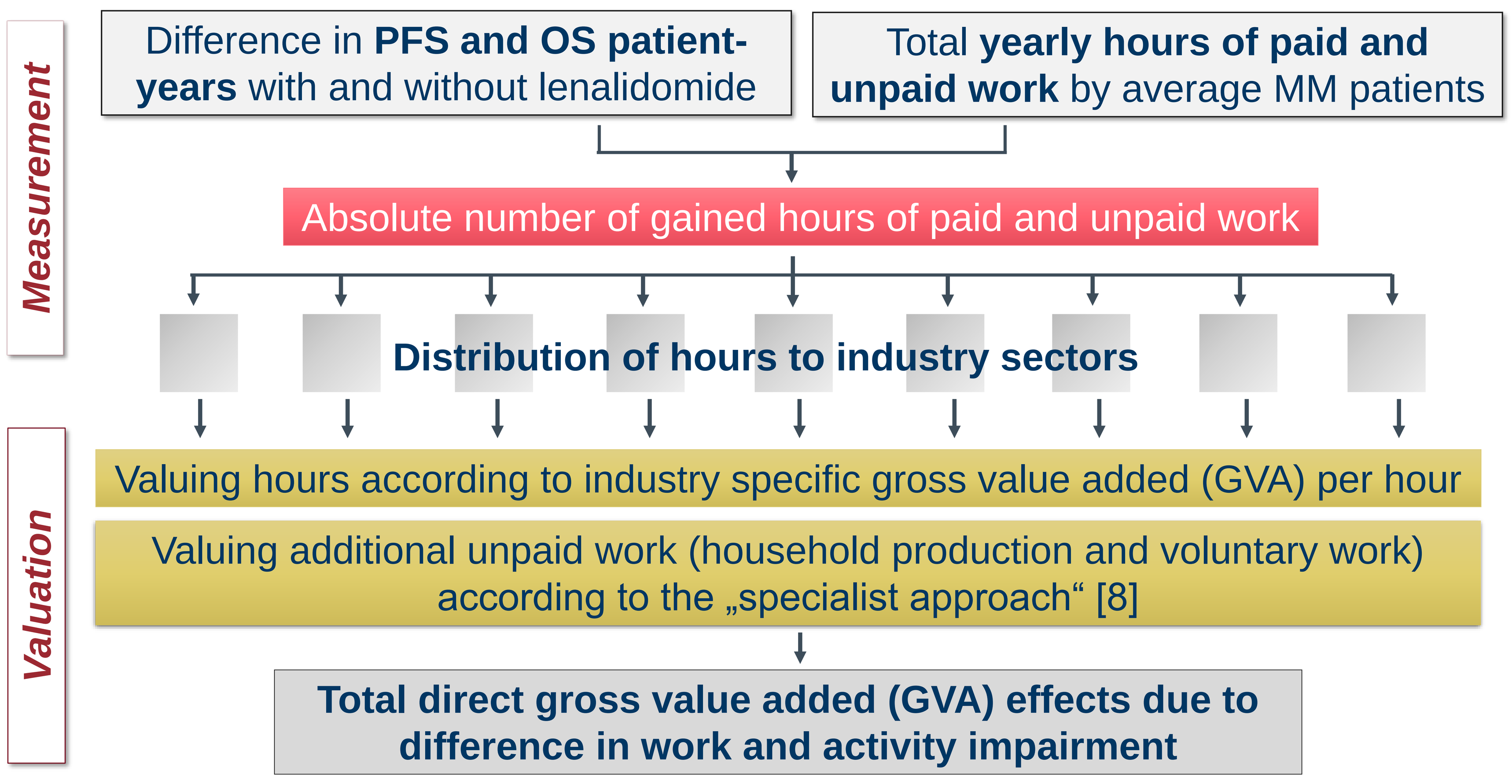
	Lenalidomide-based treatment		Comparator treatment	Sources (clinical trials)
L1 no ASCT	Rd	⟷	VMP	FIRST vs. VISTA; indirect comparison [1]
Maintenance after ASCT	R mono	⟷	Placebo	Meta-Analysis [2]: CALGB 1001042, IFM 2005-02, GIMENA
L2+	Rd/DRd/KRd/ EloRd/IxaRd	⟷	HD Dexa	MM09 [3], POLLUX [4], ASPIRE [5], ELOQUENT-2 [6], TOURMALINE [7]

Extrapolation of the health benefits to the overall patient population from 2007 up to the year 2030 using an open cohort population model stratified by different age groups.

The Socioeconomic Footprint

Translation of additional PFS into **productivity gains**

- Consideration of both paid and unpaid work
- Calculation of indirect and induced economic effects



Monetarization of the **intrinsic value of longer OS**

- Intrinsic value is captured by the „value of a statistical life year", which equals on average about EUR 158,000 in continental Europe. [9]

Value-invest analysis

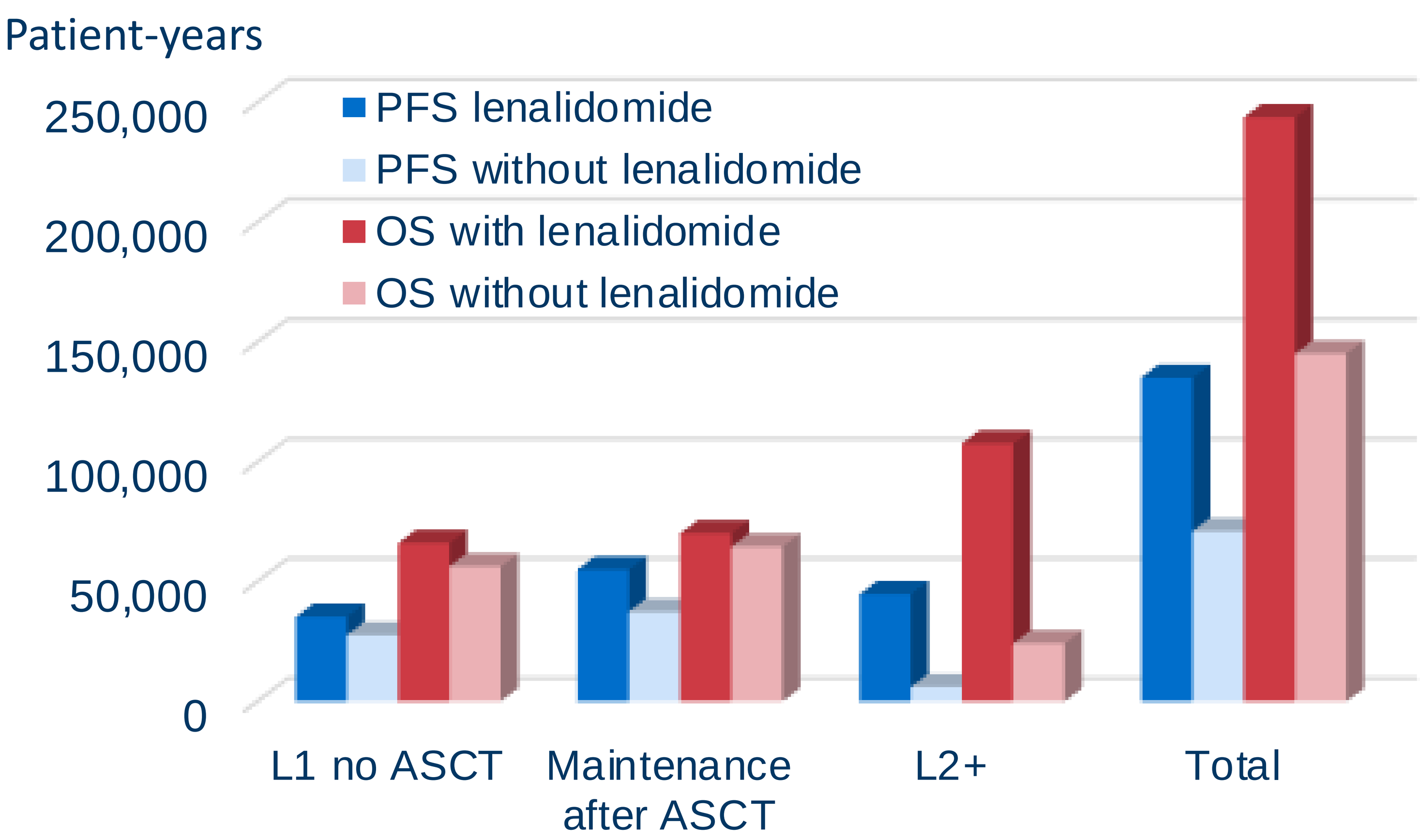
Comparison of the societal impact (value added benefits) with the additional costs of treating MM patients with lenalidomide

- Included costs: Treatment costs + general average health care costs

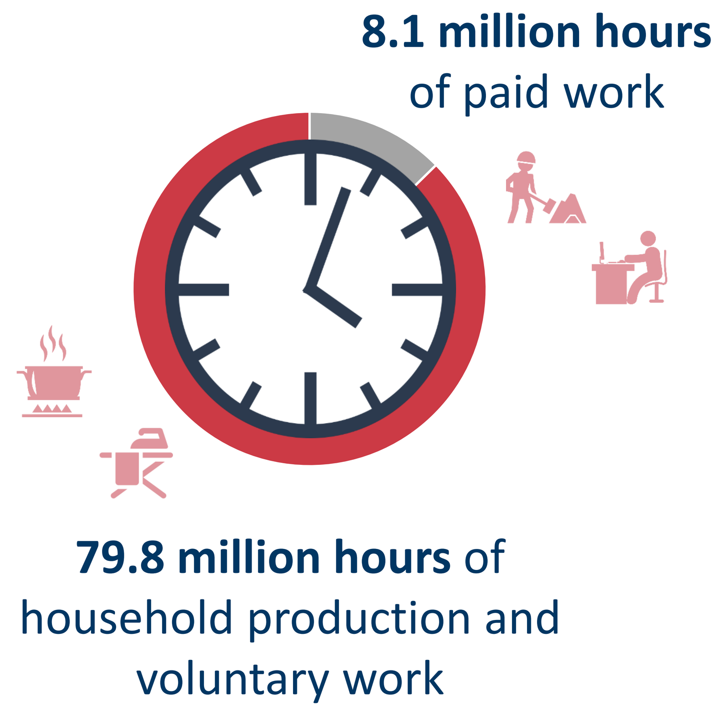
References
[1] Data provided by Celgene.
[2] McCarthy, P. L. et al. (2017). Lenalidomide maintenance after autologous stem-cell transplantation in newly diagnosed multiple myeloma: a meta-analysis. *Journal of Clinical Oncology*, *35*(29), 3279-3289.
[3] Weber, D. M.et al. (2007). Lenalidomide plus dexamethasone for relapsed multiple myeloma in North America. *New England Journal of Medicine*, *357*(21), 2133-2142.
[4] Dimopoulos, M. A. et al. (2016). Daratumumab, lenalidomide, and dexamethasone for multiple myeloma. *New England Journal of Medicine*, *375*(14), 1319-1331
[5] Stewart, A. K. et al. (2015). Carfilzomib, lenalidomide, and dexamethasone for relapsed multiple myeloma. *New England Journal of Medicine*, *372*(2), 142-152.
[6] Lonial, S. et al. (2015). Elotuzumab therapy for relapsed or refractory multiple myeloma. *New England Journal of Medicine*, *373*(7), 621-631.
[7] Moreau, P. et al. (2016). Oral ixazomib, lenalidomide, and dexamethasone for multiple myeloma. *New England Journal of Medicine*, *374*(17), 1621-1634.
[8] Hofmann S: Einfluss nicht-marktlicher Tätigkeiten auf den materiellen Wohlstand und die Einkommensverteilung in Deutschland. Sozialökonomische Schriften. Frankfurt am Main, PL Academic Research, 2015, Band 50.
[9] Schlander, M. et al. (2017). Empirical studies on the economic value of a statistical life year (VSLY) in Europe: What do they tell us?. *Value in Health*, 20(9), A666.

Results

Health Footprint: Overall PFS and OS gains of treatment with lenalidomide



- Through 2030, an estimate of **64,066** progression-free patient-years are gained due to the use of lenalidomide



Gained time is used either for paid work or for household production and voluntary (unpaid) work.

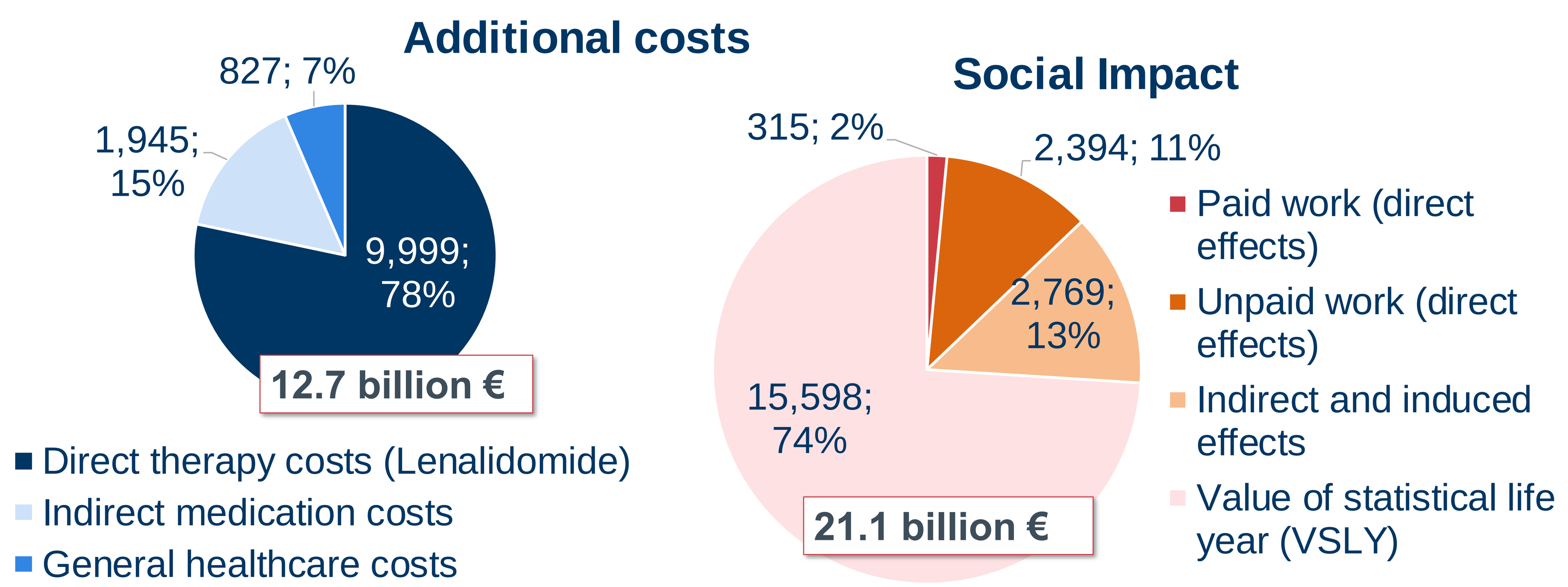
These progression free patient-years correspond to about **8.1 million hours** of paid work (~ 5,952 years of employment) and about **79.8 million hours** of unpaid work.

	L1 no ASCT	Maintenance	L2+	Total
PFS patient years	7,661	17,660	38,745	**64,066**
Value added* (paid work)	20.1	138.3	156.9	**315.5**
Value added** p. person	2.6	7.8	4.1	**4.9 (Ø)**
Value added* (unpaid work)	290.1	749.2	1,354.6	**2,394.0**
Value added** p. person	37.9	42.4	34.9	**37.4 (Ø)**

* In million EUR; ** In thousand EUR

Conclusion

The Societal Impact of the treatment of MM patients with lenalidomide 2007-2030 (in million €)



- Taking all relevant dimensions into account, including the statistical value of life, the societal impact of lenalidomide amounts to **EUR 21.1 billion** vs. EUR 12.7 billion of additional costs.
- This study quantifies not only **health gains in monetary terms**, but also the wider **economic and social benefits** that come along with improved health.
- It represents a useful tool in the current **debate on value-based pricing**.

Acknowledgements: This study was commissioned and sponsored by Celgene Germany.

ISPOR 22nd Annual European Congress | 04-06 November | Copenhagen, Denmark

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