

Cost-Effectiveness of Dimethyl Fumarate and Teriflunomide Treatment for Relapsing-Remitting Multiple Sclerosis From a Danish Perspective

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INTRODUCTION

- Relapsing-remitting multiple sclerosis (RRMS) is characterised by periods of relapse and remission, leading to progressive accumulation of disability.
- Disease-modifying treatments (DMTs) are used to treat MS to reduce the frequency of relapses and disease progression.

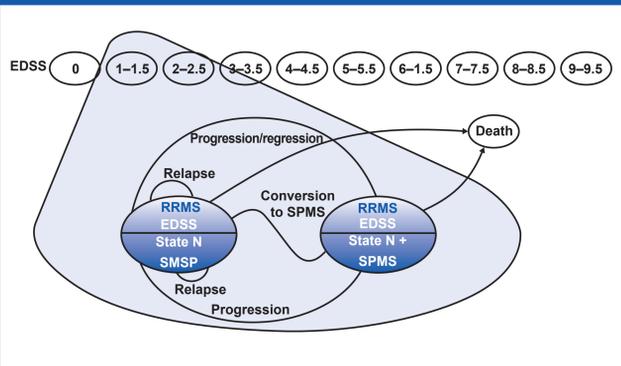
OBJECTIVE

- The study objective was to compare the cost effectiveness of dimethyl fumarate with that of teriflunomide for the treatment of RRMS in a Danish setting from a healthcare sector and societal perspective.

METHODS

- In a cohort-based Markov model, patients progress through a series of disability states based on the Expanded Disability Status Scale (EDSS). At any time, patients have fixed probabilities of progression and relapse dependent on RRMS or secondary-progressive MS (SPMS) status and EDSS state. The model uses 1-year cycles, and the time frame of the analysis was 30 years (Figure 1).

Figure 1. Markov model



- Outcomes, measured as costs and quality-adjusted life years (QALYs), depend on the average time a patient spends in each disease state.
- Healthcare resource use, lost productivity, and QALYs associated with each EDSS state and with relapses were derived from a Swedish study.¹
- The direct healthcare sector costs per EDSS state were derived by adding Danish unit costs² to resource use. Similarly, mean Danish salary³ was multiplied with productivity losses to derive indirect costs, and these costs were added to the direct costs from the societal perspective (Figure 2).

Figure 2. Yearly costs associated with MS per EDSS state

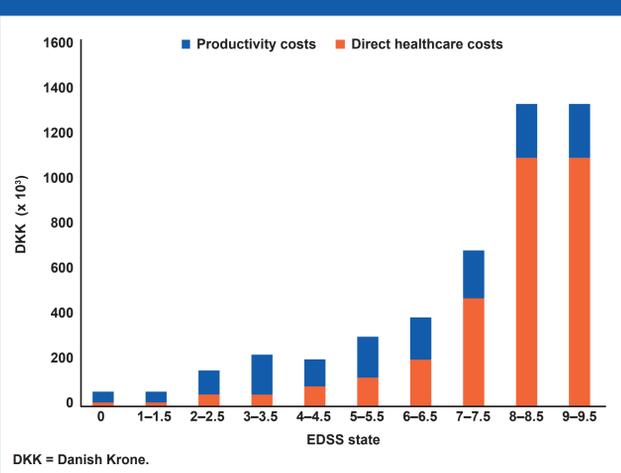


Table. Cost-effectiveness results

| Cost | Dimethyl fumarate, DKK | Teriflunomide, DKK | Incremental costs, DKK | Incremental QALYs | ICER |
|---|------------------------|--------------------|------------------------|-------------------|------------------------------------|
| Direct costs (healthcare sector perspective) | | | | | |
| Disease management | 7,339,834 | 7,578,745 | -238,911 | | |
| Drug | 557,655 | 416,261 | 141,394 | | |
| Administration and monitoring | 50,994 | 48,832 | 2162 | | |
| Relapses | 176,485 | 184,515 | -8030 | | |
| Adverse event management | 2992 | 137 | 2855 | | |
| Total | 8,127,959 | 8,228,490 | -100,530 | 0.23 | Dimethyl fumarate dominates |
| Indirect costs (societal perspective) | | | | | |
| Disease management | 3,056,810 | 3,098,100 | -41,289 | | |
| Relapses | 119,157 | 124,579 | -5422 | | |
| Total | 11,303,927 | 11,451,168 | -147,242 | 0.23 | Dimethyl fumarate dominates |

ICER = incremental cost-effectiveness ratio.

- The direct healthcare costs and productivity costs per relapse were calculated to be DKK 10,230 and DKK 6907, respectively.
- For each drug regimen, costs of monitoring, administration, adverse events and drug purchase were added.^{1,4}
- Data on file from a mixed treatment comparison⁵ determined the clinical efficacy of the treatment options in the model that delay the progression of the disease and reduce the relapse frequency.
- Risk of discontinuation was obtained from clinical trials of each drug regimen.⁶⁻⁹
- A full probabilistic sensitivity analysis was performed on key input variables using the technique of recurrent Monte Carlo simulations.
- As net prices in Denmark can change after tender, a sensitivity analysis with various yearly drug cost increments of dimethyl fumarate vs. teriflunomide was performed.
- In a conservative approach, the model only includes adverse event categories from dimethyl fumarate studies.

RESULTS

- In the base case, treatment with dimethyl fumarate compared with teriflunomide was associated with a gain of 0.23 QALYs and lower healthcare sector costs (DKK -100,530) and societal costs (DKK -147,242), implying that dimethyl fumarate is a dominant strategy (Table).
- Probabilistic sensitivity analyses were performed, showing that dimethyl fumarate dominates from a healthcare sector and societal perspective in 64.2% and 67.5% of 5000 simulations, respectively (Figure 3).
- One-way sensitivity analyses showed that dimethyl fumarate is cost saving from a healthcare sector and societal perspective at a yearly drug cost difference up to approximately DKK 49,000 and DKK 61,000, respectively (Figure 4).

CONCLUSIONS

- Compared with teriflunomide, dimethyl fumarate is a cost-effective and cost-saving treatment alternative from a Danish healthcare sector and societal perspective. The results are robust in deterministic and probabilistic sensitivity analyses.

Figure 3. Probabilistic sensitivity analysis (PSA)

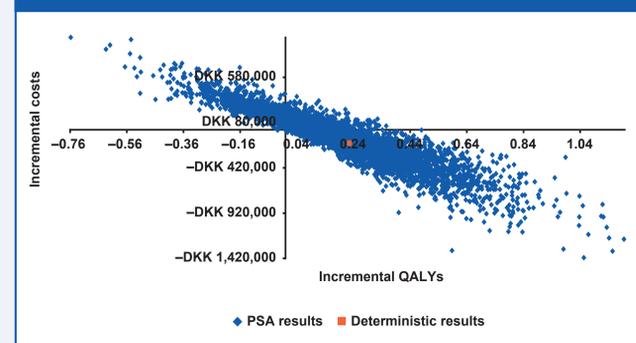
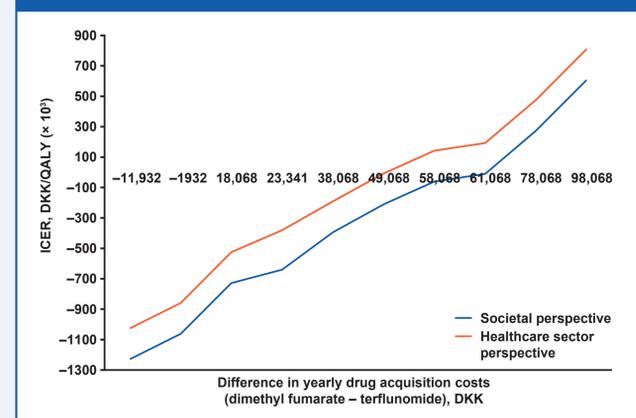


Figure 4. Deterministic sensitivity analyses of impact of yearly drug costs increments with dimethyl fumarate vs. teriflunomide



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Disclosures

JO: employee of Incentive, which has received consultancy fees from Biogen; AW: employee of and stockholder in Biogen Denmark A/S.

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