Cost-Effectiveness of Proton Beam Therapy in the Treatment of Pediatric Medulloblastoma in France

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INTRODUCTION

Medulloblastoma is the most common malignant brain tumor in children, representing 20% of central nervous system tumors among this age group. In addition to surgery, radiation therapy (RT) remains a crucial option for treating patients with medulloblastoma. Nonetheless, it carries the risk of late adverse events. These negative events lead to neurocognitive and endocrine impairments affecting almost all patients.

OBJECTIVE

The objective of the current study was to assess the cost-effectiveness of proton beam therapy compared with conventional radiation therapy in the treatment of childhood medulloblastoma from the perspective of the national health insurance system in France.

METHOD

A Markov model was developed with:

- hypothyroidism, hearing loss, growth hormone deficiency, IQ loss and secondary cancer as health states.
- time horizon is the lifetime,
- quality-adjusted life years (QALYs) and the incremental cost-effectiveness ratio (ICER) used as outcomes.

***The utility scores and costs were estimated from the literature for the French population.**

RESULTS

With a willingness to pay threshold of €50,000 and an ICER of €5,236/QALY, proton beam therapy is suggested to be cost-effective. Sensitivity analyses were performed, in which the model's parameters were varied, and it was shown that growth hormone deficiency can contribute to a reduction in costs.

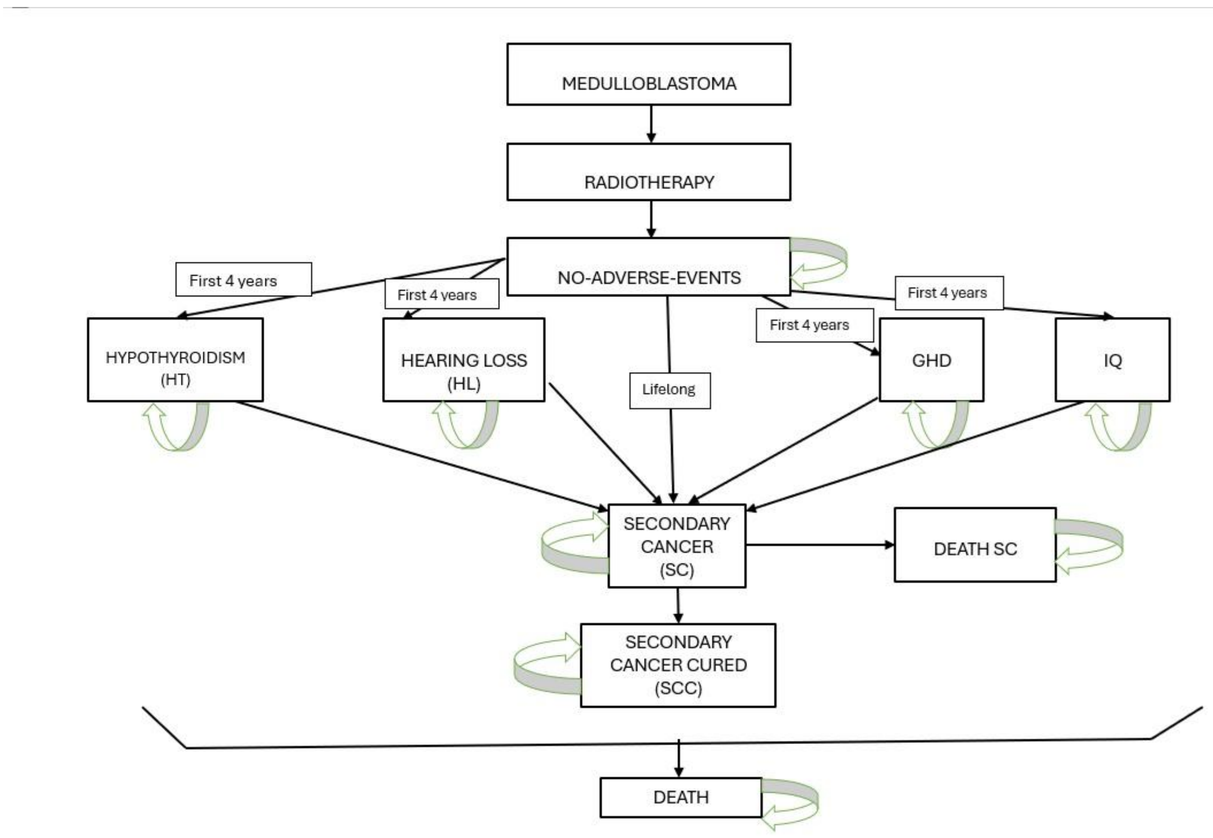

Figure 1. Markov model diagram. Proton beam therapy (PBT) vs X-Ray
HT = hypothyroidism, HL = hearing loss, GHD= growth hormone deficiency, IQ = intelligence quotient loss

CONCLUSIONS

The results of this study indicated that proton radiation therapy can be cost-effective compared with conventional radiation therapy in the treatment of children with medulloblastoma. However, much more information on the long-term consequences of radiation therapy is needed. Additionally, there is a need to consider different health states from a public health perspective, which includes the capacity of these patients to lead a normal adult life after treatment.

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