

# TRENDS IN SURVIVAL BENEFIT AND COST-EFFECTIVENESS OF ANTI-CANCER TREATMENTS IN CANADA

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## Background

- The Canadian Agency for Drugs and Technologies in Health (CADTH) is responsible for evidence-based reviews of drugs, providing non-binding funding recommendations to the Canadian provinces (with the exception of Quebec)<sup>1</sup>.
- As part of the review process, drug manufacturers include both clinical and economic evidence in their submission. Economic evidence is typically presented in terms of both incremental quality-adjusted life years (QALYs) and incremental cost-effectiveness ratios (ICERs)<sup>2</sup>.
- There have been conflicting findings on whether the price of anti-cancer treatments have outpaced the survival benefits delivered by these innovative treatments<sup>3-4</sup>.
- This analysis aims to explore the trends in survival benefits (QALYs) and cost-effectiveness (ICERs) of anti-cancer therapies evaluated by the CADTH.

## Methods

- Anti-cancer submissions available as of January 15, 2019 were reviewed to identify manufacturer-submitted incremental QALYs and ICERs<sup>5-6</sup>, and whether a positive reimbursement recommendation was made. Only drug submissions with a positive reimbursement recommendation were included as part of this analysis.
- If the manufacturer submitted multiple base case scenarios (e.g. versus different comparators, for different clinical subgroups, etc.), each of these scenarios were considered a unique data point.
- A time-trend analysis was conducted examining both the efficacy gains (incremental QALYs) and manufacturer-submitted ICERs over time. A linear regression of each value metric versus submission date was used to compare changes over time.

## Results

- 127 anti-cancer HTA recommendations were available as of January 15, 2019. Of these, 29 submissions were excluded from the analysis due to CADTH not recommending the product for provincial reimbursement.
- Some manufacturers submitted multiple economic base cases in their HTA submissions. Of the 98 positive HTA evaluations, 136 economic base cases were eligible for the analysis (85 for solid tumour submissions, and 51 for hematological tumour submissions).
- Manufacturer-submitted efficacy gains and cost-effectiveness estimates were plotted over time based on their submission date. **Figure 1** demonstrates the change in manufacturer-submitted efficacy gains over time; and **Figure 2** demonstrates the change in manufacturer-submitted cost-effectiveness estimates over time.
- A linear regression model was used to estimate the rate of change over time for each value metric. **Table 1** summarizes the average annual change and the 95% confidence interval examining solid tumour submissions, hematological tumour submissions, and all anti-cancer submissions.

Table 1: Average Annual Change by Value Metric

Value Metric	Average Annual Change	95% Confidence Interval
<b>Solid Tumour Submissions (n=85)</b>		
Efficacy	0.121	0.070 – 0.172
Cost-Effectiveness	2,443	-10,385 – 15,271
<b>Hematological Tumour Submissions (n=51)</b>		
Efficacy	0.581	0.329 – 0.834
Cost-Effectiveness	5,585	-2,730 – 13,899
<b>All Submissions (n=136)</b>		
Efficacy	0.273	0.154 – 0.392
Cost-Effectiveness	4,071	-4,843 – 12,985

## Results (continued)

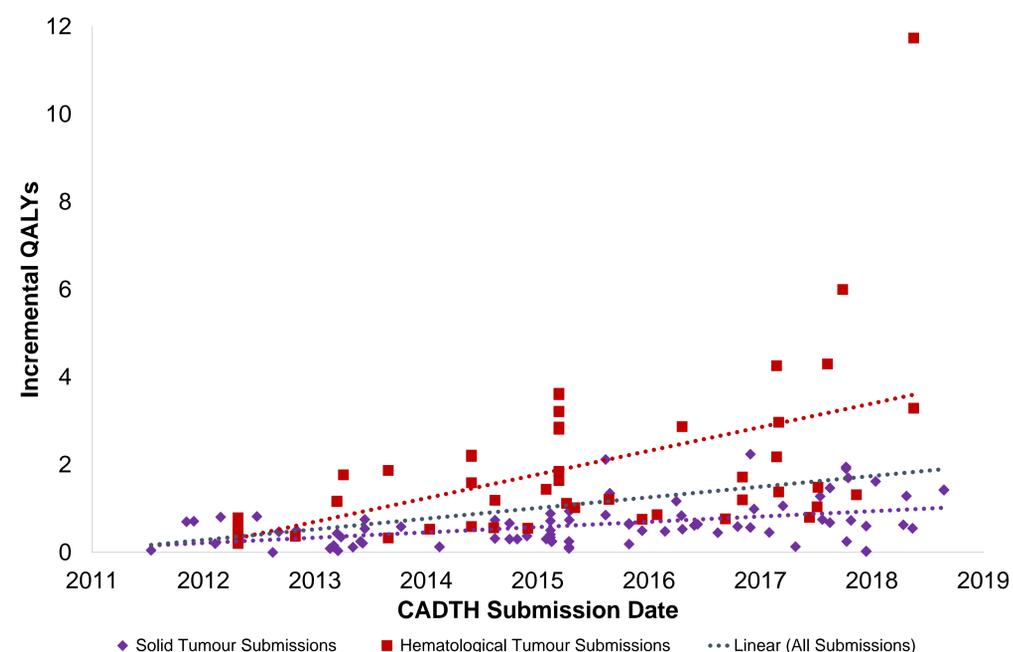


Figure 1: Time-Trend Analysis for Increased Efficacy

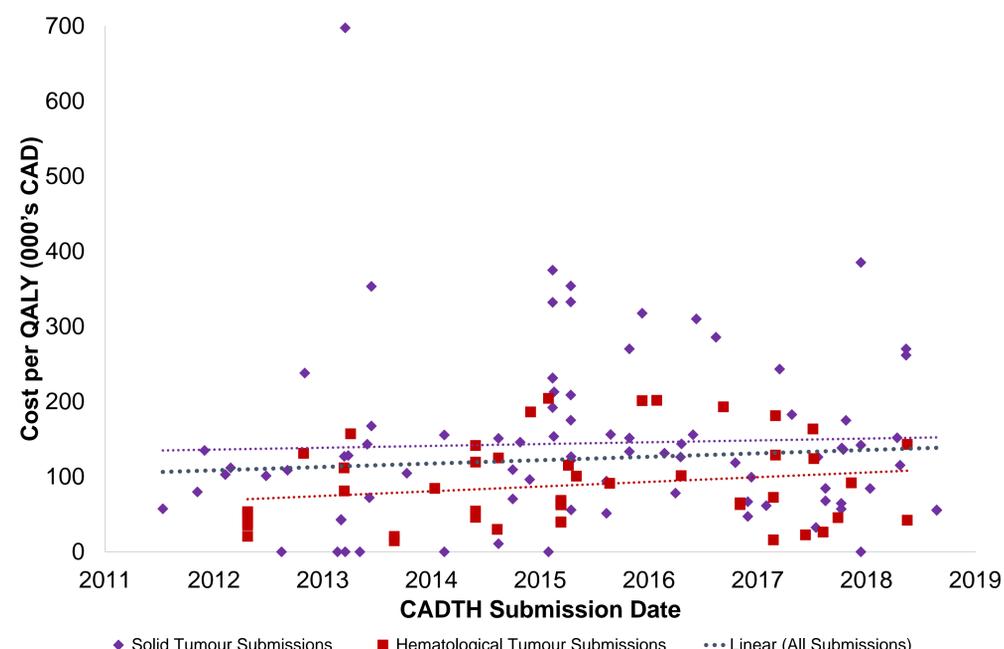


Figure 2: Time-Trend Analysis for Cost-Effectiveness

## Discussion

- Overall, anti-cancer therapies have demonstrated greater survival benefits over time, by approximately 0.273 QALYs gained per year (95% CI, 0.154 to 0.392). Treatments for hematological tumors demonstrated superior efficacy improvements [0.581 QALYs gained per year (95% CI, 0.329 to 0.834)] when compared to drugs for solid tumors [0.121 QALYs gained per year (95% CI, 0.070 to 0.172)].
- Cost-effectiveness has slightly worsened over time, with the average annual increase of \$4,071/QALY (95% CI, -4,843 to 12,985) being observed for all positive recommendations.
- Anti-cancer treatments have demonstrated increasing survival benefit improvements for patients. This positive trend reinforces the idea that innovation in the anti-cancer space has continued over time. While ICERs have marginally increased on average over time, the findings of this study suggest that it is outweighed by the improvements to clinical benefit.

## References

- Canadian Agency for Drugs and Technologies in Health (2019). *About CADTH*. Accessed January 2019, from CADTH [\[https://cadth.ca/about-cadth\]](https://cadth.ca/about-cadth)
- Canadian Agency for Drugs and Technologies in Health (2019). *Guidelines for the Economic Evaluation of Health Technologies: Canada*. Accessed January 2019, from CADTH [\[https://www.cadth.ca/about-cadth/how-we-do-it/methods-and-guidelines/guide-lines-for-the-economic-evaluation-of-health-technologies-canada\]](https://www.cadth.ca/about-cadth/how-we-do-it/methods-and-guidelines/guide-lines-for-the-economic-evaluation-of-health-technologies-canada)
- Cressman, S., Brownman, G.P., Hoch, J.S., Kovacic, L., Peacock, S.J. (2015). *A Time-Trend Economic Analysis of Cancer Drug Trials*. *The Oncologist* 2015;20:729-736. [\[http://dx.doi.org/10.1634/theoncologist.2014-0437\]](http://dx.doi.org/10.1634/theoncologist.2014-0437)
- Howard, D.H., Bach, P.B., Berndt, E.R., Conti, R.M. (2015). *Pricing in the Market for Anticancer Drugs*. *Journal of Economic Perspectives* 2015;29,1:139-162. [\[http://dx.doi.org/10.1257/jep.29.1.139\]](http://dx.doi.org/10.1257/jep.29.1.139)
- Canadian Agency for Drugs and Technologies in Health (2019). *Find a Review (pCODR)*. Accessed January 2019, from CADTH [\[https://cadth.ca/pcodr/find-a-review\]](https://cadth.ca/pcodr/find-a-review)
- Canadian Agency for Drugs and Technologies in Health (2019). *Tisagenlecleucel (Kymriah) for Pediatric Acute Lymphoblastic Leukemia and Diffuse Large B-Cell Lymphoma*. Accessed January 2019, from CADTH [\[https://cadth.ca/axicabtagene-ciloleucel-adults-relapsed-or-refractory-large-b-cell-lymphoma\]](https://cadth.ca/axicabtagene-ciloleucel-adults-relapsed-or-refractory-large-b-cell-lymphoma)