Cost Efficiency of Trilaciclib, A First-in-Class Kinase Inhibitor Providing Multilineage Myeloprotection, and Expanded Budget-Neutral Access to Multilineage Myeloprotection for Extensive-Stage Small Cell Lung Cancer Patients

Ivana Kreso[1], Gabrielle Murphy[1], Preston Ngo[1], Starley Pollei[1], Ivo Abraham[1] PhD

[1]The University of Arizona

THE UNIVERSITY OF ARIZONA
R. Ken Coit College of Pharmacy

Pharmacy

BACKGROUND

In 2019 lung cancer was the third most common type of cancer and the leading cause of cancer-related deaths in the United States. **Extensive-stage small cell lung cancer (ES-SCLC)** is a lung tumor that has gone outside of the boundaries that radiation can cover, including distant metastases and malignant pericardial or pleural effusions.[1] **Chemotherapy** stands as the main treatment option, but **myelosuppression** is a major and common concern. Myelosuppression and can lead to **neutropenia** with or without fever, **anemia**, and **thrombocytopenia**, and these are adverse events that can lead to the need for more treatment to correct these cytopenias.[2]

Understanding the importance of myeloprotection, Goldschmidt and colleagues calculated the **financial burden** that patients with a myelosuppressive event of grade 3 or greater spent **$40,896** compared to $33,361 for patients experiencing milder events.[3] They also found that patients with a grade 3 or greater myelosuppressive events spent more on supportive care (granulocyte colony-stimulating factor (G-CSF), erythropoiesis-stimulating agents, and intravenous hydration).[3]

Trilaciclib (Cosela®, G1 Therapeutics, Durham, North Carolina, USA) is a cyclin-dependent kinase inhibitor that is given before platinum/etoposide- or topotecan-containing chemotherapy for ES-SCLC.[4] It protects hematopoietic stem and progenitor cells in the **G1 phase of the cell cycle by providing multilineage protection** before chemotherapy is given in patients with ES-SCLC. Trilaciclib has been shown to decrease the incidences of myelosuppression, lowering the financial burden to insurance companies, patients, and the overall healthcare system. We propose an assessment of how much savings can be achieved by using trilaciclib in the multilineage protection against cytopenias.

PURPOSE

To perform a pharmacoeconomic analysis to determine the **cost-efficiency of multilineage treatment with trilaciclib** compared to monolineage cytopenia prophylaxis and/or management in a panel of 10,000 ES-SCLC patients.

To examine how accrued savings from the utilization of trilaciclib can be reallocated budget-neutrally to provide expanded access.

METHODS

An **economic simulation model** from the payer perspective was specified in Microsoft Excel. The economic model examined a panel of 10,000 participants with ES-SCLC and assessed the impact of using trilaciclib.

This model was based on an ideal patient with ES-SCLC, weighing 65 kilograms, measuring 180 centimeters, and who did not have end-stage renal disease.

Pricing for therapies was extracted from the United States Centers for Medicare and Medicaid Services (Average Sale Price) from 2024 quarter one.

Costs of managing cytopenias grade $\geq$3 will be sourced from Kuchava et al 2020[5]. All historical cost data for aspects of intrest will be adjusted for inflation using the US Bureau of Labor Statistics Medical Consumer Price Index calculator for prescription medicines.

Treatment agents for each cytopenia used in the analysis include:

Table 1: Rates and Explored Treatment Options of Cytopenias due to ES-SCLC Induced Myelosuppression[5]

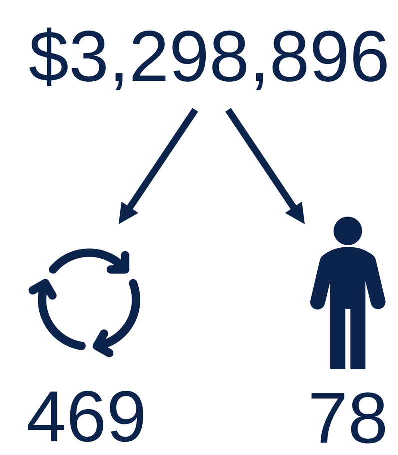
	Anemia	Neutropenia	Thrombocytopenia
Rates (%)	62.3	60.4	43.4
Treatment Options	Darbepoetin-alfa	Filgrastim Filgrastim biosimilars Pegfilgrastim Pegfilgrastim biosimilars	Romiplostim Platelet transfusion

RESULTS

Table 2: Savings from the use of Trilaciclib for a Population of 10,000 Patients for 1-Cycle

	Total Groups	Cost Effective Groups	Cost Efficiency (%)	Total Savings ($)
Anemia Neutropenia	4	0	0	0
Anemia Thrombocytopenia	2	0	0	0
Neutropenia Thrombocytopenia	8	0	0	0
Anemia Neutropenia Thrombocytopenia	8	1	12.5	549,816

Figure 1: Reallocation of Savings from using Trilaciclib in the Cost Effective Group



DISCUSSION

More than half of the population with ES-SCLC that undergoes chemotherapy develops at least one type of cytopenia due to myelosuppression. The cost of treating these cytopenias can be very burdensome to patients and healthcare systems.

Comparing different myelosuppressive treatment options, our analysis found one instance where using trilaciclib was more beneficial than using a combination of separate agents. This one instance was for the treatment of combined anemia, neutropenia, and thrombocytopenia requiring the traditional use of three agents.

Compared to using a combination of **darbepoetin-alfa, pegfilgrastim biosimilars, and romiplostim** to treat corresponding cytopenias, **trilaciclib saved $549,816 per cycle per 10,000 patient**s. This resulted in a **cost efficiency of 12.5%** when using trilaciclib over other agents when attempting to treat combined anemia, neutropenia, and thrombocytopenia. All other groups did not show a savings benefit when compared to using trilaciclib.

When extrapolated to six cycles, the aforementioned instance provided an accrued **savings of $3,298,896**. This can be reallocated into an **additional 469 individual cycles or 78 full six cycle treatments**, providing an opportunity to help expand access to myelosuppressive treatment for individuals facing financial burdens.

CONCLUSIONS

Trilaciclib has the potential to provide savings benefits when treating myelosuppressive events. However due to factors in the current market it is not very compelling to use at this time. Once trilaciclib gains expanded indications for use, a generic equivalent becomes available, or market competition changes the current prices of myelosuppressive treatments, further studies can be performed to reassess potential economic benefit of its use.

DISCLOSURES

IA is an equity owner in Matrix45, LLC, which is under contract with G1 Therapeutics for economic evaluations of trilaciclib. This present study is being conducted independently without financial support from G1 Therapeutics and is outside the scope of work of the Matrix45 contracts with G1 Therapeutics.

REFERENCES

1. Byers LA, Gay CM. Pathobiology and staging of small cell carcinoma of the lung. UpToDate. Published October 7, 2021.

2. Abraham I, Goyal A, Deniz B, et al. Budget impact analysis of trilaciclib for decreasing the incidence of chemotherapy-induced myelosuppression in patients with extensive-stage small cell lung cancer in the United States. *J Manag Care Spec Pharm*. 2022;28(4):435-448. doi:10.18553/jmcp.2022.21379

3. Goldschmidt J, Monnette A, Shi P, Venkatasetty D, Lopez-Gonzalez L, Huang H. Burden of chemotherapy-induced myelosuppression among patients with ES-SCLC in US community oncology settings. *Future Oncol*. 2022;18(35):3881-3894. doi:10.2217/fon-2022-0754

4. COSELA (trilaciclib) for injection, for intravenous use. Prescribing information. G1 Therapeutics, Inc; 2021.

5. Daniel D, Kuchava V, Bondarenko I, Ivashchuk O, Reddy S, Jaal J, Kudaba I, Hart L, Matitashvili A, Pritchett Y, Morris SR, Sorrentino JA, Antal JM, Goldschmidt J. Trilaciclib prior to chemotherapy and atezolizumab in patients with newly diagnosed extensive-stage small cell lung cancer: A multicentre, randomised, double-blind, placebo-controlled Phase II trial. Int J Cancer. 2020 Dec 21;148(10):2557–70. doi: 10.1002/ijc.33453. Epub ahead of print. PMID: 33348420; PMCID: PMC8048941.