# Pembrolizumab Monotherapy Achieves Sustained Complete Metabolic Remission in Mediastinal B-Cell Lymphoma Relapsing After CD19-Directed CAR T–Cell Therapy: A Case Report

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## Introduction

Primary mediastinal B-cell lymphoma (PMBCL) is a rare and aggressive subtype of diffuse large B-cell lymphoma that frequently demonstrates resistance to conventional chemotherapy (1). Although CD19-directed chimeric antigen receptor (CAR) T-cell therapy has transformed the treatment of relapsed or refractory large B-cell lymphomas, approximately 30–40% of patients relapse after infusion (3,5). Salvage options following CAR T-cell failure remain limited and outcomes are generally poor. Immune checkpoint inhibitors, particularly the PD-1 antibody pembrolizumab, have shown meaningful activity in heavily pretreated PMBCL and represent a promising therapeutic avenue (1,4).

## Case presentation

This is a 48-year-old man was diagnosed in May 2021 with PMBCL.

- First-line therapy: R-CHOP → refractory disease.
- Second-line: R-DHAOx → refractory.
- Third-line: R-ICE → only partial response.

The patient's treatment course was complicated by COVID-19 infection, delaying further therapy. In January 2022, he underwent CD19-directed CAR T-cell therapy with axicabtagene ciloleucel. Early post-infusion was notable for grade 3 cytokine release syndrome (CRS) and neurotoxicity, requiring intensive care support. Despite these toxicities, a PET/CT scan at 1 month demonstrated a complete metabolic response (Deauville 3) (3). Given the risk of cardiopulmonary complications from bulky mediastinal disease, consolidative radiotherapy was deferred.

- At 2 months post-CAR T, surveillance PET/CT revealed a new hypermetabolic mediastinal focus (Deauville 5). The lesion was too small and inaccessible for biopsy. Following multidisciplinary review, pembrolizumab 200 mg every 3 weeks was initiated in April 2022 (4).

Treatment with pembrolizumab was well tolerated, with only grade 1 fatigue and mild rash reported. A PET/CT performed in September 2022 showed a marked decrease in metabolic activity within the mediastinum, consistent with a near-complete response (4). A suspicious hypermetabolic signal in the sternum proved benign on CT and required no intervention.

By February 2023, serial PET/CT scans confirmed a sustained complete metabolic remission, with no evidence of new lesions. Pembrolizumab was continued without interruption, with a planned treatment duration of up to two years and surveillance imaging scheduled every three months.

## Discussion

This case illustrates the potential of immune checkpoint blockade as a rescue strategy after CAR T-cell relapse in PMBCL. Despite the absence of tissue confirmation, pembrolizumab induced a durable and ongoing remission with minimal toxicity (4). The mechanism may involve reactivation of endogenous T cells and modulation of the immune microenvironment following CAR T-cell therapy, as suggested by prior reports (1,2).

Importantly, this case highlights the role of multidisciplinary decision-making, particularly when biopsy is not feasible and conventional salvage approaches are limited (5). Our experience supports the consideration of checkpoint inhibition as a rational, personalized strategy in patients relapsing after CAR T therapy.

## Conclusions

Pembrolizumab monotherapy achieved a sustained complete remission in a patient with relapsed PMBCL following CAR T-cell therapy failure. This outcome emphasizes the potential role of PD-1 inhibition as a low-toxicity rescue option for this high-risk population (1,2,4,5). Prospective studies are needed to better define the role of checkpoint inhibition in patients who relapse after CAR T-cell therapy.

## References

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