Investigating Vein-to-Vein Time in Autologous Chimeric Antigen Receptor T-Cell Therapies: A Real-World Analysis

Abstract Number: 2SPD-025 Section 2: Selection, Procurement and Distribution

Matteo Gallina[1*], Germana Marengo[2], Sofia Bonanno[2], Ignazio Barberi[2], Maurizio Musso[2]

[1] University of Palermo, Palermo, Italy *matteo.gallina01@you.unipa.it

[2] Oncology Department «La Maddalena», Palermo, Italy

BACKGROUND AND IMPORTANCE

Autologous Chimeric Antigen Receptor (CAR) T-cell therapies have demonstrated significant clinical benefit in patients with chemorefractory aggressive B-cell lymphomas or myeloma. Emerging evidence suggests that delayed CAR T-cell infusion, including prolonged time from leukapheresis to infusion, known as **Vein-to-Vein time (V2Vt), may adversely impact clinical outcomes (Figure 1)**.

AIM AND OBJECTIVES: This study aimed to evaluate real-world V2Vt in patients receiving autologous CAR T-cell therapies at a tertiary Oncology Center, and to compare differences across available products.

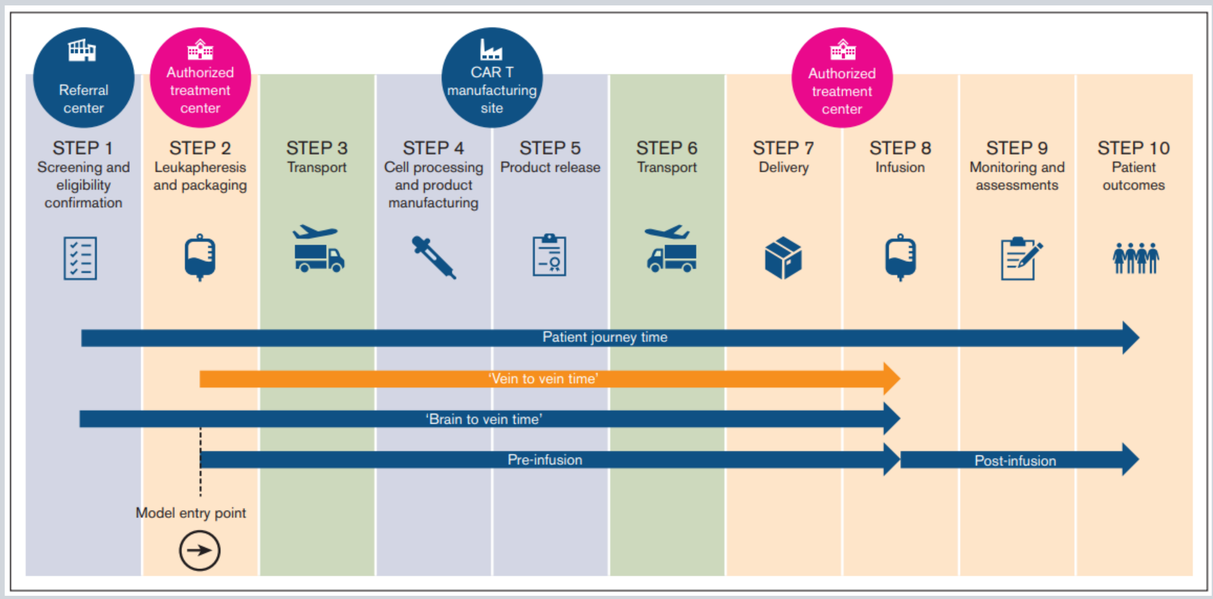

Figure 1. Patient journey for commercial autologous CAR T-cell therapies. *Adapted from reference n.1*

MATERIALS AND METHODS

Requests for CAR T-cell therapies and administration records received by the hospital pharmacy were reviewed to determine the number of therapies administered and to calculate V2Vt. **Treatments administered between January 1, 2021, and December 31, 2024, were included**. **V2Vt was expressed in days as mean ± standard deviation and median with interquartile range, for each product**. Data normality was evaluated using the D'Agostino-Pearson omnibus test. Overall intergroup differences were assessed using the Kruskal-Wallis test, and post hoc pairwise comparisons were performed using Dunn's multiple comparison test. A p-value <0.05 was considered statistically significant. All statistical analyses were performed using GraphPad Prism version 8.

RESULTS

A total of 73 CAR T-cell therapies were administered during the study period, increasing from 9 (12%) in 2021 to 36 (49%) in 2024. Specifically, 31 (42%) were axicabtagene ciloleucel (axi-cel), 31 (42%) tisagenlecleucel (tisa-cel), and 11 (16%) brexucabtagene autoleucel (brexi-cel), as shown in **Figure 2**. **Mean V2Vt was 48±19 days (median 42) for axi-cel, 67±29 days (median 57) for tisa-cel, and 53±35 days (median 41) for brexi-cel (Table 1)**. The Kruskal-Wallis test showed a significant overall difference (p=0.002), with Dunn's post hoc test indicating **significant differences between axi-cel and tisa-cel (p=0.003), and between tisa-cel and brexi-cel (p=0.035)**, as shown in **Figure 3**.

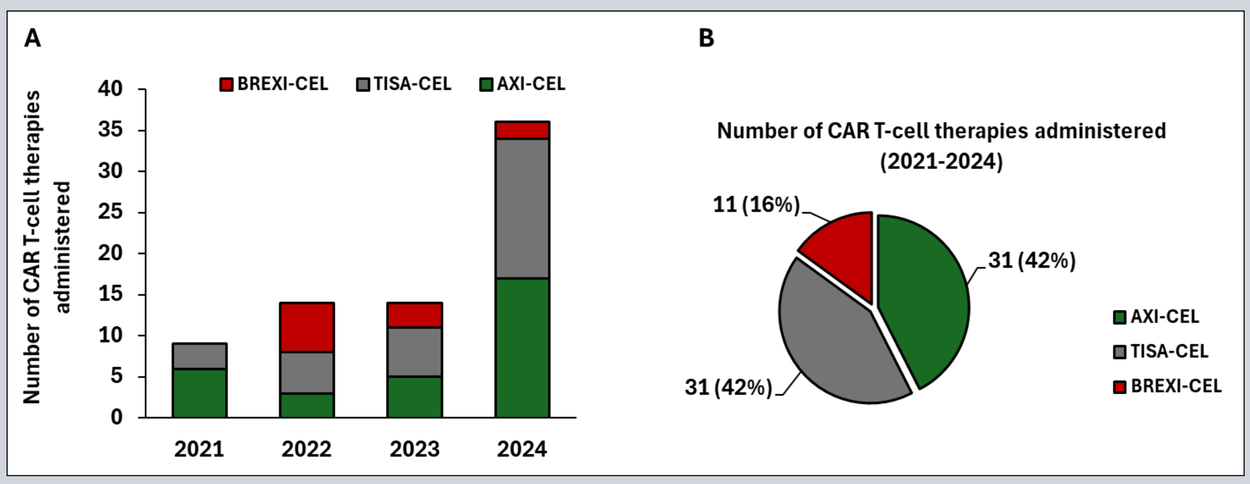

Figure 2. Number of CAR T-cell therapies administered per year **(A)** and during the study period (2021-2024), stratified for CAR-T cell product **(B)**.

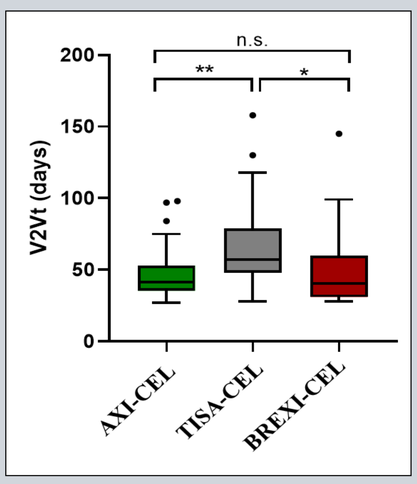

Figure 3. Tukey box plot representing the distribution of median V2Vt among groups. Significant differences showed between axi-cel and tisa-cel (p=0.003), and between tisa-cel and brexi-cel (p=0.035). **p<0.05, **p<0.01, n.s. not significant*.

Table 1. Real-world V2Vt results for each CAR T-cell product included in the study.

CAR T-cell Product	Therapies administered (2021-2024), n (%)	V2Vt (days)		
		Mean ± SD	Median (IQR)	Range (min-max)
Axicabtagene ciloleucel (Yescarta©)	31 (42%)	48 ± 19	42 (36-53)	27-98
Tisagenlecleucel (Kymriah©)	31 (42%)	67 ± 29	57 (48-75)	28-158
Brexucabtagene autoleucel (Tecartus©)	11 (16%)	53 ± 35	41 (33-56)	28-145

CAR: chimeric antigen receptor; V2Vt: vein-to-vein time; SD: standard deviation; IQR: interquartile range.

CONCLUSION AND RELEVANCE

V2Vt varied significantly among CAR T-cell products, with axi-cel showing the shortest mean time. Manufacturing and logistical delays remain key barriers to ensure timely treatment. **Decentralized manufacturing and off-the-shelf allogeneic platforms may reduce waiting times and costs.**

REFERENCES AND/OR ACKNOWLEDGEMENTS:

1. Locke, F.L. et al. Impact of Vein-to-vein Time in Patients With R/R LBCL Treated with Axicabtagene Ciloleucel. Blood Adv 2024; 9:2663-2676.
2. Bryla A. et al. Involvement of the hospital pharmacist in securing the chimeric antigen receptor (CAR)-T cell circuit. Eur J Hosp Pharm. 2025 Mar 6:ejhpharm-2024-004454.