One in Twenty Diagnosed with Secondary Cancer One Year After CAR T-Cell Therapy

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Key Findings:

- 5.2% of patients who have undergone CAR T-cell therapy develop secondary cancer within a year, including both metastatic cancers and second primary cancers, with small variations by medication.
- Skin, respiratory organ, and digestive organ cancers were the most common types of secondary cancer after CAR T-cell therapy.

Chimeric antigen receptor (CAR) T-cell therapy is a type of immunotherapy that uses altered T cells to fight cancers such as lymphoma, leukemia, and multiple myeloma when other treatments have not been successful.[1] In April 2024, the U.S. Food and Drug Administration (FDA) required a boxed warning for the risk of T-cell malignancies following CAR T-cell therapy and recommended lifelong monitoring for secondary cancers.[2] However, others have reported that secondary cancers after CAR T-cell therapy are rare.[3,4]

To understand the rate of secondary cancer among patients who received CAR T-cell therapy, we studied 3,296 patients treated with CAR T-cell therapy between January 1, 2017, and August 1, 2023. Secondary cancers included both metastatic cancers and second primary cancers. Overall, we found that 5.2% of treated patients had a new cancer diagnoses three weeks to one year after the start of CAR T-cell therapy, as seen in Figure 1. When we stratified the data by the specific CAR T-cell therapy, we found small variations in the rate of secondary cancer, though no specific treatment was significantly different from the overall rate.

Secondary Cancer Rates After CAR T-Cell Therapy by Type

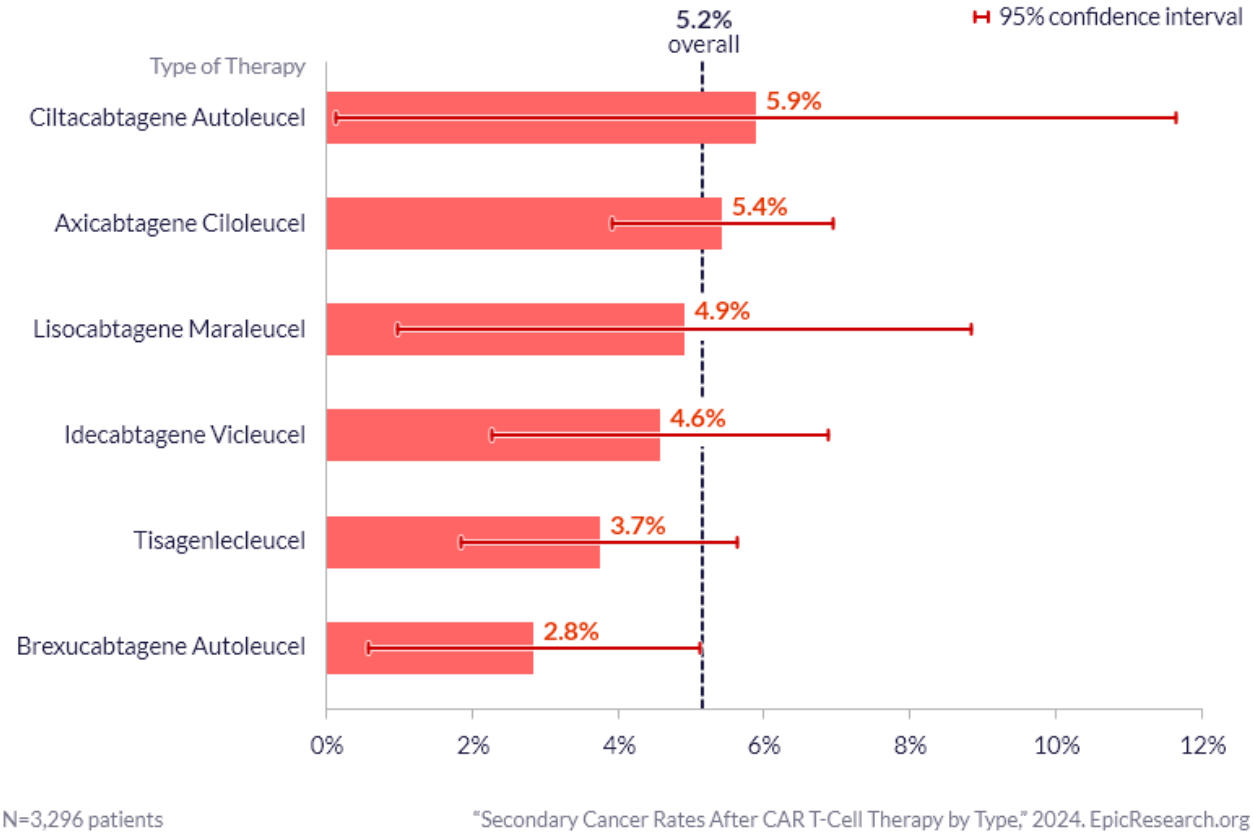

Figure 1. The rates of secondary cancer after CAR T-cell therapy by the type of therapy used.

Skin, respiratory organ, and digestive organ cancers were the most diagnosed types of secondary cancers for patients who had received CAR T-cell therapy, as seen in Figure 2.

Secondary Cancer Rate by Type After CAR T-Cell Therapy

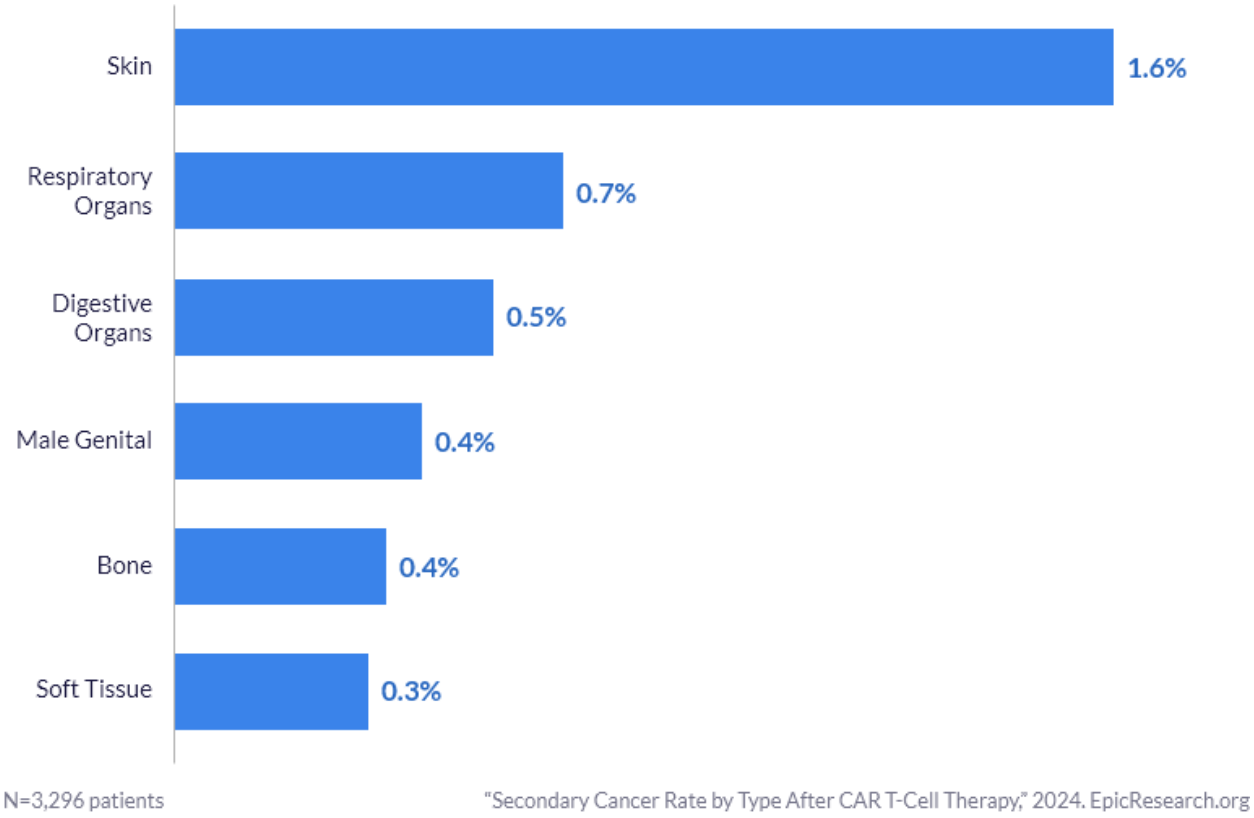

Figure 2. The rate of secondary cancers by type after CAR T-cell therapy.

These data come from Cosmos, a dataset created in collaboration with a community of Epic health systems representing more than 274 million patient records from 1,500 hospitals and more than 36,000 clinics from all 50 states, Lebanon, and Saudi Arabia. This study was completed by two teams that worked independently, each composed of a clinician and research scientists. The two teams came to similar conclusions. Graphics by Brian Olson.

References

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4. Raeke M. Secondary cancers following CAR T cell therapy are rare. Penn Medicine. Published January 24, 2024. https://www.pennmedicine.org/news/news-releases/2024/january/secondary-cancers-following-car-t-cell-therapy-are-rare. Accessed August 28, 2024.

Data Definitions

Term	Definition
Study period	1/1/2017 to 8/1/2024
Study population	Patients with **CAR T-cell treatment** between 1/1/2017 and 8/1/2023 who had a face-to-face encounter more than one year following treatment
CAR T-cell treatment	A procedure with CPT code 0540T or a medication administration with a simple generic name of "Idecabtagene vicleucel," "Lisocabtagene maraleucel," "Tisagenlecleucel," "Brexucabtagene autoleucel," "Axicabtagene ciloleucel," "Ciltacabtagene autoleucel," or "Lifileucel"
Secondary cancer	A cancer diagnosis, either metastatic or second primary, between three weeks and one year following the earliest CAR T-cell treatment date for a patient grouped into the following groups by ICD-10-CM code: • Lip, oral cavity, and pharynx: C00*-C14* • Digestive organs: C15*-C26* • Respiratory organs: C30*-C39* • Bone and articular cartilage: C40*-C41* • Skin: C43*-C44* • Mesothelial and soft tissue: C45*-C49* • Breast: C50* • Female genital organs: C51*-C58* • Male genital organs: C60*-C63* • Urinary tract: C64*-C68* • Eye: C69* • Meninges: C70* • Brain: C71* • Central nervous system: C72* • Thyroid and other endocrine glands: C73*-C75*
Metastasis	A diagnosis with ICD-10-CM code of C7B*, C78*, C79*, C77*

Table 1. Secondary Cancer Rates After CAR T-Cell Therapy by Type

Medication	Patients	Percent with Second Cancer	Lower CI	Upper CI
Axicabtagene ciloleucel	902	5.43	3.91	6.95
Brexucabtagene autoleucel	Masked	2.84	0.57	5.12
Ciltacabtagene autoleucel	Masked	5.88	0.12	11.65
Idecabtagene vicleucel	328	4.57	2.26	6.89
Lisocabtagene maraleucel	Masked	4.92	0.98	8.85
Tisagenlecleucel	401	3.74	1.85	5.63

Table 2. Secondary Cancer Rate by Type After CAR T-Cell Therapy

Second Cancer Type	Patients	Secondary Cancer Rate
Skin	53	1.6%
Respiratory organs	22	0.7%
Digestive organs	18	0.5%

Male Genital	14	0.4%
Bone	12	0.4%
Soft Tissue	11	0.3%