Armoring the Immune System:
Undergraduate Perspectives on the Evolution of CAR T Cell Therapy

By J.F. Treml*†

Chimeric Antigen Receptor (CAR) T cells represent one of the most powerful tools in modern medicine's arsenal against cancer—and, increasingly, autoimmune disease. Each year, the Topics in Biotechnology course at the University of Kansas Edwards Campus selects a timely and transformative area of research to anchor student investigation. For Spring 2025, the course explored the rise of T cell-based immunotherapies, tracing the trajectory from early adoptive transfer experiments to the development of armored, logic-gated, and multifunctional CAR platforms. The student-authored review articles featured here represent the best examples of how undergraduates can critically engage with the primary literature and contribute meaningfully to scientific conversation.

This was also the first year the course was accompanied by a podcast: Reprogrammed: The Biotechnology Podcast, created by the instructor to introduce and contextualize the key concepts in each week's reading. Each episode offered a short, structured conversation—between a human and an AI cohost—designed to scaffold students' understanding while inviting a broader audience into the unfolding story of CAR T cell research. Transcripts and show notes are available at https://downhousesoftware.wordpress.com, and the podcast is available through Apple Podcasts.

The student reviews in this issue reflect both the conceptual depth and technical diversity of the field. Benji Orth explores tandem CARs capable of targeting glioblastoma's heterogeneous antigens. Carson Gray and Yenny Feng each examine structural refinements to the scFv domain—Gray focusing on expression and antigen affinity, Feng expanding the concept into macrophage-based CARs (CAR-M) as a complementary cell therapy. Arianna Theleman reviews the integration of IL-36γ as an immune-enhancing cytokine, while Soham Kawade discusses IL-24-armored CARs targeting cancer stem cells. Yusef Elghzali considers how nanobody-based CARs, paired with dendritic/tumor fusion vaccines, may improve outcomes in solid tumors.

Two reviews extend the potential of CAR technology beyond oncology. Isabella Press and Samia Chergui examine the application of anti-CD19 CAR T cells in systemic lupus erythematosus (SLE), highlighting the therapeutic promise of fully human constructs that minimize cytokine toxicity while retaining efficacy against autoreactive B cells.

These papers represent the culmination of a semester-long exploration not only into the mechanics of CAR T cell design and function, but also into the power of scientific storytelling. We hope these reviews inspire further reading, reflection, and engagement with the exciting frontiers of cell-based immunotherapy. If you are interested in having your class participate by using this course's reading list in the future—enabling your students to submit News and Views-style articles for upcoming issues of the journal—please visit us online at the downhouse software site (see above) and at the Journal's home at: https://journals.ku.edu/MJUSc/index, where future reading lists will be posted. Or feel free to contact me directly to collaborate in generating new ones.

Reviews on other topics are also welcome, but a short format is preferable.

*University of Kansas, Edwards Campus, Biotechnology

†Corresponding Author jtreml@ku.edu