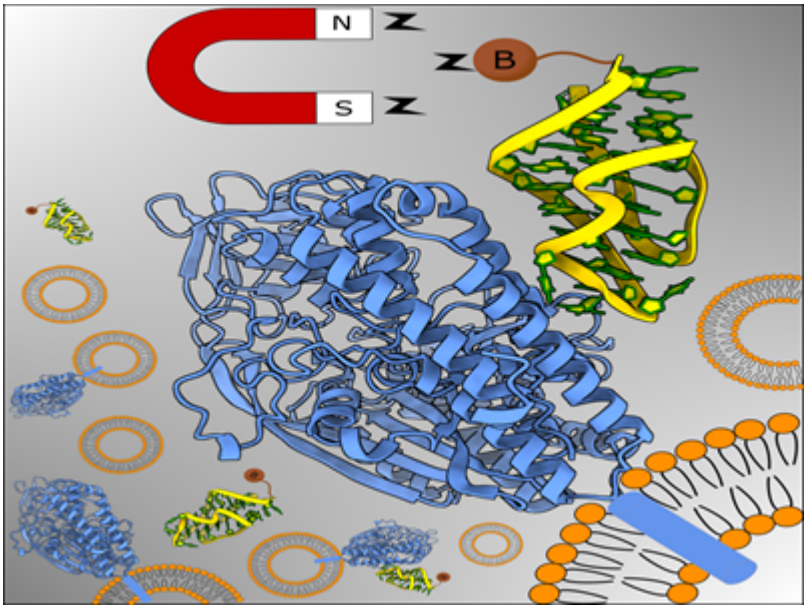
Transferrin Receptor-Binding Aptamers for Cancer Cell Depletion in Adoptive T-Cell Therapy

Innovative DNA aptamers that bind to the transferrin receptor (TfR1) offer a novel method for depleting cancer cells from therapeutic cell populations, enhancing the safety and efficacy of adoptive T-cell therapies. Additionally, these aptamers may be used for targeted delivery via the transferrin receptor.



Technology ID

BDP 8481

Category

Selection of Available Technologies

Therapeutics/Other

Authors

Suzie Hwang Pun

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What is the Problem?

Current methods for manufacturing adoptive T-cell therapies often fail to adequately eliminate cancer cells from patient-derived cell populations. This can lead to the persistence of malignant cells, which may cause treatment resistance and failure. Additionally, existing techniques for cell purification can be inefficient and costly, further complicating the production process. The presence of residual cancer cells in therapeutic products poses a significant risk to patients, potentially leading to relapse or adverse effects. Therefore, there is a critical need for more effective and reliable methods to ensure the purity and safety of therapeutic cell products.

What is the Solution?

The technology offers high-affinity DNA aptamers that specifically bind to the transferrin receptor 1 (TfR1), a protein commonly overexpressed on cancer cells. These aptamers can selectively deplete cancer cells from peripheral blood mononuclear cells (PBMCs) without significantly affecting healthy immune cells. The aptamers work by recognizing and binding to TfR1 on the surface of cancer cells, facilitating their removal from the cell population. This technology provides a safer and more efficient approach to preparing cell populations for adoptive T-cell therapy, reducing the risk of treatment failure due to residual cancer cells. Additionally, the use of DNA aptamers is a cost-effective and scalable solution, making it suitable for widespread clinical applications. By ensuring the purity of therapeutic cell products, this innovation enhances the overall efficacy and safety of adoptive T-cell therapies.

What is the Competitive Advantage?

Selective Targeting: The aptamers bind specifically to TfR1, ensuring targeted depletion of cancer cells while sparing healthy cells.

Enhanced Safety: By effectively removing malignant cells, the technology reduces the risk of treatment resistance and failure.

Cost-Effective: The use of DNA aptamers is a relatively inexpensive method compared to other cell purification techniques.

Broad Applicability: TfR1 is upregulated in various cancers, making this technology versatile for multiple types of adoptive T-cell therapies.

Patent Information:

US20230050022A1

References

1. Cheng, E. L., Cardle, I. I., Kacherovsky, N., Bansia, H., Wang, T., Zhou, Y., Raman, J., Yen, A., Gutierrez, D., Salipante, S. J., des Georges, A., Jensen, M. C., Pun, S. H.(2022) , https://pmc.ncbi.nlm.nih.gov/articles/PMC10024945/, https://pubs.acs.org/journal/jacsat, 144, 13851-13864