High-Affinity Bcma-Targeting Peptides: Innovations In Therapeutic Strategies For Hematological Malignancies

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Abstract

Background: Lymphoproliferative disorders encompass a range of diseases characterized by abnormal growth of lymphocytes, presenting challenges due to their biological diversity and treatment resistance. While existing therapies such as monoclonal antibodies, bispecific antibodies, and CAR-T cell treatments demonstrate clinical effectiveness, they are often hindered by issues such as high costs, toxicity, and the potential for antigen escape. The B-cell maturation antigen (BCMA) is expressed on malignant B cells and is crucial for tumor cell proliferation, rendering it a promising therapeutic target.

Aims: This research employs phage display technology to discover high-affinity peptides that bind to BCMA, aiming to enhance targeted drug delivery and immunotherapy approaches.

Methods: A peptide library was created using phage display, which was then incubated with the H929 human plasmacytoma cell line known for BCMA expression. After conducting four rounds of biopanning (binding, washing, and elution), phages containing high-affinity peptides were isolated. Binding affinity was evaluated using ELISA and flow cytometry. The DNA of selected high-affinity clones was sequenced to determine the peptide sequences, which were then synthesized and tested for specificity and binding strength.

Results: The commercial phage library contained approximately 10^9 phages, from which 20 clones were chosen for ELISA analysis. Two of these clones exhibited significantly enhanced binding affinities compared to the wild-type phage control. Sequencing indicated that both high-affinity clones had identical peptide sequences. The synthetic peptide was further validated through flow cytometry, confirming its ability to bind to cells expressing BCMA.

Summary/Conclusion: The identified high-affinity peptide demonstrates potential for use in targeted drug delivery and immunotherapy. Additional preclinical studies are necessary to assess its efficacy and potential for clinical applications.

Do you have any conflicts of interest?

No, I do not have a conflict of interest.