CHAPMAN UNIVERSITY | Office of Research

EGFR Targeting Peptide-Doxorubicin Conjugate with Specific Toxicity to Cancer Cells

Chapman Case # 2023-003

Market Need

Triple-negative breast cancer (TNBC) is one of the most aggressive and treatment-resistant forms of breast cancer, affecting approximately 10-15% of breast cancer patients. Unlike other subtypes, TNBC lacks hormone receptors and HER2, making it unresponsive to traditional targeted therapies. Epidermal growth factor receptor (EGFR) is overexpressed in up to 78% of TNBC cases, providing a compelling target for precision therapies. However, conventional chemotherapy remains highly toxic, affecting both cancerous and healthy cells. To address this, there is an urgent need for a selective drug delivery system that can target EGFR-expressing TNBC cells while sparing healthy tissue, thus leading to improving efficacy and reducing side effects.

Chapman Solution

Dr. Kamaljit Kaur of Chapman University and her research team developed a next-generation Peptide-Drug Conjugate (PDC) that selectively delivers chemotherapy to TNBC cells overexpressing EGFR. The conjugate, Peptide 31-Dox, exhibited potent cytotoxicity against TNBC cells while sparing normal breast cells. It also showed superior drug uptake where the EGFR-mediated endocytosis enabled efficient intracellular drug delivery. And unlike free Doxorubicin, the proposed conjugate significantly reduced off-target effects in healthy tissues.

Competitive Advantages

Feature	Peptide 31-Dox (PDC)	Standard Chemotherapy
Target Selectivity	EGFR-specific, TNBC-focused	Non-selective, affects healthy cells
Tumor Penetration	High intracellular uptake via endocytosis	Passive diffusion, limited targeting
Toxicity Profile	Minimal effect on normal cells	High systemic toxicity
Stability	>12-hour serum half-life	Rapid degradation
Manufacturing Cost	Lower than antibody-drug conjugates	High-cost formulations

Applications

- Targeted therapy for EGFR-positive TNBC - reduces systemic toxicity and enhances efficacy.
- Expanding potential to other EGFR-expressing cancers, including non-small-cell lung cancer, glioblastoma, and colorectal cancer.

Key Publication

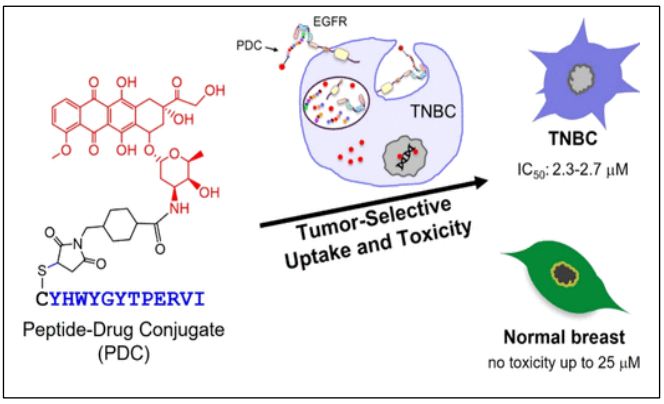
- A Conjugate of an EGFR-Binding Peptide and Doxorubicin Shows Selective Toxicity to Triple-Negative Breast Cancer Cells. ACS Medicinal Chemistry Letters. December 2024.

Intellectual Property

- US patent application filed (Application No. 18/330,748)

Stage of Development

- Preclinical efficacy demonstrated – validated in cell-based assays with TNBC



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