Innovations
UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

# Bivalent EGF-Diphtheria Fusion Toxin for the Treatment of Head and Neck Cancer

## Product

DT-EGF Fusion Toxin

## Indication

HNSCC

## Value Propositions

- High affinity and toxicity to EGFR+ HNSCC cells
- Avoids alternative cancer pathway adoption seen with EGFR inhibitors

## Market

- $2.1 Billion—HNSCC Therapeutic Market in 2020 (CAGR of 9.8% through 2030)

## Intellectual Property

- Patent pending*
- Available for licensing


## Contact

Doreen Molk
doreen.molk@cuanschutz.edu

Ref# CU5226H

303-724-0220
cuanschutz.edu/cu-innovations


## Background on CU5226H

Human head and neck squamous cell carcinoma (HNSCC) comprises about 90% of all head and neck cancer cases. Epidermal growth factor receptor (EGFR) is highly expressed in HNSCC and is an integral pathway to its survival, making it a viable target for treatment. Standard of care for HNSCC includes using conventional cytotoxic chemotherapies, immune checkpoint inhibitors, and EGFR inhibitors. However, traditional chemotherapies and immune checkpoint inhibitors can often result in toxicity, and EGFR inhibitors become less effective over time as the HNSCC adapts to alternate pathways.

## Technical Innovation

Drs. Zhirui Wang and Shi-long Luc have developed a bivalent EGF-diphtheria fusion toxin (bEGF-IT) for the treatment of HNSCC that has significantly improved efficacy and remarkably reduced off-target toxicity. The therapeutic utilizes two EGF domains to increase binding and specificity of the toxin to the target tumor cell and reduce off-target effects. In vitro studies have shown up to 86% increased binding affinity of the bivalent fusion toxin to EGFR+ HNSCC cells compared to the monovalent toxin. In vivo studies comparing bEGF-IT to Erlotinib (the FDA approved, EGFR-targeted therapeutic) showed equivalent efficacy of the two therapeutics in HNSCC xenograft mouse models and improved survival of the bEGF-IT group in metastasis mouse models (see figure below). Importantly, the inventors believe that bEGF-IT can avoid the loss of effectiveness seen in EGFR inhibitors by avoiding alternative pathway adoption.

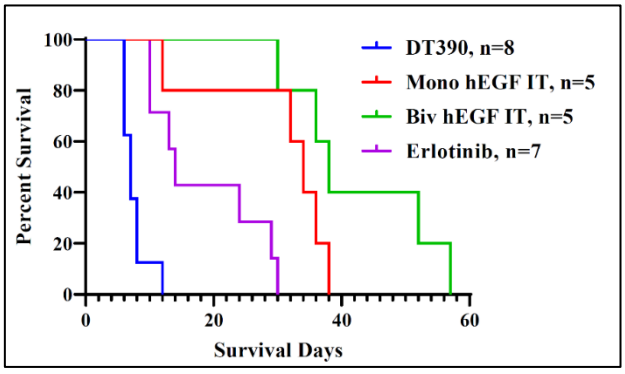


Figure: T *In vivo* efficacy analysis of the human EGF fusion toxins using human EGFR+ HNSCC metastasis mouse model. Mice were injected with one million human EGFR+ HNSCC Cal 27 cells on day 0 and treated on day 4 for 10 consecutive days. 1) mEGF-IT group (red line); 2) b-EGF-IT group (green line); 3) Erlotinib as positive control group (purple line); 4) DT390 as negative control group (blue line). The bEGF-IT group demonstrated increased survival during the study period.

*Resources & Documents:*

** PCT pending: PCT/US2021/024075—"Bivalent EGF Fusion Toxins"—Filed March 25th, 2021.*