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## Targeted drug delivery with dual-ligand decorated liposomes by anti-CA IX antibody and tumor homing cell penetrating peptide in 2D and 3D lung cancer cells

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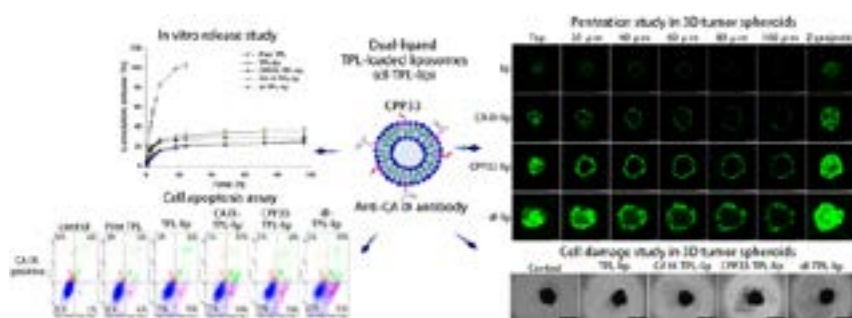
**Statement of the Problem:** Lung cancer is one of the most common lethal malignancies worldwide with 1.59 million deaths each year. Low accumulation of therapeutic agents in the tumor site and lack of penetration ability of a drug delivery system into tumor masses are the main obstacles in efficient lung cancer therapy.

**Aim:** The purpose of this study is to enhance the efficacy of anti-cancer drug against lung cancer by targeting carbonic anhydrase IX (CA IX) confined to cancerous cells to increase the accumulation at tumor sites and combining the advantage of tumor homing cell penetrating peptide (CPP33) to promote the penetration of the drug loaded liposomes into lung cancer cells.

**Methodology & Theoretical Orientation:** Anti-CA IX antibody and CPP33 dual-ligand triptolide-loaded liposomes (dl-TPL-lip) were developed using the post-insertion technique. The characteristics of dl-TPL-lip including particle size, entrapment efficiency and drug release property were carried out. The effects of dl-TPL-lip on NSCLC cells were evaluated by wound healing and apoptosis assay. Moreover, the penetrating ability and inhibition efficacy of dl-TPL-lip were further investigated using 3D tumor spheroids.

**Findings:** The dl-TPL-lip displayed the optimal efficacy in inducing apoptotic feature of NSCLC cells, which showed tunable size ( $137.6 \pm 0.8$  nm), high encapsulation efficiency ( $86.3 \pm 2.6$ ) and sustained release. The superior penetrating ability and inhibitor effect on 3D tumor spheroids were also observed for dl-TPL-lip.

**Conclusion & Significance:** The data suggest that dual-ligand modification with anti-CA IX antibody and CPP33 on the surface of liposomes endow great potential for lung cancer therapy.



### Biography

Congcong Lin has her expertise in development of novel drug delivery system and passion in improving the health and wellbeing. Her main research direction is design and evaluation of the new drug delivery system based on the special microenvironment of tumor sites to achieve targeted drug delivery and precision therapy. She has developed triptolide-loaded liposomes decorated with anti-carbonic anhydrase IX (CA IX) antibody targeting CA IX confined to cancerous cells to increase the accumulation of the drug loaded liposomes at tumor sites and combining the advantage of pulmonary delivery for better retention of active ingredients in lung. This study provides insight into targeted and sustained delivery of a toxic drug through CA IX-decorated liposomes via the pulmonary route for lung cancer therapy.

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