Formulation an In Vitro Evaluation of Solid Lipid Nanoparticle Loaded with Doxorubicin for the Treatment of Lung Cancer

Seyed Abolfazl Hosseini [a], Shakiba Aryaeinezhad[a], Katayoun Derakhshandeh[a*]

Authors' Affiliations:
[a] Department of Pharmaceutics, School of Pharmacy, Hamadan University of Medical Sciences, Hamadan, Iran

Abstract Presenter:
Seyed Abolfazl Hosseini ;Pharmacy Student; Department of Pharmaceutics, School of Pharmacy, Hamadan University of Medical Sciences, Hamadan, Iran
E-mail:
Hosseini.pharmacy.1993@gmail.com

***Correspondence:**
Katayoun Derakhshandeh; PhD; Department of Pharmaceutics, School of Pharmacy, Hamadan University of Medical Sciences, Hamadan, Iran
E-mail:
K.derakhshandeh@umsha.ac.ir

Abstract

Introduction: Lung cancer is the most malignant cancer today. Doxorubicin, an anthracycline antibiotic, is a widely used antineoplastic agent. Despite the good efficacy of doxorubicin, cardiotoxicity is the serious side effect that follows the treatment. Additionally, anthracyclines are likely to cause alopecia and myelosuppression and oral ulcerations. This toxicity and non-specific distribution of the drug often results in chemotherapeutic failure. The focus should be made on efforts to kill cancer cells by more specific targeting while sparing normal cells. Solid lipid nanoparticle (SLN) delivery strategies of doxorubicin have been developed to minimize the exposure of drug to the normal tissues.

Methods and Results: SLNs were prepared by the modified high shear homogenization (HSH) method. Lipid matrix was melted and doxorubicin was added to obtain a clear melting solution. After, double distilled water was heated. surfactant was added to the water. Next, the aqueous surfactant solution was added to the melted lipid. Then, the hot water-surfactants solution was poured into the hot lipid phase, and the HSH method was employed to produce the nanoemulsion, then cooled under the room temperature to obtain the SLNs.

Doxorubicin loaded SLNs were prepared with a mean size of 210 nm, doxorubicin encapsulation of 71% and yield of 68%. higher release rate of doxorubicin was achieved at lower pH, with the present system. Because of the basic nature of doxorubicin (pKa = 8.3), it has higher solubility at lower pH.

Conclusions:

These SLNs had superior in vitro anti proliferation activity against the A549 cell line. Doxorubicin loaded SLNs in comparison with free drug exhibits better selectivity for target cells and the formulation was less toxic to normal lung cells than against malignant A549 cells. These observations suggest that present system offers an exciting mode of delivery to the lipophilic anticancer drugs.

Key words: Lung cancer, Doxorubicin, SLN, HSH.