

STUDY OF COLLAGEN-BASED DRUG DELIVERY SYSTEM OF VINCRISTINE

Q.Q Zhang, H.Y. Zhou, Y. Sun, L.R. Liu

Institute of Biomedical Engineering, Chinese Academy Medical Sciences & Peking Union Medical College, P.O.Box.25 (204), Tianjin, 300192, P.R.China

Introduction

Collagen as a carbon-based natural biomaterial, with characteristics of biocompatibility, innocuity and biodegradation, has extensive application in research areas of drug delivery, tissue engineering and orthopedics. In this article, we reported the results of collagen as carrier to develop novel drug delivery system of anticancer drug- Vincristine(VCR).

Experiments

Drying-in-oil method was involved respectively to prepare microcapsules of VCR, then collagen was used as carrier to load these microcapsules, this system then was lyophilized and cross-linked to form controlled-release membrane. We implanted the membrane into the mice inoculated with EAC and observed the antineoplastic effects through K562 cells in vitro. Its inhibitory effect on EAC in vivo was also determined by MTT method, and K562 cells apoptosis was observed through TEM in vitro. Furthermore, the drug membrane's acute toxicity test was compared with i.v. administration.

Results and Discussion

From Table 1, Size range of microcapsules of VCR is 100-150um, and the drug encapsulation efficiency of these two drugs is 30-60%, the drug loading is 35%.

From Figure 1 and 2, the concentration-time data displayed that this system has less burst effect and its release behavior followed zero-class up to a month.

Figure 4 and 5, and Table 2 and 3 showed that this system significantly decreased the volume of tumor in vivo and increased the activity of SOD, induced the apoptosis of K562 cells, and had less damage to mice brains and blood cells.

Microcapsules were used as controlled-release device of

drugs by many researchers in present years and acquired fine therapeutic effects in many major diseases[1]. But used singly, microcapsules have serious burst effect. In our study, we used collagen as excipient of microcapsules aiming at this effect. Through diffusion and biodegradation two mechanisms, we can control release of drug to follow zero-class kinetics. Because collagen has relative slow biodegradable rate during first period after implantation, the rate increase as time. when microcapsules incorporated into collagen membrane, the slow biodegradable rate will inhibit burst effect of microcapsules effectively. What's more, this formulation will be helpful to doctors during operation.

Conclusions

This drug delivery system can significantly inhibit the growth of K562 cells and has less toxicity compared with i.v. administration. The cumulative release profiles displayed characteristics of zero-class release up to a month. All data suggested that the drug delivery system used collagen as excipient will be an ideal dosage of anticancer drug-Vincristine(VCR).

References

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