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Ocular and plasmic dexamethasone distribution following controllable continuous sub-tenon drug delivery in rabbit

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Aim: To examine the distribution of dexamethasone (DEX) in ocular and plasmic samples following CCSDD of dexamethasone disodium phosphate (DEXP) in rabbit.

Method: New Zealand white rabbits (n=6/time/group) were included in the experiments. There are three groups including controllable continuous sub-tenon drug delivery system (CCSDD) group, intravenous injection (IV) group and sub-conjunctival injection (SC) group. In the CCSDD group, trickled 0.3 ml initial doses of 5 mg/ml DEXP, and then perfused at a rate of 0.1 ml/h for 10 hours using a pump and administrated 1mg/Kg DEXP intravenously in IV group and 0.3ml of 5mg/ml DEXP into sub-conjunctive in SC group. At different time point within 24 hours, the blood samples and eye samples were collected. The DEX concentration was analyzed by Shimadzu LC–MS 2010 system.

Result: In the CCSDD group, high levels of DEX were observed in the ocular tissue immediately after the administration and were maintained at 12 hours. Even at 24 hours, the mean DEX concentration was 31.72 ng/ml and 22.40 ng/ml in aqueous and vitreous respectively. The maximum DEX in plasma was 321.81 ng/ml, 1798.44 ng/ml and 8441.26 ng/ml respectively in CCSDD, SC and IV group. Each ocular tissue peak DEX level is higher in CCSDD and SC group than IV group. Although there are a similar Cmax levels in ocular tissues in CCSDD and SC, the ocular tissues exclusion of iris exposure (AUC0-24) to DEX is higher and plasma exposure is lower in CCSDD than SC.

Conclusion: Controllable continuous sub-tenon drug delivery diffusion of DEX resulting in high levels in the ocular tissue and low levels in the plasma. Thus CCSDD is an effective method of delivering DEX into both anterior and posterior segments of the eye.

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