Treatment of experimental eye inflammation with a single subconjunctival injection of liposomal steroid

Non-infectious anterior uveitis is an inflammatory condition in the front of the eye that can potentially lead to blindness. The current gold standard for treatment is with steroid eyedrops. However, this treatment has several disadvantages. Very little drug is absorbed into the eye from this route of administration, and most patients are unable to comply fully with the intensive dosing regimen, typically requiring eyedrop administration every 1-3 hours for up to a month. These disadvantages limit the effectiveness of this treatment.

Liposomes are lipid membranes that encapsulate the drug molecule, protecting the drug from degradation and improves penetration of the drug into the eye. Liposomes as a drug delivery system may help to overcome the problems associated with eyedrops. We studied the effectiveness of a formulation of liposomal steroids, administered as a single injection in the subconjunctival space, for the treatment of experimental uveitis in rabbit eyes. Assessment of effectiveness was based on an examination of rabbit eyes to obtain an inflammatory score based on an established scoring system. After induction of uveitis (Day 0), rabbits were allocated to one of 5 treatment groups and received treatment based on allocation on Day 3. These treatment groups were: single dose of subconjunctival liposomal steroids (prednisolone phosphate and triamcinolone acetonide), steroid eyedrops 4 times a day, single dose of subconjunctival free steroid and no treatment.

Rabbits that received a single injection of subconjunctival steroids had significantly lower inflammatory scores than untreated rabbits on Day 4 and Day 8 after induction of uveitis, and lower scores than rabbits given steroid eyedrops 4 times a day on Day 8 ($p=0.03$). Uveitis was induced again on Day 8 to simulate a recurrence of inflammation. After repeat induction of uveitis, the subconjunctival liposomal steroid groups continued to have greater suppression of inflammation than untreated rabbits on Day 11. Assessment of tissue samples showed that liposomes not only accumulated in areas of inflammation in the eye but were also found within inflammatory cells and persisted in the eye for at least 1 month. Our study demonstrates that a single subconjunctival injection of liposomal steroids was effective for the treatment of experimental uveitis and provided sustained anti-inflammatory action.

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