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Superior efficacy of intravitreal dexamethasone implant over systemic and topical corticosteroids in a rabbit model of TNF-α–induced uveitis

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Purpose

The purpose of this study was to compare the anti-inflammatory efficacy of intravitreal Ozurdex (0.7 mg dexamethasone intravitreal implant), systemic prednisolone, and topical dexamethasone in a TNF-α-induced rabbit uveitis model.

Methods

Baseline ophthalmic examination (OE) was performed using a modified Hackett–McDonald and SPOTS scoring prior to a single intravitreal injection of TNF-α.

The first cohort received intravitreal Ozurdex implant (0.7 mg of dexamethasone) immediately after induction, with saline-treated eyes serving as controls.

The second cohort received topical dexamethasone three times daily for 14 days, with topical saline-treated eyes serving as controls.

The third cohort received oral prednisolone in drinking water (2 mg/kg/day) with standard water provided for control rabbit group.

OE was performed twice weekly for two weeks.

On day 15, the Ozurdex and its control group received an additional TNF-α injection to extend inflammation, and OE continued twice weekly for two more weeks.

Results

Ozurdex-treated eyes showed consistently lower OE scores from day 3 onward, with marked improvements in anterior chamber flare, vitreous haze, fundus clarity, and corneal opacity.

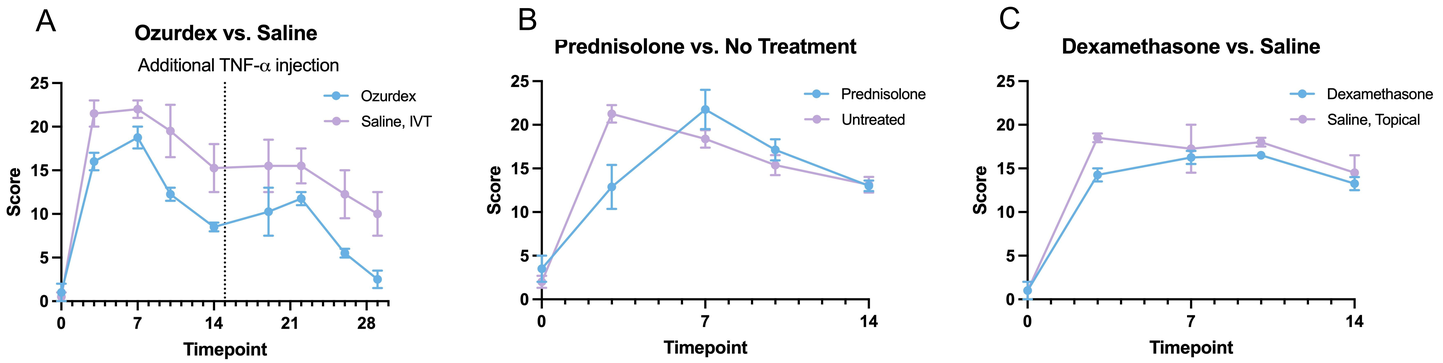

Figure 1. Combined ophthalmic examination score values throughout the study period between corticosteroid-treated eyes and their respective controls. Data are presented as mean ± SEM.

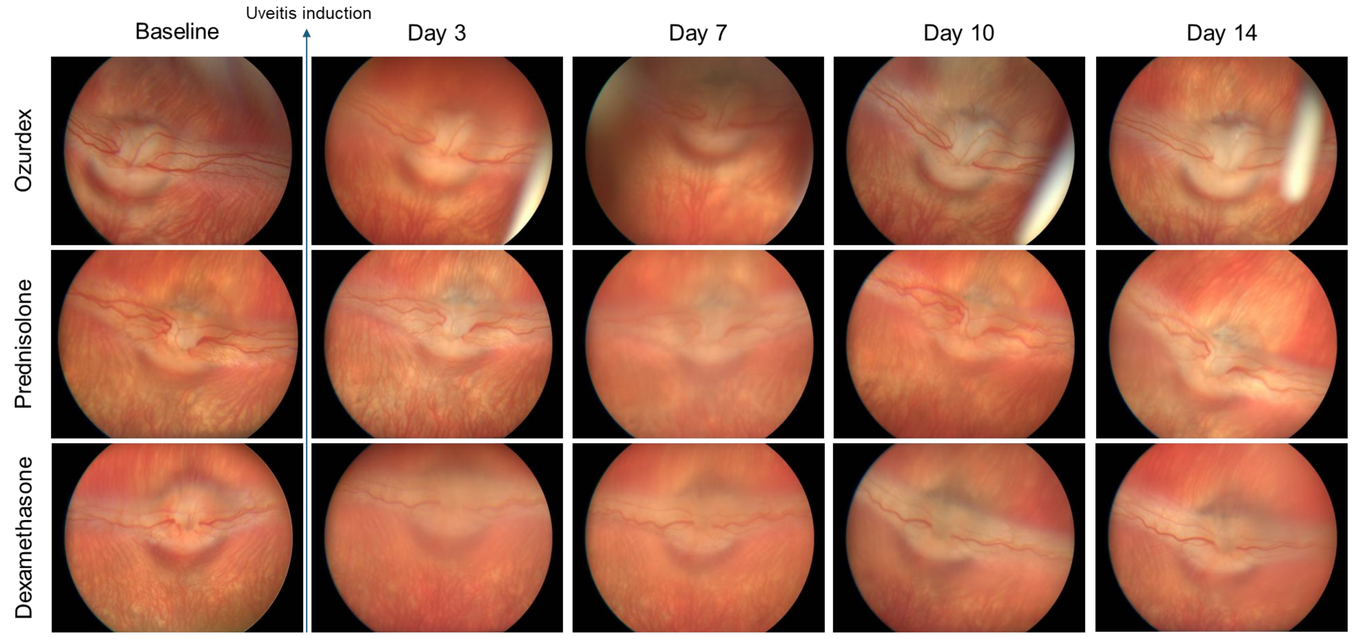

Figure 2. Representative fundoscopy images throughout the study period in corticosteroid-treated eyes.

Conclusions

- This study provides the first direct three-way comparison of the major corticosteroid delivery routes (intravitreal implant vs. systemic vs. topical) in a TNF-α-induced rabbit model of uveitis.
- The simultaneous decrease of both anterior segment (flare, corneal opacity) and posterior segment (vitreous haze, fundus clarity) inflammation in the Ozurdex group demonstrates superiority over systemic and topical corticosteroid administration.
- Systemic use of prednisolone at 2 mg/kg/day may be subtherapeutic for achieving meaningful intraocular drug concentrations while imposing systemic side-effect risks.
- Our re-challenge paradigm using Ozurdex treatment arm may have important clinical relevance, as it models chronic relapsing uveitis rather than a single, self-resolving episode.

Disclosures
OA, JM: none
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