Effect of Steroids on *Acanthamoeba* Cysts and Trophozoites

**Kathy McClellan,†,‡ Kevin Howard,¶ Jerry Y. Niederkorn,† and Hassan Alizadeh†**

**PURPOSE.** Topical steroids are frequently used to control corneal inflammation and uveitis or is administered after surgery, to prevent corneal graft rejection. This study was undertaken to determine whether steroids could affect the pathogenicity of *Acanthamoeba castellanii*.

**METHODS.** The effect of dexamethasone phosphate on encystment, proliferation, and encystment of trophozoites and cysts of *A. castellanii* was examined in vitro. Cytolysis capacity of steroid-treated *Acanthamoeba* was quantified by a spectrophotometric assay, and plasminogen activators were measured by a fibrinolysis assay. The influence of steroid treatment on corneal infection in a Chinese hamster model of *Acanthamoeba* keratitis was examined in vivo.

**RESULTS.** Treatment of *Acanthamoeba* cysts with dexamethasone induced 4- to 10-fold increases in the number of trophozoites compared with untreated control cultures. Acceleration of trophozoite proliferation was observed when trophozoites were treated with dexamethasone. However, dexamethasone treatment did not affect encystment of *Acanthamoeba* trophozoites. Dexamethasone-treated trophozoites or cysts induced a significant cytopathic effect on corneal epithelial cells compared with untreated organisms. Supernatants collected from either dexamethasone-treated or untreated organisms failed to lyse corneal epithelial cells. Treatment of organisms with dexamethasone had no effect on production of plasminogen activators by *Acanthamoeba* trophozoites. Intramuscular injection of dexamethasone had a profound effect on the incidence, severity, and chronicity of keratitis. Keratitis in dexamethasone-treated hamsters was significantly more severe at all time points than in untreated animals (*P < 0.05*).

**CONCLUSIONS.** These findings indicate that exposure of *Acanthamoeba* trophozoites and cysts to dexamethasone increases the pathogenicity of the organisms. The results emphasize the importance of maintaining adequate amebicidal therapy if a topical steroid is used in the management of *Acanthamoeba* keratitis. (Invest Ophthalmol Vis Sci. 2001;42:2885–2893)

*A. castellanii* keratitis in humans remains a challenging early diagnosis to confirm. In this corneal disease, the chronicity, tendency for recurrent inflammation, and severe pain help to distinguish the condition from bacterial or viral keratitis. The epidemiology of *Acanthamoeba* keratitis has been explained by its prevalence in contact lens wearers. Typically, waterborne organisms gain access to the corneal stroma after initial attachment to damaged corneal epithelium.1–3 These infections have often been present for many weeks by the time the diagnosis is confirmed, and topical steroids have frequently been included in the therapy. Recrudescence of *Acanthamoeba* keratitis may occur after corneal transplantation if residual *Acanthamoeba* in the host peripheral cornea is exposed to steroids after surgery.4 Although steroids are frequently needed to control pain and inflammation in *Acanthamoeba* keratitis, their effects on trophozoites and cysts have not been investigated.5–6 It is therefore important to know whether such treatments have a direct effect on cysts and trophozoites or whether any effects of steroids on *Acanthamoeba* keratitis may be purely secondary to the resultant immunosuppression. Therefore, we wanted to determine whether steroids affect aspects of pathogenesis determined by the organism, including encystment, encystment, growth, cytoytic effects, and elaboration of plasminogen activators. We hypothesized that steroids would inhibit encystment of *Acanthamoeba*, while potentiating encystment, trophozoite growth, cytolysis, and elaboration of plasminogen activators.

**MATERIALS AND METHODS**

*A. castellanii* Cultured Trophozoites and Cysts

The organism used in all experiments was a human ocular isolate of *Acanthamoeba castellanii* from the American Type Culture Collection (ATCC, 30868; Rockville, MD). Trophozoites were maintained in axenic culture at 35°C in peptone-yeast-glucose (PYG) medium in test tubes, as described previously.7–8 *Acanthamoeba* cysts were prepared by culturing trophozoites on non-nutrient agar plates without bacteria at 35°C for 1 week. At the end of 1 week, cysts were examined, and the surfaces of the agar plates were washed with 10 ml Page’s saline and scraped with a tissue scraper. Double-walled cysts with a wrinkled exocyst and an average diameter of 19 μm were produced and stored in Page’s saline until use.

**Excystment of Dexamethasone Phosphate–Treated A. castellanii Cysts In Vitro**

*A. castellanii* cysts (2 × 10⁷/ml) were incubated for 24 hours at 35°C, in 5 ml PYG medium containing 10, 100, or 400 μg/ml dexamethasone phosphate (Sigma Chemical Co., St Louis, MO). Trophozoites were then counted by a hemocytometer. Each culture was reincubated with the original concentration of dexamethasone, and trophozoites were counted daily for an additional 6 days. The control cultures were *A. castellanii* cysts (2 × 10⁷/ml) incubated for 24 hours at 35°C in 5 ml PYG medium without dexamethasone. Experimental tubes for each dexamethasone concentration and control were set up in duplicate.

**Proliferation of Dexamethasone-Treated A. castellanii Trophozoites In Vitro**

*A. castellanii* trophozoites (2 × 10⁷/ml) were incubated for 24 hours at 35°C, in 5 ml PYG medium containing 10, 100, and 400 μg/ml dexamethasone phosphate.
dexamethasone, at concentrations ranging from 10 to 400 μg/ml. Trophozoites were then counted by a hemocytometer. Each culture was reincubated with the original concentration of dexamethasone and trophozoites were counted daily for an additional 6 days. The control cultures were *A. castellanii* trophozoites (2 × 10⁵/ml) incubated at 35°C in 5 ml PYG medium without dexamethasone. Experimental tubes for each dexamethasone concentration and control were set up in duplicate.

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**Cell Cultures**

Human corneal epithelial (HCE) cells were kindly provided by Sally L. Ward (Gillette Medical Evaluation Laboratories, Gaithersburg, MD), and cultured in KGM (Clonetics, Irvine, CA) at 37°C in 5% CO₂, as described previously.⁹

**Cytopathic Effect Assay with HCE Cells**

HCE cells were chosen as target cells for the cytopathic effect (CPE) assay for their demonstrated susceptibility to lysis by *A. castellanii* trophozoites and reliable propagation in vitro.² The CPE assay was performed as described previously.¹⁰ Briefly, HCE cell suspensions were seeded into flat-bottomed 96-well microtiter plates (1 × 10⁵ cells/well) and cultured until they became confluent. *A. castellanii* trophozoites or cysts were incubated for 24 hours at 35°C in 1 ml PYG containing 10, 100, and 400 μg/ml dexamethasone. Trophozoites were then counted by a hemocytometer and 2 × 10⁶ added to the confluent cultures of HCE cells. Wells containing HCE cells alone or *A. castellanii* trophozoites or cysts with dexamethasone at 10, 100, and 400 μg/ml or without dexamethasone, served as control cultures. After incubation, all wells were washed three times with PYG and stained with Giemsa stain. The remaining contents were solubilized in 0.1 ml 5% sodium dodecyl sulfate (SDS) in phosphate-buffered saline (pH 7.2; Sigma Chemical Co.) and transferred to a new 96-well plate. Results were expressed as mean OD ± SD for each group. All assays were performed in triplicate. The spectrophotometric results were confirmed by inspection of the wells with compound microscopy.

**Acanthamoeba Supernatants**

For assay testing of cytolytic capability, supernatants were collected from *A. castellanii* trophozoites that had been incubated for 24 hours with dexamethasone at 10, 100, and 400 μg/ml. Supernatants were tested for cytolytic activity by adding 0.1 ml supernatant to wells containing confluent HCE cells in the 96-well plates. Control wells contained HCE cells alone or untreated *A. castellanii*. The CPE was quantitated as described earlier.

**Fibrin Clot Lysis Assay**

Fibrinogen-agarose overlays were prepared by mixing 15 mg/0.1 ml fibrinogen (F-8630; fraction 1, type 1S from bovine plasma; Sigma Chemical Co.) in 0.1 M Tris-HCl (pH 7.6) with 20 mg/0.1 ml low-melting-temperature agarose (Sigma Chemical Co.), prepared in the same buffer at 40°C. After adding 1.0 IU thrombin (Sigma Chemical Co.), the mixture was poured between two glass plates separated by a 2.5-mm spacer.¹¹ Wells 5 mm in diameter were cut into the fibrin clot and the assay performed by adding 10 μl supernatant from trophozoites treated with dexamethasone at doses of 10, 100, or 400 μg/ml or by adding untreated trophozoites to each well and incubating at 37°C. PYG medium without trophozoites was used as the control. Clots without plasminogen were included in all experiments to control for plasminogen-independent fibrinolysis.

The diameter of the clear zone in the clot was measured after incubation at 37°C for 2, 3, 5, and 8 hours. By using human tissue plasminogen activator (tPA; American Diagnostica, Greenwich, CT) as a standard, a linear relationship between the diameter of the clear zones and the tPA concentration was established as described previously.¹²

**Animals**

Chinese hamsters were purchased from Cytogen Research and Development, Inc. (West Roxbury, MA) and used at ages 4 to 6 weeks. The corneas were examined before experimentation to exclude animals with any preexisting corneal disease. All animals were handled in accordance with the ARVO Statement for the Use of Animals in Ophthalmic and Vision Research.

**Contact Lens Preparation**

Contact lenses were made 3.0 mm in diameter from dialysis membrane tubing (Spectra/Por; Spectrum Medical Industries, Los Angeles, CA) and heat sterilized. Dialysis tubing contact lenses were incubated for 24 hours at 35°C with *A. castellanii* in 200 μl PYG containing 3 × 10⁵/ml (50% trophozoites, 50% cysts) in 96-well microtiter plates (Costar, Cambridge, MA).

**In Vivo Corneal Infection**

*Acanthamoeba* keratitis was established in the cornea of the Chinese hamster, as described previously, by application of an *A. castellanii*-laden contact lens to an abraded corneal surface.⁷ Chinese hamsters were anesthetized with ketamine (100 mg/kg) given intramuscularly (IM; Ketaset; Ft. Dodge Laboratories, Ft. Dodge, IA) and supplemented with topical proparacaine (Alcon Inc., Humacao, Puerto Rico). A contact lens laden with *A. castellanii* was placed over the abraded cornea of one eye and the eyelids closed by central tarsorrhaphy with a 6-0 suture (Ethilon; Ethicon, Inc., Somerville, NJ). The contact lenses were removed 6 days after infection, and the corneas were observed under a dissecting microscope for clinical signs of keratitis. Animals were observed on days 7, 14, 21, and 35 after infection. Keratitis was scored on a scale of 0 to 5, according to corneal infiltration, corneal neovascularization, and corneal ulceration. Disease severity was recorded as: 0, no disease; 1, less than 10% of the cornea involved; 2, 10% to 25% involved; 3, 25% to 50%; 4, 50% to 75%; and 5, 75% to 100%, as described previously.⁷ Animals graded with a score of at least 1.0 for any parameter were considered infected. *Acanthamoeba* keratitis in Chinese hamsters resolved at approximately day 21, at which time corneal opacity, stromal necrosis, and inflammation had cleared and corneal epithelium was intact. *Acanthamoeba* trophozoites and cysts were not present on histologic examination of corneas in which keratitis had resolved.

**Systemic Dexamethasone**

Dexamethasone (0.1 mg/100 μl of saline) was administered IM daily for 5 days to 10 Chinese hamsters, beginning 24 hours after the contact lens was applied. A control group of 10 Chinese hamsters received 100 μl IM saline.
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Previous experiments suggest that dexamethasone may stimulate the growth and proliferation of trophozoites in A. castellanii. The effect of dexamethasone on the excystment rates of A. castellanii cysts was evaluated in vitro. The number of trophozoites in dexamethasone-treated cysts exceeded that in untreated control cultures after 24 hours of incubation (Fig. 1). A dexamethasone concentration equal to or greater than 100 μg/ml produced the greatest number of trophozoites; above this concentration the excystment response was uniform. After 48 hours' incubation, dexamethasone-treated cysts continued to produce three times the number of trophozoites present in untreated control cultures (P < 0.05). Trophozoites in treated cultures exceeded those in control at concentrations equal to or greater than 10 μg/ml dexamethasone. The number of trophozoites recovered from the dexamethasone-treated group at concentrations of 100 and 400 μg/ml was significantly higher than in control cultures after 72 hours' incubation (P < 0.05). However, no significant differences were observed in the number of trophozoites between dexamethasone-treated and untreated control cultures after 96 hours' incubation (Fig. 1).

**Rate of Excystment of A. castellanii Cysts**

Previous experiments suggest that dexamethasone may stimulate the growth and proliferation of trophozoites. However, it is possible that dexamethasone affects the rate of excystment rather than stimulating proliferation of the organisms. To test this possibility, cysts were exposed to different concentrations of dexamethasone, and the cysts that remained in the cultures were counted. The number of cysts recovered after 1 day of exposure to 10, 100, and 400 μg/ml dexamethasone (Fig. 2) was significantly lower than in control cultures (P < 0.05). Significant reduction in the number of cysts exposed to all concentrations of dexamethasone was observed in the 2-, 3-, and 4-day cultures (P < 0.05). These results indicate that dexamethasone induces excystment of organisms (Fig. 2).

**Proliferation of A. castellanii Trophozoites**

Steroids have been used topically to reduce corneal inflammation in patients with *Acanthamoeba* keratitis. However, it is possible that steroid treatment induces proliferation of trophozoites and contributes to the pathogenesis of the disease. It was therefore important to investigate whether dexamethasone could stimulate the proliferation of trophozoites.

Trophozoite proliferation was accelerated by dexamethasone at concentrations of 100 and 400 μg/ml after 24 hours of continuous exposure (Fig. 3). With 48 hours of continuous exposure to dexamethasone at concentrations greater than or equal to 10 μg/ml, trophozoite proliferation was significantly greater than that in untreated control cultures (P < 0.05). This positive effect on trophozoite growth was maintained after 72 hours of continuous dexamethasone exposure and was effective at concentrations of dexamethasone greater than or equal to 10 μg/ml (P < 0.05). The effect of steroid treatment of trophozoites was lost after 96 hours' incubation, with no significant difference in number of trophozoites compared with untreated control cultures (Fig. 3).

**Encystment of A. castellanii Trophozoites**

Any delay in encystment of the trophozoites in *Acanthamoeba* keratitis also increases the trophozoite load in the corneal stroma. Topical application of steroids after corneal transplantation may increase the risk of recurrence of *Acanthamoeba* keratitis by inducing the excystment of the organisms. The effect of dexamethasone on the excystment of *A. castellanii* cysts was evaluated in vitro. The number of trophozoites in dexamethasone-treated cysts exceeded that in untreated control cultures by two- to sixfold for all concentrations of dexamethasone after 24 hours' incubation (Fig. 1). A dexamethasone concentration equal to or greater than 100 μg/ml produced the greatest number of trophozoites; above this concentration the excystment response was uniform. After 48 hours' incubation, dexamethasone-treated cysts continued to produce three times the number of trophozoites present in untreated control cultures (P < 0.05). Trophozoites in treated cultures exceeded those in control at concentrations equal to or greater than 10 μg/ml dexamethasone. The number of trophozoites recovered from the dexamethasone-treated group at concentrations of 100 and 400 μg/ml was significantly higher than in control cultures after 72 hours' incubation (P < 0.05). However, no significant differences were observed in the number of trophozoites between dexamethasone-treated and untreated control cultures after 96 hours' incubation (Fig. 1).

**Statistical Analysis**

Student’s t-test was used to determine the significance of the differences between experimental and control groups. Clinical severity scores were analyzed by Mann-Whitney test.
ites pretreated with dexamethasone did not appear to alter cells were stained to assess the CPE (Figs. 4A, 4B). Trophozo-

HCE cells. After 48 hours' incubation, the remaining epithelial treated with dexamethasone for 48 hours and then applied to A. castellanii.

epithelial cells, removing this potential barrier to deeper corneal invasion. We next determined whether steroids affect the rate of excystment of trophozoites treated with dexamethasone, and trophozoites were counted daily for an additional 4 days. Results are expressed as the mean number of trophozoites per milliliter ± SD. *Significantly different from untreated control cultures (P < 0.05).

FIGURE 3. Effect of dexamethasone on proliferation of A. castellanii trophozoites. A. castellanii trophozoites (1 × 10^5) were incubated for 24 hours at 35°C in 5 ml PYG medium containing 10, 100, or 400 μg/ml dexamethasone. Each culture was reincubated with the original concentration of dexamethasone, and trophozoites were counted daily for an additional 4 days. Results are expressed as the mean number of trophozoites per milliliter ± SD. *Significantly different from untreated control cultures (P < 0.05).

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stomal invasion. Therefore, we used encystment on non-nutrient agar to compare dexamethasone-treated trophozoites with untreated trophozoites. However, there was no significant difference between the rate of encystment of trophozoites treated with dexamethasone and that of untreated trophozoites, at any of the time points during 7 days of culture on non-nutrient agar (Table 1).

Trophozoite-Mediated Cytolysis of HCE Cells

Initiation of infection by Acanthamoeba trophozoites is facilitated by the ability of the organism to bind and kill corneal epithelial cells, removing this potential barrier to deeper corneal invasion. We next determined whether steroids affect Acanthamoeba-mediated cytolysis of HCE cells. HCE cells were incubated for 48 hours with A. castellanii trophozoites (1 × 10^5) in medium with or without 10, 100, and 400 μg/ml dexamethasone. In some experiments, trophozoites were pretreated with dexamethasone for 48 hours and then applied to HCE cells. After 48 hours' incubation, the remaining epithelial cells were stained to assess the CPE (Figs. 4A, 4B). Trophozoites pretreated with dexamethasone did not appear to alter CPE. In contrast, trophozoites incubated with dexamethasone for 48 hours induced significant cytolyis (P < 0.05). Moreover, HCE cells incubated with 10, 100, and 400 μg/ml dexamethasone were unaffected. The results show that the presence of dexamethasone in the medium enhances trophozoite-mediated cytolysis.

It is possible that dexamethasone induces Acanthamoeba trophozoites to secrete soluble cytolytic factors. To test this, supernatants were collected from trophozoites grown in medium containing different concentrations of dexamethasone and tested directly for cytolytic activity. The results shown in Figure 5 demonstrate that dexamethasone did not stimulate trophozoites to release soluble factors that induce cytolysis. Alternatively, exposure of epithelial cells to dexamethasone may render the epithelial cells more vulnerable to trophozoite-induced cytolysis. To test this hypothesis, HCE cells were treated with 10, 100, and 400 μg/ml dexamethasone at 37°C for 24 to 72 hours. After incubation, 1 × 10^5 A. castellanii trophozoites were added to each well and the CPE was determined 48 hours later. Treated and untreated HCE cells with or without trophozoites served as the control. The results indicate that addition of dexamethasone to epithelial cells does not affect trophozoite-mediated cytolysis (data not shown).

Cytolysis of HCE Cells by Dexamethasone-Treated Cysts

Previous experiments showed that dexamethasone stimulates excystment of the organisms. It is possible that steroid treatment increases the load of organisms and contributes to the pathogenesis of the Acanthamoeba infection. It was therefore important to investigate whether cysts treated with dexamethasone could induce cytolysis of HCE cells.

HCE cells were incubated for 72 hours with A. castellanii cysts (2.5 × 10^5) in medium with or without 10, 100, and 400 μg/ml dexamethasone. In other experiments, cysts were pretreated with dexamethasone for 72 hours and were then applied to HCE cells. The CPE was measured 72 hours later, as described in the Methods section. Pretreatment of cysts with dexamethasone did not produce significant CPE. However, cysts incubated with dexamethasone for 72 hours induced significant cytolyis of HCE cells (Fig. 6). Dexamethasone at a concentration of 100 μg/ml produced more than 33% cyst-associated cytolysis (P < 0.05). Moreover, incubation in different concentrations of dexamethasone alone did not affect HCE cell viability. The results indicate that the presence of dexamethasone had a profound effect on cyst-associated cytolysis. However, the supernatant collected from cysts exposed to different concentrations of dexamethasone did not induce significant cytolyis (data not shown). We conclude that the increased CPE that follows cyst treatment with steroids is due to accelerated excystment and enhanced proliferation of trophozoites, which are the actual mediators of CPE.

Acanthamoeba Plasminogen Activators

Because the pathogenesis of Acanthamoeba keratitis is dependent on the parasite's capacity to penetrate the corneal epithe-

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Table 1

Table 1. Encystment of Dexamethasone-Treated A. castellanii Trophozoites In Vitro

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<td>400 μg/ml</td>
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Data indicate percentage of encystment of trophozoites on non-nutrient agar.
cultures demonstrated plasminogen activator activity. A with a previous report, supernatants from fibrinogen was monitored over a 6-hour period. In agreement agarose clot. The zone of lysis formed due to degradation of the dilutions of tPA were applied to each well of a fibrinogen-fibrin clot assay. Ten microliters of each sample and several were collected and assayed for plasminogen activators by radial

Effect of dexamethasone on CPE mediated by A. castellanii trophozoites. HCE cell monolayers were incubated for 48 hours with trophozoites (1 × 10^5) in medium with or without 10, 100, or 400 µg/ml dexamethasone (A). A with trophozoites that were pretreated with dexamethasone for 48 hours before addition to HCE cells (B). CPE was assessed 48 hours later. Negative control cultures consisted of monolayers cultured in media with dexamethasone or without trophozoites. Monolayers were washed and stained with Giemsa stain, and CPE was assessed spectrophotometrically. *Significantly different from untreated control cultures (P < 0.05).

A. castellanii Keratitis in the Chinese Hamster

The effect of systemic immunosuppression on Acanthamoeba keratitis is determined by the response of the organism to steroids and the role of the immune system in the killing of Acanthamoeba. Our in vitro studies demonstrated an increase in the numbers of trophozoites in response to dexamethasone, through accelerated excystment and trophozoite replication. Histopathology of the cornea in human Acanthamoeba keratitis showed predominantly neutrophils and macrophages, with few lymphocytes, indicating the importance of the innate immune system in the response to the presence of Acanthamoeba. Studying Acanthamoeba keratitis in an animal model enabled in vivo assessment of the effect of immunosuppression mediated by systemic steroid on Acanthamoeba keratitis. Accordingly, the incidence, severity, and duration of keratitis were evaluated in animals treated with dexamethasone IM and compared with that in untreated control animals.

Intramuscular injection of dexamethasone had a profound effect on the incidence, severity, and chronicity of keratitis. The incidence of infection in untreated animals was 89%, but increased to 100% in dexamethasone-treated animals (Fig. 8). The increased rates of infection were maintained throughout the period of observation. However, dexamethasone treatment did not accelerate the onset of keratitis.

Keratitis in dexamethasone-treated hamsters was significantly more severe at all time points than in untreated animals (P < 0.05), in some cases resulting in corneal ulceration. Severe keratitis was present in 90% of treated hamsters at day 20 and remained moderate in 55% of these animals at day 35. By contrast, 45% of untreated hamsters had only mild residual keratitis by day 20, and all infections had resolved by day 35 (Figs. 8A, 8B).

Discussion

Although topical steroids have been consistently included in therapy for Acanthamoeba keratitis, their effects on the organism have not been documented. The existence of two forms of Acanthamoeba, trophozoites and cysts, affords the organism maximal environmental adaptation and so assists in its survival. A4-18

The Acanthamoeba trophozoite is capable of initiating these corneal infections if there is an epithelial defect. A can-
thamoebae attach to corneal epithelium through a mannose-specific surface receptor. Adherent acanthamoebae secrete soluble factors that dissociate and kill corneal epithelial cells. Acanthamoebae secrete collagenase, as well as a series of proteases that enable it to penetrate deep into the corneal stroma.

The Acanthamoeba cyst is the dormant form of the organism, produced by inhibition of DNA synthesis and glucose starvation. Cysts are often found deep in the corneal stroma in established Acanthamoeba keratitis. The susceptibility of both trophozoites and cysts to killing by polyhexamethylene biguanide, chlorhexidine, and propamidine isethionate has been confirmed, and these agents remain the mainstay of amebicidal therapy. Although steroids are frequently needed to control pain and inflammation in Acanthamoeba keratitis, their effect on trophozoites and cysts has not been previously investigated.

These experiments show for the first time that exposure of Acanthamoeba cysts to dexamethasone promotes excystment of the organism. After 24 hours of dexamethasone exposure, the number of trophozoites significantly exceeded that in untreated control cultures, at all concentrations of dexamethasone. This effect was maintained during an additional 24 hours of incubation.
of exposure, and rates of excystment were similar for all concentrations of the steroid. Significant reduction in the number of cysts exposed to all concentrations of dexamethasone was observed in the culture at 2, 3, and 4 days after incubation. These results indicate that use of topical steroids at even a minimal dose promotes an increase in the number of trophozoites produced by excystment in corneal stroma while any cysts remain. This work emphasizes the clinical importance of the maintenance of an adequate dose of amebicidal drugs if steroids are considered necessary to control pain or inflammation in Acanthamoeba keratitis.

The greater excystment of Acanthamoeba at higher steroid concentrations should be considered when using steroid therapy as prophylaxis against corneal graft rejection after penetrating keratoplasty (PK). Cure of Acanthamoeba keratitis has not always been achieved with PK.29,36–38 Risk of recurrent treating keratoplasty (PK). Cure of...
such as macrophages and neutrophils that play and important role in Acanthamoeba keratitis.13–21

Our results show that Chinese hamsters treated with systemic dexamethasone are more likely to have Acanthamoeba keratitis and that the resultant infection is more severe and fails to resolve. Systemic dexamethasone downregulates the innate immune system through inhibition of neutrophil chemotaxis and neutrophil and macrophage activation. Thus, the effects of steroid-induced severe Acanthamoeba infection in the Chinese hamster are consistent with previous findings that macrophage depletion induces chronic Acanthamoeba keratitis.20–22

In our in vitro studies, exposure to dexamethasone increased the number of trophozoite through excystment and growth. Although systemic steroid may be expected to have less direct impact on patients who are receiving any concurrent topical steroid therapy to control the inflammatory complications of Acanthamoeba keratitis.

References


