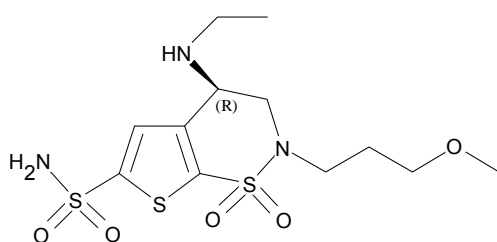


DATA SHEET

AZARGA[®] Eye Drops (brinzolamide & timolol)

NAME OF THE DRUG

AZARGA[®] Eye Drops is a suspension containing a combination of brinzolamide (10 mg/mL) and timolol (5 mg/mL; as timolol maleate). The chemical structure of each active ingredient is represented below:



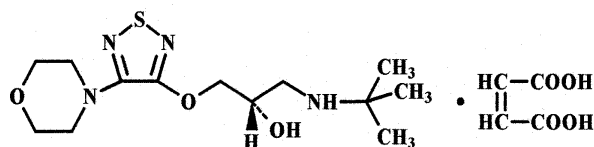
Brinzolamide

Empirical formula: $C_{12}H_{21}N_3O_5S_3$

Molecular weight: 383.51

Chemical name: (R)-4-(Ethylamino)-3,4-dihydro-2-(3-methoxypropyl)-2H-thieno[3,2-e]-1,2-thiazine-6-sulfonamide-1,1-dioxide

CAS Number: 138890-62-7



Timolol maleate

Empirical formula: $C_{13}H_{24}N_4O_3S \cdot C_4H_4O_4$

Molecular weight: 432.50

Chemical name: (S)-1-(tert-butylamino)-3-[(4-morpholino-1,2,5-thiadiazol-3-yl)oxy]-2-propanol maleate (1:1) (salt)

CAS Number: 26921-17-5

DESCRIPTION

Brinzolamide is a white to off-white, crystalline powder which is very slightly soluble in water at neutral pH.

Timolol maleate is a white to off-white, crystalline powder which is soluble in water, alcohol and practically insoluble in ether.

AZARGA is a white to off-white uniform suspension for multiple-dose topical ophthalmic use. The pH of AZARGA is approximately 7.2.

AZARGA also contains mannitol, carbomer 974P, tyloxapol, disodium edetate, sodium chloride, hydrochloric acid and/or sodium hydroxide (to adjust pH), purified water and benzalkonium chloride (0.1 mg/mL) as preservative.

PHARMACOLOGY

Mechanism of Action

AZARGA contains two active substances: brinzolamide and timolol maleate. These two components decrease elevated intraocular pressure (IOP) primarily by reducing aqueous humour secretion, but do so by different mechanisms of action. The combined effect of these two active substances results in additional IOP reduction compared to either compound alone.

Brinzolamide is a potent inhibitor of human carbonic anhydrase II (CA-II), the predominant iso-enzyme in the eye. Inhibition of CA-II in the ciliary processes of the eye decreases aqueous humour secretion, presumably by slowing the formation of bicarbonate ions with subsequent reduction in sodium and fluid transport.

Timolol is a non-selective beta-adrenergic blocking agent that has no intrinsic sympathomimetic, direct myocardial depressant or membrane-stabilising activity. Tonography and fluorophotometry studies in man suggest that its predominant action is related to reduced aqueous humour formation and a slight increase in outflow facility.

Pharmacokinetics

Absorption

Following topical ocular administration, brinzolamide and timolol are absorbed through the cornea and into the systemic circulation. In a pharmacokinetic study, healthy subjects received oral brinzolamide (1 mg) twice daily for 2 weeks to shorten the time to reach steady-state prior to starting AZARGA administration. Following twice daily dosing of AZARGA for 13 weeks, whole blood concentrations of brinzolamide averaged 18.8 ± 3.29 μM , 18.1 ± 2.68 μM and 18.4 ± 3.01 μM at weeks 4, 10 and 15, respectively, indicating that steady-state whole blood concentrations of brinzolamide were maintained.

At steady state, following administration of AZARGA, the mean plasma C_{max} and $\text{AUC}_{0-12\text{h}}$ of timolol were 27% and 28% lower (C_{max} : 0.824 ± 0.453 ng/mL; $\text{AUC}_{0-12\text{h}}$: 4.71 ± 4.29 ng h/mL), respectively in comparison to the administration of timolol 5 mg/mL (C_{max} : 1.13 ± 0.494 ng/mL; $\text{AUC}_{0-12\text{h}}$: 6.58 ± 3.18 ng h/mL). The lower systemic exposure to timolol following AZARGA administration is not clinically relevant. Following administration of AZARGA, mean C_{max} of timolol was reached at 0.79 ± 0.45 hours.

Distribution

Plasma protein binding of brinzolamide is moderate (about 60%). Brinzolamide is sequestered in red blood cells (RBCs) due to its high affinity binding to CA-II and to a lesser extent to CA-I. Its active N-desethyl metabolite also accumulates in RBCs where it binds primarily to CA-I. The affinity of brinzolamide and metabolite to RBCs and tissue carbonic anhydrase results in low plasma concentrations.

Ocular tissue distribution data in rabbits showed that timolol can be measured in aqueous humour up to 48 hours after administration of AZARGA. At steady-state, timolol is detected in human plasma for up to 12 hours after administration of AZARGA.

Metabolism

The metabolic pathways for brinzolamide involve N-dealkylation, O-dealkylations and oxidation of its N-propyl side chain. N-desethyl brinzolamide is a major metabolite of brinzolamide formed in humans, which also binds to CA-I in the presence of brinzolamide

and accumulates in RBCs. *In vitro* studies show that the metabolism of brinzolamide mainly involves CYP3A4 as well as at least four other isozymes (CYP2A6, CYP2B6, CYP2C8 and CYP2C9).

Timolol is metabolised by two pathways. One route yields an ethanolamine side chain on the thiadiazole ring and the other gives an ethanolic side chain on the morpholine nitrogen and a second similar side chain with a carbonyl group adjacent to the nitrogen. Timolol metabolism is mediated primarily by CYP2D6.

Excretion

Brinzolamide is eliminated primarily by renal excretion (approximately 60%). About 20% of the dose has been accounted for in urine as metabolite. Brinzolamide and N-desethyl-brinzolamide are the predominant components found in the urine along with trace levels (<1%) of the N-desmethoxypropyl and O-desmethyl metabolites.

Timolol and its metabolites are primarily excreted by the kidneys. Approximately 20% of a timolol dose is excreted in the urine unchanged and the remainder excreted in urine as metabolites. The plasma $t_{1/2}$ of timolol is 4.8 hours after administration of AZARGA.

CLINICAL STUDIES

In a twelve-month, double-masked, randomised clinical trial in patients (n=437) with open-angle glaucoma or ocular hypertension who, in the investigator's opinion, could benefit from combination therapy and who had baseline mean IOP of 25 to 27 mm Hg, the mean IOP-lowering effect of AZARGA was 7 to 9 mm Hg and for dorzolamide 20 mg/mL + timolol 5mg/mL it was 7 to 9 mm Hg, when dosed twice daily. The non-inferiority of AZARGA as compared to dorzolamide 20 mg/mL + timolol 5 mg/mL in the mean IOP reduction was demonstrated across all time-points at all visits. When evaluated at each visit, up to 60% of patients in the AZARGA group and up to 59% of patients in the dorzolamide 20 mg/mL group had IOP of less than 18 mm Hg.

In a six-month, double-masked, randomised clinical study in patients (n=523) with open-angle glaucoma or ocular hypertension and baseline mean IOP of 25 to 27 mm Hg, the mean IOP-lowering effect of AZARGA dosed twice daily was 8 to 9 mm Hg, and was up to 3 mm Hg greater than that of brinzolamide 10 mg/mL dosed twice daily and up to 2 mm Hg greater than that of timolol 5 mg/mL dosed twice daily. A statistically superior reduction ($p < 0.05$) in mean IOP was observed compared to both brinzolamide and timolol at all time-points and visits throughout the study. IOP measurements conducted at 8 am, 10 am, 12 pm, 4 pm and 8 pm confirm that diurnal IOP control is superior ($p < 0.009$) and clinically relevant for AZARGA compared to either brinzolamide 10 mg/mL or timolol 5 mg/mL.

In a 7-day double masked, randomised clinical trial (n=96), the ocular comfort, based on burning and stinging, of AZARGA was superior ($p=0.0003$) to that of dorzolamide 20 mg/mL + timolol 5 mg/mL. A comparison of the frequency distribution of the severity of ocular discomfort demonstrated a significant difference ($p=0.0001$) between the two treatment groups, with AZARGA having a lesser percentage of patients experiencing mild, moderate and severe ocular discomfort compared to dorzolamide 20 mg/mL + timolol 5 mg/mL. A significantly higher percentage of patients randomized to AZARGA experienced no ocular discomfort after 1 week of dosing ($p=0.0004$) compared to patients who received dorzolamide 20 mg/mL + timolol 5 mg/mL.

INDICATIONS

Decrease of intraocular pressure (IOP) in patients with open-angle glaucoma or ocular hypertension for whom monotherapy provides insufficient IOP reduction.

CONTRAINDICATIONS

A history of hypersensitivity to brinzolamide and other sulphonamides, timolol, or any other component of the medication.

The following conditions may also contraindicate the use of AZARGA:

- bronchial asthma, a history of bronchial asthma, or severe chronic obstructive pulmonary disease.
- sinus bradycardia, second or third degree atrioventricular block, overt cardiac failure, or cardiogenic shock.
- severe allergic rhinitis and bronchial hyperreactivity; hypersensitivity to other beta-blockers.
- hyperchloraemic acidosis.
- severe renal impairment (see Hepatic / Renal Impairment).

PRECAUTIONS

FOR TOPICAL USE ONLY - NOT FOR INJECTION OR ORAL INGESTION

AZARGA should be discontinued at the first appearance of a skin rash or any other sign of hypersensitivity.

Systemic effects

Like other topically applied ophthalmic agents, brinzolamide and timolol are absorbed systemically.

Brinzolamide

AZARGA contains brinzolamide, a sulphonamide. The same types of undesirable effects that are attributable to sulphonamides may occur with topical administration. Acid-base disturbances have been reported with oral carbonic anhydrase inhibitors. If signs of serious reactions or hypersensitivity occur, discontinue use of this medicine.

There is potential for an additive effect on the known systemic effects of carbonic anhydrase inhibition in patients receiving an oral carbonic anhydrase inhibitor and AZARGA. The concomitant administration of AZARGA and oral carbonic anhydrase inhibitors has not been studied and is not recommended.

Timolol

Due to the beta-adrenergic component, timolol, the same types of cardiovascular and pulmonary adverse reactions as seen with systemic beta-adrenergic blocking agents may occur. Cardiac failure should be adequately controlled before beginning therapy with timolol. Patients with a history of severe cardiac disease should be watched for signs of cardiac failure and have their pulse rates checked. Respiratory reactions and cardiac reactions, including death due to bronchospasm in patients with asthma and, rarely, death in association with cardiac failure, have been reported following administration of timolol maleate. Beta-adrenergic blocking agents should be administered with caution in patients subject to spontaneous hypoglycaemia or to patients with labile insulin-dependent diabetes, as beta-adrenergic blocking agents may mask the signs and symptoms of acute hypoglycaemia. They may also mask the signs of hyperthyroidism and cause worsening of

Prinzmetal angina, severe peripheral and central circulatory disorders and hypotension.

Anaphylactic reactions

While taking beta-adrenergic blocking agents, patients with a history of atopy or a history of severe anaphylactic reaction to a variety of allergens may be unresponsive to the usual doses of adrenaline used to treat anaphylactic reactions.

Ocular effects

AZARGA has not been studied in patients with narrow-angle glaucoma and its use is not recommended in these patients.

There is limited experience with AZARGA in the treatment of patients with pseudoexfoliative glaucoma or pigmentary glaucoma. Caution should be utilized in treating these patients and close monitoring of IOP is recommended.

The possible role of brinzolamide on corneal endothelial function has not been investigated in patients with compromised corneas (particularly in patients with low endothelial cell count). Specifically, patients wearing contact lenses have not been studied and careful monitoring of these patients when using brinzolamide is recommended, since carbonic anhydrase inhibitors may affect corneal hydration and wearing contact lenses might increase the risk for the cornea. Careful monitoring of patients with compromised corneas, such as patients with diabetes mellitus or corneal dystrophies, is recommended.

Use with contact lenses

AZARGA contains benzalkonium chloride which may cause eye irritation and is known to discolour soft contact lenses. Contact with soft contact lenses is to be avoided. Patients must be instructed to remove contact lenses prior to the application of AZARGA and wait 15 minutes after instillation of the dose before reinsertion.

Drug Interactions

No drug interaction studies have been performed with AZARGA.

Brinzolamide

AZARGA contains brinzolamide, a carbonic anhydrase inhibitor and, although administered topically, is absorbed systemically. Acid-base disturbances have been reported with oral carbonic anhydrase inhibitors. The potential for interactions must be considered in patients receiving AZARGA.

The cytochrome P-450 isozymes responsible for metabolism of brinzolamide include CYP3A4 (main), CYP2A6, CYP2B6, CYP2C8 and CYP2C9. It is expected that inhibitors of CYP3A4 such as ketoconazole, itraconazole, clotrimazole and ritonavir will inhibit the metabolism of brinzolamide by CYP3A4. Caution is advised if CYP3A4 inhibitors are given concomitantly. However, accumulation of brinzolamide is unlikely as renal elimination is the major route. Brinzolamide is not an inhibitor of cytochrome P-450 isozymes.

Timolol

There is a potential for additive effects resulting in hypotension and/or marked bradycardia when eye drops with timolol are administered concomitantly with oral calcium channel blockers or beta-adrenergic blocking agents, antiarrhythmics, digitalis glycosides or parasympathomimetics. The use of two local beta-adrenergic blocking agents or two local

carbonic anhydrase inhibitors is not recommended.

The hypertensive reaction to sudden withdrawal of clonidine can be potentiated when taking beta-adrenergic blocking agents.

Potential systemic beta-blockade (eg. decreased heart rate) has been reported during combined treatment with CYP2D6 inhibitors (eg. quinidine, cimetidine) and timolol.

Beta-adrenergic blocking agents may increase the hypoglycaemic effect of antidiabetic agents. Beta-adrenergic blocking agents can mask the signs and symptoms of hypoglycaemia.

Use In Pregnancy - Category C

AZARGA should be used during pregnancy only if the potential benefit justifies the potential risk to the foetus.

Brinzolamide

There are no adequate data from the use of brinzolamide in pregnant women. Studies in animals have shown reproductive toxicity. The potential risk for humans is unknown.

Timolol

Well-controlled epidemiological studies with systemic use of beta-adrenergic blocking agents did not indicate malformative effects, but some pharmacological effects such as bradycardia have been observed in fetuses or neonates. Data on a limited number of exposed pregnancies indicate no adverse effects of timolol in eye drops on pregnancy or on the health of the foetus/newborn child but bradycardia and arrhythmia have been reported in one case in the foetus of a woman treated with timolol eye drops. To date, no other relevant epidemiological data are available.

Use in Lactation

It is not known whether brinzolamide is excreted in human breast milk. Animal studies have shown excretion of brinzolamide in breast milk. Timolol does appear in human breast milk, however, at therapeutic doses of AZARGA, no effects on the breastfed newborns / infants are anticipated. AZARGA can be used during breast-feeding.

Use in Children

AZARGA is not recommended for use in children below 18 years due to a lack of data on safety and efficacy.

Use in Elderly

There are no modifications to the recommended dosing regimen for elderly patients.

Hepatic / Renal Impairment

No studies have been conducted with AZARGA in patients with hepatic or renal impairment. No dosage adjustment is necessary in patients with hepatic impairment or in patients with mild to moderate renal impairment.

AZARGA has not been studied in patients with severe renal impairment (creatinine clearance <30 mL/min) or in patients with hyperchloraemic acidosis. Since brinzolamide and

its main metabolite are excreted predominantly by the kidney, AZARGA is therefore contraindicated in patients with severe renal impairment.

Carcinogenesis, Mutagenesis, Impairment of Fertility

There are no human data on the effects of AZARGA on male or female fertility.

Brinzolamide

Non-clinical data reveal no special hazard for humans with brinzolamide, based on conventional studies of genotoxicity and carcinogenic potential.

Developmental toxicity studies in rabbits with oral doses of brinzolamide of up to 6 mg/kg/day (214 times the recommended daily clinical dose of 28 µg/kg/day) revealed no effect on foetal development despite significant maternal toxicity. Similar studies in rats resulted in slightly reduced ossification of skull and sternebrae of foetuses of dams receiving brinzolamide at doses of 18 mg/kg/day (642 times the recommended daily clinical dose), but not 6 mg/kg/day. These findings occurred at doses that caused metabolic acidosis with decreased body weight gain in dams and decreased foetal weights. Dose-related decreases in foetal weights were observed in pups of dams receiving brinzolamide orally ranging from a slight decrease (about 5-6%) at 2 mg/kg/day to nearly 14% at 18 mg/kg/day. During lactation, the no adverse effect level in the offspring was 5 mg/kg/day.

Timolol

Non-clinical data revealed no special hazard for humans with timolol based on conventional studies of genotoxicity and carcinogenic potential.

Reproduction toxicity studies with timolol showed delayed foetal ossification in rats with no adverse effects on postnatal development (at 50 mg/kg/day or 3500 times the daily clinical dose of 14 µg/kg/day) and increased foetal resorption in rabbits (at 90 mg/kg/day or 6400 times the daily clinical dose).

Effects on ability to drive and use machines

As with any eye drops, temporary blurred vision or other visual disturbances may affect the ability to drive or use machines. If blurred vision occurs at instillation, the patient must wait until the vision clears before driving or using machinery.

ADVERSE REACTIONS

In two clinical trials of 6 and 12 months duration involving 394 patients treated with AZARGA, the most frequently reported adverse reaction was transient blurred vision upon instillation (3.6%), lasting from a few seconds to a few minutes.

The following adverse reactions were assessed to be treatment-related. Within each frequency grouping, undesirable effects are presented in order of decreasing seriousness.

Eye disorders:

Common (≥1% to <10%): blurred vision, eye pain, eye irritation, foreign body sensation in eyes

Uncommon (≥0.1% to <1%): corneal erosion, punctate keratitis, dry eye, eye discharge, eye pruritus, ocular hyperaemia, blepharitis, allergic conjunctivitis, corneal disorder, anterior chamber flare, conjunctival hyperaemia, eyelid margin crusting, asthenopia, abnormal

sensation in eye, eyelids pruritus, allergic blepharitis, erythema of eyelid.

Nervous system disorders:

Common ($\geq 1\%$ to $< 10\%$): dysgeusia

Dysgeusia (bitter or unusual taste in the mouth following instillation) was a frequently reported systemic undesirable effect associated with the use of AZARGA during clinical studies. It is probably caused by passage of the eye drops in the nasopharynx via the nasolacrimal canal. Nasolacrimal occlusion and gently closing the eyelid after instillation may help reduce the incidence of this effect.

Respiratory, thoracic and mediastinal disorders:

Uncommon ($\geq 0.1\%$ to $< 1\%$): chronic obstructive pulmonary disease, pharyngolaryngeal pain, rhinorrhoea, cough

Skin and subcutaneous tissue disorders:

Uncommon ($\geq 0.1\%$ to $< 1\%$): hair disorder, lichen planus

Vascular disorders:

Uncommon ($\geq 0.1\%$ to $< 1\%$): decreased blood pressure

Psychiatric disorders:

Uncommon ($\geq 0.1\%$ to $< 1\%$): insomnia

DOSAGE AND ADMINISTRATION

The recommended dosage is one drop of AZARGA in the conjunctival sac of the affected eye(s) twice daily. Shake the bottle well before use.

Nasolacrimal occlusion and gently closing the eyelid after instillation are recommended. This may reduce the systemic absorption of eye drops and result in a decrease in systemic adverse reactions.

If more than one topical ophthalmic medicine is being used, the medicines must be administered at least 5 minutes apart.

If a dose is missed, treatment should be continued with the next dose as planned. The dose should not exceed one drop in the affected eye(s) twice daily.

When substituting another ophthalmic antiglaucoma agent with AZARGA, the other agent should be discontinued and AZARGA should be started the following day.

To prevent contamination of the dropper tip and solution, care must be taken not to touch the eyelids, surrounding areas or other surfaces with the dropper tip of the bottle. Instruct patients to keep the bottle tightly closed when not in use.

OVERDOSAGE

No case of overdose has been reported.

A topical overdose of AZARGA may be flushed from the eye(s) with warm tap water.

If an overdose with AZARGA occurs, treatment should be symptomatic and supportive. Electrolyte imbalance, development of an acidotic state, and possibly central nervous system effects may occur. Serum electrolyte levels (particularly potassium) and blood pH levels should be monitored. Studies have shown that timolol does not dialyse readily.

POISON SCHEDULE OF THE DRUG

Prescription Only Medicine.

PRESENTATION

AZARGA is presented in an 8 mL round opaque low density polyethylene DROP-TAINER[®] dispenser containing 5 mL suspension.

Consumer Medicine Information is supplied with this product.

STORAGE

AZARGA should be stored below 25°C. It can be stored in the fridge. Do not freeze.

Discard container 4 weeks after opening.

NAME AND ADDRESS OF SPONSOR

In Australia this product is supplied by:

Alcon Laboratories (Australia) Pty Ltd
25 Frenchs Forest Road East
Frenchs Forest NSW 2086

In New Zealand this product is distributed by:

Alcon New Zealand Limited
c/o Pharmaco (NZ) Ltd
4 Fisher Crescent
Mt Wellington, Auckland
New Zealand

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