

## SUMMARY OF PRODUCT CHARACTERISTICS

### 1. NAME OF THE MEDICINAL PRODUCT

[BRINZOLAMIDE] 10 mg/mL eye drops, suspension

### 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Each mL of suspension contains 10 mg brinzolamide.

One drop contains approximately 309 micrograms brinzolamide.

#### Excipients with known effect

Each mL of suspension contains approximately 0.1 mg benzalkonium chloride.

One drop contains approximately 3.1 micrograms benzalkonium chloride.

For the full list of excipients, see section 6.1.

### 3. PHARMACEUTICAL FORM

Eye drops, suspension.

White homogenous suspension.

pH: 7.1 - 7.9

Osmolality: 270-320 mOsm/Kg

### 4. CLINICAL PARTICULARS

#### 4.1 Therapeutic indications

[BRINZOLAMIDE] is indicated to decrease elevated intraocular pressure in:

- ocular hypertension
- open-angle glaucoma

as monotherapy in adult patients unresponsive to beta-blockers or in adult patients in whom beta-blockers are contraindicated or as adjunctive therapy to beta-blockers or prostaglandin analogues (see also section 5.1).

#### 4.2 Posology and method of administration

##### Posology

When used as monotherapy or adjunctive therapy, the dose is one drop of [BRINZOLAMIDE] in the conjunctival sac of the affected eye(s) twice daily. Some patients may have a better response with one drop three times a day.

##### Special populations

###### *Elderly population*

No dose adjustment in elderly patients is necessary.

### *Hepatic and renal impairment*

Brinzolamide has not been studied in patients with hepatic impairment and is therefore not recommended in such patients.

Brinzolamide 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, [BRINZOLAMIDE] is therefore contraindicated in such patients (see also section 4.3).

### *Paediatric population*

The safety and efficacy of brinzolamide in infants, children and adolescents aged 0 to 17 years have not been established. Currently available data are described in sections 4.8 and 5.1. Brinzolamide is not recommended for use in infants, children and adolescents.

### Method of administration

For ocular use.

Nasolacrimal occlusion or gently closing the eyelid after instillation is recommended. This may reduce the systemic absorption of medicinal products administered via the ocular route and result in a decrease in systemic adverse reactions.

Instruct the patient to shake the bottle well before use. After the cap is removed, if tamper evident snap collar is loose, remove before using the product.

To prevent contamination of the dropper tip and suspension, 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.

When substituting another ophthalmic antiglaucoma agent with [BRINZOLAMIDE], discontinue the other agent and start the following day with [BRINZOLAMIDE].

If more than one topical ophthalmic medicinal product is being used, the medicinal products must be administered at least 5 minutes apart. Eye ointments should be administered last.

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) three times daily.

## **4.3 Contraindications**

- Hypersensitivity to the active substance or to any of the excipients listed in section 6.1.
- Known hypersensitivity to sulphonamides (see also section 4.4).
- Severe renal impairment.
- Hyperchloraemic acidosis.

## **4.4 Special warnings and precautions for use**

### Systemic effects

Brinzolamide is a sulphonamide inhibitor of carbonic anhydrase and, although administered topically, is absorbed systemically. The same types of adverse reactions that are attributable to sulphonamides may occur with topical administration. If signs of serious reactions or hypersensitivity occur, discontinue the use of this preparation.

Acid-base disturbances have been reported with oral carbonic anhydrase inhibitors. Use with caution in patients with risk of renal impairment because of the possible risk of metabolic acidosis (see section 4.2).

Brinzolamide has not been studied in pre-term infants (less than 36 weeks gestational age) or those less than 1 week of age. Patients with significant renal tubular immaturity or abnormalities should only receive brinzolamide after careful consideration of the risk benefit balance because of the possible risk of metabolic acidosis.

Oral carbonic anhydrase inhibitors may impair the ability to perform tasks requiring mental alertness and/or physical coordination. [BRINZOLAMIDE] is absorbed systemically and therefore this may occur with topical administration.

#### Concomitant therapy

There is a potential for an additive effect on the known systemic effects of carbonic anhydrase inhibition in patients receiving an oral carbonic anhydrase inhibitor and brinzolamide. The concomitant administration of brinzolamide and oral carbonic anhydrase inhibitors has not been studied and is not recommended (see also section 4.5).

Brinzolamide was primarily evaluated in concomitant administration with timolol during adjunctive glaucoma therapy. Additionally, the IOP-reducing effect of brinzolamide as adjunctive therapy to the prostaglandin analogue travoprost has been studied. No long-term data are available on the use of brinzolamide as adjunctive therapy to travoprost (see also section 5.1).

There is limited experience with brinzolamide in the treatment of patients with pseudoexfoliative glaucoma or pigmentary glaucoma. Caution should be used in treating these patients and close monitoring of intraocular pressure (IOP) is recommended. Brinzolamide has not been studied in patients with narrow-angle glaucoma and its use is not recommended in these patients.

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.

Benzalkonium chloride, which is commonly used as a preservative in ophthalmic products, has been reported to cause punctate keratopathy and/or toxic ulcerative keratopathy. Since [BRINZOLAMIDE] contains benzalkonium chloride, close monitoring is required with frequent or prolonged use in dry eye patients, or in conditions where the cornea is compromised.

Brinzolamide has not been studied in patients wearing contact lenses. [BRINZOLAMIDE] 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 [BRINZOLAMIDE] and wait at least 15 minutes after instillation of the dose before reinsertion.

Potential rebound effects following cessation of treatment with brinzolamide have not been studied; the IOP-lowering effect is expected to last for 5-7 days.

#### Paediatric population

The safety and efficacy of brinzolamide in infants, children and adolescents aged 0 to 17 years have not been established and its use is not recommended in infants, children or adolescents.

#### **4.5 Interaction with other medicinal products and other forms of interaction**

Specific interaction studies with other medicinal products have not been performed with brinzolamide.

In clinical studies, brinzolamide was used concomitantly with prostaglandin analogues and timolol ophthalmic preparations without evidence of adverse interactions. Association between brinzolamide and miotics or adrenergic agonists has not been evaluated during adjunctive glaucoma therapy.

Brinzolamide is 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 brinzolamide.

The cytochrome P-450 isozymes responsible for metabolism of brinzolamide include CYP3A4 (main), CYP2A6, CYP2C8 and CYP2C9. It is expected that inhibitors of CYP3A4 such as ketoconazole, itraconazole, clotrimazole, ritonavir and troleandomycin 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.

#### **4.6 Fertility, pregnancy and lactation**

##### Pregnancy

There are no or limited amount of data from the use of ophthalmic brinzolamide in pregnant women. Studies in animals have shown reproductive toxicity following systemic administration (see also section 5.3).

[BRINZOLAMIDE] is not recommended during pregnancy and in women of childbearing potential not using contraception.

##### Breast-feeding

It is unknown whether brinzolamide/metabolites are excreted in human milk following topical ocular administration. Animal studies have shown the excretion of minimal levels of brinzolamide in breast milk following oral administration.

A risk to the newborns/infants cannot be excluded. A decision must be made whether to discontinue breast-feeding or to discontinue/abstain from [BRINZOLAMIDE] therapy taking in to account the benefit of breast-feeding for the child and the benefit of therapy for the woman.

##### Fertility

Animal studies with brinzolamide demonstrated no effect on fertility. Studies have not been performed to evaluate the effect of topical ocular administration of brinzolamide on human fertility.

#### **4.7 Effects on ability to drive and use machines**

Brinzolamide has minor influence on the ability to drive and use machines.

Temporary blurred vision or other visual disturbances may affect the ability to drive or use machines (see also section 4.8). If blurred vision occurs at instillation, the patient must wait until the vision clears before driving or using machines.

Oral carbonic anhydrase inhibitors may impair the ability to perform tasks requiring mental alertness and/or physical coordination (see also section 4.4 and section 4.8).

#### 4.8 Undesirable effects

##### Summary of the safety profile

In clinical studies involving 2,732 patients treated with brinzolamide as monotherapy or adjunctive therapy to timolol maleate 5 mg/mL, the most frequently reported treatment-related adverse reactions were: dysgeusia (6.0 %) (bitter or unusual taste, see description below) and temporary blurred vision (5.4 %) upon instillation, lasting from a few seconds to a few minutes (see also section 4.7).

##### Tabulated summary of adverse reactions

The following adverse reactions have been reported with brinzolamide 10 mg/mL eye drops, suspension and are classified according to the following convention: very common ( $\geq 1/10$ ), common ( $\geq 1/100$  to  $< 1/10$ ), uncommon ( $\geq 1/1,000$  to  $< 1/100$ ), rare ( $\geq 1/10,000$  to  $< 1/1,000$ ), very rare ( $< 1/10,000$ ) or not known (cannot be estimated from the available data). Within each frequency grouping, adverse reactions are presented in order of decreasing seriousness. The adverse reactions were obtained from clinical trials and post-marketing spontaneous reports.

<b>System Organ Classification</b>	<b>MedDRA Preferred Term (v.15.1)</b>
Infections and infestations	<u>Uncommon</u> : nasopharyngitis, pharyngitis, sinusitis <u>Not Known</u> : rhinitis
Blood and lymphatic system disorders	<u>Uncommon</u> : red blood cell count decreased, blood chloride increased
Immune system disorders	<u>Not Known</u> : hypersensitivity
Metabolism and nutrition disorders	<u>Not known</u> : decreased appetite
Psychiatric disorders	<u>Uncommon</u> : apathy, depression, depressed mood, libido decreased, nightmare, nervousness <u>Rare</u> : insomnia
Nervous system disorders	<u>Uncommon</u> : motor dysfunction, amnesia, dizziness, paraesthesia, headache <u>Rare</u> : memory impairment, somnolence <u>Not Known</u> : tremor, hypoaesthesia, ageusia
Eye disorders	<u>Common</u> : blurred vision, eye irritation, eye pain, foreign body sensation in eyes, ocular hyperaemia <u>Uncommon</u> : corneal erosion, keratitis, punctate keratitis, keratopathy, deposit eye, corneal staining, corneal epithelium defect, corneal epithelium disorder, blepharitis, eye pruritus, conjunctivitis, eye swelling, meibomianitis, glare, photophobia, dry eye, allergic conjunctivitis, pterygium, scleral pigmentation, asthenopia, ocular discomfort, abnormal sensation in eye, keratoconjunctivitis sicca, subconjunctival

	<p>cyst, conjunctival hyperaemia, eyelids pruritus, eye discharge, eyelid margin crusting, lacrimation increased</p> <p><u>Rare:</u> corneal oedema, diplopia, visual acuity reduced, photopsia, hypoaesthesia eye, periorbital oedema, intraocular pressure increased, optic nerve cup/disc ratio increased</p> <p><u>Not Known:</u> corneal disorder, visual disturbance, eye allergy, madarosis, eyelid disorder, erythema of eyelid</p>
Ear and labyrinth disorders	<p><u>Rare:</u> tinnitus</p> <p><u>Not Known:</u> vertigo</p>
Cardiac disorders	<p><u>Uncommon:</u> cardio-respiratory distress, bradycardia, palpitations</p> <p><u>Rare:</u> angina pectoris, heart rate irregular</p> <p><u>Not Known:</u> arrhythmia, tachycardia, hypertension, blood pressure increased, blood pressure decreased, heart rate increased</p>
Respiratory, thoracic and mediastinal disorders	<p><u>Uncommon:</u> dyspnoea, epistaxis, oropharyngeal pain, pharyngolaryngeal pain, throat irritation, upper airway cough syndrome, rhinorrhoea, sneezing</p> <p><u>Rare:</u> bronchial hyperreactivity, upper respiratory tract congestion, sinus congestion, nasal congestion, cough, nasal dryness</p> <p><u>Not Known:</u> asthma</p>
Gastrointestinal disorders	<p><u>Common:</u> dysgeusia</p> <p><u>Uncommon:</u> oesophagitis, diarrhoea, nausea, vomiting, dyspepsia, upper abdominal pain, abdominal discomfort, stomach discomfort, flatulence, frequent bowel movements, gastrointestinal disorder, hypoaesthesia oral, paraesthesia oral, dry mouth</p>
Hepatobiliary disorders	<p><u>Not Known:</u> liver function test abnormal</p>
Skin and subcutaneous tissue disorders	<p><u>Uncommon:</u> rash, rash maculo-papular, skin tightness</p> <p><u>Rare:</u> urticaria, alopecia, pruritus generalised</p> <p><u>Not Known:</u> dermatitis, erythema</p>
Musculoskeletal and connective tissue disorders	<p><u>Uncommon:</u> back pain, muscle spasms, myalgia</p> <p><u>Not Known:</u> arthralgia, pain in extremity</p>
Renal and urinary disorders	<p><u>Uncommon:</u> renal pain</p> <p><u>Not Known:</u> pollakiuria</p>
Reproductive system and breast disorders	<p><u>Uncommon:</u> erectile dysfunction</p>
General disorders and administration site conditions	<p><u>Uncommon:</u> pain, chest discomfort, fatigue, feeling abnormal</p> <p><u>Rare:</u> chest pain, feeling jittery, asthenia, irritability</p> <p><u>Not Known:</u> peripheral oedema, malaise</p>
Injury, poisoning and procedural complications	<p><u>Uncommon:</u> foreign body in eye</p>

#### Description of selected adverse events

Dysgeusia (bitter or unusual taste in the mouth following instillation) was the most frequently reported systemic adverse reaction associated with the use of brinzolamide during clinical studies. It is likely caused by passage of the eye drops in the nasopharynx via the nasolacrimal canal. Nasolacrimal occlusion or gently closing the eyelid after instillation may help reduce the incidence of this effect (see also section 4.2).

Brinzolamide is a sulphonamide inhibitor of carbonic anhydrase with systemic absorption. Gastrointestinal, nervous system, haematological, renal and metabolic effects are generally associated with systemic carbonic anhydrase inhibitors. The same type of adverse reactions that are attributable to oral carbonic anhydrase inhibitors may occur with topical administration.

No unexpected adverse reactions have been observed with brinzolamide when used as adjunctive therapy to travoprost. The adverse reactions seen with the adjunctive therapy have been observed with each active substance alone.

#### Paediatric population

In small short-term clinical trials, approximately 12.5 % of paediatric patients were observed to experience adverse reactions, the majority of which were local, non-serious ocular reactions such as conjunctival hyperaemia, eye irritation, eye discharge and lacrimation increased (see also section 5.1).

#### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system listed in [Appendix V](#).

### **4.9 Overdose**

No case of overdose has been reported.

Treatment should be symptomatic and supportive. Electrolyte imbalance, development of an acidotic state and possible nervous system effects may occur. Serum electrolyte levels (particularly potassium) and blood pH levels must be monitored.

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: Antiglaucoma preparations and miotics, carbonic anhydrase inhibitors, ATC code: S01EC04

#### Mechanism of action

Carbonic anhydrase (CA) is an enzyme found in many tissues of the body, including the eye. Carbonic anhydrase catalyses the reversible reaction involving the hydration of carbon dioxide and the dehydration of carbonic acid.

Inhibition of carbonic anhydrase 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. The result is a reduction in intraocular pressure (IOP) which is a major risk factor in the pathogenesis of optic nerve damage and glaucomatous

visual field loss. Brinzolamide, an inhibitor of carbonic anhydrase II (CA-II), the predominant iso-enzyme in the eye, with an *in vitro* IC<sub>50</sub> of 3.2 nM and a K<sub>i</sub> of 0.13 nM against CA-II.

#### Clinical efficacy and safety

The IOP-reducing effect of brinzolamide as adjunctive therapy to the prostaglandin analogue travoprost was studied. Following a 4 week run-in with travoprost, patients with an IOP  $\geq$ 19 mmHg were randomized to receive added treatment with brinzolamide or timolol. An additional decrease in mean diurnal IOP of 3.2 to 3.4 mmHg for the brinzolamide group and 3.2 to 4.2 mmHg for the timolol group were observed. There was an overall higher incidence of non-serious ocular adverse reactions, mainly related to signs of local irritation, in the brinzolamide/travoprost groups. The events were mild and did not affect the overall discontinuation rates in the studies (see also section 4.8).

A clinical trial was conducted with brinzolamide in 32 paediatric patients less than 6 years of age, diagnosed with glaucoma or ocular hypertension. Some patients were naive to IOP therapy whilst others were on other IOP-lowering medicinal product(s). Those who had been on previous IOP medicinal product(s) were not required to discontinue their IOP medicinal product(s) until initiation of monotherapy with brinzolamide.

Among patients who were naive to IOP therapy (10 patients), the efficacy of brinzolamide was similar to that seen previously in adults, with mean IOP reductions from baseline ranging up to 5 mmHg. Among patients who were on topical IOP-lowering medicinal product(s) (22 patients), mean IOP increased slightly from baseline in the brinzolamide group.

## **5.2 Pharmacokinetic properties**

Following topical ocular administration, brinzolamide is absorbed into the systemic circulation. Due to its high affinity for CA-II, brinzolamide distributes extensively into the red blood cells (RBCs) and exhibits a long half-life in whole blood (mean of approximately 24 weeks). In humans, the metabolite N-desethylbrinzolamide is formed, which also binds to CA and accumulates in RBCs. This metabolite binds mainly to CA-I in the presence of brinzolamide. In plasma, both brinzolamide and N-desethylbrinzolamide concentrations are low and generally below assay quantitation limits (<7.5 ng/mL).

Binding to plasma proteins is not extensive (about 60%). 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-desethylbrinzolamide are the predominant components in the urine along with trace levels (<1%) of the N-desmethoxypropyl and O-desmethyl metabolites.

In an oral pharmacokinetic study, healthy volunteers received 1 mg capsules of brinzolamide twice daily for up to 32 weeks and RBC CA activity was measured to assess the degree of systemic CA inhibition.

Brinzolamide saturation of RBC CA-II was achieved within 4 weeks (RBC concentrations of approximately 20  $\mu$ M). N-desethylbrinzolamide accumulated in RBCs to steady-state within 20-28 weeks reaching concentrations ranging from 6-30  $\mu$ M. The inhibition of total RBC CA activity at steady-state was approximately 70-75%.

Subjects with moderate renal impairment (creatinine clearance of 30-60 mL/minute) were administered 1 mg of brinzolamide twice daily orally for up to 54 weeks. Brinzolamide RBC concentration ranged from about 20 to 40  $\mu$ M by week 4 of treatment. At steady-state, brinzolamide and its metabolite RBC concentrations ranged from 22.0 to 46.1 and 17.1 to 88.6  $\mu$ M, respectively.

N-desethylbrinzolamide RBC concentrations increased and total RBC CA activity decreased with decreasing creatinine clearance but brinzolamide RBC concentrations and CA-II activity remained unchanged. In subjects with the highest degree of renal impairment inhibition of total CA activity was greater although it was inferior to 90% at steady-state.

In a topical ocular study, at steady-state, brinzolamide RBC concentrations were similar to those found in the oral study, but levels of N-desethylbrinzolamide were lower. Carbonic anhydrase activity was approximately 40-70% of predose levels.

### **5.3 Preclinical safety data**

Non-clinical data reveal no special hazard for humans based on conventional studies of safety pharmacology, repeated dose toxicity, genotoxicity and carcinogenic potential.

Developmental toxicity studies in rabbits with oral doses of brinzolamide of up to 6 mg/kg/day (125 times the recommended human ophthalmic dose) 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 (375 times the recommended human ophthalmic 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 reaction level in the offspring was 5 mg/kg/day.

## **6. PHARMACEUTICAL PARTICULARS**

### **6.1 List of excipients**

Benzalkonium chloride solution 50%  
Mannitol (E421)  
Poloxamer 407  
Carbomer 974P  
Disodium edetate  
Sodium chloride  
Sodium hydroxide (for pH adjustment)  
Water for injection

### **6.2 Incompatibilities**

Not applicable.

### **6.3 Shelf life**

3 years

4 weeks after first opening.

### **6.4 Special precautions for storage**

This medicinal product does not require any special storage conditions.

### **6.5 Nature and contents of container**

10 mL dropper container consisting of LDPE bottle with LDPE sealed dropper tip and white PP or HDPE cap with tamper proof seal, containing 5 mL white homogenous suspension.

The following pack sizes are available: outer cartons containing 1 x 5 mL, 3 x 5 mL, 6 x 5 mL.

Not all pack sizes may be marketed.

#### **6.6 Special precautions for disposal**

No special requirements.

#### **7. MARKETING AUTHORISATION HOLDER**

<[To be completed nationally]>

#### **8. MARKETING AUTHORISATION NUMBER(S)**

<[To be completed nationally]>

#### **9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

<[To be completed nationally]>

#### **10. DATE OF REVISION OF THE TEXT**

<[To be completed nationally]>