

1. NAME OF THE MEDICINAL PRODUCT

Vesitirim 1 mg/ml oral suspension

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Vesitirim oral suspension contains 1 mg/ml solifenacin succinate, equivalent to 0.75 mg/ml solifenacin.

Excipients with known effect:

Benzoic acid (E210) 0.015 mg/ml.

Methyl parahydroxybenzoate (E218) 1.6 mg/ml.

Propylene glycol (E1520) 20 mg/ml.

Propyl parahydroxybenzoate (E216) 0.2 mg/ml.

This medicine contains 48.4 mg of alcohol (ethanol) per maximum dose of 10 ml. Ethanol originates from the natural orange flavour.

For the full list of excipients, see section 6.1.

3. PHARMACEUTICAL FORM

Oral suspension

A white to off-white coloured aqueous, homogeneous suspension with an orange flavour.

4. CLINICAL PARTICULARS

4.1 Therapeutic indications

Overactive bladder in adults

Vesitirim oral suspension is indicated for symptomatic treatment of urge incontinence and/or increased urinary frequency and urgency as may occur in patients with overactive bladder (OAB) syndrome.

Neurogenic detrusor overactivity

Vesitirim oral suspension is indicated for treatment of neurogenic detrusor overactivity (NDO) in paediatric patients aged 2 to 18 years.

4.2 Posology and method of administration

Posology

Overactive bladder

Adults, including elderly:

The recommended dose is 5 mg (5 ml) solifenacin succinate once daily. If needed, the dose may be increased to 10 mg (10 ml) solifenacin succinate once daily.

Paediatric population:

The efficacy of Vesitirim in children and adolescents with overactive bladder has not been established. Therefore, Vesitirim should not be used for treatment of overactive bladder in children and adolescents under 18 years of age. Currently available data are described in section 5.1 and 5.2.

Neurogenic detrusor overactivity

Paediatric population (age 2 to 18 years):

The recommended dose of Vesitirim oral suspension is determined based on patient weight. Treatment should be initiated at the recommended starting dose. Thereafter, the dose may be increased to the lowest effective dose. The maximum dose should not be exceeded. During long-term therapy, patients should be periodically evaluated for treatment continuation and for potential dose adjustment, at least annually or more frequently if indicated. The doses according to the patient's body weight are found in the table below.

Weight range (kg)	Starting dose (ml) § ¹	Maximum dose (ml) § ²
9 to 15	2	4
>15 to 30	3	5
>30 to 45	3	6
>45 to 60	4	8
>60	5	10

§ The oral suspension formulation of Vesitirim has a concentration of 1 mg/ml.

¹ Equivalent to steady-state exposure after a 5 mg daily dose in adults.

² Equivalent to steady-state exposure after a 10 mg daily dose in adults.

Vesitirim oral suspension should be taken once daily by mouth.

Vesitirim oral suspension should not be used in children below age of 2 years.

Patients with renal impairment

No dose adjustment is necessary for patients with mild to moderate renal impairment (creatinine clearance >30 ml/min). Patients with severe renal impairment (creatinine clearance ≤30 ml/min) should be treated with caution and receive no more than 5 mg (5 ml) once daily (adults) and no more than the starting dose (children and adolescents) (see section 5.2).

Patients with hepatic impairment

No dose adjustment is necessary for patients with mild hepatic impairment. Patients with moderate hepatic impairment (Child-Pugh score of 7 to 9) should be treated with caution and receive no more than 5 mg (5 ml) once daily (adults) and no more than the starting dose (children and adolescents) (see section 5.2).

Potent inhibitors of cytochrome P450 3A4

The maximum dose of Vesitirim oral suspension should be limited to 5 mg (5 ml) (adults) and no more than the starting dose (children and adolescents) when treated simultaneously with ketoconazole or therapeutic doses of other potent CYP3A4-inhibitors e.g., ritonavir, nelfinavir, itraconazole (see section 4.5).

Method of administration

Vesitirim oral suspension should be taken orally followed by a glass of water. It should not be ingested together with food and/or other drinks. This ingestion with food and/or drinks may cause a release of solifenacin in the mouth resulting in a bitter taste and a feeling of numbness in the mouth.

Use syringe and adaptor provided with Vesitirim oral suspension to measure the correct dose (see section 6.6).

4.3 Contraindications

When used for treatment of overactive bladder, solifenacin is contraindicated in patients with urinary retention.

When used for treatment of overactive bladder or neurogenic detrusor overactivity, solifenacin is contraindicated in:

- Patients with severe gastro-intestinal condition (including toxic megacolon), myasthenia gravis or narrow-angle glaucoma and in patients at risk for these conditions.
- Patients hypersensitive to the active substance or to any of the excipients listed in section 6.1.
- Patients undergoing haemodialysis (see section 5.2).
- Patients with severe hepatic impairment (see section 5.2).
- Patients with severe renal impairment or moderate hepatic impairment and who are on treatment with a potent CYP3A4 inhibitor, e.g., ketoconazole (see section 4.5).

4.4 Special warnings and precautions for use

Other causes of frequent urination (heart failure or renal disease) should be assessed before treatment with solifenacin. If urinary tract infection is present, an appropriate antibacterial therapy should be started.

Solifenacin should be used with caution in patients with:

- clinically significant bladder outflow obstruction in the absence of clean intermittent catheterization because of the risk of urinary retention.
- gastrointestinal obstructive disorders.
- risk of decreased gastrointestinal motility.
- severe renal impairment (creatinine clearance ≤ 30 ml/min), and doses should not exceed 5 mg (5 ml) in adults or the starting dose in children and adolescents for these patients (see section 4.2 and 5.2).
- moderate hepatic impairment (Child-Pugh score of 7 to 9), and doses should not exceed 5 mg (5 ml) in adults or the starting dose in children and adolescents for these patients (see section 4.2 and 5.2).
- concomitant use of a potent CYP3A4 inhibitor, e.g., ketoconazole, and doses should not exceed 5 mg (5 ml) in adults or the starting dose in children and adolescents for these patients (see section 4.2 and 4.5).
- hiatus hernia/gastro-oesophageal reflux and/or who are concurrently taking medicinal products (such as bisphosphonates) that can cause or exacerbate oesophagitis.
- autonomic neuropathy.

QT prolongation and *Torsades de pointes* have been observed in patients with risk factors, such as pre-existing long QT syndrome and hypokalaemia.

Angioedema with airway obstruction has been reported in some patients on solifenacin. If angioedema occurs, solifenacin should be discontinued and appropriate therapy and/or measures should be taken.

Anaphylactic reaction has been reported in some patients treated with solifenacin. In patients who develop anaphylactic reactions, solifenacin should be discontinued and appropriate therapy and/or measures should be taken.

The maximum effect of solifenacin can be determined after 4 weeks at the earliest.

Vesitirim oral suspension contains methyl parahydroxybenzoate and propyl parahydroxybenzoate. This may cause allergic reactions (possibly delayed).

Vesitirim oral suspension contains 48.4 mg of alcohol (ethanol) per maximum dose of 10 ml. The amount of ethanol in 10 ml Vesitirim oral suspension is equivalent to 1 ml beer (4% w/v) or less than 1 ml wine (10% w/v). The small amount of alcohol in this medicine will not have any noticeable effects.

Vesitirim oral suspension contains less than 1 mmol sodium (23 mg) per ml, that is to say essentially 'sodium-free'.

Vesitirim oral suspension contains 0.015 mg benzoic acid in each ml, which is equivalent to 0.15 mg/10 ml.

Vesitirim oral suspension contains 20 mg propylene glycol in each ml, which is equivalent to 200 mg/10 ml.

4.5 Interaction with other medicinal products and other forms of interaction

Pharmacological interactions

Concomitant medication with other medicinal products with anticholinergic properties may result in more pronounced therapeutic effects and undesirable effects. An interval of approximately one week should be allowed after stopping treatment with solifenacin, before commencing other anticholinergic therapy. The therapeutic effect of solifenacin may be reduced by concomitant administration of cholinergic receptor agonists.

Solifenacin can reduce the effect of medicinal products that stimulate the motility of the gastrointestinal tract, such as metoclopramide and cisapride.

Pharmacokinetic interactions

In vitro studies have demonstrated that at therapeutic concentrations, solifenacin does not inhibit CYP1A1/2, 2C9, 2C19, 2D6, or 3A4 derived from human liver microsomes. Therefore, solifenacin is unlikely to alter the clearance of drugs metabolised by these CYP enzymes.

Effect of other medicinal products on the pharmacokinetics of solifenacin

Solifenacin is metabolised by CYP3A4. Simultaneous administration of ketoconazole (200 mg/day), a potent CYP3A4 inhibitor, resulted in a two-fold increase of the AUC of solifenacin, while ketoconazole at a dose of 400 mg/day resulted in a three-fold increase of the AUC of solifenacin. Therefore, the maximum dose of solifenacin should be restricted to 5 mg (5 ml) for adults or the starting dose for children and adolescents, when used simultaneously with ketoconazole or therapeutic doses of other potent CYP3A4 inhibitors (e.g., ritonavir, nelfinavir, itraconazole) (see section 4.2).

Simultaneous treatment of solifenacin and a potent CYP3A4 inhibitor is contra-indicated in patients with severe renal impairment or moderate hepatic impairment.

The effects of enzyme induction on the pharmacokinetics of solifenacin and its metabolites have not been studied as well as the effect of higher affinity CYP3A4 substrates on solifenacin exposure. Since solifenacin is metabolised by CYP3A4, pharmacokinetic interactions are possible with other CYP3A4 substrates with higher affinity (e.g., verapamil, diltiazem) and CYP3A4 inducers (e.g., rifampicin, phenytoin, carbamazepin).

Effect of solifenacin on the pharmacokinetics of other medicinal products

Oral Contraceptives

Intake of solifenacin showed no pharmacokinetic interaction of solifenacin on combined oral contraceptives (ethinylestradiol/levonorgestrel).

Warfarin

Intake of solifenacin did not alter the pharmacokinetics of *R*-warfarin or *S*-warfarin or their effect on prothrombin time.

Digoxin

Intake of solifenacin showed no effect on the pharmacokinetics of digoxin.

4.6 Fertility, pregnancy and lactation

Pregnancy

No clinical data are available from women who became pregnant while taking solifenacin. Animal studies do not indicate direct harmful effects on fertility, embryonal/foetal development or parturition (see section 5.3). The potential risk for humans is unknown. Caution should be exercised when prescribing to pregnant women.

Breast-feeding

No data on the excretion of solifenacin in human milk are available. In mice, solifenacin and/or its metabolites was excreted in milk and caused a dose dependent failure to thrive in neonatal mice (see section 5.3). The use of solifenacin should therefore be avoided during breast-feeding.

Fertility

There are no clinical data available on effects of solifenacin on fertility. No effects on fertility were observed in animals.

4.7 Effects on ability to drive and use machines

Since solifenacin, like other anticholinergics may cause blurred vision, and, uncommonly, somnolence and fatigue (see section 4.8. Undesirable effects), the ability to drive and use machines may be negatively affected.

4.8 Undesirable effects

Summary of the safety profile

Due to the pharmacological effect of solifenacin, solifenacin may cause anticholinergic undesirable effects of (in general) mild or moderate severity. The frequency of anticholinergic undesirable effects is dose related.

The most commonly reported adverse reaction with solifenacin was dry mouth. It occurred in 11% of patients treated with 5 mg once daily, in 22% of patients treated with 10 mg once daily and in 4% of placebo-treated patients. The severity of dry mouth was generally mild and did only occasionally lead to discontinuation of treatment. In general, medicinal product compliance was very high (approximately 99%) and approximately 90% of the patients treated with solifenacin completed the full study period of 12 weeks treatment.

Tabulated list of adverse reactions

MedDRA system organ class	Very common ≥1/10	Common ≥1/100, <1/10	Uncommon ≥1/1 000, <1/100	Rare ≥1/10 000, <1/1 000	Very rare <1/10 000	Not known (cannot be estimated from the available data)
Infections and infestations			Urinary tract infection Cystitis			
Immune system disorders						Anaphylactic reaction*
Metabolism and nutrition disorders						Decreased appetite* Hyperkalaemia*
Psychiatric disorders					Hallucinations* Confusional state*	Delirium*
Nervous system disorders			Somnolence Dysgeusia	Dizziness* Headache*		
Eye disorders		Blurred vision	Dry eyes			Glaucoma*
Cardiac disorders						<i>Torsades de pointes</i> * Electrocardiogram QT prolonged* Atrial fibrillation* Palpitations* Tachycardia*
Respiratory, thoracic and mediastinal disorders			Nasal dryness			Dysphonia*
Gastrointestinal disorders	Dry mouth	Constipation Nausea Dyspepsia Abdominal pain	Gastro-oesophageal reflux diseases Dry throat	Colonic obstruction Faecal impaction Vomiting*		Ileus* Abdominal discomfort*
Hepatobiliary disorders						Liver disorder* Liver function test abnormal*
Skin and subcutaneous tissue disorders			Dry skin	Pruritus* Rash*	Erythema multiforme* Urticaria* Angioedema*	Exfoliative dermatitis*
Musculoskeletal and connective tissue disorders						Muscular weakness*
Renal and urinary disorders			Difficulty in micturition	Urinary retention		Renal impairment*

MedDRA system organ class	Very common ≥1/10	Common ≥1/100, <1/10	Uncommon ≥1/1 000, <1/100	Rare ≥1/10 000, <1/1 000	Very rare <1/10 000	Not known (cannot be estimated from the available data)
General disorders and administration site conditions			Fatigue Peripheral oedema			

*Observed post-marketing.

Paediatric population

Solifenacin oral suspension has been evaluated for safety in 95 paediatric patients aged 2 years to less than 18 years with neurogenic detrusor overactivity in two open-label trials. Common adverse reactions observed in the paediatric population with NDO include: constipation, dry mouth, abdominal pain, somnolence, urinary tract infection, bacterial test positive, and QT prolonged. The incidence of constipation in patients treated with solifenacin oral suspension was higher in the maximum dose group compared to the starting dose group.

In the paediatric patients with NDO, no severe adverse reactions were reported. The most frequent adverse reaction leading to study discontinuation was QT prolongation.

Overall, the safety profile in children and adolescents is similar to that observed in adults.

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 HPRA Pharmacovigilance, Website: www.hpra.ie.

4.9 Overdose

Symptoms

Overdosage with solifenacin can potentially result in severe anticholinergic effects. The highest dose of solifenacin accidentally given to a single patient was 280 mg in a 5-hour period, resulting in mental status changes not requiring hospitalization.

Treatment

In the event of overdose with solifenacin the patient should be treated with activated charcoal. Gastric lavage is useful if performed within 1 hour, but vomiting should not be induced.

As for other anticholinergics, symptoms can be treated as follows:

- Severe central anticholinergic effects such as hallucinations or pronounced excitation: treat with physostigmine or carbachol.
- Convulsions or pronounced excitation: treat with benzodiazepines.
- Respiratory insufficiency: treat with artificial respiration.
- Tachycardia: treat with beta-blockers.
- Urinary retention: treat with catheterisation.
- Mydriasis: treat with pilocarpine eye drops and/or place patient in dark room.

As with other antimuscarinics, in case of overdosing, specific attention should be paid to patients with known risk for QT-prolongation (i.e., hypokalaemia, bradycardia and concurrent administration of medicinal products known to prolong QT-interval) and relevant pre-existing cardiac diseases (i.e., myocardial ischaemia, arrhythmia, congestive heart failure).

5. PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Urologicals, Drugs for urinary frequency and incontinence, ATC code: G04BD08.

Mechanism of action

Solifenacin is a competitive, specific cholinergic-receptor antagonist.

The urinary bladder is innervated by parasympathetic cholinergic nerves. Acetylcholine contracts the detrusor smooth muscle through muscarinic receptors of which the M3 subtype is predominantly involved. *In vitro* and *in vivo* pharmacological studies indicate that solifenacin is a competitive inhibitor of the muscarinic M3 subtype receptor. In addition, solifenacin showed to be a specific antagonist for muscarinic receptors by displaying low or no affinity for various other receptors and ion channels tested.

Pharmacodynamic effects

Adults:

Treatment with Vesitirim in doses of 5 mg and 10 mg daily was studied in several double blind, randomised, controlled clinical trials in men and women with overactive bladder.

As shown in the table below, both the 5 mg and 10 mg doses of Vesitirim produced statistically significant improvements in the primary and secondary endpoints compared with placebo. Efficacy was observed within one week of starting treatment and stabilises over a period of 12 weeks. A long-term open label study demonstrated that efficacy was maintained for at least 12 months. After 12 weeks of treatment approximately 50% of patients suffering from incontinence before treatment were free of incontinence episodes, and in addition 35% of patients achieved a micturition frequency of less than 8 micturitions per day. Treatment of the symptoms of overactive bladder also results in a benefit on a number of Quality of Life measures, such as general health perception, incontinence impact, role limitations, physical limitations, social limitations, emotions, symptom severity, severity measures and sleep/energy.

Results (pooled data) of four controlled Phase 3 studies with a treatment duration of 12 weeks

	Placebo	Vesitirim 5 mg o.d.	Vesitirim 10 mg o.d.	Tolterodine 2 mg b.i.d.
No. of micturations/24 h				
Mean baseline	11.9	12.1	11.9	12.1
Mean reduction from baseline	1.4	2.3	2.7	1.9
% change from baseline	(12%)	(19%)	(23%)	(16%)
n	1 138	552	1 158	250
p-value*		<0.001	<0.001	0.004
No. of urgency episodes/24 h				
Mean baseline	6.3	5.9	6.2	5.4
Mean reduction from baseline	2.0	2.9	3.4	2.1
% change from baseline	(32%)	(49%)	(55%)	(39%)
n	1 124	548	1 151	250
p-value*		<0.001	<0.001	0.031
No. of incontinence episodes/24 h				
Mean baseline	2.9	2.6	2.9	2.3
Mean reduction from baseline	1.1	1.5	1.8	1.1
% change from baseline	(38%)	(58%)	(62%)	(48%)
n	781	314	778	157
p-value*		<0.001	<0.001	0.009
No. of nocturia episodes/24 h				
Mean baseline	1.8	2.0	1.8	1.9
Mean reduction from baseline	0.4	0.6	0.6	0.5
% change from baseline	(22%)	(30%)	(33%)	(26%)
n	1 005	494	1 035	232
p-value*		0.025	<0.001	0.199
Volume voided/micturition				
Mean baseline	166 ml	146 ml	163 ml	147 ml
Mean increase from baseline	9 ml	32 ml	43 ml	24 ml
% change from baseline	(5%)	(21%)	(26%)	(16%)
n	1 135	552	1 156	250
p-value*		<0.001	<0.001	<0.001
No. of pads/24 h				
Mean baseline	3.0	2.8	2.7	2.7
Mean reduction from baseline	0.8	1.3	1.3	1.0
% change from baseline	(27%)	(46%)	(48%)	(37%)
n	238	236	242	250
p-value*		<0.001	<0.001	0.010

Note: In 4 of the pivotal studies, Vesitirim 10 mg and placebo were used. In 2 out of the 4 studies also Vesitirim 5 mg was used and one of the studies included tolterodine 2 mg bid.

Not all parameters and treatment groups were evaluated in each individual study. Therefore, the numbers of patients listed may deviate per parameter and treatment group.

* P-value for the pair wise comparison to placebo.

Paediatrics:

Overactive bladder

Children and adolescents (age 5 years and older):

Treatment with Vesitirim oral suspension was studied in two clinical studies. A 12-week double-blind, randomised, placebo-controlled, clinical trial (905-CL-076) was performed in 189 paediatric patients with OAB (73 children aged 5 to 11 years and 22 adolescents aged 12 to 17 years were treated with solifenacin). This was followed by a 40-week long-term open-label extension study (905-CL-077) in

148 paediatric patients (119 children and 29 adolescents were treated with solifenacin). In both studies, the majority of patients were up-titrated to the weight-based equivalent of 10 mg in adults.

In study 905-CL-076, Vesitirim oral suspension did not show a statistically significant improvement in the primary endpoint of mean volume voided per micturition compared with placebo in the overall population.

In children (aged 5 to 11 years) a statistically significant difference was observed for this primary endpoint. No statistically significant improvement was observed in the secondary endpoints of micturition frequency, number of incontinence episodes per day and number of dry days per week. No unexpected or unlisted adverse events were reported for the entire dose range tested.

In the open-label extension study, no unexpected or unlisted adverse events were reported. The safety profile for solifenacin in paediatric patients during long-term exposure was comparable to that observed in adults.

Neurogenic detrusor overactivity

Children and adolescents (age 6 months to less than 18 years):

Vesitirim oral suspension was evaluated in two 52-week, open-label, baseline-controlled, sequential dose titration studies for the treatment of neurogenic detrusor overactivity (NDO) in paediatric patients aged 6 months to less than 18 years (studies 905-CL-074 and 905-CL-047).

In study 905-CL-074, a total of 4 subjects aged 6 months to less than 2 years and 19 subjects aged 2 to less than 5 years of age received treatment with Vesitirim oral suspension, while in study 905-CL-047, a total of 76 subjects aged 5 to less than 18 years of age received treatment with Vesitirim oral suspension.

In both studies the primary endpoint was the change from baseline in maximum cystometric capacity (MCC) after 24 weeks of Vesitirim oral suspension treatment. Children treated with Vesitirim oral suspension had a statistically significant increase in MCC compared with baseline after 24 weeks of treatment. The magnitude of the observed changes in both the primary and secondary endpoints in children (5 to less than 12 years of age) and in adolescents (12 to less than 18 years of age) was comparable.

The results for the primary endpoint in the clinical studies of Vesitirim oral suspension in pediatric patients with NDO are reported in the table below. Treatment effects were maintained over 52-weeks.

Change from Baseline to 24 Weeks for Vesitirim oral suspension

Parameter	Aged 6 months to Less than 5 Years Mean (SD, n)	Aged 5 to Less than 18 Years Mean (SD, n)
Primary Endpoint		
Maximum Cystometric Capacity (ml)		
Baseline	92.3 (38.2, 21)	223.7 (132.9, 55)
Week 24	129.4 (40.2, 21)	279.1 (126.8, 49)
Change from baseline	37.0 (35.9, 21)	57.2 (107.7, 49)
	P = <0.001	P = <0.001
	95% CI: 20.7, 53.4	95% CI: 26.3, 88.1

Secondary urodynamic measurements also demonstrated an improvement from baseline to 24 weeks in both age groups. In subjects aged 6 months to less than 5 years of age, bladder compliance increased (mean change: 5.1 ml/cmH₂O; SD: 6.82; 95% CI: 2.0, 8.2), number of overactive contractions >15 cmH₂O decreased (mean change: -7.0; SD: 8.6; 95% CI: -11.0, -3.1) and bladder volume until first detrusor contraction >15 cmH₂O, expressed as % of expected bladder capacity, improved (baseline

median: 38.00%; week 24 median 99.89%). In subjects aged 5 to less than 18 years of age, bladder compliance increased (mean change: 9.1 ml/cmH₂O; SD: 28.6; 95% CI: 1.0, 17.2), number of overactive contractions >15 cmH₂O decreased (mean change: -2.3; SD: 5.1; 95% CI: -3.7, -0.8) and bladder volume until first detrusor contraction >15 cmH₂O, expressed as % of expected bladder capacity, improved (baseline median: 28.25%; week 24 median 58.28%).

Additional diary-based measurements demonstrated improvement from baseline to 24 weeks in both age groups. In subjects aged 6 months to less than 5 years of age, the average maximum catheterized volume per day increased (mean change: 40.3 ml; SD: 50.0; 95% CI: 16.2, 64.4), and average number of periods between clean intermittent catheterisations with incontinence episodes per 24 hours decreased (mean change: -1.31; SD: 1.35; 95% CI: -1.99, -0.64). In subjects aged 5 to less than 18 years, the average maximum catheterized volume per day increased (mean change: 67.45 ml; SD: 88.07; 95% CI: 42.68, 92.22) and the average number of incontinence episodes per 24 hours decreased (mean change: -1.60; SD: 2.04; 95% CI: -2.18, -1.03).

The treatment with Vesitirim oral suspension in children and adolescents was well-tolerated at all dose levels. No new safety concerns were identified compared with the known safety profile of solifenacin in adults.

There is no clinical study data available beyond one year in treatment of NDO in children and adolescents.

There is insufficient clinical experience in paediatric patients with NDO less than 2 years of age. Clinical studies have not been conducted in paediatric patients with NDO less than 6 months of age.

5.2 Pharmacokinetic properties

Absorption

After oral intake of solifenacin by adults, maximum solifenacin plasma concentrations (C_{max}) are reached after 4 to 12 hours. The t_{max} is independent of the dose. The C_{max} and area under the curve (AUC) increase in proportion to the dose between 5 to 40 mg. Absolute bioavailability is approximately 90%.

Food intake does not affect the C_{max} and AUC of solifenacin.

Distribution

The apparent volume of distribution of solifenacin following intravenous administration is about 600 l. Solifenacin is to a great extent (approximately 98%) bound to plasma proteins, primarily α_1 -acid glycoprotein.

Biotransformation

Solifenacin is extensively metabolised by the liver, primarily by cytochrome P450 3A4 (CYP3A4). However, alternative metabolic pathways exist, that can contribute to the metabolism of solifenacin. The systemic clearance of solifenacin is about 9.5 l/h and the terminal half-life of solifenacin is 45 - 68 hours. After oral dosing, one pharmacologically active (4R-hydroxy solifenacin) and three inactive metabolites (N-glucuronide, N-oxide and 4R-hydroxy-N-oxide of solifenacin) have been identified in plasma in addition to solifenacin.

Elimination

After a single administration of 10 mg [¹⁴C-labelled]-solifenacin, about 70% of the radioactivity was detected in urine and 23% in faeces over 26 days. In urine, approximately 11% of the radioactivity is recovered as unchanged active substance; about 18% as the N-oxide metabolite, 9% as the 4R-hydroxy-N-oxide metabolite and 8% as the 4R-hydroxy metabolite (active metabolite).

Linearity/non-linearity

Pharmacokinetics are linear in the therapeutic dose range.

Other special populations

Elderly

No dosage adjustment based on patient age is required. Studies in elderly have shown that the exposure to solifenacin, expressed as the AUC, after administration of solifenacin succinate (5 mg and 10 mg once daily) was similar in healthy elderly subjects (aged 65 through 80 years) and healthy young subjects (aged less than 55 years). The mean rate of absorption expressed as $t_{\max}$ was slightly slower in the elderly and the terminal half-life was approximately 20% longer in elderly subjects. These modest differences were considered not clinically significant.

Children and adolescents (age 2 to 18 years):

The pharmacokinetics of solifenacin following weight-adjusted dosing in children and adolescents with OAB (aged 5 years and older) and NDO (aged 2 to 18 years) were similar to those observed in adults after body weight adjustment, with a slightly shorter $t_{\max}$ and $t_{1/2}$; these differences were not considered clinically significant.

Gender

The pharmacokinetics of solifenacin are not influenced by gender.

Race

The pharmacokinetics of solifenacin are not influenced by race.

Renal impairment

The AUC and $C_{\max}$ of solifenacin in mild and moderate renally impaired patients, was not significantly different from that found in healthy volunteers. In patients with severe renal impairment (creatinine clearance ≤ 30 ml/min) exposure to solifenacin was significantly greater than in the controls with increases in $C_{\max}$ of about 30%, AUC of more than 100% and $t_{1/2}$ of more than 60%. A statistically significant relationship was observed between creatinine clearance and solifenacin clearance.

Pharmacokinetics in patients undergoing haemodialysis have not been studied.

Hepatic impairment

In patients with moderate hepatic impairment (Child-Pugh score of 7 to 9) the $C_{\max}$ is not affected, AUC increased with 60% and $t_{1/2}$ doubled. Pharmacokinetics of solifenacin in patients with severe hepatic impairment have not been studied.

5.3 Preclinical safety data

Preclinical data reveal no special hazard for humans based on conventional studies of safety pharmacology, repeated dose toxicity, fertility, embryofetal development, genotoxicity, and carcinogenic potential. In the pre- and postnatal development study in mice, solifenacin treatment of the mother during lactation caused dose-dependent lower postpartum survival rate, decreased pup weight and slower physical development at clinically relevant levels. Dose related increased mortality without preceding clinical signs occurred in juvenile mice treated from day 10 or 21 after birth with doses that achieved a pharmacological effect and both groups had higher mortality compared to adult mice. In juvenile mice treated from postnatal day 10, plasma exposure was higher than in adult mice; from postnatal day 21 onwards, the systemic exposure was comparable to adult mice. The clinical implications of the increased mortality in juvenile mice are not known. Vesitrim oral suspension showed no potential for irritation to the eyes when tested in rabbits.

6. PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Polacrillin potassium
Methyl parahydroxybenzoate (E218)
Propyl parahydroxybenzoate (E216)
Propylene glycol (E1520)

Simethicone emulsion 30%; consisting of simethicone, polyethylene glycol sorbitan tristearate (E436), methylcellulose (E461), polyethylene glycol stearate, glycerides, xanthan gum (E415), benzoic acid (E210), sorbic acid (E200), sulphuric acid (E513) and water.

Carbomer

Xylitol (E967)

Acesulfame potassium (E950)

Natural orange flavour; consisting of orange essential oils, natural flavouring substances, ethanol, propylene glycol (E1520), butylated hydroxyanisol (E320) and water

Sodium hydroxide

Purified water

6.2 Incompatibilities

In the absence of compatibility studies, this medicinal product must not be mixed with other medicinal products or food.

6.3 Shelf life

3 years.

After first opening of the bottle, the oral suspension can be stored for 28 days.

6.4 Special precautions for storage

Store in the original bottle in order to protect from light.

Store the oral syringe under clean and dry conditions and protect from sunlight and heat.

This product does not require any special temperature storage conditions.

6.5 Nature and contents of container

150 ml Vesitirim oral suspension in amber polyethylene terephthalate (PET) bottle with a child resistant and high-density polyethylene-polypropylene cap with a pulp and vinyl seal liner, packed in a carton. Devices for dosing and administration are packed in the carton: 5 ml oral syringe and press-in bottle neck adaptor.

6.6 Special precautions for disposal and other handling

The oral syringe provided with Vesitirim oral suspension must be used with the adaptor to measure the correct dose.

Preparation for the first use of a bottle of Vesitirim oral suspension

1. Wash your hands carefully.
2. Open the carton and remove the bottle, syringe, and adaptor.
3. Place the bottle on a flat surface and remove the cap.
4. Firmly press the adaptor into the neck of the bottle.
5. Ensure that the top of the adaptor is flush with the top of the bottle neck.
6. The adaptor should remain in the neck of the bottle until the end of the 28-day shelf life period.
7. Replace the cap on the bottle.

Before each oral administration

1. Wash your hands carefully.
2. Shake the Vesitirim oral suspension bottle at least 20 times.
3. Remove the bottle cap and ensure the adaptor is present in the bottle neck. Insert the oral syringe tip into central opening of the bottle adaptor until it is firmly in place.
4. Carefully invert the bottle and syringe ensuring the adaptor remains in place.
5. Pull back the plunger of the syringe slowly to withdraw the amount prescribed by your doctor from the inverted bottle.
6. Discard the overage if too much medicine has been accidentally withdrawn.

7. Ensure that there are no air bubbles in the syringe. If an air bubble appears, push the plunger upwards to remove a potential bubble.
8. Leave the syringe in place and turn the bottle upright and ensure the plunger of the syringe does not move. Gently remove the syringe from the adaptor. The adaptor should remain in place.
9. Confirm the appropriate dose has been measured. Place the syringe in the mouth and gently push the plunger down to administer the medication to the patient.
10. After completion of dosing, close the bottle with the cap.
11. Wash the syringe with warm water. Allow to dry.

Note: If the patient requires a dose >5 ml rinse the tip of the syringe with warm water prior to reuse.

Cleaning of the oral syringe

After use, clean the oral syringe with warm water only.

The oral syringe can be used throughout the 28-day shelf life after first opening (see section 6.3).

Disposal

The bottle, syringe, adaptor, and any unused medicinal product or waste material should be disposed of in accordance with local requirements. Discard any medicine remaining 28 days after opening the bottle. Medicines should not be disposed of via wastewater or household waste. These measures will help to protect the environment.

7. MARKETING AUTHORISATION HOLDER

Astellas Pharma Co., Ltd.
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8. MARKETING AUTHORISATION NUMBER(S)

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10. DATE OF REVISION OF THE TEXT

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