

# Summary of Product Characteristics

## 1 NAME OF THE MEDICINAL PRODUCT

Bonasol Once Weekly 70 mg Oral Solution

## 2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each 100 ml single-dose contains sodium alendronate trihydrate equivalent to 70 mg alendronic acid

Excipients:

Each dose (100 ml) contains 80 mg methyl parahydroxybenzoate (E218), 20 mg propyl parahydroxybenzoate (E216) 6 mg Sunset Yellow (E110) and up to 115 mg ethanol. For a full list of excipients, see section 6.1.

## 3 PHARMACEUTICAL FORM

Oral solution.

Orange coloured opalescent solution.

## 4 CLINICAL PARTICULARS

### 4.1 Therapeutic indications

Treatment of post-menopausal osteoporosis.

Alendronic acid reduces the risk of vertebral and hip fractures.

### 4.2 Posology and method of administration

#### Posology

For oral administration.

The recommended dosage is one 70mg unit-dose (100 ml) once weekly.

The optimal duration of bisphosphonate treatment for osteoporosis has not been established. The need for continued treatment should be re-evaluated periodically based on the benefits and potential risks of Bonasol Once weekly 70 mg Oral Solution on an individual patient basis, particularly after 5 or more years of use.

#### Method of Administration

*To permit adequate absorption of alendronic acid*

*Bonasol Once Weekly 70 mg Oral Solution* must be taken at least 30 minutes before the first food, beverage, or medicinal product of the day with plain water only. Other beverages (including mineral water), food and some medicinal products are likely to reduce the absorption of alendronic acid (see Section 4.5).

*To facilitate delivery to the stomach and thus reduce the potential for local and oesophageal irritation/adverse experiences (see Section 4.4)*

- Patients should not lie down until after their first food of the day which should be at least 30 minutes after taking the solution
- Patients should not lie down for at least 30 minutes after taking *Bonasol once weekly 70 mg Oral Solution*
- *Bonasol once weekly 70 mg Oral Solution* should only be swallowed on arising for the day as a single 100 ml dose (entire bottle contents) followed by at least 30 ml of plain water. Additional water (plain) may be taken.
- *Bonasol Once weekly 70 mg Oral Solution* should not be taken at bedtime or before arising for the day

Patients should receive supplemental calcium and vitamin D if dietary intake is inadequate (see section 4.4).

*Use in the elderly:* In clinical studies there was no age-related difference in the efficacy or safety profiles of Alendronic Acid. Therefore no dosage adjustment is necessary for the elderly.

*Use in renal impairment:* No dosage adjustment is necessary in patients with a glomerular filtration rate (GFR) greater than 35 ml/min. Alendronic acid is not recommended for patients with impaired renal function where GFR is less than 35 ml/min, due to lack of experience.

*Use in children and adolescents:* Alendronic acid is not recommended for use in children under the age of 18 years due to insufficient data on safety and efficacy in conditions associated with paediatric osteoporosis (also see section 5.1).

Alendronic Acid has not been investigated in the treatment of glucocorticoid-induced osteoporosis.

#### 4.3 Contraindications

- Abnormalities of the oesophagus and other factors which delay oesophageal emptying such as stricture or achalasia
- Inability to stand or sit upright for at least 30 minutes.
- Hypersensitivity to alendronic acid or to any of the excipients
- Hypocalcaemia
- Patients who have difficulty swallowing liquids
- Patients at risk of aspiration
- See also 4.4 'Special warnings and precautions for use'.

#### 4.4 Special warnings and precautions for use

##### Upper gastrointestinal adverse reactions

Bonasol Once Weekly can cause local irritation of the upper gastro-intestinal mucosa. Because there is a potential for worsening of the underlying disease, caution should be used when Bonasol Once Weekly is given to patients with active upper gastro-intestinal problems, such as dysphagia, oesophageal disease, gastritis, duodenitis, ulcers, or with a recent history (within the previous year) of major gastro-intestinal disease such as peptic ulcer, or active gastro-intestinal bleeding, or surgery of the upper gastro-intestinal tract other than pyloroplasty (see section 4.3). In patients with known Barrett's oesophagus, prescribers should consider the benefits and potential risks of alendronate on an individual patient basis.

Oesophageal reactions (sometimes severe and requiring hospitalisation), such as oesophagitis, oesophageal ulcers and oesophageal erosions, rarely followed by oesophageal stricture, have been reported in patients receiving alendronic acid. Physicians should therefore be alert to any signs or symptoms signalling a possible oesophageal reaction and patients should be instructed to discontinue alendronic acid and seek medical attention if they develop symptoms of oesophageal irritation such as dysphagia, pain on swallowing or retrosternal pain, new or worsening heartburn.

The risk of severe oesophageal adverse experiences appears to be greater in patients who fail to take alendronic acid properly and/or who continue to take alendronic acid after developing symptoms suggestive of oesophageal irritation. It is very important that the full dosing instructions are provided to, and understood by the patient (see 4.2 'Posology and method of administration'). Patients should be informed that failure to follow these instructions may increase their risk of oesophageal problems.

While no increased risk was observed in extensive clinical trials, there have been rare (post-marketing) reports of gastric and duodenal ulcers, some severe and with complications.

##### Osteonecrosis of the jaw

Osteonecrosis of the jaw, generally associated with tooth extraction and/or local infection (including osteomyelitis), has been reported in patients with cancer receiving treatment regimens including primarily intravenously administered bisphosphonates. Many of these patients were also receiving chemotherapy and corticosteroids. Osteonecrosis of the jaw has also been reported in patients with osteoporosis receiving oral bisphosphonates.

The following risk factors should be considered when evaluating an individual's risk of developing osteonecrosis of the jaw: potency of the bisphosphonate (highest for zoledronic acid), route of administration (see above) and cumulative dose; cancer, chemotherapy, radiotherapy, corticosteroids, angiogenesis inhibitors, smoking

·history of dental disease, poor oral hygiene, periodontal disease, invasive dental procedures and poorly fitting dentures

A dental examination with appropriate preventive dentistry should be considered prior to treatment with bisphosphonates in patients with poor dental status.

While on treatment, these patients should avoid invasive dental procedures if possible. For patients who develop osteonecrosis of the jaw while on bisphosphonate therapy, dental surgery may exacerbate the condition. For patients requiring dental procedures, there are no data available to suggest whether discontinuation of bisphosphonate treatment reduces the risk of osteonecrosis of the jaw. Clinical judgement of the treating physician should guide the management plan of each patient based on individual benefit/risk assessment.

During bisphosphonate treatment, all patients should be encouraged to maintain good oral hygiene, receive routine dental check-ups, and report any oral symptoms such as dental mobility, pain or swelling.

#### Osteonecrosis of the external auditory canal

Osteonecrosis of the external auditory canal has been reported with bisphosphonates, mainly in association with long-term therapy. Possible risk factors for osteonecrosis of the external auditory canal include steroid use and chemotherapy and/or local risk factors such as infection or trauma. The possibility of osteonecrosis of the external auditory canal should be considered in patients receiving bisphosphonates who present with ear symptoms including chronic ear infections.

#### Musculoskeletal pain

Bone, joint, and/or muscle pain has been reported in patients taking bisphosphonates. In post-marketing experience, these symptoms have rarely been severe and/or incapacitating (see section 4.8). The time to onset of symptoms varied from one day to several months after starting treatment. Most patients had relief of symptoms after stopping. A subset had recurrence of symptoms when rechallenged with the same drug or another bisphosphonate.

#### Atypical fractures of the femur

Atypical subtrochanteric and diaphyseal femoral fractures have been reported with bisphosphonate therapy, primarily in patients receiving long-term treatment for osteoporosis. These transverse or short oblique, fractures can occur anywhere along the femur from just below the lesser trochanter to just above the supracondylar flare. These fractures occur after minimal or no trauma and some patients experience thigh or groin pain, often associated with imaging features of stress fractures, weeks to months before presenting with a completed femoral fracture. Fractures are often bilateral; therefore the contralateral femur should be examined in bisphosphonate-treated patients who have sustained a femoral shaft fracture. Poor healing of these fractures has also been reported. Discontinuation of bisphosphonate therapy in patients suspected to have an atypical femur fracture should be considered pending evaluation of the patient, based on an individual benefit risk assessment. During bisphosphonate treatment patients should be advised to report any thigh, hip or groin pain and any patient presenting with such symptoms should be evaluated for an incomplete femur fracture.

#### Atypical fractures of other bones

Atypical fractures of other bones, such as the ulna and tibia have also been reported in patients receiving long-term treatment. As with atypical femoral fractures, these fractures occur after minimal, or no trauma and some patients experience prodromal pain prior to presenting with a completed fracture. In cases of ulna fracture, this may be associated with repetitive stress loading associated with the long-term use of walking aids.

#### Skin reactions

In post-marketing experience, there have been rare reports of severe skin reactions including Stevens Johnson syndrome and toxic epidermal necrolysis.

#### Missed dose

Patients should be instructed that if they miss a dose of *Alendronic Acid 70 mg Oral Solution*, they should take one single unit-dose (100 ml) on the morning after they remember. They should not take two doses on the same day but should return to taking one unit-dose once a week, as originally scheduled on their chosen day.

#### Renal impairment

Alendronic acid is not recommended for patients with renal impairment where GFR is less than 35 ml/min, (see section 4.2).

#### Bone and mineral metabolism

Causes of osteoporosis other than oestrogen deficiency and ageing should be considered.

Hypocalcaemia must be corrected before initiating therapy with alendronic acid (see section 4.3). Other disorders affecting mineral metabolism (such as vitamin D deficiency and hypoparathyroidism) should also be effectively treated. In patients with these conditions, serum calcium and symptoms of hypocalcaemia should be monitored during therapy with Bonasol Once Weekly.

Due to the positive effects of alendronic acid in increasing bone mineral, decreases in serum calcium and phosphate may occur especially in patients taking glucocorticoids in whom calcium absorption may be decreased. These are usually small and asymptomatic. However, there have been rare reports of symptomatic hypocalcaemia, which have occasionally been severe and often occurred in patients with predisposing conditions (e.g. hypoparathyroidism, vitamin D deficiency and calcium malabsorption). Ensuring adequate calcium and vitamin D intake is particularly important in patients receiving glucocorticoids.

#### Excipients

This medicinal product contains 0.15 % volume ethanol (alcohol), i.e. up to 115 mg per dose, equivalent to 3 ml beer or 1.3 ml wine per dose. The small amount of alcohol in this medicine will not have any noticeable effects.

*Bonasol Once weekly 70 mg Oral Solution* contains the colouring agent sunset yellow (E110) methyl parahydroxybenzoate (E218), and propyl parahydroxybenzoate (E216) that may cause allergic reactions.

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

If taken at the same time, it is likely that food and beverages (including mineral water), calcium supplements, antacids, and some oral medicinal products will interfere with absorption of alendronic acid. Therefore, patients must wait at least 30 minutes after taking alendronic acid before taking any other oral medicinal product (see section 4.2 ' and section 5.2).

No other interactions with medicinal products of clinical significance are anticipated. A number of patients in the clinical trials received oestrogen (intravaginal, transdermal, or oral) while taking alendronic acid. No adverse experiences attributable to their concomitant use were identified.

Since NSAID use is associated with gastrointestinal irritation, caution should be used during concomitant use with alendronate.

Although specific interaction studies were not performed, in clinical studies alendronic acid was used concomitantly with a wide range of commonly prescribed medicinal products without evidence of clinical adverse interactions.

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

Bonasol Once Weekly 70 mg Oral Solution is only intended for use in postmenopausal women and therefore it should not be used during pregnancy or in breast-feeding women.

#### Pregnancy

There are no or limited data from the use of alendronate in pregnant women. Studies in animals have shown reproductive toxicity. Alendronic acid given during pregnancy in rats caused dystocia related to hypocalcemia (see section 5.3).

Bonasol Once Weekly 70mg Oral Solution should not be use during pregnancy

#### Breast-feeding

It is not known whether alendronate is excreted into human breast milk. A risk to the newborns /infants cannot be excluded. Alendronic acid should not be used by breast-feeding women.

#### Fertility

Bisphosphonates are incorporated into the bone matrix, from which they are gradually released over a period of years. The amount of bisphosphonate incorporated into adult bone, and hence, the amount available for release back into the systemic circulation, is directly related to the dose and duration of bisphosphonate use (see section 5.2). There are no data on foetal risk in humans. However, there is theoretical risk of foetal harm, predominantly skeletal, if a woman becomes pregnant after completing a course of bisphosphonate therapy. The impact of variables such as time between cessation of bisphosphonate therapy to conception, the particular bisphosphonate used, and the route of administration (intravenous versus oral) on the risk has not been studied.

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

Alendronic Acid has no or negligible direct influence on the ability to drive and use machines. However, certain adverse reactions that have been reported with Alendronic Acid may affect some patients' ability to drive or operate machinery. Individual responses to Bonasol once weekly may vary (see section 4.8).

#### 4.8 Undesirable effects

In a one-year study in post-menopausal women with osteoporosis the overall safety profiles for alendronic acid once-weekly tablets (n=519) and alendronic acid 10 mg daily (n=370) were similar.

In two three-year studies of virtually identical design, in post-menopausal women (alendronic acid 10 mg: n=196; placebo: n=397) the overall safety profiles for alendronic acid 10 mg daily and placebo were similar.

Adverse experiences reported by the investigators as possibly, probably or definitely drug- related are presented below if they occurred in  $\geq 1\%$  in either treatment group in the one-year study, or in  $\geq 1\%$  of patients treated with alendronate 10 mg/day and at a greater incidence than in patients given placebo in the three-year studies:

|                                                      | <i>The one-year study</i>                               |                                                          | <i>Three-year studies</i>                                |                                  |
|------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------|
|                                                      | <i>Alendronic acid once-weekly tablet (n=519)<br/>%</i> | <i>Alendronic acid<br/>10 mg daily<br/>(n=370)<br/>%</i> | <i>Alendronic acid<br/>10 mg daily<br/>(n=196)<br/>%</i> | <i>Placebo<br/>(n=397)<br/>%</i> |
| <i>Gastrointestinal</i>                              |                                                         |                                                          |                                                          |                                  |
| Abdominal pain                                       | 3.7                                                     | 3.0                                                      | 6.6                                                      | 4.8                              |
| Dyspepsia                                            | 2.7                                                     | 2.2                                                      | 3.6                                                      | 3.5                              |
| Acid regurgitation                                   | 1.9                                                     | 2.4                                                      | 2.0                                                      | 4.3                              |
| Nausea                                               | 1.9                                                     | 2.4                                                      | 3.6                                                      | 4.0                              |
| Abdominal distension                                 | 1.0                                                     | 1.4                                                      | 1.0                                                      | 0.8                              |
| Constipation                                         | 0.8                                                     | 1.6                                                      | 3.1                                                      | 1.8                              |
| Diarrhoea                                            | 0.6                                                     | 0.5                                                      | 3.1                                                      | 1.8                              |
| Dysphagia                                            | 0.4                                                     | 0.5                                                      | 1.0                                                      | 0.0                              |
| Flatulence                                           | 0.4                                                     | 1.6                                                      | 2.6                                                      | 0.5                              |
| Gastritis                                            | 0.2                                                     | 1.1                                                      | 0.5                                                      | 1.3                              |
| Gastric ulcer                                        | 0.0                                                     | 1.1                                                      | 0.0                                                      | 0.0                              |
| Oesophageal ulcer                                    | 0.0                                                     | 0.0                                                      | 1.5                                                      | 0.0                              |
| <i>Musculoskeletal</i>                               |                                                         |                                                          |                                                          |                                  |
| Musculoskeletal pain<br>(bone, muscle or joint pain) | 2.9                                                     | 3.2                                                      | 4.1                                                      | 2.5                              |
| Muscle cramp                                         | 0.2                                                     | 1.1                                                      | 0.0                                                      | 1.0                              |
| <i>Neurological</i>                                  |                                                         |                                                          |                                                          |                                  |
| Headache                                             | 0.4                                                     | 0.3                                                      | 2.6                                                      | 1.5                              |

The following undesirable effects have also been reported during clinical studies and/or post marketing use:

Frequencies are defined as: [Very common ( $\geq 1/10$ ), Common ( $\geq 1/100$ ,  $< 1/10$ ), Uncommon ( $\geq 1/1000$ ,  $< 1/100$ ), Rare ( $\geq 1/10,000$ ,  $< 1/1000$ ), Very rare ( $< 1/10,000$  including isolated cases), not known (cannot be estimated from the available data)]

##### **Immune system disorders:**

Rare: hypersensitivity reactions including urticaria and angioedema

##### **Metabolism and nutrition disorders:**

Rare: symptomatic hypocalcaemia, often in association with predisposing conditions. (see section 4.4)

**Nervous system disorders:**

Common: headache, dizziness<sup>†</sup>

Uncommon: dysgeusia<sup>†</sup>

**Eye disorders:**

Uncommon: eye inflammation (uveitis, scleritis, episcleritis)

**Ear and labyrinth disorders:**

Common: vertigo<sup>†</sup>

Very Rare: Osteonecrosis of the external auditory canal (bisphosphonate class adverse reaction)

**Gastrointestinal disorders:**

Common: abdominal pain, dyspepsia, constipation, diarrhoea, flatulence, oesophageal ulcer\*, dysphagia\*, abdominal distension, acid regurgitation

Uncommon: nausea, vomiting, gastritis, oesophagitis\*, oesophageal erosions\*, melena<sup>†</sup>

Rare: oesophageal stricture\*, oropharyngeal ulceration\*, upper gastrointestinal PUBs (perforation, ulcers, bleeding)(see section 4.4)

**Skin and subcutaneous tissue disorders:**

Common: Alopecia<sup>†</sup>, pruritis<sup>†</sup>

Uncommon: rash, erythema

Rare: rash with photosensitivity, severe skin reactions including Stevens-Johnson syndrome and toxic epidermal necrolysis<sup>‡</sup>

**Musculoskeletal, connective tissue and bone disorders:**

Very Common: musculoskeletal (bone, muscle or joint) pain<sup>†</sup>(see section 4.4)

Common: joint swelling<sup>†</sup>

Rare: Osteonecrosis of the jaw<sup>‡</sup> has been reported in patients treated by bisphosphonates. The majority of the reports refer to cancer patients, but such cases have also been reported in patients treated for osteoporosis. Osteonecrosis of the jaw is generally associated with tooth extraction and / or local infection (including osteomyelitis). Diagnosis of cancer, chemotherapy, radiotherapy, corticosteroids and poor oral hygiene are also deemed as risk factors; severe musculoskeletal (bone, muscle or joint) pain (see section 4.4).

Atypical subtrochanteric and diaphyseal femoral fractures (bisphosphonate class adverse reaction)

Not known: atypical fractures of other bones

**General disorders and administration site conditions:**

Common: asthenia<sup>†</sup>, peripheral oedema<sup>†</sup>

Uncommon: transient symptoms as in an acute-phase response (myalgia, malaise and rarely, fever), typically in association with initiation of treatment <sup>†</sup>.

<sup>†</sup>Frequency in Clinical Trials was similar in the drug and placebo group.

<sup>\*</sup>See sections 4.2 and 4.4

<sup>‡</sup>This adverse reaction was identified through post-marketing surveillance. The frequency of rare was estimated based on relevant clinical trials.

Identified in post-marketing experience

**Description of selected adverse reactions**

Atypical subtrochanteric and diaphyseal femoral fractures

Although the pathophysiology is uncertain, consistent evidence from epidemiological studies suggests an increased risk of atypical subtrochanteric and diaphyseal femoral fractures with long-term bisphosphonate therapy for postmenopausal

osteoporosis, particularly beyond three to five years of use. The absolute risk of atypical subtrochanteric and diaphyseal long bone fractures (bisphosphonate class adverse reaction) remains rare.

### **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, Earlsfort Terrace, IRL - Dublin 2; Tel: +353 1 6764971; Fax: +353 1 6762517. Website: [www.hpra.ie](http://www.hpra.ie); E-mail: [medsafety@hpra.ie](mailto:medsafety@hpra.ie).

## **4.9 Overdose**

### **Symptoms**

Hypocalcaemia, hypophosphataemia and upper gastro-intestinal adverse events, such as upset stomach, heartburn, oesophagitis, gastritis, or ulcer, may result from oral overdosage.

### **Management**

No specific information is available on the treatment of overdosage with alendronic acid. Milk or antacids should be given to bind alendronic acid. Owing to the risk of oesophageal irritation, vomiting should not be induced and the patient should remain fully upright.

## **5 PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: Drugs for treatment of bone diseases, bisphosphonates.

ATC code: M05B A04

### **Mechanism of action**

The active substance in Bonasol Once Weekly, alendronic acid (as sodium alendronate trihydrate), is a bisphosphonate that inhibits osteoclastic bone resorption with no direct effect on bone formation. Preclinical studies have shown preferential localisation of alendronate to sites of active resorption. Activity of osteoclasts is inhibited, but recruitment or attachment of osteoclasts is not affected. The bone formed during treatment with alendronate is of normal quality.

### **Clinical efficacy and safety**

#### *Treatment of post-menopausal osteoporosis*

**Osteoporosis is defined as BMD of the spine or hip 2.5 SD below the mean value of a normal young population or as a previous fragility fracture, irrespective of BMD.**

The therapeutic equivalence of alendronic acid 70 mg once-weekly (n=519) and alendronic acid 10 mg daily (n=370) was demonstrated in a one-year multicentre study of post-menopausal women with osteoporosis. The mean increases from baseline in lumbar spine BMD at one year were 5.1% (95% CI: 4.8, 5.4%) in the 70 mg once-weekly group and 5.4% (95% CI: 5.0, 5.8%) in the 10 mg daily group. The mean BMD increases were 2.3% and 2.9% at the femoral neck and 2.9% and 3.1% at the total hip in the 70 mg once weekly and 10 mg daily groups, respectively. The two treatment groups were also similar with regard to BMD increases at other skeletal sites.

The effects of alendronic acid on bone mass and fracture incidence in post-menopausal women were examined in two initial efficacy studies of identical design (n=994) as well as in the Fracture Intervention Trial (FIT: n=6,459).

In the initial efficacy studies, the mean bone mineral density (BMD) increases with alendronic acid 10 mg/day relative to placebo at three years were 8.8%, 5.9% and 7.8% at the spine, femoral neck and trochanter, respectively. Total body BMD also increased significantly. There was a 48% reduction (alendronic acid 3.2% vs placebo 6.2%) in the proportion of patients treated with alendronic acid experiencing one or more vertebral fractures relative to those treated with placebo.

In the two-year extension of these studies BMD at the spine and trochanter continued to increase and BMD at the femoral neck and total body were maintained.

FIT consisted of two placebo-controlled studies using alendronic acid daily (5 mg daily for two years and 10 mg daily for either one or two additional years):

- FIT 1: A three-year study of 2,027 patients who had at least one baseline vertebral (compression) fracture. In this study alendronic acid daily reduced the incidence of 1 new vertebral fracture by 47% (alendronic acid 7.9% vs. placebo 15.0%). In addition, a statistically significant reduction was found in the incidence of hip fractures (1.1% vs. 2.2%, a reduction of 51%).
- FIT 2: A four-year study of 4,432 patients with low bone mass but without a baseline vertebral fracture. In this study, a significant difference was observed in the analysis of the subgroup of osteoporotic women (37% of the global population who correspond with the above definition of osteoporosis) in the incidence of hip fractures (alendronic acid 1.0% vs. placebo 2.2%, a reduction of 56%) and in the incidence of 1 vertebral fracture (2.9% vs. 5.8%, a reduction of 50%).

#### Laboratory test findings

In clinical studies, asymptomatic, mild and transient decreases in serum calcium and phosphate were observed in approximately 18 and 10%, respectively, of patients taking alendronate 10 mg/day versus approximately 12 and 3% of those taking placebo. However, the incidences of decreases in serum calcium to <8.0 mg/dl (2.0 mmol/l) and serum phosphate to 2.0 mg/dl (0.65 mmol/l) were similar in both treatment groups.

#### Paediatric population

Alendronic acid has been studied in a small number of patients with osteogenesis imperfecta under 18 years of age. Results are insufficient to support the use of alendronic acid in paediatric patients with osteogenesis imperfecta.

## **5.2 Pharmacokinetic properties**

### *Absorption*

Relative to an intravenous reference dose, the oral mean bioavailability of alendronic acid in women was 0.64% for doses ranging from 5 to 70 mg when administered after an overnight fast and two hours before a standardised breakfast. Bioavailability was decreased similarly to an estimated 0.46% and 0.39% when alendronic acid was administered one hour or half an hour before a standardised breakfast. In osteoporosis studies, alendronic acid was effective when administered at least 30 minutes before the first food or beverage of the day.

Bioavailability was negligible whether alendronic acid was administered with, or up to two hours after, a standardised breakfast. Concomitant administration of alendronic acid with coffee or orange juice reduced bioavailability by approximately 60%.

In healthy subjects, oral prednisone (20 mg three times daily for five days) did not produce a clinically meaningful change in oral bioavailability of alendronic acid (a mean increase ranging from 20% to 44%).

### *Distribution*

Studies in rats show that alendronic acid transiently distributes to soft tissues following 1 mg/kg intravenous administration but is then rapidly redistributed to bone or excreted in the urine. The mean steady-state volume of distribution, exclusive of bone, is at least 28 litres in humans.

Concentrations of drug in plasma following therapeutic oral doses are too low for analytical detection (<5 ng/ml). Protein binding in human plasma is approximately 78%.

### *Biotransformation*

There is no evidence that alendronic acid is metabolised in animals or humans.

### *Elimination*

Following a single intravenous dose of [<sup>14</sup>C] alendronic acid, approximately 50% of the radioactivity was excreted in the urine within 72 hours and little or no radioactivity was recovered in the faeces. Following a single 10 mg intravenous dose, the renal clearance of alendronic acid was 71 ml/min, and systemic clearance did not exceed 200 ml/min. Plasma concentrations fell by more than 95% within six hours following intravenous administration. The terminal half-life in humans is estimated to exceed ten years, reflecting release of alendronic acid from the skeleton.

Alendronic acid is not excreted through the acidic or basic transport systems of the kidney in rats, and thus it is not anticipated to interfere with the excretion of other medicinal products by those systems in humans.

*Characteristics in patients*

Preclinical studies show that the drug that is not deposited in bone is rapidly excreted in the urine. No evidence of saturation of bone uptake was found after chronic dosing with cumulative intravenous doses up to 35 mg/kg in animals. Although no clinical information is available, it is likely that, as in animals, elimination of alendronic acid via the kidney will be reduced in patients with impaired renal function. Therefore, somewhat greater accumulation of alendronic acid in bone might be expected in patients with impaired renal function (see 4.2 'Posology and method of administration'.

**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. Studies in rats have shown that treatment with alendronic acid during pregnancy was associated with dystocia in dams during parturition which was related to hypocalcaemia. In studies, rats given high doses showed an increased incidence of incomplete foetal ossification. The relevance to humans is unknown.

**6 PHARMACEUTICAL PARTICULARS****6.1 List of excipients**

Xanthan gum (E415),  
Sodium cyclamate (E952),  
Sucralose (E955),  
Sunset yellow FCF (E110),  
Methyl parahydroxybenzoate (E218),  
Propyl parahydroxybenzoate (E216)  
Orange flavour containing ethanol and butylated hydroxyanisole  
Purified Water

**6.2 Incompatibilities**

Not applicable.

**6.3 Shelf life**

2 years.

**6.4 Special precautions for storage**

Store below 25°C

**6.5 Nature and contents of container**

Clear polyethylene terephthalate (PET) bottle with a tamper-evident closure fitted with a low density polyethylene liner in pack sizes of 1, 2, 4, and 12 bottles. Each bottle contains 100 ml of solution.

Not all pack sizes may be marketed.

**6.6 Special precautions for disposal and other handling**

For single-use only.

Any unused medicinal product or waste material should be disposed of in accordance with local requirements.

**7 MARKETING AUTHORISATION HOLDER**

Xeolas Pharmaceuticals Limited  
Hamilton Building  
DCU, Glasnevin  
Dublin 9  
Ireland

**8 MARKETING AUTHORISATION NUMBER**

PA1572/001/001

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

Date of first authorisation: 25<sup>th</sup> February 2011

Date of last renewal: 1<sup>st</sup> October 2014

**10 DATE OF REVISION OF THE TEXT**

January 2026