INDICATIONS AND USAGE

- Zemaira® is an alpha1-proteinase inhibitor (A1-PI) indicated for chronic augmentation and maintenance therapy in adults with A1-PI deficiency and clinical evidence of emphysema (1).
- The effect of augmentation therapy with Zemaira or any A1-PI product on pulmonary exacerbations and on the progression of emphysema in A1-PI deficiency has not been demonstrated in randomized, controlled clinical studies (1).
- Zemaira is not indicated as therapy for lung disease patients in whom severe A1-PI deficiency has not been established (1).

DOSAGE AND ADMINISTRATION

For intravenous use after reconstitution only (2).
- The recommended weekly dose of Zemaira is 60 mg/kg body weight. Dose ranging studies using efficacy endpoints have not been performed with Zemaira or any A1-PI product (2).
- Administer at room temperature within 3 hours after reconstitution (2.1).
- Do not mix with other medicinal products. Administer through a separate dedicated infusion line (2.2).
- Administer through a suitable 5 micron infusion filter (not supplied) at a rate of approximately 0.08 mL/kg/min as determined by the response and comfort of the patient (2.2).
- Monitor closely the infusion rate and the patient’s clinical state, including vital signs, throughout the infusion. Slow or stop the infusion if adverse reactions occur. If symptoms subside promptly, the infusion may be resumed at a lower rate that is comfortable for the patient (2.2).

ADVERSE REACTIONS

The most common adverse reactions occurring in at least 5% of subjects receiving Zemaira in all pre-licensure clinical trials were headache, sinusitis, upper respiratory infection, bronchitis, asthenia, cough increased, fever, injection site hemorrhage, rhinitis, sore throat, and vasodilation (6).

CONTRAINDICATIONS

- History of anaphylaxis or severe systemic reactions to Zemaira or A1-PI protein (4).
- Immunoglobulin A (IgA)-deficient patients with antibodies against IgA, due to the risk of severe hypersensitivity (4).

WARNINGS AND PRECAUTIONS

- Use caution when administering Zemaira to individuals who have experienced anaphylaxis or severe systemic reactions to another A1-PI product (5.1).
- Patients with selective or severe IgA deficiency can develop antibodies to IgA and, therefore, have a greater risk of developing potentially severe hypersensitivity and anaphylactic reactions. If anaphylactic or severe anaphylactoid reactions occur, discontinue the infusion immediately (5.2).
- Because Zemaira is made from human plasma, it may carry a risk of transmitting infectious agents (e.g., viruses, and theoretically, the Creutzfeldt-Jakob disease [CJD] agent) (5.3).

USE IN SPECIFIC POPULATIONS

- Pregnancy: No human or animal data. Use only if clearly needed (8.1).

See 17 for PATIENT COUNSELING INFORMATION.

FULL PRESCRIBING INFORMATION: CONTENTS*

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Zemaira®
Alpha1-Proteinase Inhibitor (Human)

FULL PRESCRIBING INFORMATION

1 INDICATIONS AND USAGE
Zemaira is an alpha 1-proteinase inhibitor (A1-PI) indicated for chronic augmentation and maintenance therapy in adults with A1-PI deficiency and clinical evidence of emphysema.

Zemaira increases antigenic and functional (anti-neutrophil elastase capacity [ANEC]) serum levels and lung epithelial lining fluid (ELF) levels of A1-PI.

Clinical data demonstrating the long-term effects of chronic augmentation therapy of serum levels and lung epithelial lining fluid (ELF) levels of A1-PI in Zemaira are not available.

The effect of augmentation therapy with Zemaira or any A1-PI product on pulmonary exacerbations and on the progression of emphysema in A1-PI deficiency has not been demonstrated in randomized, controlled clinical studies.

Zemaira is not indicated as therapy for lung disease patients in whom severe A1-PI deficiency has not been established.

2 DOSAGE AND ADMINISTRATION

For Intravenous Use After Reconstitution Only.

The recommended dose of Zemaira is 60 mg/kg body weight administered once weekly.

Dose ranging studies using efficacy endpoints have not been performed with Zemaira or any A1-PI product.

2.1 Preparation and Reconstitution

1. Ensure that the Zemaira (green cap) vial and diluent (white cap) are at room temperature.

2. Remove the plastic flip-top caps from the vials. Aseptically cleanse the rubber stoppers with an aseptic solution and allow them to dry.

3. Remove the protective cover from the white (diluent) end of the transfer device. Insert the white end of the transfer device into the center of the stopper of the upright diluent vial (Figure 2).

4. Remove the protective cover from the green (Zemaira) end of the transfer device. Invert the diluent vial with the attached transfer device and, using minimum force, insert the green end of the transfer device into the center of the rubber stopper of the upright Zemaira vial (green top) (Figure 3). The flange of the transfer device should rest on the surface of the stopper so that the diluent flows into the Zemaira vial.

5. Allow the vacuum in the Zemaira vial to pull the diluent into the Zemaira vial.

6. During diluent transfer, wet the lyophilized cake completely by gently tilting the Zemaira vial (Figure 4). Do not allow the air inlet filter to face downward. Care should be taken not to lose the vacuum, as this will prolong or prevent reconstitution.

7. After diluent transfer is complete, the transfer device will allow filtered air into the Zemaira vial through the air filter; additional venting of the Zemaira vial is not required. When diluent transfer is complete, withdraw the transfer device from the diluent vial and discard the diluent vial and transfer device.

8. Gently swirl the Zemaira vial until the powder is completely dissolved (Figure 5). DO NOT SHAKE.

If more than 1 vial of Zemaira is needed to achieve the required dose, use aseptic technique to transfer the reconstituted solution from the vials into the administration container (e.g., empty intravenous bag or glass bottle).

2.2 Administration

• For intravenous use only.

• Do not mix Zemaira with other medicinal products. Administer Zemaira through a separate dedicated infusion line.

• Perform a visual inspection of the reconstituted solution. The solution should be clear, colorless to slightly yellow, and free from visible particles.

• Administer at room temperature within 3 hours after reconstitution.

• Filter the reconstituted solution during administration. To ensure proper filtration of Zemaira, use an intravenous administration set with a suitable 5 micron infusion filter (not supplied).

• Administer Zemaira intravenously at a rate of approximately 0.08 mL/kg/min as determined by the response and comfort of the patient. The recommended dosage of 60 mg/kg body weight will take approximately 15 minutes to infuse.

• Monitor closely the infusion rate and the patient's clinical state, including vital signs, throughout the infusion. Slow or stop the infusion if adverse reactions occur. If symptoms subside promptly, the infusion may be resumed at a lower rate that is comfortable for the patient.

• Zemaira is for single use only. Following administration, discard any unused solution and all administration equipment in an appropriate manner as per local requirements.

3 DOSAGE FORMS AND STRENGTHS

Zemaira is supplied in a single-use vial containing approximately 1000 mg of functionally active A1-PI as a lyophilized powder for reconstitution with 20 mL of Sterile Water for Injection, USP. The amount of functional A1-PI is printed on the vial label and carton.

4 CONTRAINDICATIONS

• Zemaira is contraindicated in patients with a history of anaphylaxis or severe systemic reactions to Zemaira or A1-PI protein.

• Zemaira is contraindicated in immunoglobulin A (IgA)-deficient patients with antibodies against IgA, due to the risk of severe hypersensitivity (see Warnings and Precautions (5.2)).

5 WARNINGS AND PRECAUTIONS

5.1 Hypersensitivity to Other A1-PI Products

Caution should be used when administering Zemaira to individuals who have experienced anaphylaxis or severe systemic reaction to another A1-PI product. IF ANAPHYLACTIC OR SEVERE ANAPHYLACTOID REACTIONS OCCUR, DISCONTINUE THE INFUSION IMMEDIATELY. Have epinephrine and other appropriate supportive therapy available for the treatment of any acute anaphylactic or anaphylactoid reaction. Zemaira is contraindicated in patients with a history of anaphylaxis or severe systemic reactions to Zemaira or A1-PI protein.

5.2 Hypersensitivity to IgA

Zemaira may contain trace amounts of IgA. Patients with selective or severe IgA deficiency can develop antibodies to IgA and, therefore, have a greater risk of developing potentially severe hypersensitivity and anaphylactic reactions. IF ANAPHYLACTIC OR SEVERE ANAPHYLACTOID REACTIONS OCCUR, DISCONTINUE THE INFUSION IMMEDIATELY. Have epinephrine and other appropriate supportive therapy available for the treatment of any acute anaphylactic or anaphylactoid reaction. Zemaira is contraindicated in IgA-deficient patients with antibodies against IgA, due to the risk of severe hypersensitivity.
5.3 Transmissible Infectious Agents

Because Zemaira is made from human plasma, it may carry a risk of transmitting infectious agents (e.g., viruses, and theoretically the Creutzfeldt-Jakob disease [CJD] agent). The risk of infectious agent transmission has been reduced by screening plasma donors for prior exposure to certain viruses, testing for the presence of current virus infections, and including virus inactivation/removal steps in the manufacturing process for Zemaira (see Description (11)). Despite these measures, Zemaira, like other products made from human plasma, may still potentially contain human pathogenic agents, including those not yet known or identified. Thus, the risk of transmission of infectious agents cannot be totally eliminated.

All infections thought by a physician to have been possibly transmitted by this product should be reported by the physician or other healthcare provider to the CSL Behring Pharmacovigilance Department at 1-866-915-6958 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

6 ADVERSE REACTIONS

The most common adverse reactions (ARs) occurring in at least 5% of subjects receiving Zemaira in all pre-licensure clinical trials were headache, sinusitis, upper respiratory infection, bronchitis, asthma, cough increased, fever, injection site hemorrhage, rhinitis, sore throat, and vasodilatation. Serious adverse reactions reported following administration of Zemaira in pre-licensure clinical trials included one event each in separate subjects of bronchitis and dyspnea, and one event each in a single subject of chest pain, cerebral ischemia and convulsion.

In post-licensure trials, the exposure adjusted incidence rate (EARI) of serious exacerbations of chronic obstructive pulmonary disease (COPD) among subjects was higher during the RAPID Extension trial as compared to the rate observed during the preceding RAPID trial [see Adverse Reactions (6.1)].

Serious adverse reactions identified during postmarketing use were hypersensitivity reactions [see Warnings and Precautions (5.1)].

6.1 Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug product cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in clinical practice.

The following clinical trials were conducted with Zemaira:

- Controlled, double-blind trial in 44 subjects, who received a weekly 60 mg/kg body weight dose of either Zemaira (30 subjects) or Prolastin® (a commercially available Alpha1-Proteinase Inhibitor [Human] product) (14 subjects) for 10 weeks, followed by an open-label phase in which 43 subjects received Zemaira weekly for 14 weeks;
- Open-label trial in 9 subjects who received a weekly 60 mg/kg body weight dose of Zemaira for 26 weeks, followed by a 7-week to 22-week extension;
- Crossover, double-blind trial in 18 subjects who received a single 60 mg/kg dose of Zemaira and a single 60 mg/kg dose of Prolastin;
- Open-label trial of 19 subjects who received a single 15 mg/kg (2 subjects), 30 mg/kg (5 subjects), 60 mg/kg (6 subjects), or 120 mg/kg (6 subjects) dose of Zemaira; and
- Post-Licensure Randomized, Placebo-Controlled Trial of Augmentation Therapy in Alpha-1 Protease Inhibitor Deficiency (RAPID), in 180 subjects who received a weekly 60 mg/kg body weight dose of either Zemaira (93 subjects) or placebo (87 subjects) for 24 months (referred to as years 1 and 2 in Table 3);
- Post-Licensure Open-label extension of the RAPID trial involving 140 subjects who had completed blinded treatment with Zemaira or placebo for 24 months in the RAPID trial and who entered the extension trial and received open-label Zemaira for up to an additional 24 months (referred to as years 3 and 4 in Table 3).

Table 1 summarizes the ARs, expressed as events per subject-year, and the corresponding number of ARs per infusion, expressed as % of all infusions, for each treatment in pre-licensure clinical trials of Zemaira.

Table 1: Overall Adverse Reactions (ARs) and Serious ARs

<table>
<thead>
<tr>
<th></th>
<th>Number of Subjects* (Events per Subject-Year†)</th>
<th>Number of Infusions† (% of all Infusions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zemaira</td>
<td>(n=66, SY=28.72)</td>
<td></td>
</tr>
<tr>
<td>Prolastin</td>
<td>(n=32, SY=3.83)</td>
<td></td>
</tr>
<tr>
<td>Zemaira</td>
<td>(n=1296)</td>
<td></td>
</tr>
<tr>
<td>Prolastin</td>
<td>(n=160)</td>
<td></td>
</tr>
<tr>
<td>ARs (AEs assessed by investigator as at least possibly related or occurring during or within 72 hours after the end of the infusion or for which causality assessment was missing or indeterminate).</td>
<td>54 (5.6)</td>
<td>16 (3.8)</td>
</tr>
</tbody>
</table>

Table 2: Adverse Reactions Occurring in ≥5% of Subjects

<table>
<thead>
<tr>
<th></th>
<th>Number of Subjects* (Events per Subject-Year†)</th>
<th>Number of Infusions† (% of all Infusions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zemaira</td>
<td>(n=66, SY=28.72)</td>
<td></td>
</tr>
<tr>
<td>Prolastin</td>
<td>(n=32, SY=3.83)</td>
<td></td>
</tr>
<tr>
<td>Zemaira</td>
<td>(n=1296)</td>
<td></td>
</tr>
<tr>
<td>Prolastin</td>
<td>(n=160)</td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td>13 (0.7)</td>
<td>5 (1.3)</td>
</tr>
<tr>
<td>Sinusitis</td>
<td>10 (0.5)</td>
<td>1 (0.3)</td>
</tr>
<tr>
<td>Upper Respiratory Infection</td>
<td>10 (0.4)</td>
<td>1 (0.3)</td>
</tr>
<tr>
<td>Bronchitis</td>
<td>5 (0.2)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Asthma</td>
<td>5 (0.2)</td>
<td>2 (0.5)</td>
</tr>
<tr>
<td>Cough Increased</td>
<td>5 (0.2)</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Fever</td>
<td>4 (0.1)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Injection Site Hemorrhage</td>
<td>4 (0.1)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Rhinitis</td>
<td>4 (0.1)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Sore Throat</td>
<td>4 (0.1)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Vasodilatation</td>
<td>4 (0.1)</td>
<td>1 (0.3)</td>
</tr>
</tbody>
</table>

Based on unique subjects. If a subject experienced more than one AR of the same type, the subject was only counted once.

The exposure adjusted event rate was based on total exposure time presented in subject-years and the total number of adverse reactions in the database.

If there were multiple occurrences of ARs following a single infusion, only one occurrence was counted.

* SY=subject-year.

Table 2 summarizes the ARs occurring in 5% or more (>3) subjects, expressed as events per subject-year, and the corresponding number of ARs per infusion, expressed as % of all infusions, for each treatment in clinical trials of Zemaira.

Chronic Obstructive Pulmonary Disease (COPD) Exacerbations

In a retrospective analysis, during the 10-week blinded portion of the 24-week clinical trial, 6 subjects (20%) of the 30 treated with Zemaira had a total of 7 exacerbations of their chronic obstructive pulmonary disease (COPD). Nine subjects (64%) of the 14 treated with Prolastin had a total of 11 exacerbations of their COPD. The observed difference between groups was 44% (95% confidence interval [CI] from 8% to 70%). Over the entire 24-week treatment period, of the 30 subjects in the Zemaira treatment group, 7 subjects (23%) had a total of 11 exacerbations of their COPD.
In the 24-week double-blind trial, Zemaira-treated subjects were tested for HAV, HBV, HCV, HIV, and parvovirus B19 (B19V), and no evidence of virus transmission was observed. In the RAPID study 25 serious exacerbations of COPD were reported in 15 Zemaira subjects vs. 17 such events in 9 placebo subjects, corresponding to rates of 0.146 exacerbations per subject-year with Zemaira and 0.115 exacerbations per subject-year with placebo, (ratio Zemaira:Placebo [95% confidence interval]: 1.26 [0.457 - 3.454]).

Subjects who were randomized to Zemaira in the 2-year RAPID trial who then entered and received open-label Zemaira in the 2-year RAPID extension trial were in the “Early Start” group. Subjects who were randomized to Placebo in the 2-year RAPID trial who then entered and received open-label Zemaira in the 2-year RAPID extension trial were in the “Delayed Start” group. During the RAPID extension trial 37 serious exacerbations of COPD were reported in 19 subjects (25%) in the Early Start group, corresponding to rates of 0.25 exacerbations per subject-year. In comparison, 20 serious exacerbations were reported in 11 subjects (17%) in the Delayed Start group corresponding to rates of 0.16 exacerbations per subject-year (ratio Early: Delayed [95% confidence interval]: 1.58 [0.68 – 3.66]). Table 3. Among the Early Start subjects who entered the RAPID extension trial (N = 76), the exposure adjusted incidence rate of serious exacerbations during the RAPID extension trial (years 3-4) was 0.25 compared to 0.12 for those subjects during the earlier RAPID trial (years 1-2), (ratio RAPID Extension:RAPID: 2.10 [95% confidence interval: 1.21 – 3.67]). Among the Delayed Start subjects who entered the RAPID extension trial (N = 64), the exposure adjusted incidence rate of serious exacerbations during the RAPID extension trial (years 3-4) was 0.16 compared to 0.10 for those subjects during the earlier RAPID trial (years 1-2), (ratio RAPID Extension:RAPID: 1.56 [95% confidence interval: 0.80 – 3.03]).

Table 3: Comparison of Exposure-Adjusted Incidence Rates for Serious COPD Exacerbations Occurring in the RAPID study between Zemaira and Placebo subjects and in the RAPID Extension Studies between Early Start and Delayed Start subjects

<table>
<thead>
<tr>
<th></th>
<th>Zemaira (N = 93)</th>
<th>Placebo (N = 87)</th>
<th>Zemaira: Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAPID Study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Years 1 - 2)</td>
<td>25 15</td>
<td>16.1 (0.10 - 0.22)</td>
<td>17 9</td>
</tr>
<tr>
<td>Extension Study</td>
<td>37 19</td>
<td>25.0 (0.18 - 0.35)</td>
<td>20 11</td>
</tr>
</tbody>
</table>

7 N = total number of safety subjects, n = number of subjects within a category. 95% CI = Confidence Interval. Subject time at risk: Zemaira = 171.14 years, Placebo = 147.75 years, Early Start Group = 146.46 years, Delay Start Group = 124.71 years.

Table 4: ARs Reported During the Postmarketing Use of Zemaira

<table>
<thead>
<tr>
<th>System Organ Class</th>
<th>Preferred Term/Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood and lymphatic system disorders</td>
<td>Lymph node pain</td>
</tr>
<tr>
<td>Gastrointestinal disorders</td>
<td>Nausea</td>
</tr>
<tr>
<td>General disorders and administration site conditions</td>
<td>Chills, infusion site reactions, facial, periorbital, lip and extremity swelling, chest pain</td>
</tr>
<tr>
<td>Immune system disorders</td>
<td>Hypersensitivity, anaphylactic reactions, tachycardia, hypertension, confusion, syncope, oxygen consumption decreased, pharyngeal edema</td>
</tr>
<tr>
<td>Nervous system disorders</td>
<td>Hypoesthesia, paresthesia, dizziness</td>
</tr>
<tr>
<td>Skin disorders</td>
<td>Hyperhidrosis, pruritus, rash including exfoliative and generalized, urticaria</td>
</tr>
<tr>
<td>Vascular disorders</td>
<td>Flushing</td>
</tr>
</tbody>
</table>

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Pregnancy Category C. Animal reproduction studies have not been conducted with Zemaira. Safety and effectiveness in pregnancy have not been established. Zemaira should be given to a pregnant woman only if clearly needed.

8.3 Nursing Mothers

It is not known whether Zemaira is excreted in human milk. Use Zemaira only if clearly needed when treating nursing women.

8.4 Pediatric Use

Safety and effectiveness in the pediatric population have not been established.

8.5 Geriatric Use

The safety and efficacy of Zemaira in the geriatric population have not been established due to an insufficient number of subjects.

11 DESCRIPTION

Zemaira is a sterile, white, lyophilized preparation of purified Alpha 1-Proteinase Inhibitor (Human) (A-PI), also known as alpha,-antitrypsin, to be reconstituted and administered by the intravenous route. The specific activity of Zemaira is 607 mg of functional A-PI per milligram of total protein. The purity (total A-PI/total protein) is 90% A-PI. Each vial contains approximately 1000 mg of functionally active A1-PI as determined by its capacity to neutralize human neutrophil elastase (NE) is printed on the vial label and carton. Following reconstitution with 20 mL of Sterile Water for Injection, USP, the Zemaira solution contains 73 to 89 mM sodium, 33 to 42 mM chloride, 15 to 20 mM phosphate, and 121 to 168 mM mannitol. Hydrochloric acid and/or sodium hydroxide may have been added to adjust the pH. Zemaira contains no preservative.

All plasma used in the manufacture of Zemaira is obtained from US donors and is tested using serological assays for HBsAg and antibodies to HBV-1/2 and HCV. The plasma is tested with Nucleic Acid Testing (NAT) for HBV, HCV, HIV-1, and HIV-2 and found to be nonreactive (negative). The plasma is also tested by NAT for B19V. Only plasma that passed the virus screening is used for production. The limit for B19V in the fractionation pool is 10² International Units of B19V per mL.

Zemaira is manufactured from large pools of human plasma by cold ethanol fractionation according to a modified Cohn process followed by additional purification steps. The manufacturing process includes two virus clearance steps: heat treatment at 60°C for 2 hours in an aqueous solution with stabilizers; and nanofiltration. These virus clearance steps have been validated in a series of in vitro experiments for their capacity to inactivate/remove both enveloped and non-enveloped viruses. Table 5 shows the virus clearance capacity of the Zemaira manufacturing process, expressed as mean log₁₀ reduction factor.

Table 5: Cumulative (log₁₀) Virus Inactivation/Removal in Zemaira

<table>
<thead>
<tr>
<th>Manufacturing Step</th>
<th>Enveloped Viruses</th>
<th>Non-Enveloped Viruses</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV-1 BDVV PRRW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat treatment*</td>
<td>≥6.8  ≥5.2  ≥8.3  4.4  ≥5.4  na</td>
<td></td>
</tr>
<tr>
<td>Nanofiltration</td>
<td>≥5.5  ≥5.4  ≥8.4  ≥6.3  ≥5.3  ≥6.4</td>
<td></td>
</tr>
<tr>
<td>Cumulative Virus Reduction (log₁₀)</td>
<td>≥12.3  ≥10.6  ≥16.7  ≥10.7  ≥10.7  ≥6.4</td>
<td></td>
</tr>
</tbody>
</table>

* Studies using B19V, which are considered experimental in nature, have demonstrated a virus reduction factor of 1.9 log₁₀.
Subjects had emphysema. Another registry study showed 72% of A1-PI deficient subjects had emphysema. Augmenting the levels of functional protease inhibitor by intravenous infusion is an approach significantly to the morbidity of the disease.

Conducted in 13 males and 5 females with A 1-PI deficiency, ranging in age from 36 to 66 years. Nine subjects received a single 60 mg/kg dose of Zemaira followed by Prolastin, and 9 subjects received Prolastin followed by a single 60 mg/kg dose of Zemaira, with a wash-out period of 35 days between doses. A total of 13 post-infusion serum samples were taken at various time points up to Day 21. Table 6 shows the mean results for the Zemaira pharmacokinetic parameters.

Table 6: Pharmacokinetic Parameters for Antigenic A1-PI in 18 Subjects Following a Single 60 mg/kg Dose of Zemaira

<table>
<thead>
<tr>
<th>Pharmacokinetic Parameter</th>
<th>Mean (SD)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area under the curve (AUC0–∞)</td>
<td>144 (±27) µM x day</td>
</tr>
<tr>
<td>Maximum concentration (Cmax)</td>
<td>44.1 (±10.8) µM</td>
</tr>
<tr>
<td>Terminal half-life (t1/2)</td>
<td>5.1 (±2.4) days</td>
</tr>
<tr>
<td>Total clearance</td>
<td>603 (±129) mL/day</td>
</tr>
<tr>
<td>Volume of distribution at steady state</td>
<td>3.8 (±1.3) L</td>
</tr>
</tbody>
</table>

* n=18 subjects

Clinical trials were conducted pre-licensure with Zemaira in 89 subjects (59 males and 30 females). The subjects ranged in age from 29 to 68 years (median age 49 years). Ninety-five percent of the treated subjects had the PiZZ phenotype of A1-PI deficiency, and 3% had the PiMZ phenotype. At screening, serum A1-PI levels were between 3.2 and 10.1 µM (mean of 5.6 µM). The objectives of the clinical trials were to demonstrate that Zemaira augments and maintains serum levels of A1-PI above 11 mg/dL and increases A1-PI levels in ELF of the lower lung. In a double-blind, controlled clinical trial to evaluate the safety and efficacy of Zemaira, 44 subjects were randomized to receive 60 mg/kg of either Zemaira or Prolastin once weekly for 10 weeks. After 10 weeks, subjects in both groups received Zemaira for an additional 14 weeks. Subjects were followed for a total of 24 weeks to complete the safety evaluation (see Adverse Reactions (6.1)). The mean trough serum A1-PI levels at steady state (Weeks 7-11) in the Zemaira-treated subjects were statistically equivalent to those in the Prolastin-treated subjects within a range of ±3 µM. Both groups were maintained above 11 µM. The mean (range and standard deviation (SD)) of the steady state trough serum antigenic A1-PI level for Zemaira-treated subjects was 17.7 µM (range 13.9 to 23.2, SD 2.5) and for Prolastin-treated subjects was 19.1 µM (range 14.7 to 23.1, SD 2.2). The difference between the Zemaira and the Prolastin groups was not considered clinically significant and may be related to the higher specific activity of Zemaira. In a subgroup of subjects enrolled in the trial (10 Zemaira-treated subjects and 5 Prolastin-treated subjects), bronchoalveolar lavage was performed at baseline and at Week 11. Four A1-PI related analytes in ELF were measured: antigenic A1-PI, A1-PI:NE complexes, free NE, and functional A1-PI (ANEC). A blinded retrospective analysis, which revised the prospectively established acceptance criteria showed that within each treatment group, ELF levels of antigenic A1-PI and A1-PI:NE complexes increased from baseline to Week 11 (Table 7). Free elastase was immeasurably low in all samples. The post-treatment ANEC values in ELF were not significantly different between the Zemaira-treated and Prolastin-treated subjects (mean 1725 nm vs. 1418 nm). No conclusions can be drawn about changes of ANEC values in ELF during the trial period as baseline values in the Zemaira-treated subjects were unexpectedly high. No A1-PI analytes showed any clinically significant differences between the Zemaira and Prolastin treatment groups.

Table 7: Change in ELF From Baseline to Week 11 in a Subgroup Analysis

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Treatment</th>
<th>Mean Change From Baseline</th>
<th>90% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1-PI (nm)</td>
<td>Zemaira*</td>
<td>1358.3</td>
<td>822.6 to 1894.0</td>
</tr>
<tr>
<td></td>
<td>Prolastin</td>
<td>949.9</td>
<td>460.0 to 1439.7</td>
</tr>
<tr>
<td>ANEC (nm)</td>
<td>Zemaira</td>
<td>-588.1</td>
<td>-2032.3 to 856.1</td>
</tr>
<tr>
<td></td>
<td>Prolastin</td>
<td>497.5</td>
<td>-392.3 to 1387.2</td>
</tr>
<tr>
<td>A1-PI:NE Complexes (nM)</td>
<td>Zemaira</td>
<td>118.0</td>
<td>39.9 to 196.1</td>
</tr>
<tr>
<td></td>
<td>Prolastin</td>
<td>287.1</td>
<td>49.8 to 524.5</td>
</tr>
</tbody>
</table>

* n=10 subjects. For the clinical efficacy of Zemaira or any A1-PI product in influencing the course of pulmonary emphysema or pulmonary exacerbations has not been demonstrated in adequately powered, randomized, controlled clinical trials.
15 REFERENCES

16 HOW SUPPLIED/STORAGE AND HANDLING
Zemaira is supplied in a single use vial containing the amount of functionally active A₁-PI printed on the label.
The product presentation includes a package insert and the following components:

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Carton Number</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 mg of functionally active A₁-PI</td>
<td>0053-7201-02</td>
<td>• Zemaira in a single-use vial [NDC 0053-7211-01]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 20 mL vial of Sterile Water for Injection, USP [NDC 0053-7653-20]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• One vented transfer device</td>
</tr>
</tbody>
</table>

When stored up to 25°C (77°F), Zemaira is stable for the period indicated by the expiration date on its label. Avoid freezing, which may damage the diluent vial.

17 PATIENT COUNSELING INFORMATION
- Inform patients of the early signs of hypersensitivity reactions to Zemaira (including hives, generalized urticaria, tightness of the chest, dyspnea, wheezing, faintness, hypotension, and anaphylaxis). Advise patients to discontinue use of Zemaira and contact their physician and/or seek immediate emergency care, depending on the severity of the reaction, if these symptoms occur [see Warnings and Precautions (5.2)].
- Inform patients that because Zemaira is made from human blood, it may carry a risk of transmitting infectious agents (e.g., viruses and, theoretically, the CJD agent) [see Warnings and Precautions (5.3)].
- Inform patients that administration of Zemaira has been demonstrated to raise the plasma level of A₁-PI, but that the effect of this augmentation on the frequency of pulmonary exacerbations and on the rate of progression of emphysema has not been established by clinical trials.
- Dizziness may occur following the administration of Zemaira, therefore, patients should exercise caution immediately following an infusion.

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