A separate copy of this form must accompany each policy submitted for review. Policies submitted without this form will not be considered for review.

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<th>Plan: Aetna Better Health</th>
<th>Submission Date: 10/01/2018</th>
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<tr>
<td>Policy Number: 0145</td>
<td>Effective Date:</td>
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<tr>
<td></td>
<td>Revision Date:</td>
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<tr>
<td>Policy Name: Alpha 1-Antitrypsin Inhibitor Therapy</td>
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**Type of Submission – Check all that apply:**
- [ ] New Policy
- [x] Revised Policy*
- [ ] Annual Review – No Revisions

*All revisions to the policy must be highlighted using track changes throughout the document. Please provide any clarifying information for the policy below:

**CPB 0145 Alpha 1-Antitrypsin Inhibitor Therapy**

Clinical content was last revised 04/29/2016. Additional non-clinical updates were made by Corporate since the last PARP submission, as documented below.

**Revision and Update History since last PARP submission:**
- 05/03/2018 - This CPB has been updated with additional background information and references.
- 01/24/2019 – Next tentative scheduled review date by Corporate.

**Name of Authorized Individual (Please type or print):**

Dr. Bernard Lewin, M.D.

**Signature of Authorized Individual:**

[Signature]

www.aetnabetterhealth.com/pennsylvania  Updated 05/03/2018
Alpha 1-Antitrypsin Inhibitor Therapy

Number: 0145

*Please see amendment for Pennsylvania Medicaid at the end of this CPB.

Policy

Aetna considers alpha 1-antitrypsin (AAT) inhibitor therapy (e.g., Aralast NP, Glassia, Prolastin-C, and Zemaira) medically necessary for selected adult members with emphysema due to AAT deficiency when all of the following criteria are met:

1. Member has a low serum concentration of AAT less than 80 mg per deciliter (mg/dL) (0.8 g/L) by radial immunodiffusion (or less than 50 mg/dL (0.5 g/L) if measured by nephelometry) or less than 11 uM/L (35 % of normal), which is considered the threshold thought to protect against emphysema; and

2. Member has PiZZ, PiZ(null) or Pi(null, null) phenotype (homozygous) AAT deficiency or other phenotypes associated with serum AAT concentrations of less than 80 mg/dL. (AAT inhibitor therapy is considered not medically necessary for use in individuals with the PiMZ or PiMS phenotypes of AAT deficiency because these individuals appear to be at small risk of developing panacinar emphysema); and

Policy History

Last Review 05/03/2018
Effective: 07/17/1996
Next Review: 01/24/2019

Definitions

Additional Information

Clinical Policy Bulletin Notes
3. Member has progressive panacinar emphysema with a documented rate of decline in forced expiratory volume in 1 second (FEV1); and

4. Member is a non-smoker; and

5. Member is not IgA antibody deficient with antibodies to IgA.

Because panacinar emphysema does not develop in some individuals who have AAT deficiency, replacement therapy with AAT inhibitor is of no proven value in affected individuals without clinical evidence of emphysema and is therefore considered experimental and investigational for these individuals.

Aetna considers AAT inhibitor therapy experimental and investigational when criteria are not met.

Aetna considers AAT inhibitor experimental and investigational for treatment of cystic fibrosis.

Aetna considers repeat doses of AAT inhibitor therapy medically necessary for members who met the requirements for AAT inhibitor at therapy initiation and who demonstrate a substantial reduction in rate of deterioration of lung function.

Aetna considers alpha-1 antitrypsin deficiency gene therapy experimental and investigational because its effectiveness has not been established.

Aetna considers inhaled alpha-1 antitrypsin therapy experimental and investigational because its effectiveness has not been established.

Background
Alpha 1-antitrypsin is an antiprotease found in human plasma that inhibits the neutrophil elastase enzyme from degrading elastin tissues in the lung. Alpha-1-antitrypsin (AAT) deficiency is a hereditary disorder associated with the early onset of severe pulmonary emphysema in adults. Although alpha 1-antitrypsin inhibitor therapy (Prolastin, Aralast) has not been shown to prevent or reverse emphysema in these patients affected by AAT deficiency, there is reason to believe that maintenance of antitrypsin serum levels may be compatible with retardation of the progression of emphysema.

Once initiated, therapy will usually be continued for the remainder of the patient's life. Recipients of alpha 1-antitrypsin inhibitor therapy should be immunized against hepatitis B. It is also recommended that this medication not be used in patients with immunoglobulin antibody IgA deficiency that is known to have antibodies against IgA (anti-IgA antibody). These patients may experience severe reactions, including anaphylaxis to IgA, which may be present in human alpha 1-antitrypsin inhibitor.

According to American Thoracic Society (2003) guidelines, a "protective" threshold plasma AAT level of 11 mol/L corresponds to 80 mg/dl if measured by radial immunodiffusion and to 50 mg/dl if measured by nephelometry. This protective threshold has evolved from the observation that patients with heterozygote phenotypes whose levels of AAT exceed this level are usually free from emphysema.

Alpha-1 Proteinase inhibitors are contraindicated in IgA deficient patients with antibodies against IgA, since these products may contain trace amounts of IgA and cause an increased risk for severe hypersensitivity.

Abboud and colleagues (2005) stated that AAT replacement therapy has not yet been proven to be clinically effective in reducing the progression of disease in AAT-deficient patients.
There was a suggestion of a slower progression of emphysema by computed tomography scan in a small randomized trial. Two non-randomized studies comparing AAT-deficient patients already receiving replacement therapy with those not receiving it, and a retrospective study evaluating a decline in forced expiratory volume in 1 second (FEV1) before and after replacement therapy, suggested a possible benefit for selected patients. Because of the lack of definitive proof of the clinical effectiveness of AAT replacement therapy and its cost, these investigators recommended reserving AAT replacement therapy for deficient patients with impaired FEV1 (35 to 65 % of predicted value), who have quit smoking and are on optimal medical therapy but continue to show a rapid decline in FEV1 after a period of observation of at least 18 months.

An assessment by the Canadian Agency for Drugs and Technologies in Health (Chen et al, 2007) concluded that evidence showing health improvement from alpha-1 antitrypsin inhibitor therapy is inconclusive. The assessment found that, in controlled trials, augmentation therapy has not shown reduced lung function impairment in patients with AAT deficiency and chronic obstructive pulmonary disease (COPD), compared with normal care. Conversely, the assessment reported that in observational studies, alpha-1 antitrypsin inhibitor therapy is associated with outcomes suggestive of therapeutic benefit in patients with severe AAT deficiency and moderate airflow obstruction. The assessment found that severe adverse events from treatment have been reported in approximately 1 % of study populations.

The assessment concluded that use of alpha-1 antitrypsin inhibitor therapy in patients without COPD is experimental (Chen et al, 2007). The assessment found no evidence evaluating the use of alpha-1 antitrypsin inhibitor therapy in patients with AAT deficiency and no lung function impairment.
On July 1, 2010, Kamada, Ltd., (Beit Kama, Israel) received approval from the Food and Drug Administration for manufacturing Glassia (alpha-1-proteinase inhibitor [human]), which is an intravenously administered biologic product indicated for chronic augmentation and maintenance therapy in individuals with emphysema due to congenital deficiency of alpha-1-proteinase inhibitor, also known as AAT deficiency.

McElvaney and colleagues (2017) noted that purified alpha 1 proteinase inhibitor (A1PI) slowed emphysema progression in patients with severe alpha 1 antitrypsin deficiency in a randomized controlled trial (RAPID-RCT), which was followed by an open-label extension trial (RAPID-OLE). These researchers examined the prolonged treatment effect of A1PI on the progression of emphysema as assessed by the loss of lung density in relation to RAPID-RCT. Patients who had received either A1PI treatment (Zemaira or Respreeza; early-start group) or placebo (delayed-start group) in the RAPID-RCT trial were included in this 2-year open-label extension trial (RAPID-OLE). Patients from 22 hospitals in 11 countries outside of the USA received 60 mg/kg per week A1PI. The primary end-point was annual rate of adjusted 15th percentile lung density loss measured using CT in the intention-to-treat population with a mixed-effects regression model. Between March 1, 2006, and October 13, 2010, a total of 140 patients from RAPID-RCT entered RAPID-OLE: 76 from the early-start group and 64 from the delayed-start group. Between day 1 and month 24 (RAPID-RCT), the rate of lung density loss in RAPID-OLE patients was lower in the early-start group (-1.51 g/L per year [SE 0.25] at total lung capacity [TLC]; -1.55 g/L per year [0.24] at TLC plus functional residual capacity [FRC]; and -1.60 g/L per year [0.26] at FRC) than in the delayed-start group (-2.26 g/L per year [0.27] at TLC; -2.16 g/L per year [0.26] at TLC plus FRC, and -2.05 g/L per year [0.28] at FRC). Between months 24 and 48, the rate of lung density loss was reduced in delayed-start patients (from -2.26 g/L per year to -1.26 g/L per year), but no significant difference was seen in the rate in early-start patients during this time period (-1.51 g/L per year).
per year to -1.63 g/L per year), thus in early-start patients the efficacy was sustained to month 48. The authors concluded that RAPID-OLE supported the continued efficacy of A1PI in slowing disease progression during 4 years of treatment. Lost lung density was never recovered, highlighting the importance of early intervention with A1PI treatment.

Inhaled Human Alpha-1 Antitrypsin Therapy

Franciosi et al (2015) stated that alpha-1 antitrypsin deficiency (AATD) is an autosomal co-dominant condition characterized by low circulating levels of AAT. Significant work has been performed in the development of AAT augmentation therapy for AATD. While the majority of this activity has focused on intravenous (i.v.) augmentation, evidence of a significant clinical benefit is still debated and i.v. therapy is expensive, onerous and time consuming. Inhalation therapy offers the opportunity for easier and more efficient delivery of AAT directly to the lungs with some evidence of a reduction in local inflammatory and proteolytic activity, potentially offering an alternative therapeutic option to the i.v. route. There are, however, theoretical obstacles to the potential effectiveness of aerosol-delivered AAT and although there have been a number of short-term studies examining inhaled AAT and its effect on lung inflammation, there has only been 1 long-term study to date in AATD looking at clinical outcomes, which is as yet unpublished.

Gaggar et al (2016) noted that inhaled alpha-1 proteinase inhibitor (PI) is known to reduce neutrophil elastase burden in some patients with cystic fibrosis (CF). In a phase IIa, randomized, double-blind, placebo-controlled study, these researchers tested inhaled Aapha-1 HC, a new aerosolized alpha1-PI formulation, in CF patients. These investigators evaluated the safety of 100 or 200 mg of inhaled Alpha-1 HC once-daily for 3 weeks in subjects with CF. A total of 30 adult subjects were randomized in a 2:1 ratio to receive alpha-1 HC or placebo. Drug delivery was confirmed by a dose-dependent
increase in the sputum alpha1-PI; 7 (20.0 %) of the 35 adverse events in the 100-mg dose group, 3 (13.0 %) of 23 in the 200-mg dose group, and 4 (14.3 %) of 28 in the placebo group were drug-related in these subjects. One serious adverse event occurred in 1 subject within each group. The authors concluded that alpha-1 HC inhalation was safe and well-tolerated. However, the effectiveness of inhaled alpha-1 antitrypsin therapy has yet to be established.

The current study was not powered to assess changes in FEV1 or sputum A1AT concentrations; however, subsequent phase II and phase III studies could be sufficiently powered to analyze these parameters. Other opportunities for further phase II and phase III studies include a longer duration safety evaluation period, inclusion of patients with more severe respiratory insufficiency, and the delivery of Alpha-1 HC via alternative delivery devices. The authors concluded that daily alpha-1 HC (100 mg or 200 mg) delivered for 3 weeks was safe, well-tolerated, and effective in raising the alpha1-PI levels in the sputum of subjects with CF. They stated that these promising results suggested that alpha-1 HC is effectively and safely delivered in patients with CF. However, future studies are needed to determine the effectiveness and potential use of alpha-1 HC for chronic therapy in CF lung disease.

Griese and Scheuch (2016) noted that treatment with exogenous AAT was developed originally for COPD associated with AAT deficiency; however, other lung conditions involving neutrophilic inflammation and proteolytic tissue injury related to neutrophil elastase and other serine proteases may also be considered for AAT therapy. These conditions include bronchiectasis caused by primary ciliary dyskinesia, CF, and other diseases associated with an increased free elastase activity in the airways. Inhaled AAT may be a viable option to counteract proteolytic tissue damage. This form of treatment requires efficient drug delivery to the targeted pulmonary compartment. Aerosol technology
meeting this requirement is currently available and offers an alternative therapeutic approach to systemic AAT administration. To-date, early studies in humans have shown biochemical efficacy and have established the safety of inhaled AAT. The authors stated that to bring aerosol AAT therapy to patients, large phase III protocols in carefully selected patient populations (i.e., subgroups of patients with AAT deficiency, CF, or other lung diseases with bronchiectasis) will be needed with clinical end-points in addition to the measurement of proteolytic activity in the airway. They stated that the outcomes likely will have to include lung function, lung structure assessed by computed tomography imaging, disease exacerbations, health status, and mortality.

**Alpha-1 Antitrypsin Deficiency Gene Therapy**

Guo et al (2014) noted that AAT is a serum protease inhibitor that belongs to the serpin superfamily. Mutations in AAT are associated with AATD, a rare genetic disease with 2 distinct manifestations: AATD lung disease and AATD liver disease. The former is caused by loss-of-function of AAT and can be treated with plasma-derived AAT; the latter is due to the aggregation and retention of mutant AAT protein in the liver. The only treatment available for AATD liver disease is liver transplantation. These researchers demonstrated that anti-sense oligonucleotides (ASOs) targeting human AAT efficiently reduced levels of both short and long human AAT transcript in-vitro and in transgenic mice, providing a novel therapy for AATD liver disease. In addition, ASO-mediated depletion of mouse AAT may offer a useful animal model for the investigation of AATD lung disease.

Wozniak et al (2015) stated that a number of identified mutations in the SERPINA1 gene encoding this protein result in AATD. A decrease in AAT serum concentration or reduced biological activity causes considerable risk of chronic respiratory and liver disorders. As a monogenic disease,
AATD appears to be an attractive target for gene therapy, particularly for patients with pulmonary dysfunction, where augmentation of functional AAT levels in plasma might slow down respiratory disease development. The short AAT coding sequence and its activity in the extracellular matrix would enable an increase in systemic serum AAT production by cellular secretion. In-vitro and in-vivo experimental AAT gene transfer with gamma-retroviral, lentiviral, adenoviral, and adeno-associated viral (AAV) vectors has resulted in enhanced AAT serum levels and a promising safety profile.

Human clinical trials using intramuscular viral transfer with AAV1 and AAV2 vectors of the AAT gene demonstrated its safety, but did not achieve a protective level of AAT greater than 11 μM in serum. These researchers provided an in-depth critical analysis of current progress in AATD gene therapy based on viral gene transfer. The factors affecting transgene expression levels, such as site of administration, dose and type of vector, and activity of the immune system, were discussed further as crucial variables for optimizing the clinical effectiveness of gene therapy in AATD subjects.

Chiuchiolo and Crystal (2016) described the various strategies for AAT gene therapy for the pulmonary manifestations of AATD and the state of the art in bringing AAT gene therapy to the bedside. These researchers noted that the pre-clinical safety and efficacy studies with the AAVrh.10 vector supported the Food and Drug Administration (FDA)'s approval for a phase I/II clinical trial Investigational New Drug (IND) application. The aim of the clinical trial (NCT02168686) is to assess the hypothesis that a single intra-pleural administration of a serotype AAVrh.10 vector expressing the normal M1-type AAT (AAVrh.10hAAT) to individuals with AATD is safe and results in persistent therapeutic serum and alveolar ELF levels of AAT. The study will compare 2 doses: (i) $8 \times 10^{12}$, and (ii) $8 \times 10^{13}$ genome copy, administered to individuals ($n = 5$) with a ZZ or Z null genotype and serum AAT levels of less than 11 μM. Individuals will receive the vector as one 50-ml dose, administered directly into the intra-pleural space using a
needle attached to a central line catheter, and fluoroscopic guidance. As a comparator to the intra-pleural route, 5 individuals with AATD will be administered the AAVrh.10hAAT vector at each dose level by the intravenous route. In addition to the normal safety parameters, the goal of the therapy will be to reach a sustained concentration of more than 1.2 μM AAT in epithelial lining fluid (ELF), the lung “protective level”. The completion of this study will provide critical safety and preliminary efficacy data to determine whether to proceed to a phase II/III efficacy study for eventual FDA approval.

Appendix

Note: Prolastin-C is a more purified and concentrated form of alpha1-antitrypsin (AAT) that may be infused over a shorter period of time than Prolastin (15 minutes on average).

Aralast NP is a similar product to Aralast (now off the market), containing the same active components of plasma alpha1-proteinase inhibitor with identical formulations. However, Aralast NP should be stored at room temperature, not to exceed 25°C (77°F). Refrigeration is not needed.

CPT Codes / HCPCS Codes / ICD-10 Codes

Information in the [brackets] below has been added for clarification purposes. Codes requiring a 7th character are represented by "+":

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<td>Management of recipient hematopoietic progenitor cell donor search and cell acquisition [alpha-1-antitrypsin deficiency gene therapy]</td>
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<td>Alpha-1-antitrypsin; total</td>
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HCPCS codes covered if selection criteria are met:

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<td>J0256</td>
<td>Injection, alpha 1-proteinase inhibitor - (human), not otherwise specified, 10 mg</td>
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<tr>
<td>J0257</td>
<td>Injection, alpha 1 proteinase inhibitor - (human), (glassia), 10 mg</td>
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<tr>
<td>S9346</td>
<td>Home infusion therapy, alpha-1-proteinase inhibitor (e.g., Prolastin); administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment (drugs and nursing visits coded separately), per diem</td>
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ICD-10 codes covered if selection criteria are met:

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<td>Alpha-1-antitrypsin deficiency [only covered when billed with panlobular emphysema]</td>
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<tr>
<td>J43.1</td>
<td>Panlobular emphysema [panacinar emphysema]</td>
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ICD-10 codes not covered for indications listed in the CPB (not all-inclusive):

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<td>E84.0 -</td>
<td>Cystic fibrosis</td>
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<tr>
<td>E84.9</td>
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<tr>
<td>F17.200 -</td>
<td>Nicotine dependence [member must be nonsmoker]</td>
</tr>
<tr>
<td>F17.299</td>
<td></td>
</tr>
</tbody>
</table>

Nidhi Sinha:

Test entry
The above policy is based on the following references:


10. Seersholm N, Wencker M, Banik N, et al. Does alpha1-antitrypsin augmentation therapy slow the annual decline in FEV1 in patients with severe hereditary...


30. U.S. Food and Drug Administration (FDA). Glassia -- Approval letter. Silver Spring, MD; FDA; July 1, 2010. Available at:


39. Franciosi AN, McCarthy C, McElvaney NG. The efficacy and safety of inhaled human α-1 antitrypsin in people
with α-1 antitrypsin deficiency-related emphysema.


AETNA BETTER HEALTH® OF PENNSYLVANIA

Amendment to
Aetna Clinical Policy Bulletin Number:
0145 Alpha 1-Antitrypsin Inhibitor Therapy

There are no amendments for Medicaid.

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Updated 05/03/2018