Infusion Management of
Alpha-1 Antitrypsin
Deficiency Patients

Teresa Kitchen, RN, BSN
AlphaNet Clinical Nurse Manager
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Alpha-1 Antitrypsin (AAT)
the protein

- 52,000 molecular weight protein coded for by single gene on long arm of chromosome 14
- Made predominantly in the liver, but also can be made by other cells
- Transported to blood where it bathes all tissues
- Prototype SERPIN
- Primary target: neutrophil elastase
- Acute phase reactant
- Anti-inflammatory

AAT Deficiency (Alpha-1)

- Genetic/Hereditary condition causing decreased levels of AAT in blood and tissues
- Over 100 different mutations identified
  - 1/3 associated with deficiency or dysfunction
- Usually estimated to be 100,000 people in the US and a similar number in Europe
- Over 20 million carriers of the Alpha-1 gene in the US
- Predisposes to lung, liver, other disease
A Brief History of Alpha-1

- 1963 - Alpha,-Antitrypsin Deficiency first described
- 1964 - Role of elastase
- 1967 - Discovery of neutrophil elastase
- 1969 - Neonatal cirrhosis
- 1970s - Cigarette smoke capable of destroying alpha,-antitrypsin function
- 1980s - Plasma deficiency due to blockage of release alpha,-antitrypsin from liver
- 1987 - Prolastin approved in US
- 2003 - Zemaira and Aralast in US
- 2010 - Glassia in US

Not Rare?

- 100,000 with severe deficiency
- At least 150,000 with severe deficiency and COPD! (Perhaps as many as 300,000)

The Good “M” Phenotype
The Bad “Z” Phenotype
Leadership, Education, Accountability, Development

Who should be tested?
Leadership, Education, Accountability, Development

- All individuals with COPD
- Asthma with incomplete reversibility on maximal therapy
- Bronchiectasis without other risk factors
- Siblings of AAT deficient individual
- Fam Hx of AAT deficiency or early onset COPD
- Cirrhosis without apparent risk factors

Making the Diagnosis
Leadership, Education, Accountability, Development

- Simple to diagnose
  - Tube of blood
  - Finger stick
  - Buccal swab
- Level
- Phenotyping
- Genotyping
Making the Diagnosis

- Simple to diagnose
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- Level
- Phenotyping
- Genotyping

- Alpha-1 is a laboratory diagnosis, not a clinical diagnosis
- Problems
  - Differences between the various testing methods difficult to appreciate

Alpha-1 COPD is Treatable!

- Reduce Risk
  - Smoking cessation
  - Immunize
  - Reduce other exposures
- Reduce Symptoms
  - Bronchodilators
  - Inhaled steroids
  - Pulmonary rehabilitation
- Reduce Complications
  - Treat exacerbations
  - Supplemental oxygen
- Reduce Lung Destruction
  - Augmentation therapy


Leadership, Education, Accountability, Development
Augmentation Therapy for Alpha-1

- **1980s** NIH evaluated purified AAT administration
  - Attempt to interest plasma companies
  - Re-attempt
- **1987** Prolastin (Cutter => Miles => Bayer => Talecris => Griffols)
- **2003** Aralast (Alpha Therapeutics => Baxter/Grifols => Baxter)
- **2004** Zemaira (Armor => Cention => Aventis Behring => ZLB Behring => CSL Behring)
- **2010** Glassia (Kamada => Baxter)

Guidelines for Intravenous Infusion

- Patient should be under the care of a licensed physician familiar with the use of augmentation therapy, including indications, dosing, method of administration, and potential adverse reactions;
- Consideration should be given to administering initial infusion in a medically supervised setting, however there is no requirement for this stated in the packet insert, epinephrine injection/EpiPen and emergency equipment available.
- Establish home care services with a licensed home health agency/home infusion company with qualified IV nurses trained in the procedure if insurance benefits allow

Home Infusion vs. Facility

- First dose can be administered in facility or home environment
- Insurance approval
- Self Infusion
- Specialized home infusion companies
- Facility
Peripheral vs. Central

- Majority of patients use peripheral access
- Port placement as necessary
- PICC line short term
- Augmentation therapy not a vesicant

How Supplied

- Supplied in single use vials with the functional activity in milligrams stated on the label of each vial. Vial size is supplied in 1000 mg approximate activity
- Reconstitution of protein powder and sterile water
- Ready to use liquid

Dosing

- The recommended dose is 60 mg/kg body weight IV once weekly
- Alternate dosing
- Given by intermittent intravenous infusion
- Rate of infusion
- Gravity vs. Pump
MD Orders

- Dosage calculated according to patient’s weight
- Route of administration
- Frequency of infusions
- Any premedications
- Laboratory monitoring parameters and schedule if indicated
- Standing order for use of epinephrine injection/EpiPen 0.3 mg IM prn anaphylaxis

Contraindications

- Do not use in patients with known selective IgA deficiency with antibody to IgA, due to the increased risk of severe hypersensitivity reactions, including anaphylaxis.

Side Effects

- Side effects are reported to be mild and generally rare; they include:
  - Chills
  - Malaise
  - Headache
  - Rash
  - Hot Flash
  - Pruritis
  - Anaphylaxis (rare) is a risk with any plasma product
Nursing Implications

• Assess needs of patient and/or primary caregiver: physical, psychosocial, & cognitive.
• Educate the patient/caregiver against smoking, and second hand smoke as smoke inactivates the drug and serves to further promote lung destruction.

Nursing Implications

• Instruct patient and/or caregiver on proper storage of drug and supplies, therapy requirements, and procedures: Universal Precautions, aseptic technique, catheter care, connect, disconnect, medication preparation/handling and disposal of used supplies.
• Instruct patient in self-monitoring: including but not limited to: temperature, reporting of side effects, weight changes, over all status, including any changes in activity or exercise tolerance.
• Instruct patient to report significant changes to healthcare provider.

Documentation

• Total given milligrams and milliliters, Lot Numbers, concentration in vial, Exp. date
• Route of infusion
• Length of infusion
• Baseline cardiopulmonary assessment (including breath sounds)
• Baseline vital signs
• Weight
• Changes in condition, activity or exercise tolerance, sputum production, cough
**Documentation**

- Any patient complaints
- Patient tolerance of infusion
- Any adverse reaction and intervention

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**Summary**

- **Alpha-1 antitrypsin deficiency (Alpha-1):**
  - The most common genetic cause of COPD
  - Accounts for about 1% of all COPD, although most remain undiagnosed
  - Specific plasma-derived therapy is available that improves survival and quality of life
  - The diagnosis of Alpha-1 is a laboratory diagnosis, not a clinical diagnosis
  - All patients with COPD should be tested for Alpha-1

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**Patient Resources**

- AlphaNet
- www.alphanet.org
- Alpha-1 Foundation
- www.alpha-1foundation.org
- Alpha-1 Association
- www.alpha1.org