Acetylcysteine Solution, USP is supplied as a sterile, unpreserved solution (not for injection) in vials containing 10 mL of 500 mg/mL or 20 mL of either 250 mg/mL or 500 mg/mL of acetylcysteine as the sodium salt. The mucolytic activity of acetylcysteine is reduced if the solution is adjusted to a pH of 7.0 or above. The solution is isotonic. The concentration of acetylcysteine in the solution is 0.5% w/v. The solution has a pH of 6.8 ± 0.2. The solution has a colorless to pale yellow color. The solution has a very slight odor. The structural formula of acetylcysteine is:

$$\text{CH}_2\text{NO}_2\text{S}$$

$$\text{H}_2\text{NCOCH}_2\text{SH}$$

$$\text{C} \quad \text{C} \quad \text{O} \quad \text{N}$$

$$\text{H} \quad \text{H} \quad \text{C} \quad \text{O}$$

The viscosity of pulmonary mucous secretions depends on the concentrations of mucoprotein and, to a lesser extent, deoxyribonucleic acid (DNA). The latter increases with increasing purulence owing to the presence of cellular debris. The viscosity of the solution is measured as 2.5 centipoise. The viscosity of acetylcysteine is related to the sulfhydryl group in the molecule. This group probably "disappears" linkages in mucous thereby lowering the viscosity. The mucolytic activity of acetylcysteine is unaltered by the presence of DNA, and increases with increasing pH. Significant mucoysis occurs between pH 7 and 9.

Acetylcysteine is indicated as adjuvant therapy for patients with abnormal, viscid, or inspissated mucous secretions in such conditions as:

- Chronic bronchitis
- Bronchiectasis
- Primary amyloidosis of the lung
- Certain chronic lung conditions associated with emphysema
- Impairment of Fertility
- Atelectasis due to mucous obstruction
- Pulmonary complications associated with surgery
- Naso- and oropharyngeal aspirations
- Bronchoscopies
- Pulmonary complications of cystic fibrosis
- Tracheostomy
- Tracheostomy care
- Atelectasis due to mucous obstruction

Acetylcysteine is indicated in patients who are sensitive to it.

Clindamycin may be given every 1 to 4 hours by instillation into the tracheostomy.

Acetylcysteine may be introduced directly into a particular segment of the bronchomotoric tree by inserting a naso- or oropharyngeal catheter and directing the aerosol towards this segment. The aerosol may be given as a nebulizer treatment or as a nebulizer aerosol instilled into a tracheostomy or endotracheal tube. A heated nebulizer may be part of the nebulizer assembly to provide a warm saturated atmosphere if the acetylcysteine aerosol is introduced by means of a separate unheated nebulizer. Usual precautions for administration of nebulizer therapy should be observed.

Acetylcysteine should be discontinued immediately.

Adverse Reactions

Acetylcysteine does not contain an antimicrobial agent, and care must be taken to minimize contamination of the sterile solution. If only a portion of the solution in a vial is used, store the remainder in a refrigerator and use for injection within 48 hours.

Nebulization

Nebulization — Face Mask, Mouthpiece, Tracheostomy: When nebulized into a face mask, mouthpiece, or tracheostomy, 1 to 10 mL of the 20% solution or 2 to 20 mL of the 10% solution may be given every 2 to 6 hours to each patient. When the most patients is 3 to 5 mL of the 20% solution or 6 to 10 mL of the 10% solution three to four times a day.

Nebulization — Tent, Croupette: In special circumstances it may be necessary to nebulize into a tent or croupette, and this method of use must be individualized to take into account the equipment available, the patient's particular needs. This form of administration requires very large volumes of the solution, occasionally as much as 30 to 50 mL per treatment. When more than 5 mL of the 20% solution may be given every 1 to 4 hours by instillation into the tracheostomy.

Direct Instillation: When used by direct instillation, 1 to 2 mL of a 10% to 20% solution may be given as often as every hour.

When used for the routine nursing care of patients with tracheostomy, 1 to 2 mL of a 10% to 20% solution may be given every 1 to 4 hours by instillation into the tracheostomy.

Acetylcysteine may be introduced directly into a particular segment of the bronchomotoric tree by inserting a naso- or oropharyngeal catheter and directing the aerosol towards this segment. The aerosol may be given as a nebulizer treatment or as a nebulizer aerosol instilled into a tracheostomy or endotracheal tube. A heated nebulizer may be part of the nebulizer assembly to provide a warm saturated atmosphere if the acetylcysteine aerosol is introduced by means of a separate unheated nebulizer. Usual precautions for administration of nebulizer therapy should be observed.

Administration of Aerosol

Materials: Acetylcysteine solution may be administered using disposable nebulizers made of plastic or glass. Certain materials used in nebulization equipment react with acetylcysteine. The most reactive of these are certain metals (notably iron and copper) and rubber. Where materials may come into contact with acetylcysteine solution, parts made of the following acceptable materials should be used: glass, plastic, aluminum, anodized aluminum, tin-plated metal, or stainless steel. Silver may become tarnished after exposure, but this is not harmful to the drug or to the patient.

Nebulizing Gases: Compressed tank gas (air) or an air compressor should be used to provide pressure for nebulizing equipment. Oxygen is not recommended but should be used with usual precautions in patients with severe respiratory disease and CO2 retention.

Apparatus: Acetylcysteine solution is usually administered as a nebulizer and the nebulizer used should be carefully selected in order to achieve the optimum distribution of the aerosol in the respiratory tract. The nebulizing equipment should be cleaned and disinfected to avoid bacterial contamination. Commercially available nebulizers will produce nebulae of acetylcysteine satisfactory for retention in the respiratory tract. Most of the nebulizers tested will supply a high proportion of the drug solution as particles of less than 1 micron in diameter but this is not of itself a test of nebulization.

Nebulizing equipment should be cleaned immediately after use, otherwise the residues may clog the nebulizer.

Drugs Interactions: Safety and stability of acetylcysteine when mixed with other drugs in a nebulizer have not been confirmed by patch testing. Sensitization has been confirmed in several inhalation therapists who reported a history of dermal eruptions after frequent and extended exposure to acetylcysteine. When nebulized into the chamber, although hemoptysis has occurred in patients receiving acetylcysteine such findings are not uncommon in patients with bronchopulmonary disease and a causal relationship has not been established.

DOSAGE AND ADMINISTRATION

General

Acetylcysteine Solution, USP is available in rubber stoppered glass vials containing 10 mL or 30 mL. The 20% solution may be diluted to a lesser concentration with either Sodium Chloride Injection, Sodium Chloride for Injection, Lactated Ringer's Injection or a similar solution. The 10% solution may be given undiluted.

ACETYLCYSTEINE SOLUTION, USP

Rrx only

DESCRIPTION

Acetylcysteine is the nonproprietary name for the N-acetylated derivative of the naturally occurring amino acid, l-cysteine. Chemically, it is N-acetyl-l-cysteine. The compound is a white crystalline powder melts in the range of 104° to 105° and has a very slight odor. The structural formula of acetylcysteine is:

$$\text{H}_2\text{NCOCH}_2\text{SH}$$

$$\text{C} \quad \text{C} \quad \text{O} \quad \text{N}$$

$$\text{H} \quad \text{H} \quad \text{C} \quad \text{O}$$

The viscosity of pulmonary mucous secretions depends on the concentrations of mucoprotein and, to a lesser extent, deoxyribonucleic acid (DNA). The latter increases with increasing purulence owing to the presence of cellular debris. The viscosity of acetylcysteine in the opened bottle. The light purple color is removed by washing with water.

Acetylcysteine is administered by nebulization. If bronchospasm progresses, the medication should be discontinued immediately.

INDICATIONS AND USAGE

Acetylcysteine is indicated as adjuvant therapy for patients with abnormally viscous secretions.

Acetylcysteine is indicated as adjuvant therapy for patients with abnormally viscous secretions.

Acetylcysteine is indicated in patients who are sensitive to it.

EXPERIENCE

Prolonged Nebulization:

The nebulizing equipment should be cleaned immediately after use, otherwise the residues may clog the nebulizer. If bronchospasm progresses, the medication should be discontinued immediately.

PRECAUTIONS

General

With the administration of acetylcysteine, the patient may observe initially a slight disagreeable odor that is soon not noticeable. With a face mask there may be stickiness on the face after nebulization. This is easily overcome by frequent application of a sterile saline solution or by washing with water.

Under certain conditions, a color change may occur in acetylcysteine in the opened bottle. The light purple color is removed by washing with water.

Acetylcysteine is not attacked by alkali within the recommended pH range. Under certain conditions, a color change may occur in acetylcysteine in the opened bottle. The light purple color is removed by washing with water.

Acetylcysteine is a very slightly effervescent solution. The solution contains sodium bicarbonate and sodium carbonate.

Under certain conditions, a color change may occur in acetylcysteine in the opened bottle. The light purple color is removed by washing with water.

Acetylcysteine is indicated as adjuvant therapy for patients with abnormally viscous secretions.

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Acetylcysteine is indicated in patients who are sensitive to it.
Acetylcysteine has been shown to reduce the extent of liver injury following acetaminophen overdose. Its effectiveness depends on early oral administration and benefit seen principally in patients treated within 16 hours of the overdose. Acetylcysteine probably protects the liver by maintaining or restoring the glutathione levels, or by activating the efflux pump which results in detoxification of the reactive metabolite.

INDICATIONS AND USAGE

Acetylcysteine, administered orally, is indicated as an antidote to prevent or lessen hepatic injury which may occur following the ingestion of a potentially hepatotoxic quantity of acetaminophen. Acetylcysteine probably protects the liver by maintaining or restoring the glutathione levels, or by activating the efflux pump which results in detoxification of the reactive metabolite.

ACETYLCYSTEINE SOLUTION IS NOT APPROVED FOR

DILUTION AND ADMINISTRATION

To prepare the acetylcysteine solution for administration, complete the following procedure:

A. Preparation of Acetylcysteine Solution for Oral Administration

1. Maintain fluid and electrolyte balance based on clinical evaluation of state of hydration and serum electrolytes.

2. Treat as necessary for hypoglycemia.

3. Administer vitamin K1, if prothrombin time ratio exceeds 1.5 or fresh frozen plasma if the prothrombin time ratio exceeds 3.0.

4. Diuretics and forced diuresis should be avoided.

Estimating Potential for Hepatotoxicity:

The following nomogram has been developed to estimate the probability that plasma levels in relation to intervals post-ingestion will result in hepatotoxicity.

Acetaminophen Assays - Interpolation and Methodology:

The acute ingestion of acetaminophen in quantities of 150 mg/kg or greater may result in hepatic toxicity. However, the reported history of the quantity of a drug ingested as an overdose is often inaccurate and is not a reliable guide to therapy of the overdose. Therefore, SERUM OR SERUM ACETAMINOPHEN CONCENTRATIONS, DETERMINED AS EARLY AS POSSIBLE, BUT NO SOONER THAN FOUR HOURS FOLLOWING AN ACUTE OVERDOSE, ARE ESSENTIAL IN ASSESSING THE POTENTIAL RISK OF HEPATOTOXICITY. IF AN ASSAY FOR ACETAMINOPHEN CANNOT BE OBTAINED, IT IS NECESSARY TO ASSUME THAT THE OVERDOSE IS POTENTIALLY TOXIC.

Acetaminophen Assay Methodology: Assays procedures must be suitable for determining acetaminophen concentrations using high performance liquid chromatography (HPLC) or gas liquid chromatography (GLC). The assay may use only parent acetaminophen and not conjugated. The assay procedures listed below fulfill this requirement.

Selected Techniques (nonnucleic): HPLC


Colorimetry


Supportive Treatment of Acetaminophen Overdose:

1. Maintain fluid and electrolyte balance based on clinical evaluation of state of hydration and serum electrolytes.