HYDROGEN PEROXIDE
by Stacie Rabe, PharmD

Introduction

In July 2006, the FDA warned consumers not to ingest high concentration (35%) or ‘Food Grade’ hydrogen peroxide because it can cause ill health effects and even death.1 This warning was in response to health claims that promoted the use of ‘Food Grade’ hydrogen peroxide to cure diseases such as cancer, AIDS, and multiple sclerosis. The use of ‘Food Grade’ hydrogen peroxide to cure diseases has also been called ‘hyperoxygenation therapy’.2 ‘Food Grade’ hydrogen peroxide is available for purchase at health food stores and online retailers. Various routes of administration are recommended by retailers and include ingestion, topical application, IV infusion and enemas.3

Pharmacology

Hydrogen peroxide is a topical antiseptic and disinfectant in concentrations less than 6%. It can be applied to the skin or used as an oral rinse. It should not be used in the eye, or on large areas of the body, puncture wounds, or burned skin.4 It is also an oxidizing agent and releases oxygen when it comes into contact with tissue. The amount of oxygen released depends on the concentration of hydrogen peroxide. One ml of 3% solution releases 10 ml oxygen, whereas one ml of 35% solution releases 100 mL of oxygen.5

Adverse Effects & Toxicology

Concentrated solutions (> 10%) are used for bleaching paper and textiles, manufacturing other chemicals, as a food preservative and for the production of rocket fuel. Toxicity can occur following ingestion, skin or mucous membrane exposure, inhalation and wound irritation. The severity of toxicity is dependent on the route and duration of exposure, and the concentration of the solution.

The concentration of hydrogen peroxide used in “hyperoxygenation” therapy varies depending on the route of administration. Topical application is typically 3%, IV administration is usually 0.075%, and the concentration recommended for ingestion is 35%.6 Proponents of hyperoxygenation therapy recommend diluting the peroxide in drinks, such as juice and water.7 They also recommend storing a small bottle of the hydrogen peroxide in the refrigerator, a contributing factor to unintentional exposures.6

A study performed by the Utah Poison Control Center (cont. on pg. 2)
TOXICOLOGY TODAY

EDUCATION MATERIAL HIGHLIGHT

The UPCC worked collaboratively with a pediatric resident to develop a new brochure. The brochure title, “In Your Hands or Out Of Reach,” is a reminder that potential poisons should be put away when not in use. This brochure includes a list of common potential poisons from around the home, helpful hints to prevent poisonings, and a household checklist, and is available in English and Spanish. It was reviewed by pediatric healthcare providers and parents. We are excited to share the new product with you. If you would like copies to distribute, you may order it using the order form on our website: www.utahpoisoncontrol.

( cont. from pg. 1 )

Hydrogen Peroxide

Center reviewed 325 hydrogen peroxide exposures reported over a 36 month period. Most of the exposures were from ingestion (85%), less severe outcomes were associated with concentrations < 10% (compared to > 10%) and the only severe outcomes (or death) were from ingestion of 35% hydrogen peroxide. Common symptoms from ingestion of 3% hydrogen peroxide are vomiting, mild abdominal pain and bloating. As a strong oxidizer, it is corrosive and can cause severe burns to the GI mucosa, mucus membranes, skin and eyes. Systemic effects after ingestion are due to the oxygen gas that is released, which can cause massive gastric distention, perforation and gas embolism to various organs causing life-threatening tissue ischemia. Following oral ingestion a patient may present with white discoloration of the skin around the mouth, vomiting blood or foam, abdominal pain and bloating, seizures, gastric mucosal hemorrhage and edema. Symptoms of a gas embolism include rapidly deteriorating mental status, cyanosis, respiratory failure, seizures, and ischemic EKG changes. A MRI of the brain can be used to assess for anoxic brain injury.

Skin exposure to 35% can result in blistering and necrosis. Embolic complications have resulted from bowel and wound irrigation. Acute hemolytic anemia, air embolism, hemorrhage and death have been reported following IV infusions of hydrogen peroxide. Inhalation of concentrated solutions has resulted in pulmonary edema, coma and seizures.

Treatment

Topical exposures should be thoroughly irrigated with water. Decontamination with activated charcoal is not recommended. There is a high risk of aspiration, charcoal does not bind hydrogen peroxide and administration will make endoscopic evaluation more difficult. Nasogastric aspiration can potentially remove large volumes of hydrogen peroxide if the patient presents immediately after exposure. Patients with abdominal distention from oxygen liberation should be treated with nasogastric suctioning. A chest or abdominal x-ray can be used to look for gas emboli. There are case reports that hyperbaric oxygen therapy is helpful in treating hydrogen peroxide associated gas emboli. Patients who are asymptomatic can be released after 6 hours. Patients who experienced any cardiac or pulmonary symptoms should be admitted and observed for 24 to 72 hours.

References


OUTREACH EDUCATION

POISON CONTROL UPDATE CONFERENCE

MAY 29TH, 2008 AND JUNE 5TH, 2008

The Utah Poison Control Center is offering regional update conferences in Salt Lake on May 29th and Richfield on June 5th. The goal is to provide a forum for health professionals and other public health advocates to improve their knowledge and understanding of current poisoning issues, including: Trends in prescription and OTC drug abuse, recent poisonings in the news, and education tools for high risk populations. ACPE, CHES, and UNA continuing education credits will be available.

Registration is due by April 18th.

Visit our website for the Update Conference Registration Brochure www.utahpoisoncontrol.org

TOXICOLOGY TODAY

A publication for Health Professionals.
Sympathomimetics

methamphetamine manufacturing, the Combat Methamphetamine Epidemic Act of 2005 restricts pseudoephedrine, as well as phenylpropanolamine and ephedrine, to be sold “behind the counter” in limited amounts (3.6 grams per day or 9 grams per 30 days) requiring photo identification with each purchase. As a result, manufacturers have reformulated many pseudoephedrine containing products with phenylephrine, which cannot be converted to methamphetamine.

Phenylephrine has replaced pseudoephedrine as the most commonly available nasal decongestant in a variety of non-prescription cough and cold preparations. The safety and effectiveness of phenylephrine was the subject of a recent FDA non-prescription drug advisory committee meeting.

Pharmacology

Phenylpropanolamine and phenylephrine are sympathomimetic amines that work by direct stimulation of alpha,-adrenergic receptors. Pseudoephedrine has both direct and indirect alpha and beta (greater affinity) adrenergic activity. These agents are used as nasal decongestants and work by acting directly on alpha-adrenergic receptors in the mucosa of swollen nasal membranes resulting in vasoconstriction and decreased nasal congestion.

In general, sympathomimetic amines have both cardiac and central nervous system stimulatory properties. Common adverse effects include excitability, restlessness, anxiety, dizziness, tremor and hypertension. Tachycardia is common with pseudoephedrine, whereas reflex bradycardia may occur with phenylpropanolamine and phenylephrine.

Safety

There has been much attention to the risk for serious and life-threatening cardiac and CNS events associated with sympathomimetic agents beginning with phenylpropanolamine. In 2004, the FDA banned ephedra alkaloids in dietary supplements due to unreasonable cardiac and CNS risks. Pseudoephedrine, a stereoisomer, of ephedrine, has also been associated with myocardial infarction.

A recent FDA nonprescription drug advisory committee meeting focused on the safety and efficacy of phenylephrine. A report of the outcome of that committee meeting has not yet been published. Along with concerns about individual decongestants, the FDA has been evaluating information about the safety and efficacy of OTC cough and cold preparations in general in the pediatric population. On January 17, 2008 the FDA issued a public health advisory recommending avoiding use of OTC cough and cold preparations in children under 2 years of age. The FDA is currently evaluating the safety of OTC cough and cold preparations in children 2-11 years of age. Many manufacturers have voluntarily withdrawn OTC cough and cold preparations marketed for children under the age of 2 years. The public health advisory followed review of serious side effects reported in children and the recommendations of the FDA nonprescription advisory board.

OTC medications that were marketed prior to 1962 are approved under a monograph approved by therapeutic class. Medications included in OTC monographs are generally considered safe and effective although they do not undergo the same rigorous evaluation as a prescription or OTC product approved through a new drug application. Rigorous evaluation of safety and efficacy of individual drugs in all age groups is not generally available.

Summary

Sympathomimetic nasal decongestants are available to consumers in many different OTC cold remedies as single and combination products. They may be perceived as safe to the public because of their OTC status. While the risk of serious and life-threatening adverse events with OTC decongestants is rare, no drug is completely safe. Clinicians should be aware of the risks and benefits of OTC nasal decongestants and report any serious adverse reactions or toxicity to the poison control center and/or through the FDA MedWatch program.

References

Fentanyl Patch Deaths: Deaths and life-threatening events have occurred in opioid-naive patients and when opioid-tolerant patients have applied more patches than prescribed, changed the patch too frequently, and exposed the patch to a heat source.

Fentanyl Buccal Tablets (Fentora): Life-threatening respiratory depression can occur in patients who are not opioid-tolerant. It should not be prescribed for acute or postoperative pain, headaches, or post-traumatic pain. Patients should never take more than two doses to treat an episode of breakthrough pain. Fentora cannot be substituted for Actiq on a mcg-for-mcg basis. [http://www.fda.gov/medwatch/safety/2007/safety07.htm#Fentora]

Sudden Hearing Loss from Erectile Dysfunction Drugs: Acute hearing loss with occasional tinnitus, vertigo, or dizziness has been reported in patients taking erectile dysfunction drugs (PDE5 inhibitors: Viagra (sildenafil), Cialis (tadalafil) and Levitra (vardenafil)). In most cases the hearing loss involved one ear, and about a third of the time it was temporary. [http://www.fda.gov/medwatch/safety/2007/safety07.htm#PDE5]

Biphosphonates Associated Pain: Severe bone, joint, or muscle pain has occurred in patients taking biphosphonates. The pain may occur within days, months, or years after starting the drug. [http://www.fda.gov/medwatch/safety/2008/safety08.htm#Bisphosphonates]

*CSPI denotes Certified Specialist in Poison Information.

**TOXINS IN THE NEWS**

**MEET THE UPCC STAFF**

Barbara Insley Crouch, PharmD, MSPH joined the UPCC in 1990. Since 1992 she has served as the UPCC director. She received her BS in Pharmacy from the Philadelphia College of Pharmacy and Science, her PharmD jointly administered by the University of Texas Health Science Center at San Antonio and The University of Texas at Austin College of Pharmacy. She completed a Clinical Toxicology Fellowship at the Maryland Poison Center, University of Maryland School of Pharmacy. She received a masters of science in public health from the University of Utah. Prior to moving to Utah she worked at the Delaware Valley Regional Poison Control Center and the San Francisco Bay Area Regional Poison Control Center. She is also a faculty member in the Department of Pharmacotherapy, University of Utah College of Pharmacy where she also serves as vice-chair. When not working she enjoys cooking, exercise, reading, snowshoeing, skiing, hiking and camping. Favorite poisoning topics: inhalants, non-prescription drugs of abuse, salicylates and dietary supplements.

**UTAH POISON CONTROL CENTER STAFF**

Director  
Barbara Insley Crouch, PharmD, MSPH

Medical Director  
E. Martin Caravati, MD, MPH

Associate Medical Director  
Douglas E. Rollins, MD, PhD

Assistant Directors  
Heather Bennett, MPA  
Scott Marshall, PharmD, CSPI*

Administrative Assistant  
Julie Gerstner

Specialists in Poison Information  
Kathleen T. Anderson, PharmD, CSPI*  
Michael Andrus, PharmD  
Bradley D. Dahl, PharmD, CSPI*  
Michael L. Donnelly, RN, BSN, CSPI*  
Craig Graham, RN, BSN  
Mo Mulligan, RN, BSN, JD  
Ed Moltz, RN, BSN, CSPI*  
Sandee Oliver, RN, BSN, CSPI*

Poison Information Providers  
Megan Glanville  
Monique Hall  
Christine Holman  
Karen Thomas

Outreach Education Provider  
Marty C. Malheiro, MS, CHeS

Assistant Education Provider  
Sherri Pace, BS, CHES

Editors  
E. Martin Caravati, MD, MPH  
Barbara Insley Crouch, PharmD, MSPH

Please send comments and suggestions for future articles to the editor of Toxicology Today at:

585 Komas Dr., Suite 200  
Salt Lake City, Utah 84108

Or send e-mail to  
poison@hsc.utah.edu

*CSPI denotes Certified Specialist in Poison Information.

**THANK YOU**

The Utah Poison Control Center expresses its sincere thanks to the health care professionals, public health officials and toxicology colleagues that work together to treat and prevent poisonings.

The University of Utah  
Utah Poison Control Center  
Administrative: (801) 587-0600