HYDROFLUORIC ACID/FLUORINE GAS EXPOSURE

SIGNS & SYMPTOMS:
1. Skin corrosion, ulceration, blisters, or burns
2. Excruciating pain
3. Eye discomfort w/ tearing or visual disturbance
4. Eye, nose, or throat irritation
5. Coughing, painful breathing, pulmonary edema
6. Cardiac arrhythmias, esp. prolonged Q-T segment (occurs just prior to arrest)
7. Severely reddened, swollen areas with blanched, whitish regions

OBTAIN HISTORY OF:
1. PMH/Meds/Allergies
2. Concentration & temperature of HF
3. Duration of exposure
4. Elapsed time since exposure
5. First aid measures instituted prior to arrival
6. Enclosed or open space exposure
7. How exposure occurred

INTRODUCTION:

Hydrofluoric acid (HF) is primarily an industrial raw material. It is present in the household product Whink™ and used in stainless steel, aluminum, organic and inorganic chemicals, and electrical component manufacturing, in iron and steel foundries, metal finishing, petroleum refining, mineral processing, and glassmaking. Employees that work with the chemical will be a valuable resource to EMS personnel and are usually familiar with and trained in first aid measures. Many companies have HF exposure kits available as well that contain the antidotes (medications) mentioned in this guideline.

HF differs from other acids because of its unique ability to penetrate tissue, bind body calcium and persist in its action for some time after initial exposure. Anhydrous HF causes immediate and serious burns on contact. Concentrations above 50% cause immediate burns and rapid tissue destruction. Initial therapy is important because it may bring tissue destruction to a halt. Flourine gas is a powerful oxidizer. It rapidly forms HF on contact with moisture. HF gas causes skin and eye irritation, delayed burns, lung damage and pulmonary edema. It is fortunate that the odor threshold is very low compared to the levels that can cause harm to health. These warning properties give people working with the material an opportunity to escape.

PRECAUTIONS:
1. Extremely hazardous liquid and gas.
2. Concentrations $< 50\%$ may not produce symptoms for ≥ 8 hours.
3. Relief of pain is an excellent indication of the success of treatment and therefore anesthetics should be avoided.
4. Take appropriate precautions and wear impervious gloves when treating victims.
5. Do not induce vomiting for ingestions.

BASIC LIFE SUPPORT CARE:
1. Administer oxygen.
2. If present, allow trained workers or first responders to administer HF antidote kit.
3. Remove contaminated clothing and flush exposed areas (including eyes) with copious amounts of water for at least 20 minutes. If antidote kit is available, flush for 5 minutes and proceed as directed.
4. EMT with IV training - establish IV of NS TKO.
5. Initiate cardiac monitoring.
6. Immediate and follow-up care is extremely important. Even minor exposures should be transported to a Burn Center.

ADVANCED LIFE SUPPORT CARE: In addition to above and as appropriate:
1. HF rapidly depletes body calcium. Be prepared to administer IV calcium chloride or calcium gluconate under the direction of a medical control physician.

SPECIAL CONSIDERATIONS FOR 3M INCIDENTS: HF kits are available in HF work areas and at many of the guard stations. In addition to the above and using the contents of kits provided, exposures at 3M are treated in the following way:
1. Skin Contact
   A. Flush skin with copious amounts of water for five minutes, then
   B. Rub Calcium Gluconate gel into the burn area; or
   C. Apply aqueous iced Zephiran to the burn area.
   D. Continue until pain completely subsides or until medical attention is received.
2. Eye Contact

A. Holding the eyelids apart, continuously flush the eyes with large amounts of water or saline.
B. A surface anesthetic such as Opthane may be used.
C. If available, the contact lens/IV tubing apparatus may be used for irrigation after the anesthetic is given.

3. Inhalation
   A. Administer a 20 minute treatment of nebulized 2.5% Calcium Gluconate.

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