POISINDEX(R) SUBSTANCE IDENTIFICATION

MACE (LACRIMATOR)

SYNONYMS:
CAS 532-27-4
UN 1697
NA 1697
STCC 4925220
NIOSH/RTECS AM 6300000
NCI-c 55107
CHLOROACETOPHENONE
CAF
CAP
CHLOROMETHYL PHENYL KETONE
CN
MACE (LACRIMATOR)
PHENACYL CHLORIDE
PHENYLCHLOROMETHYLKETONE (Main substance.)
C8H7ClO (MOLECULAR FORMULA) (CHLOROACETOPHENONE)
ACETOPHENONE, 2-CHLORO-
a-CHLOROACETOPHENONE
alpha-CHLOROACETOPHENONE
omega-CHLOROACETOPHENONE
1-CHLOROACETOPHENONE
2-CHLOROACETOPHENONE
ETHANONE, 2-CHLORO-1-PHENYL-

Choose management by its number
1. LACRIMATORS
2. WARFARE AGENTS

Product Reference: 2940074

CARBON MONOXIDE IS FORMED WHENEVER CARBONACEOUS MATERIAL IS BURNED WITH INSUFFICIENT OXYGEN.
EXHAUST OR FUEL GASES MAY CONTAIN CORROSIVE OXIDES OF NITROGEN AND SULFUR.
METHANE IS A SIMPLE ASPHYXIANT AND IN HIGH CONCENTRATIONS CAUSES NARCOSIS.

Choose toxicologic management by its number
1. ASPHYXIANTS, SIMPLE

Enter Command: Product Reference: 2297326 04/75
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F2 Main Menu F10 Next Substance
F3 New Substance Esc Last Menu F4 Print
POISINDEX(R) Toxicologic Management

Topic: LACRIMATORS (Mace Exposure.)

2.1 SUMMARY OF EXPOSURE
A. INITIAL SYMPTOMS: In threshold concentrations the lacrimators cause immediate ocular burning, blepharospasm, lacrimation and pain but no tissue damage. In higher concentrations chemical burns with loss of the corneal epithelium may be noted.
B. DELAYED SYMPTOMS: Initial symptoms may be followed by chest tightness and coughing, burning of the tongue and mouth, salivation, and vomiting. Burning of the skin, followed by erythema, may occur.
C. DURATION: Symptoms subside rapidly with 15-30 minutes of cessation of exposure in most individuals. Ocular symptoms may persist if the eyes are rubbed.

2.3 HEENT
2.3.1 HEAD
A. HEADACHE: Was reported in 48% of symptomatic persons exposed to chloropicrin (Goldman et al, 1987).

2.3.2 EYES
A. SUMMARY
1. Ocular burning and pain and lacrimation are the most important clinical effects, and may last for up to 30 minutes following exposure. Blepharospasm is characteristic. Redness and edema may persist for up to 48 hours. Corneal opacification is rare. Mydriasis has been reported. High concentrations of CN (chloroacetophenone) have produced ocular necrosis in animals.
B. LACRIMATION
1. Lacrimation and ocular burning and pain and are the most important clinical effects, and, depending upon the atmosphere, may last for up to 30 minutes following exposure (Beeswick, 1983).
C. PAIN
1. Ocular burning and pain and lacrimation are the most important clinical effects, and, depending upon the atmosphere, may last for up to 30 minutes following exposure (Beeswick, 1983).
D. BLEPHAROSPASM
1. Characteristic finding (Grant, 1986).
E. REDNESS/EDEMA
1. May last for up to 48 hours. Vascularizing keratitis has been reported.
F. CORNEAL OPACIFICATION
1. May occur from short range contamination with CN (chloroacetophenone) from tear gas pistols (Grant, 1986).
G. NECROSIS

1. High concentrations of CN (chloroacetophenone) have produced ocular necrosis in animals (Grant, 1986).

H. MYDRIASIS
1. Noted on autopsy of a 18-year-old female sprayed with chloropicrin (Gonmori et al, 1987).

2.3.4 NOSE
A. SUMMARY
1. Rhinorrhea, sneezing, and burning pain occur within seconds and are characteristic of exposure (Beeswick, 1983).
B. RHINORRHEA
1. Rhinorrhea, sneezing, and burning pain occur within seconds and are characteristic of exposure (Beeswick, 1983).
C. SNEEZING
1. Sneezing, rhinorrhea, and burning pain occur within seconds and are characteristic of exposure (Beeswick, 1983).
D. PAIN
1. Burning pain, sneezing, and rhinorrhea occur within seconds and are characteristic of exposure (Beeswick, 1983).

2.3.5 THROAT
A. SUMMARY
1. Salivation, sore throat, and burning or stinging pain of the tongue may occur within seconds to minutes.
B. SALIVATION
1. Salivation, sore throat, and burning or stinging pain of the tongue may occur within seconds to minutes (Beeswick, 1983; Thorburn, 1982).
C. PHARYNGITIS
1. Sore throat, salivation, and burning or stinging pain of the tongue may occur within seconds to minutes (Beeswick, 1983; Thorburn, 1982).
D. TONGUE PAIN
1. Burning or stinging pain of the tongue, salivation, and sore throat may occur within seconds to minutes (Beeswick, 1983; Thorburn, 1982).

2.4 CARDIOVASCULAR
A. SUMMARY
1. Tachycardia and mild hypertension may occur as a result of fear and pain. Congestive heart failure may occur in adults after exposure to high concentrations of 2-chloroban (CS).
B. TACHYCARDIA
1. Tachycardia and mild hypertension may occur as a result of fear and pain (Beeswick, 1983).
C. HYPERTENSION
1. Mild hypertension and tachycardia may occur as a result of fear and pain (Beeswick, 1983).
D. CONGESTIVE HEART FAILURE

Topic: LACRIMATORS

1. Reported in adults after exposure to high concentrations of 2-chloroban (CS) (Hu, 1989).

2.5 RESPIRATORY

A. SUMMARY

1. Coughing, sneezing, and chest tightness immediately after exposure are characteristic; these symptoms may persist for weeks. Laryngospasm may occur immediately. Pulmonary edema may occur as a delayed (usually 12-24 hours post-exposure) effect. Bronchospasm and bronchopneumonia may occur immediately or as delayed effects.

B. COUGH

1. Coughing, sneezing, and chest tightness immediately after exposure are characteristic; these symptoms may persist for weeks after exposure (Beeswick, 1983; Hu, 1989).

C. SNEEZING

1. Sneezing, coughing, and chest tightness immediately after exposure are characteristic; these symptoms may persist for weeks after exposure (Beeswick, 1983; Hu, 1989).

D. CHEST TIGHTNESS

1. Chest tightness, sneezing, and coughing immediately after exposure are characteristic; these symptoms may persist for weeks after exposure (Beeswick, 1983; Hu, 1989).

E. LARYNGOSPASM

1. May occur immediately after exposure due to irritant effects.

F. PULMONARY EDEMA

1. SUMMARY: May occur up to 24 (usually 12-24) hours post-exposure. Fatalities have been reported (Sonmori, 1987).
2. CASE REPORT (ADULTS): An 18-year-old female sprayed with chloropicrin died of pulmonary edema with an onset of 3 hours postexposure (Gonmori et al, 1987).
3. CASE REPORT (ADULTS): Krapf & Thalmann (1981) reported a 43-year-old who developed pulmonary edema complicated by pneumonia, heart failure, and hepatocellular damage.

G. BRONCHOSPASM

1. SUMMARY: Develops in most individuals exposed to an enclosed space (Anon, 1971). May be delayed up to 48 hours post-exposure and persist indefinitely. Occasionally associated with bronchorrhea (Folb, 1989).
2. CASE SERIES: Delayed onset (1-2 days post-exposure) laryngotracheobronchitis, characterized by wheezing, dyspnea, tachypnea, hoarseness, fever, and purulent sputum, was reported in 3/8 patients severely exposed to CN (chloroacetophenone). Long term bronchodilator

therapy was required in one patient with pre-existing pulmonary disease (Thorburn, 1982).
3. CASE REPORT (ADULT): Bronchospasm was reported in a 21 year old female with no previous pulmonary disease following exposure to CS in a closed space for 5-10 minutes. Immediate cough and dyspnea required treatment with inhaled beta agonists, theophylline, and steroids; symptoms persisted 2 years after exposure and were exacerbated by exercise, cold air or smoke exposure, despite continued bronchodilator and steroid treatment (Hu, 1992).

H. BRONCHOPNEUMONIA
1. May occur from prolonged exposure to chlorbenzylidene malononitrial (CS) in an enclosed space. Onset may be delayed by about 24 hours or more (Beeswick, 1983).

I. RESPIRATORY TRACT INJURY
1. Experimental animal studies have shown that lower respiratory tract injury (fibrosing peribronchitis and peribronchiolitis) can be produced by chloropicrin (Buckley et al, 1984).

2.6 NEUROLOGIC

A. SUMMARY
1. Agitation and syncope, both attributed to panic, have been reported.

B. AGITATION
1. Agitation and panic may develop in individuals not previously exposed to teat gas (Beeswick, 1983; Stein, 1984).

C. SYNCOPE
1. Has been reported (Athanaselis, 1990).

2.7 GASTROINTESTINAL

A. SUMMARY
1. A metallic taste with a burning sensation of the tongue is common. Nausea is common; vomiting occurs occasionally. Epigastric discomfort and burping may occur if tear gas is swallowed.

B. TASTE
1. A metallic taste with a burning sensation of the tongue is common (Folb, 1989).

C. TONGUE DYSESTHESIAS
1. A burning sensation of the tongue with a metallic taste is common (Folb, 1989).

D. NAUSEA
1. Nausea is common; vomiting occurs occasionally (Athanaselis, 1990).

E. VOMITING
1. SUMMARY
a. Nausea is common; vomiting occurs occasionally (Athanaselis, 1990).

b. CASE SERIES
1. Vomiting was reported in 2 of 8 patients with severe reactions to CN in an enclosed space. Vomiting lasted for 1 week in one patient (Thorburn, 1982).

F. EPIGASTRIC DISCOMFORT
1. Likely to occur if tear gas is swallowed (Beeswick, 1983).

2.8 HEPATIC
A. HEPATOTOXICITY
1. CASE REPORT: Hepatocellular injury reported in one case of serious CS gas intoxication (Krapf, 1981).

2.9 GENITOURINARY
A. NEPHRITIS
1. Reported anecdotally in 1 patient after a lacrimator manufacturing plant explosion (Cookson, 1969).

2.15 DERMATOLOGIC
A. SUMMARY
1. Irritation will occur to all body surfaces exposed for a significant period of time. Erythema is common, and usually resolves within 48 hours. Allergic contact dermatitis may occur. First and 2nd degree burns may occur with high concentration exposure.

B. IRRITATION
1. All body surfaces exposed for a prolonged period will be irritated, particularly with chloropicrin.

C. ERYTHEMA
1. A common effect, which generally resolves within 28 hours.

D. ALLERGIC CONTACT DERMATITIS
1. Has been reported (Penneys, 1971; Madden, 1951).
2. Sensitization is more likely to occur after dermal exposure to high concentrations under occlusion (Holland & White, 1972; Pennys et al, 1969; Leenutaphong & Goerz, 1989).
3. Reactions can persist for up to 4 weeks (Leenutaphong & Goerz, 1989).
4. This hypersensitivity has been shown to chloroacetophenone (Kissin & Mazer, 1944; Ingram, 1942); to Mace (chloroacetophenone, 5% chloroethane, 4% hydrocarbons) (Steffen, 1968; Frazier, 1976), and to CS (orthochlorobenzylidene) (Ro & Lee, 1991).

E. BURNS
1. High concentrations may produce first and second degree burns of the skin (Stein & Kirwan, 1964; Hu et al, 1987). A high incidence of burns in one series of prisoners exposed to CN was attributed to showering without removal of clothing and contact with flooded floors (Thorburn, 1982).

2.19 PREGNANCY/BREAST MILK