BASF Chemical Emergency Medical Guidelines

Acrylamide (CH_2=$CHCONH_2$) C 1

Information and recommendations for doctors at hospitals/emergency departments

- **Patients exposed only to acrylamide mist or vapor do not pose a significant risk of secondary contamination. Patients whose clothing or skin is contaminated with aqueous solutions of acrylamide (melting point 84.5°C, 184°F respectively) can secondarily contaminate rescue and medical personnel by direct contact or evaporation of acrylamide.**
- **Acrylamide is irritating when it comes in contact with the eyes, skin, nose and throat and causes hallucinations, hypotension, seizures, gastrointestinal disorders and adult respiratory distress syndrome. Encephalopathy, central nervous system changes and peripheral neuropathy may occur.**
- **There is no antidote to be administered to counteract the effects of acrylamide. Treatment consists of supportive measures.**

1. Substance information

Acrylamide (CH_2=$CHCONH_2$), CAS 79-06-1

Synonyms: acrylic acid amide, ethylenecarboxamide, vinyl amide

Acrylamide is, at room temperature, a colorless and odorless crystal with a melting point of 84.5°C, 184°F, respectively. It is soluble in acetone and ether, and miscible with water and alcohol. Acrylamide is stable at room temperature, but it is quite reactive and known to polymerize violently when heated to the melting point or under ultraviolet light. Therefore, acrylamide is usually handled as inhibited aqueous solution. Carbon monoxide, carbon dioxide, ammonia, and NO_x may be released in an acrylamide fire.

Acrylamide is used as a reactive monomer and intermediate in the production of organic chemicals in the manufacture of acrylamide polymers and copolymers such as adhesives, fibers, paper sizing, molded parts, water coagulant aids, and textiles.

2. Routes of exposure

Inhalation — **Exposure may occur by inhalation of acrylamide mist or vapor.** Acrylamide is readily absorbed by the respiratory tract.

Skin/eye contact — It is absorbed through the skin causing systemic effects.

Ingestion — Acrylamide is absorbed from the gastrointestinal tract. However, ingestion is uncommon in occupational settings.

3. Acute health effects

Systemic — **Acrylamide causes hallucinations, hypotension, seizures and gastrointestinal disturbances.** Acrylamide poisoning may cause respiratory depression and cardiovascular collapse. Even after acute high dose exposure the appearance of these symptoms may be delayed for hours.

Respiratory — Acrylamide is irritating to the upper respiratory tract and causes **adult respiratory distress syndrome.**

Dermal — Irritation of the skin may be caused by direct contact to aqueous solutions of acrylamide.

Ocular — Eye contact to vapor or aqueous solutions of acrylamide causes burning discomfort, spasmodic blinking or involuntary closing of the eyelids, redness, and tearing. Visual damage may occur due to retinal neuronal damage.

CNS — **Encephalopathy, central nervous system changes and peripheral neuropathy may occur.** Drowsiness, loss of

concentration, and midbrain and cerebellar signs (dysarthria, tremor, ataxia, gait disturbances) are the most common neurologic effects from acute and subacute exposures.

Dose-effect relationships

Quantitative human data concerning dose-effect and dose-response relationships are not available. However, in general, acrylamide exposure levels in the occupational environment are low. It appears that central nervous effects were seen following acute high dose acrylamide poisoning, but peripheral neuropathies occur after prolonged low-level exposure.

The time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect is 0.03 mg/m³. A worker should be able to escape within 30 minutes without injury or irreversible health effects from 600 mg/m³.

Potential sequelae

If the patient survives the initial 48 hours after inhalation exposure, recovery is likely. After acute exposure, pulmonary function usually returns to normal in 7 to 14 days. Complete recovery is usual; however, neurologic symptoms and pulmonary deficits may persist. After a severe intoxication incident, residual neurologic deficits may be present; recovery occurs within several months to a year, although severe exposures may result in permanent sequelae. Pulmonary tissue destruction and scarring may lead to chronic dilation of the bronchi and increased susceptibility to infection. Central nervous system changes (ataxia, dysarthria, and tremor) and peripheral neuropathies (weakness, paresthesia, fatigue, lethargy, decreased pinprick sensation, vibratory loss, decreased reflexes, desquamation of the palms and soles, sweating, and peripheral vasoconstriction) have been observed in chronically exposed workers.

Carcinogenicity

According to EC directive 1272/2008 acrylamide is classified as follows:
Carc. 1B (known or presumed human carcinogen, classification is largely based on animal evidence)
Muta. 1B (known or to induce or to be regarded as if they induce heritable mutations in the germ cell of humans, classification is is based on positive results from in vivo mutagenicity tests in mammals)

4. Actions

Decontamination

Patients exposed to acrylamide require decontamination.

Patients who are able and cooperative may assist with their own decontamination. If clothing is contaminated, remove and double-bag the clothing.

Assure that exposed or irritated eyes have been irrigated with plain water or saline for at least 15 minutes. If not, continue eye irrigation during other basic care.

Remove contact lenses if present and easily removable without additional trauma to the eye.

Assure that exposed skin and hair have been flushed with plain water for at least 15 minutes. If not, continue flushing during other basic care. Protect eyes during flushing of skin and hair.

Assure that following ingestion mouth was rinsed with plenty of water and afterwards charcoal as a slurry (240 ml water/30 g charcoal) has been administered. Induced emesis is not recommended.

Initial treatment

Therapy will be empiric; there is no specific antidote to counteract the effects of acrylamide.

If inhalation exposure has occurred and symptoms, e. g. eye irritation or pulmonary symptoms have developed:
The following measures are recommended if the exposure concentration is 10 ppm or greater (depending on time exposed),

if symptoms, e. g. eye irritation or pulmonary symptoms have developed, or if no exposure concentration can be estimated but exposure has possibly occurred:
- **Administration of oxygen**
- **Administration of 8 puffs of beclomethasone (800 µg beclomethasone dipropionate) from a metered dose inhaler.**

Patients with severe clinical respiratory symptoms (e.g. bronchospasms, stridor) should be treated as follows:
a) Nebulization of adrenaline (epinephrine): 2 mg adrenaline (2 ml) with
3 ml NaCl 0.9% and inhale through a nebulizer mask.

b) Administration of a ß2-selective adrenoceptor agonist, e.g., four strokes of terbutaline or salbutamol or fenoterol (one stroke usually contains 0.25 mg of terbutaline sulfate; or 0.1 mg of salbutamol; or 0.2 mg of fenoterol); this may be repeated once after 10 minutes. Alternatively, 2.5 mg salbutamol and 0.5 mg atrovent may be administered by nebulizer mask.
If inhalation is not possible, administration of terbutaline sulfate (0.25 mg to 0.5 mg) subcutaneously or salbutamol (0.2 mg to 0.4 mg over 15 minutes) intravenously.

c) Intravenous administration of 250 mg methylprednisolone (or equivalent steroid dose).

Patients with clinical signs of a toxic lung edema (e.g. foamy sputum, wet crackles) should be treated as follows:
a) Start CPAP-therapy (Continuous Positive Airway Pressure Ventilation).
b) Intravenous administration of 1000 mg methylprednisolone (or an equivalent steroid dose) is recommended.

Intubation of the trachea or an alternative airway management should be considered in cases of respiratory compromise. When the patient's condition precludes this, consider cricothyrotomy if equipped and trained to do so.

Note: Efficacy of corticosteroid administration has not yet been proven in controlled clinical studies.

If acrylamide vapor or aqueous solutions of acrylamide have been in contact with the skin, irritation may result; treat as thermal burns. Consult a dermatologist.

After eye exposure irritation, may result; treat as thermal burns. Immediately consult an ophthalmologist.

Laboratory tests

The diagnosis of acute acrylamide toxicity is primarily a clinical one, based on the irritation and CNS effects together with known or strongly suspected acrylamide exposure. Specific laboratory tests can not be recommended.

Further evaluation and treatment

Standard exposure history, physical examination, vital signs, and spirometry should be performed. Routine laboratory studies should include a complete blood count, liver enzyme, blood glucose and electrolyte determinations.

Prophylactic antibiotics are not routinely recommended but may be used based on clinical signs of pneumonia.

Patient release/ follow-up instructions

Clinically asymptomatic patients as well as patients **who have a normal clinical examination and no signs or symptoms of toxicity** may be discharged **after an appropriate observation period** in the following circumstances:

a) The evaluating physician is experienced in the evaluation of individuals with acrylamide exposure.
b) Information and recommendations for patients with follow-up instructions are provided verbally and in writing. Patients are advised to seek medical care promptly if symptoms develop or recur.
c) The physician is comfortable that the patient understands the health effects of acrylamide.
d) Site medical is notified, so that the patient may be contacted at regular intervals in the 24-hour period following release from the emergency department.
e) If the exposure concentration is not known, the patient should be observed for at least 6 hours.
f) Drinking of alcohol beverages should be forbidden for at least 72 hours.
g) Heavy physical work should be precluded for 24 hours.
h) Exposure to cigarette smoke should be avoided for 72 hours; the smoke may worsen the condition of the lungs.

Patients who have serious skin or eye injuries should be reexamined in 24 hours.

BASF SE
Corporate Health Management
Carl-Bosch-Straße 38
67056 Ludwigshafen
Germany

BASF Corporation
Medical Department
100 Campus Drive, M/S F 221
Florham Park, NJ 07932
USA