

Physical Research Laboratory
THE DOW CHEMICAL COMPANY

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Subject

BENZENE POISONING

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By KL

To Dr. Irish

From K.W.Linsenmann

Mode of Entry

1. Oral ingestion - suicidal or medical purposes.
2. Inhalation of vapors - common industrially as in repairing tanks or pipes.
*Hamilton - J.A.M.A., 1922, 78, 627.

Symptoms

Oral ingestion-

1. burning sensation in stomach, gastric cramps.
2. dizziness, flushing, restlessness, excitement followed by narcosis, cyanosis of the extremities.
3. dilated pupils.
4. fever
5. hallucinations and delirium often followed by convulsions.
6. narcosis and coma, and death from respiratory failure.

Inhalation of vapor-

1. high concentration - immediate unconsciousness, possibly death in a few minutes.
*Heffter, Deut. med. Work., 1915, 41, 182.
Hamilton, J. Ind. Hyg., 1919, 1, 200.
2. lower concentration - dizziness, flushing, roaring in ears, a condition resembling alcoholic intoxication and unconsciousness.

General Action

1. As a narcotic about equal to chloroform.
*Fühner Biochem. Zeitsch., 1921, 115, 235.
2. As a C.N.S. stimulator resulting in muscular tremor and convulsions.
3. As a W.B.C. and R.B.C. destroyer, especially the former.

Specific Physiological Action

Mild poisoning

1. Low W.B. count - 1200 $\pm$, the first and sometimes the only effect.

Acute poisoning

1. Affects C.N.S. causing muscular tremor and convulsions accompanied by great muscular weakness, followed by narcosis.
2. Heart action weak and rapid - animals.
3. Combined central and peripheral vasomotor paralysis.

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Chronic or subacute poisoning

1. Purpuric eruptions, or dermatitis.
2. Possible abscess formation by localized penetration.
3. Hemorrhage from gums and nose.
4. Diminished antibody production - rabbits.
*Hektoen, J. Infect. Dis., 1916, 19, 69.
5. Lighting up of latent infectious processes.
*Weisskotton, Schwartz, Steensland, J. Med. Res.,
1915, 33, 127
1916-17, 25, 63, 71
1917-18, 37, 215
1918-19, 39, 485
6. Various degrees of destruction of the whole hematopoietic system, capillaries, and lymph glands.
7. Blood picture changes.
 - a. progressive anemia, cells showing anisocytosis, poikilocytosis, achromia, no nucleated R.B.C's.
(aplastic anemia with destruction of hemopoietic tissue)
 - b. Lowered Hb values.
 - c. Leucopenia profound, especially the polymorphonuclear neutrophils
 - d. Relative lymphocytosis with relative leucopenia.
*Teleky, Weiner, Klin. Wehnschr., Berlin, 3, 226, 265, 1924.
 - e. Platelets diminished.
 - f. Coagulation and bleeding time increased.

Dosage Data

Individual susceptibility plays an important role.

1. Nine to twelve grams have caused serious collapse - Lewin
2. Death in 12 hours by swallowing 30 cc. of nearly pure benzene.
*Kelynack, Gas. Med. de Paris, 1893, 541.
Med. Chronick, 1893-94, 19, 112.
3. Four minutes exposure to vapor resulted in death.
*Munch. Med. Wehnschr., 1912, 59, 2286.
4. No definite figures for chronic poisoning.
*Noxious Gases, New York, 1927, p. 165.
5. Bureau of Mines figures-
1570-3130 p.p.m. of air - slight symptoms after several hours exposure.
3130-4700 p.p.m. of air - maximum concentration that can be inspired for 1 hr. without serious results.
200 p.p.m. of air - has caused poisoning.
*U.S. Dept. Int., Bureau of Mines, Technical paper 272, 1921.

Absorption

1. More than one half of the amount contained in air may be retained and gradually given off.
2. Taken up very slowly by hypodermic injections.
3. Poorly absorbed when taken orally.

Storage

1. Chiefly in the brain and cord - 70 mgm per 100 gm.
2. Also in the liver- 25 mgm per 100 gm.
3. Less so in the blood- 12 mgm per 100 gm.
4. In the kidneys-- no figures available.

Excretion

1. Half is excreted unchanged by the lungs when inspired, the rest being converted to phenols, etc., then eliminated as sulphonates in the urine together with some which has been converted to muconic acid.
2. That taken orally is chiefly eliminated in the stools.

Isolation, quantitative determination and tests

Refer to Peterson, Haines, Webster,
Legal Med. & Tox. Vol.2, pg. 693.

REFERENCES

- Legal Medicine & Toxicology - Peterson, Haines, Webster; Vol.2, 691.
- Legal Medicine & Toxicology - Webster, 786.
- Pharmaco-Therapeutics - Solis-Cohen, 741.
- Med. Klin., Berlin - Schneider, 29; 1163-96, Aug. 25, 1933.
(accidental aspiration of a small amount of benzene)
- Presse Med. Paris - Heim, 32; 497-508, June 7, 1924.
(acute poisoning by benzene)
- Am. J. Pub. Health - Hogan, Schrader, 13; 279, April 1923.
(benzene poisoning)
- Canadian M. A. J. - Anderson, 13; 395, June 1923.
(Purpura hemorrhagica, aplastic anemia)
- J.A.M.A. - Hamilton, Mar. 4, 1922, 627.
- Klin. Wehnschr - Nick, 1;68, Jan. 8, 1922.
- J. Ind. Hyg. - Legge, 1: 539, Mar., 1920.
- J.A.M.A. - Newton, Apr. 24, 1920, 1149.
- J. Ind. Hyg. - Hamilton, 1:200, Aug., 1919.
- Mod. Med. - Albaugh, 1;670, Dec. 1919.
- Boston M.& S. J. - Harrington, 177, 203, Aug. 16, 1917.
- J. A. M. A. - McClure, Sept. 9, 1916, 793.
- Med. Klin. - Ziel, 21; 93, Jan. 18, 1925.
- Northwest Med. - Speidel, 24: 182, April, 1925.
- Boston M. & S. J. - Chronin, 191: 1164, Dec. 18, 1924.
- Ann. de m d. - Faure-Beaulieu, 15:97, Feb., 1924.