

Formaldehyde- A Boon Or Curse For Anatomist Routine Life ?**Dr. Anurag Panwar**

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Abstract :

Everyday life a regular medical student and various anatomists around the world spend almost one fourth of their day in dissection hall with cadaver, inhaling the dangerous formaldehyde fumes. Formaldehyde is colorless, flammable, strong smelling chemical Formaldehyde, which has been well established preservative or cadavers in anatomy laboratory years.

Short term effect- when formaldehyde is present in the air exceeding 0.1PPM¹, burning eyes, nose, throat and wheezing, nausea, skin irritation. Long term effect- the long term exposure to formaldehyde causes contact dermatitis, congenital defect and cancers. In 1980² laboratory studies showed that exposure to long time could cause nasal cancers in rat. In 1987² it could also cause cancer in humans. Several surveys of professionals who are potentially exposed to formaldehyde in their work, such as anatomist, increased risk of leukemia, brain cancer, compared with general population.

The article discuss the adverse effect of continual exposure to formaldehyde and suggest various measures that can eliminate or minimize that danger to staff and students In gross anatomy and laboratories.

Keywords : preservative, cadaver, anatomist, formaldehyde, exposure levels, regulatory guidelines

Introduction:

Formaldehyde is a simple chemical compound made of hydrogen, oxygen and carbon. Formaldehyde is a colorless, flammable, strong-smelling chemical. Formaldehyde is also commonly used as a preservative in medical laboratories, mortuaries, and consumer products, including some hair smoothing and straightening products. It is also a by-product of automobile combustion and is produced in small amounts by most living organisms, including humans.

Uses Of Formaldehyde- Industrial applications, Disinfectant and biocide, Tissue fixative and embalming agent, Drug testing, Photography.

Advantages Of Formaldehyde For Anatomist:

The advantages of formalin over other preservatives are: it is inexpensive, it is generally available, a small bulk of concentrated stock solution may be diluted as needed, and specimens almost never decay in it. As formalin is a strong disinfectant and tissue hardener, it used for preserving biological and anatomical specimens. Formalin: A 37% aqueous (water) solution of formaldehyde, a pungent gas, with the chemical formula **HCHO**, used as an antiseptic, disinfectant, and especially today as a fixative for histology (the study of tissues under the microscope).

Disadvantages:-

Formaldehyde can be toxic, allergenic and carcinogenic. Evaporation of formaldehyde from formalin-treated cadavers in the anatomy dissection rooms can produce high exposure. Its principal disadvantages are: it has a very irritating odor, irritation in nose and ear, water comes out of eyes. It is very poisonous and may cause skin irritation or rash, it has a tendency to make specimens become brittle if the solution is too strong, and tends to fade out certain colors rapidly. Exposure to concentrations ranging from 0.1 to 5.0 ppm can cause burning of the eyes, tearing, and general irritation to the upper respiratory passages. Low levels (0.3-2.7 ppm) have also been found to disturb sleep and to be irritating to some persons. Higher levels (10-20 ppm) may produce coughing, tightening in the chest, a sense of pressure in the head, and palpitations. Exposures of 50-100 ppm and above can cause serious injury, including pulmonary edema, pneumonitis, or death.⁵

After a few days of exposure, a sudden inflammatory skin reaction may develop on the eyelids, face, neck, scrotum, vomiting tendency, and flexor surfaces of the arms. Other surfaces of the body may also be involved, sometimes after years of repeated exposure.

Formaldehyde has been shown to induce a rare form of nasal cancer in both Fischer 344 rats and B6C3F1 mice and may induce the same type of cancer in Sprague-Dawley rats. Although humans and animals may differ in their susceptibility to specific chemical compounds, any substance producing cancer in experimental animals, particularly in more than one species, should be viewed as a potential cancer-causing agent in humans. Formaldehyde has also demonstrated mutagenic activity in several test systems.

Management of Formaldehyde Related Health Hazards:

Increasing awareness of the health hazards associated with chemicals commonly used in Anatomy, Histology departments has stimulated both equipment manufacturers and medical laboratory scientists to improve the laboratory environment by reducing the release of toxic fumes. Closed circuit tissue processors and the absorption of fumes by charcoal filters are both examples of developments by manufacturers. The efficiency of removal of the formaldehyde and xylene was measured using infrared spectroscopy.¹⁹ Chemicals used to fix specimens that are purchased for dissection are notorious for the dangers they pose to human health. Dissections that are carried out over a period of months lead to conditions that promote desiccation and degeneration of the specimens. The problem of students working with important but potentially harmful materials is not a new one. Similar situations exist in the dissection labs of medical schools and other student labs where many hours are spent dissecting fixed material. The use of a formaldehyde neutralizing spray each time students work on their specimens and the use of 2% phenoxy-ethanol results in greatly improved air quality in the dissection laboratory. The improved work conditions will allow students to concentrate on their dissections and the fascinating anatomical configurations that form the core of any course in comparative vertebrate anatomy. Students and instructors should be aware of the potential health hazards of formaldehyde. Persons handling formalin or preparing dilute formalin solutions should wear protective equipment, including rubber gloves, protective aprons, and eye and face protection.

Ventilation should provide a minimum of five air changes per hour to help lower formaldehyde concentrations.⁶

Effective management of formalin vapors The most effective solution to minimizing exposure to formalin vapors includes successful management of room air exchange. Ideally, the lab equipment should include ventilation and operate in tandem with a whole room ventilation system to achieve well-balanced airflow.⁷

Management of Acute Exposure to Formaldehyde

This includes showers, eyewash stations if contact with eye occurs. Use of antihistamines and bronchodilators are advised if Asthma like symptoms exists. When airborne concentrations exceed allowable limits, respirators must be used.

Conclusion-

Formaldehyde is the preservative solution which is universally accepted for preservation of dead body. Though it is proven chemical but due to some of its disadvantages, it is now a days on the way of being outdated specifically for newer techniques like lumen casting ,plastination etc.

However there is no alternative existing today like formaldehyde to preserve the wet specimens. So formaldehyde will be continued as the best preservative in the anatomy laboratory as basic component. So inspite of its disadvantages and drawbacks, the importance of formaldehyde in the advance anatomy can not be challenged at least up to coming 4-5 decades.

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