



# **CHAMPION® Expanding Encyclopedia Of Mortuary Practices**

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Number 634, 1999

## **FORMALDEHYDE/WOOD DUST EXPOSURE DANGERS OF AUTOPSY/HARDENING COMPOUNDS:**

### **A Report for Embalmers**

#### **Part 1**

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*ABSTRACT: The exposure dangers of using formaldehyde/wood dust autopsy and hardening compounds in embalming is discussed. The dangers of wood dust exposure and the health problems with inhalation is delineated and explained. The increased dangers when formaldehyde in various forms is combined with wood dust and other particulates is summarized. Alternatives to old-fashioned autopsy/hardening compounds are reviewed and techniques to reduce or virtually eliminate exposures to formaldehyde/wood dusts are discussed.*

**INTRODUCTION:** There is a significant danger that all embalmers face during the treatment and restoration of an autopsy or postmortem case when using traditional accepted formaldehyde-based autopsy or hardening compounds — inhalation exposure to wood dust, paraformaldehyde and other particulates. This insidious combination of powdery substances that is regularly used in our profession presents a serious health hazard for all embalmers. Most embalmers are not aware of the problem or assume that the hazards are not great or that wearing a disposable paper mask will provide adequate protection during autopsy treatment. Unfortunately, nothing could be farther from the truth.

The exposure hazards during autopsy treatment are second only to the exposures registered while using concentrated high index, high fuming formaldehyde-based cavity fluids during cavity treatment. In addition,

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the health effects on the embalmer are longterm and insidious. From an exposure standpoint — the use of dusty autopsy/hardening compounds is one of the most dangerous operations in the embalming room.

We will begin with a review of the exposure dangers involved with wood dust and its companion formaldehyde (in its various forms). Alternatives to these old-fashioned autopsy/hardening compounds are discussed and safety measures that should be implemented will be covered. Methods to virtually eliminate this type of occupational exposure will be discussed.

**WOOD DUST IN GENERAL:** Wood dust, of course, is derived from trees and is composed of many substances including: cellulose, polyoses, lignins, fatty acids, resins, waxes, terpenes, alcohols, tannins, carbohydrates, alkaloids, proteins and various inorganics. Trees, botanically, are divided into gymnosperms and angiosperms. Gymnosperms or conifers are described as softwoods and comprise two-thirds of all wood products and wood dusts. Angiosperms or the deciduous hardwoods, such as beech and oaks, account for the balance of wood products that are produced. Historically, hardwood dusts have been considered more dangerous from an exposure and health standpoint than softwoods. More recent evidence and investigations, however, point to the definite exposure risks involved in softwoods also. This differentiation between hardwoods and softwoods is purely botanical and some softwood dusts may be more dangerous than hardwood dusts.

Over 2 million people are exposed to wood dust in any one year with the highest exposures occurring in the furniture manufacturing sector. Significant exposures also occur in plywood and particle board mills and secondary exposures occur to various other workers such as carpenters, joiners and formers.

Wood dust, itself, varies in particle size from less than a micron to very large particles in the 30-40 micron range. Most wood dust particulates have a mean diameter of greater than 5 microns, but a sizable percentage of wood dust particulates are less than 5 microns and extend down to less than 1 micron in size. Any particles less than 2.5 microns is classified as an RSP (respirable suspended particle) and the health hazards with these small particles is great. RSP's are particles that are small enough to evade mucosal capture by the protective cilia and mucosa of the human upper respiratory system and invade the deeper reaches of the lungs with serious health consequences. In fact, any particles of 5 - 10 microns or less is considered a definite inhalation hazard because of the inability of the human body to filter effectively these particles from the lungs. Wood dusts used in embalming, unfortunately, meet all the above criteria with a significant fraction of small particles and RSP's present in old-fashioned autopsy/hardening compounds.

The other significant problem associated with wood dusts in general is the presence of additive chemicals during manufacture and production of wood and wood products. These additives exacerbate the exposure potentials of wood dusts by adding their own exposure potentials to the wood dust particulates. These chemicals include preservatives, solvents and glues used in wood manufacture. The most mentioned and implicated chemical in wood manufacture is formaldehyde. Formaldehyde combines with wood dust to cause an increased health risk by the additive effect of dual exposure during wood dust exposures. Unfortunately, for

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the embalming profession, this has been our preferred additive to wood dust absorbents in autopsy and hardening compounds and the dangers of such a combination are obvious.

The limits for wood dust exposures have been set by various agencies. OSHA limits are at 5mg/m<sup>3</sup> for an 8-hour TWA and 10mg/m<sup>3</sup> for a 15-minute STEL (except for Cedar which has lower limits). These limits are now vacated temporarily, but are used as a guideline. ACGIH has set similar limits for softwoods at 5mg/m<sup>3</sup> and 10mg/m<sup>3</sup> respectively and lower limits for some hardwoods and Cedars. NIOSH has set limits at 1 mg/m<sup>3</sup> for wood dusts in general, emphasizing their belief in the inherent dangers of wood dust inhalation regardless of dust type.

**WOOD DUST HEALTH EFFECTS:** The health effects of wood dust exposure are considerable and well-documented by numerous epidemiological and case-referent studies. Wood dust inhalation, in general, causes moderate to severe lung changes in experimental animals when they are exposed to RSP's (respirable suspended particles). In both guinea pigs and hamsters there was evidence of severe effects to the respiratory tract when exposed to long term wood dust inhalation.

Dermatitis occurs in certain occupations associated with wood dust exposures. This dermatitis is caused by a chemical irritation or a sensitization (or both) to chemicals found in predominately heartwood and the additive chemicals such as formaldehyde found in wood products. Secondary workers seem to be most affected by dermatitis and, consequently, most frequently is found in carpenters and other secondary wood workers.

True allergic respiratory effects are also noted during exposures to wood dust. This type of reaction is a true immune-mediated IgE antibody response to irritation with resultant sensitization. Asthma and asthmatic-like conditions is the most common symptom of this allergy and Western Red Cedar seems to produce the most allergic response. There are also numerous reports of moderate to severe eye irritation associated with wood dust exposure in general.

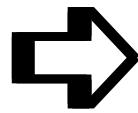
Wood dust, obviously, affects the nasal mucosa and respiratory tract in a significant manner. Numerous mucosal and non-allergic respiratory effects have been reported in workers exposed to wood dust. These symptoms include: nasal dryness, irritation, bleeding, obstruction, coughing, wheezing, sneezing, sinusitis, and prolonged colds. These symptoms are observed even when exposures are relatively low — such as 2-4mg/m<sup>3</sup>. Studies show that 10 year exposures in the furniture industry to wood dust resulted in impaired mucociliary clearance and decreased pulmonary function. Large airway function was also impaired in wood dust inhalation in wood workers. Anosmia (loss of smell) was also noted in exposed workers.

CONTINUED: Formaldehyde/Wood Dust Exposure Dangers of Autopsy/Hardening Compounds  
Champion Expanding Encyclopedia of Mortuary Practices  
Number 635, 1999



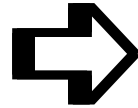
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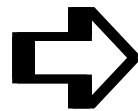
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