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Death from Inhalation of Fluorocarbon Propellants*

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Sniffing the propellant from an aerosol spray preparation appeals to some youths perhaps because they mistakenly equate it with glue sniffing, or with sniffing concentrated vapors of other products. There are important similarities; some propellants are hydrocarbons which, when inhaled, have effects more or less comparable to the solvents of glues. An important difference may escape attention: glues give fairly dilute air-vapor mixtures whereas propellants from their convenient "package" provide easy access to relatively large volumes of highly concentrated fumes. The hazard of propellant inhalation is disproportionately greater -- in plain language, this hazard is deadly; the public press bears the record. Newspapers from all over the country have recorded 36 deaths, 7 in 1967, 29 to mid-December in 1968. The tragic fad cost the lives of nearly a dozen young men during the past summer, mostly 16 to 18-year-olds who inhaled from balloons the concentrated aerosol product (commonly fluorocarbon 12, chemically dichlorodifluoromethane). Used for the purposes and in the manner intended, fluorocarbon propellants are safe. This is NOT TRUE for high concentrations of propellants. It cannot be said too strongly, and young people please note: inhaling virtually pure propellant risks death. The lethal effects are not mysterious and death may come from one of several causes.

1) A few young people sprayed the propellant into a balloon so rapidly that liquid propellant collected in the balloon. When the low boiling liquid was inadvertently tipped into the mouth and throat, the larynx was frozen, air could neither leave nor enter the lung; the result -- asphyxiation.

2) It is possible but improbable a) that a few others died from an acute oxygen lack when the heavier-than-air fluorocarbon filled the lungs to the exclusion of oxygen, or b) that hearts may have been paralyzed from the inhalation of very high concentrations of the fluorocarbon as happens sometimes with chloroform.

3) The effect most frequently fatal probably is an acute heart failure from a loss of the coordinated beating which pumps blood. The propellant can sensitize the myocardium to the stimulant action of the normal adrenaline to such an extent that the heart responds in an uncontrollable arrhythmia terminating in ventricular fibrillation in which parts of the heart contract independently and ineffectively. That arrhythmias precede sudden deaths during chloroform anesthesia has long been recognized; other anesthetic agents (trichlorethylene, cyclopropane) share to varying degrees this hazard. During World War II, men inhaling gasoline fumes during napalm handling died suddenly when frightened under strafing attack. The cause of death was heart failure: ventricular muscle sensitized by gasoline offers a sufficient explanation for the nearly instantaneous deaths from fluorocarbon propellant inhalation.

A special danger attends propellant inhalation: a mistaken sense of security may be engendered by the absence of acute cardiac effects on the first, the second or repeated inhalation of the fumes; nevertheless, ventricular fibrillation may occur on the first or the tenth or any trial.

A growing list of products are marketed with propellants; these products used as intended create no fume hazard. The deliberate inhalation of concentrated vapors may produce sudden death; therefore every aerosol product shares this danger; none can safely be misused. The fluorocarbon propellants (one trade name for which is "freon") are not the only propellants used in the aerosol industry. They may comprise less than half of the aerosol products sold. The remainder of aerosol products are propelled either by inert gases (such as nitrogen, carbon dioxide, or the like), or hydrocarbons (such as propane or isobutane). The hydrocarbons also present a health hazard. These hydrocarbons are more commonly known because of their use as heating fuel. Because they are quite flammable in their pure state, they are typically compounded in aerosol products with non-flammable solvents such that the resulting mixture is not flammable. These nonflammable solvents are probably hazardous in the same way as the fluorocarbons. The total market represents several billion containers per year.

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