CHEMICAL AGENTS AND CHEMICAL TERRORISM

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SUMMARY

Chemical terrorism is a new threat to the security of mankind, which scale essentially exceeds the impact of use of the most modern firearms. At present time all over the world threats from different radical elements to use radioactive materials, potent poisonous substances and pathogenic microorganisms for terrorist purposes became more frequent. High-toxic chemical substances can fall in terrorist hands through wide range of sources. Potentially misused types of chemical compounds are discussed in this article.

Key words: chemical substance, toxicity, terrorism

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INTRODUCTION

Potential property of every chemical compound is its biological activity, i.e. the capability to affect vital functions of living organism. Important biological activity is toxicity, the ability to bias living organisms and invoke their damage or death. Essentially all chemical compounds are toxic, but also some of them are known as poisons. Toxic compounds represented important role in human history and during the 20th century were widely used in many wars and crippled and killed number of people. Their use in military conflicts is banned according to some international convention (1). Prohibition of chemical weapons is not respected by terrorists and by non-conventional countries. Nowadays nations are facing the threat of terrorism, but this threat is much more related to the potential disorganization of the society than to the lethal effect of the agents (2).

LETHAL WEAPONS

These agents are designed to kill and incapacitate. They are broadly broken down into four main categories: blood agents, nerve agents, blister agents, and choking agents (3).

Blood agents are designed to interfere with the hemoglobin's ability to carry oxygen. They cause asphyxia. The most significant blood agents are arsine, cyanogen chloride, hydrogen chloride, and hydrogen cyanide. Cyanogen agents produce their effects by interfering with oxygen utilization at the cellular level. Inhalation is the usual route of entry.

Nerve agents are highly toxic chemical agents that poison the nervous system and disrupt bodily functions that are vital to individuals' survival. There are five major substances that are classified as nerve agents. These onse are broken up into

two main groups: the "G" agents and the "V" agents. The "G" agents are tabun (GA), soman (GD), sarin (GB), and cyclohexyl methylphosphonofluridate (GF). The "V" agent is typified by the agent known as VX. Nerve agents have a very rapid effect on an individual and their toxic effect is based on the inhibition of enzyme acetylcholinesterase in the peripheral and central cholinergic nervous system.

Blister agents are designed to cause casualties and not necessarily kill, although in high concentrations, or if inhaled, they can cause death. Blister agents contain powerful irritants which cause large, fluid filled blisters on exposed skin. These blisters break, making the exposed individual susceptible to infections, causing casualties. If inhaled, these agents cause blistering of the alveoli in the lungs. Mucous is secreted which, if exposure is severe enough, can cause the lungs to fill with mucous, causing death by dry land drowning. The primary blister agent was mustard vapor. Several well-known chemical substances that are classified as blister agents are sulphur mustard agent (bis-2-chloroethyl-sulphide) and the nitrogen mustards (HN-1, HN-2 and HN-3), phosgene oxime (CX), lewisite (L), phenyldichloroarsine (PD), and ethyldichloroarsine (ED).

Choking agents, sometimes called lung irritants, primarily injure the respiratory tract- that is the nose, throat, and particularly the lungs, causing pulmonary edema. In extreme cases, membranes swell, lungs become filled with liquid, and death results from lack of oxygen. The two most common choking agents are phosgene (CG) and diphosgene (DP). The most important agents of this type are diphenylcyanarsine (DA), diphenylchanoarsine (DC), and adamsite (DM). These agents are dispersed as aerosols and produce their effects by inhalation. Some minor eye irritation also might be observed. These agents produce a feeling of pain and sense of fullness in the nose and sinuses. This is accompanied by a severe headache, intense burning in the throat, tightness and pain in the chest, irritation of the eyes and lacrimation. Coughing is uncontrollable and sneezing is violent and persistent. Nausea and vomiting are prominent.

Bioregulators are naturally occurring organic compounds that regulate diverse cellular processes in all organisms and theoretically it is possible to use these biochemicals affecting cell signaling, as toxic compounds. Bioregulators are substances normally found in the body that regulate normal biological processes, such as blood pressure, heart rate, breathing, muscle contraction, temperature, mood control, consciousness, sleep, emotions, immune responses and other critical functions. A characteristic of them is that they are active in extremely low doses and frequently have rapid effect. Unlike traditional disease-causing biowarfare agents that take hours and days to act, bioregulators can act within minutes after administration. That is comprehensible, because all these compounds work as regulators and modulators of all vital biochemical pathways, linked with physiological functions of living organisms. If the bioregulators are exploited for the purpose of bioterrorism, they could potentially cause profound pathophysiological effects (4). The main group of bioregulators, discussed at present, are different biochemicals such as neurotransmitters, hormones, proteolytic enzymes and others. All these compounds are peptides, i.e. bioorganic compounds composite from amino acids connected into linear or cyclic chains by peptidic linkage, and it is very difficult to classify their implacability with regard to their physiological function. Some of them act as neuromediators, but simultaneously perform as hormones, enzymes, modulators, and so on. Common property of all bioregulators is their fast biological effect and consequential rapid fall of their concentration in tissues. They cannot be traced by pathologists.

NON-LETHAL WEAPONS

The category of weapons, designated "non-lethal" by the military services is very significant. This weapon is also classified as "less-than-lethal" or "less-lethal" by law enforcement agencies (5). National security experts consider these weapons increasingly important in the post-Cold War era. This type of weapon is not quite new. It has been used throughout history. Unlike conventional lethal weapons that destroy their targets principally through blast, penetration and fragmentation, non-lethal weapons have relatively reversible effects on personnel or material. This type of weapons take on an increasing importance and military strategists expect that most of fighting conflict in the 21th century will be solved by means of non-lethal weapons (6). Non-lethal weapons can work on different physical, chemical and biological principles. This paper addicts itself to toxic chemical compounds that can be used for military or terrorist purposes.

Riot-Control Agents known also as lacrimators or lachrymatory gases produce a burning sensation of the mucous membranes and severe irritation and tearing of the eyes with acute pain in the forehead (7). Society has entrusted the police with power and obligation to enforce law, maintain order and protect its members and the legal order of society. To be able to fulfil these obligations the police need credible means of countering threats against these values (8). Selecting the weapons presents a multifaceted problem of balancing human considerations, judicial and societal requirements with tactical needs and technological possibilities. 4-bromobenzylcyanide (CA) was one of the first tear agents used but today is obsolete. Chloroacetophenone (CN) is lacrimator that causes irritation to the upper respiratory passages and may cause irritations to the skin. On average, it incapacitates for approximately 3 minutes. Ortho-chlorobenzalmalononitrile (CS) was made the standard riot control agent in 1959. Dibenz-(b,f)-1,4-oxazepine (CR) is irritant developed in England in 1962 by the British chemists. It is about 5 times more effective than CS, induces eye pain, discomfort and excessive tearing occurs with sometimes painful sensitivity to strong light or temporary blindness. Symptoms can persist for 15 to 30 minutes. In addition, CR is much less toxic than CS.

Calmatives include compounds known to depress or inhibit the function of the central nervous system. Several major classes of pharmacological compounds under this category include sedative-hypnotic agents, anesthetic agents, skeletal muscle relaxants, opioid analgesics, anxiolytics, antipsychotics, antidepressants and selected drugs of abuse. Drugs which depress the nervous system have a range of effects that are dependent on the dose and duration of drug administered; these physiological and behavioral effects range from amelioration of anxiety, mild sedation, hypnotic effects to coma and death. Pharmaceutical compounds recommended for use as non-lethal calmatives will typically not be administered to produce deep sedation or hypnosis; rather, calmatives will be used to relieve anxiety and produce mild sedation.

Malodorous Agents are foul-smelling gases and sprays such as hydrogen sulphide (H_2S) or a compound known as NaS_8 which

is used in making plastics. Recently 5-methylindole (skatol) was patented in the United States as a new non-lethal chemical agent (9).

Foam-Sticky is a name given to a polymer-based super-adhesive agents. The technology first began appearing in commercial applications such as "super glue" and quick setting foam insulation. It is extremely persistent and is virtually impossible to remove it without suitable liquid solvent. The solvent can be applied as a spray. The foam then appears to dissipate, releasing its hold and allowing suspects to be arrested and safely transported. Sticky foam came to public attention on February 28, 1995 when U.S. Marines used it in Mogadishu, Somalia, to prevent armed intruders from impeding efforts to extricate United Nation forces from that country (10). The ordinary suds of barrier foam can be enhanced with the addition of substances such as oleoresin capsicum, the primary ingredient in "pepper spray," or CS.

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