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Review article

Countermeasures against chemical terrorism in Japan☆,☆☆

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ABSTRACT

Japan has experienced numerous incidents of chemical disasters and terrorist attacks. Here we review the history of changes in countermeasures against such incidents. Since 2004, the Civil Protection Law, more formally known as the "Law Concerning the Measures for Protection of the People in Armed Attack Situations etc" was enacted to fully prepare the nation for chemical terrorism. According to this law, the Japanese government must carry out Civil Protection Exercises on an annual basis to gauge response. Problem areas that remain are chosen and addressed one by one until they are judged to be resolved in subsequent exercises.

Contents

1. Introduction

In both 1994 and 1995, Japan experienced two separate terrorism with sarin gas attacks [1,2]. For the last nearly 20 years, Japan has invested a sustained effort into the development of countermeasures against further such acts of terrorism. Here we review the past, present and future development of the countermeasures against chemical disasters and terrorism in Japan.

1.1. Chemical accidents/disasters chronicled in Japan (Table 1)

1.1.1. Before the sarin attacks

We would like to describe the history of chemical disasters and incidents in Japan, beginning with an incident which occurred in

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☆☆ This article contains the personal opinions of the researcher and therefore should not be taken as the official view of the government.

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Table 1
Chemical accidents/disasters in Japan.

745	Mass mercury poisoning during construction of the Great Buddha of Todaiji
1885	Ashio copper minei ncident
1930s–1940s	Injuries due to chemical weapons production
1948	Imperial Bank incident
1956	Minamata disease
1961	Nabari poison wine incident
1963	Mitsui-Miike-Mikawa coal mine explosion
1968	Kanemi rice oil contamination
1985	Paraquat murder spree
1994	Matsumoto sarin incident
1995	Tokyo subway sarin attack
1998	The Wakayama curry and rice arsenic poisoning incident
1998	Numerous poisoning incidents
2000	Kyushu-Okinawa G8 Summit
2001	Creation of government chemical terrorism management model
2004	Civil Protection Law enacted
2011	Great East Japan Earthquake and Tsunami

745. During construction of the Great Buddha of Todaiji Temple in Nara, a mass mercury poisoning occurred due to the gold sheathing process [3]. The number of victims was not recorded, but historians say that the government of that time had no other choice but to relocate the capital due to the scope and seriousness of the poisoning. During the next 1000 years, no other major chemical incidents occurred in Japan. The Ashio copper mine incident brought this streak to an end in 1885. This incident, caused by the sustained release of sulfurous acid gas into over decades during the process of copper refining [4,5], was the first major environmental disaster in modern Japan. Between 1930s and 1940s, chemical weapons were being produced in Japan and more than 5000 workers suffered from injuries related to the handling of chemical warfare agents [6]. In 1948, a man identifying himself as a public health official ordered by US occupation troops to inoculate the staff for dysentery due to a nearby outbreak of *Shigella* bacteria, entered the Imperial Bank in Tokyo and proceeded to dispense cyanide to the employees [7]. They quickly became incapacitated, and after he escaped with 160,000 yen, twelve people eventually died. Minamata disease was discovered in 1956. The cause was later identified as severe mercury poisoning from industrial waste and over 2000 victims were officially recognized [8]. This was followed by the Nabari poisoned wine incident in 1961. Five of 17 women who drank wine which had been contaminated with a pesticide were killed [4]. In 1963, the Mitsui-Miike-Mikawa coal mine explosion caused 458 deaths and 839 cases of carbon monoxide poisoning [7]. In 1968, about 1900 people were officially confirmed as victims of a mass poisoning of coplanar polychlorinated biphenyls (Co-PCBs) and polychlorinated dibenzofurans (PCDFs) in the Kanemi rice oil contamination incident [9,10]. A total of 13 victims were killed in a 1985 murder spree involving bottled beverages laced with Paraquat [11], a widely used herbicide, and placed near vending machines for victims to freely consume [7].

1.1.2. The sarin attacks

The first chemical terrorism event to occur during peacetime, the Matsumoto sarin incident, took place on June 27, 1994. The Aum Shinrikyo Cult sprayed 30 kg of sarin solution [purity unknown] from a truck, heated it to a gaseous state and, using a fan, dispersed it toward a dormitory in a residential area [1]. In this incident, seven people were killed and 660 people were injured. In other words, about 1% of the victims died. The sarin attack on the Tokyo subway occurred on March 20, 1995. Thirteen people were killed and a total of over 5500 were affected [12–16]. In what was also known as the Subway sarin incident, vinyl bags containing about 30% sarin inside the five subway trains subway, punctured using the tips of umbrellas, and left to leak. In other words, the process was passive and designed to occur solely by evaporation, which was an inefficient method of dispersal. Subsequently, of the 5500 affected victims, 13 died, accounting for only 0.2%. Some researchers think that this low mortality rate can be attributed to Tokyo's emergency medical services, while others, especially in reports from overseas, credit Japan's emergency response system. However, we believe that the main reason for the low mortality rate was not the efficiency of Japanese medical services, but rather because, as mentioned above, the methods of sarin delivery in the Tokyo attacks were inefficient. In other words, it is important to stress that humankind has yet to experience full-scale catastrophic nuclear, biological, or chemical (NBC) terrorism in an urban setting. In summary, no effective portable detectors, no zoning policies, no field decontamination units, no field medical treatment resources, and only limited personal protective equipments (PPEs) were available at the time of the attack. Therefore, before the attack on the Tokyo subway, substantial countermeasures against chemical terrorism did not exist in Japan [2,17,18].

1.1.3. After the sarin attacks

In the late 1990s, several poisoning incidents occurred involving the deliberate chemical contamination of food, starting with the Wakayama curry and rice arsenic poisoning incident in 1998 [7,19]. On July 25, 1998, someone mixed arsenic into a curry and rice meal at a local community summer festival. Four people were killed and 58 were affected. Food poisoning was suspected initially, followed by cyanide poisoning, but arsenic poisoning was finally confirmed as the cause 8 days later [20]. Public concern became focused on the ability to promptly and accurately analyze food involved in such incidents. In response to the threat that these events posed to public health, 73 emergency centers located throughout Japan were furnished with equipment which could perform special types of instrumental analysis such as gas chromatography–mass spectrometry (GC/MS), high-performance liquid chromatography (HPLC), and inductively coupled plasma MS (ICP/MS).

An official policy in Japan regarding which entities should perform on-site decontamination had still not been established 5 years after the Tokyo subway sarin attack. The first organized event in which the Japanese Government seriously assessed NBC threats and considered appropriate responses was the Kyushu-Okinawa G8 Summit (2000). Decontamination facilities were set up and PPEs were distributed. This became a model for future responses to chemical disasters. On April 16, 2001, "Responses to NBC terrorism and other mass casualty terrorism," a manual detailing standard government measures, including a responsibility chart for relevant ministries, was drafted. On November 8, 2001, the "Government's Basic Policy on Biochemical Terror Attacks" was established during the Ministerial Meeting on Measures Against NBC Terrorism held at the Emergency Anti-Terrorism Headquarters. Decontamination facilities were then distributed to 150 hospitals throughout the country. The Japanese Government also established an NBC terrorism management model in 2001, characterized on the local level by an on-site coordination center and on the national level by the coordinating role of the Japanese Poison Information Center. This official policy also specifies that firefighters and police officers have to assist in on-site decontamination, and thus decontamination equipment is being distributed to these departments. Since the 2002 FIFA World Cup was held in Japan, police and fire departments, particularly in major cities, have established special teams to respond to NBC terrorism and are currently preparing their own mass decontamination systems. In March 2004, the Fire and Disaster Management Agency assembled leaders in this field to form the study group on Decontamination in NBC Emergencies, which proposed a more practical model for decontamination