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Dear Editor,

We would like to express our concern on organophosphate poisoning and terrorism. On February 13, 2017, Kim Jong-nam, the half-brother of North Korean leader Kim Jong-un, died at Kuala Lumpur airport in Malaysia. Although mystery still surrounds his death, involvement of an internationally-banned chemical substance, VX nerve agent, has been suspected by the Malaysian police (1). Notably, two days before his death announcement, a former senior member of the AUM Shinrikyo doomsday cult and primary doctor for the cult's guru wrote a letter from Tokyo detention center to a leading US toxicologist (2).

The doctor had been sentenced to death after being convicted of involvement in three assaults using VX nerve agent as well as the 1995 sarin nerve gas attack on the Tokyo subway system committed by the cult. Purportedly, in the letter, he enumerated a couple of inferences based on his experience; first, the use of VX nerve agent on Kim's eyes can be suggested based on his complaint of eye pain, followed by his quick death after showing poisoning symptoms; second, an appearance of foam around his mouth further strengthens his inference because VX causes an increased secretion in the respiratory tract (2). Such a prompt perception was not unprecedented; after the occurrence of the Tokyo gas attack in 1995, the initial reports of poisonous gas made some doctors with the knowledge concerning the Matsumoto sarin attack by the same cult in 1994 speculate that it must be due to some kind of

organophosphate based on the unique symptoms such as pupil constrictions (3, 4). Based on their assumptions, those doctors could provide early emergency room treatment for the affected patients of the Tokyo gas attack, and distribute necessary information to other medical institutions before the toxic chemical substance was officially identified (3).

Those episodes provides several implications for pre-emptive judgement in an early phase of terrorism. First, organophosphates, such as tabun, sarin, soman and VX gases are stable cholinesterases inhibitors like pesticides. The accumulation of acetylcholine activates the cholinergic system by stimulating muscarinic and nicotinic acetylcholine receptors, creating an acute cholinergic crisis (5). Although chemical terrorism may happen unexpectedly, organophosphate poisoning can be diagnosed earlier if attending doctors or security guards have enough knowledge about the typical symptoms and are alert enough. Secondly, early perception may lead to an appropriate decontamination intervention with an attempt to save the lives of victims. Although medical management is difficult, early resuscitation with atropine, 2-pralidoxime chloride, anticonvulsants, oxygen, respiratory support and fluids may improve the symptoms (5). Finally, storage of antidotes may be considered in a mass-gathering place such as an international airport, considering the current global trend of terrorism. Despite continuing effort to control chemical weapons, nerve gas such as sarin or

a similar gas was used in the attack that killed more than 80 people in Syria in April 2017 (6). It should be re-affirmed that the risk of chemical terrorism is not an empty threat, and adequate preparedness should be explored for possible future events.

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## Conflict of Interest

None

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