



Deprived of Nukes, Iran Will Likely Ramp Up Its Chemical and Biological Weapons Capacities

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EXECUTIVE SUMMARY: Alongside Iran’s persistent progress towards nuclear weapons, which was recently stemmed – apparently for good – by Israel and the US, the Islamic regime possesses arsenals of other weapons of mass destruction, specifically chemical and biological weapons (CBW). Now that its nuclear strategy has been largely derailed, the Iranian regime is likely to continue to pursue and to considerably upgrade its ballistic capabilities, particularly in terms of CBW warheads. Ballistic CBW warheads (possibly including radiological weapons as well) will thus constitute Iran's primary strategic offensive alignment.

Iran has doggedly pursued the development and manufacture of CBW arsenals while being an ostensibly “obedient” state party to the global CBW conventions. Iran’s already operational CBW programs and first-generation weaponry inventories were expounded comprehensively in 2005, in a 52-page article in the *International Journal of Intelligence and Counter-Intelligence*. The regime’s subsequent progress in the CBW field is examined below.

While some of its CBW facilities were somewhat incapacitated during the 2025-26 Israel-US attacks on Iran, the regime is liable - particularly now that it is likely to be deprived of its goal of achieving nuclear weapons - to take steps to significantly augment its CBW capacities.

First, we should note several assaults that took place during the 2025-26 conflict that apparently undermined some of Iran's CBW-related assets (among other things). Nuclear and ballistic infrastructures across Iran were the attackers' top-priority military-associated targets, but within six specific facilities, CBW-related assets were at times deliberately and directly damaged in parallel. These facilities were: Malek-Ashtar University of Technology (**MUT**), Imam Hussein University (**IHU**), Shahid Beheshti University (**SBU**), Iran University of Science and Technology (**IUST**), the Tofiq Daru Research and Engineering Company (**ToDa**), and the Shahid Meisami Research Center (**SMRC**).

MUT (Lavizan, Tehran) is tightly linked to Iran's CBW programs (and other military programs) through its status as a subordinate R&D arm of the Defense Technology and Science Research Center within the MOD, placing it directly under military command. It focuses on technical development, bridging the gap between academic study and industrial production. The activities taking place at MUT include aspects related to nerve gases, pharmaceutical-based chemical warfare agents (particularly in terms of aerosolizing fentanyl and medetomidine), incapacitants, and genetic engineering of pathogens. It provides a scientific foundation for the weaponizing of toxic and pathogenic agents.

IHU (near Mini) is affiliated with the IRGC and primarily trains its internal scientific elite. Unlike a standard university, IHU is directly owned and operated by the IRGC. Every lab in it is essentially a military lab. It is largely equivalent to MUT, especially with regard to its efforts in the field of pharmaceutical-based chemical warfare agents and incapacitants. Biological warfare agents are investigated in IHU labs as well. Its related R&D activities are fairly advanced.

SBU (Velenjak, Tehran) serves as an essential academic and research consortium for Iran's CBW defensive and offensive programs. It acts as a civilian cover for activities led by both the IRGC and the MOD. SBU's Institute of Medical Science and Technology, which was attacked, fosters dual-use technologies with applied aspects in nano-medicine, proteins, genomics, neuroscience and infectious lung diseases. (The Shahid Beheshti University of Medical Sciences, in the same location, is of collateral importance and worthy of note.)

IUST (Narmak, Tehran), a top Iranian institution, maintains deep, well-established connections with both the Ministry of Defense and the IRGC. Engineering research at IUST has focused on nozzle design, fluid dynamics, and

aerosol dispersion. While often presented as civil engineering or aerospace research, these aspects are critical for developing the means to deliver and disperse the payloads of chemical and biological warfare agents.

ToDa (Vardavard, Tehran) is a major civilian Iranian pharmaceutical firm for the research, development and production of active pharmaceutical ingredients. The facility at ToDa that was attacked was acting as a false front for civilian production while secretly supplying fentanyl, a potent synthetic opioid, to the Iranian Organization of Defensive Innovation and Research (part of the Ministry of Defense) for the preparation of CW. SMRC (nearby; see below) has been involved in this as well.

SMRC (near Karaj) also operates under the aegis of the Organization for Defense Innovation and Research. The specific facilities targeted and destroyed therein were vital to the enabling of nuclear, radiological, chemical and biological warfare R&D activities. SMRC and the co-located Iranian Defense Chemical Research Laboratory are deeply interconnected entities within Iran's military-industrial R&D alignment. They are primarily focused on chemical and biological warfare agents and their dispersal. Their relationship is defined by tightly shared infrastructure, leadership, and oversight. In parallel, though mostly undisclosed, the Biological Research Center of Iran's Special Industries Organization (or Group) is hosted on-site by SMRC while developing and producing biological warfare agents. Vira Laboratory (sometimes appearing as Sina Industry) acts covertly in collaboration, either at this location or in Tehran. Strikingly, amid the COVID-19 pandemic in Iran, SMRC developed FAKHRAVAC - a COVID-19 vaccine that reached clinical trials - as well as Iran's first COVID-19 testing kits. The China-originated pandemic virus is well known for its lab-induced upgraded infectivity and virulence.

Following the Russians

Two classes of toxic substances comprise the second-generation core of Iranian chemical warfare agents. They basically follow Russian courses, as detailed below.

Pharmaceutical-based agents (PBAs): This category of dose-dependent toxicants is used routinely for anesthetic procedures. Its use as a CBW broke out at the 2002 terrorism incident at a Moscow theater, where Russian security forces employed these substances against the perpetrators at the scene. Iran followed the same line. Ever since 2005, the regime has worked on designing incapacitating agents -

mainly fentanyl and medetomidine plus their derivatives – to be used for dispersal via grenades, mortars, drones and bullets. Iran may also intend them to be employed by its regional proxy forces.

The IRGC is the central entity developing PBAs. Key contributors to this effort include IHU, MUT, and the SMRC. The IRGC has conducted open-air field tests involving incapacitant-filled hand grenades and cartridges (such as the 38mm MK 2) as dispersing mechanisms. The tests optimized various aerosolization techniques of those agents.

The potential deployment of these agents via drone is a significant concern. Deployment can take place via existing multi-rotor drones like the Arbaeen bomber, which can carry chemically converted grenades, cartridges and rounds. While no definitive evidence exists confirming extensive operational use of these agents in combat, it is notable that during the 2022 Mahsa Amini protests, in which female protesters, including schoolchildren, were key participants in the demonstrations, victims reported "feelings of anesthesia" inconsistent with standard tear gas as well as unexplained severe delayed impacts.

This group of substances is considerably more potent than ordinary incapacitants. Verified images confirm that MK 2 cartridges (manufactured by Shahid Sattari Industries in Iran) that matched those in hacked PBA development documents were used against Iranian civilians during the crackdowns. Anesthetic-derived tactical munitions were procured, with supporting production linked to the Chemical Industries and Development of Materials Group (affiliated with the Iranian Defense Industries Organization), in specialized, concealed production tunnels beneath Tehran's District 22.

Furthermore, during the January 2026 protests, aerosolized fentanyl derivatives and medetomidine were employed, probably by means of weaponized grenades and canisters, mortars and projectiles, military-style vehicles equipped with dispersal systems, and drones. The resulting impacts included sudden collapse and immediate loss of consciousness, neurological impairment and mental disorientation, temporary muscle paralysis or acute inability to move, as well as delayed fatality.

As expected, the Iranian regime flatly denied having employed CW in these ways, just as it did about its conduct during the 2022 protests.

Novichok nerve agents: While the potency of the above-mentioned anesthetic agents is controversial due to their being critically dose-dependent, Novichok nerve agents are unequivocally the most toxic synthetic molecules ever created by man. They were initially developed by the Russians. Apart from the USSR (and NATO, in terms of protection), only Iran was (overtly, at least) working on Novichok agents, ostensibly on a scientific level alone. Yet the timing, uniqueness, focus, and meticulousness of Iran's engagement with these agents are quite striking. According to a scientific paper published in 2016 by Iranian researchers, five Novichok agents – likely including at least some of the four weaponized by Russia – were synthesized at the Iranian Defense Chemical Research Laboratory (the above-referenced complex near Karaj). The syntheses were reportedly performed on a micro-scale to minimize exposure.

Iranian researchers succeeded in synthesizing and obtaining detailed mass spectral data on a series of unusual top nerve agents, and those data were added to the Central Analytical Database of the Organization for the Prohibition of Chemical Weapons. The Iranian researchers explained their study as follows: “For unambiguous identification of Chemical Weapons Convention-related chemicals in environmental samples, the availability of mass spectra, interpretation skills and rapid microsynthesis of suspected chemicals are essential requirements. For the first time... spectra of a series of Novichok agents related to CWC were collected and investigated with the aim of enriching the Organization for the Prohibition of Chemical Weapons Central Analytical Database, which may be used in OPCW verification activities, on/off site analysis, and toxic chemical destruction monitoring.” Through this graceful means, the Iranians pursued both legitimacy and access to the domain of Novichok-based CW.

Biological warfare agents

While the first-generation of Iranian biological warfare agents includes traditional bacterial pathogens and toxins (see below), the second generation includes virulent viruses and sophisticated toxins, as follows.

Highly lethal snake venoms. Alongside synthetic toxic molecules (such as Novichok), one of the most poisonous natural substances in the world is the venom produced by the Caspian cobra. Like the class of PBAs dealt with by the Iranians in terms of dispersibility (as described), this venom was upgraded at Iran's Razi Vaccine and Serum Research Institute in Karaj. This was done in several

ways: by isolating lethal, low molecular weight portions of crude Caspian cobra venom by gel filtration chromatography; by encapsulating that venom into copolymer-shaped poly-microspheres in the size range of 1-10 μm as a biotoxin carrier; and through the advanced encapsulation into nanoparticles of a polysaccharide with an estimated diameter of 120-150 nanometers as a carrier.

These dual-use technologies are applicable to both pharmaceuticals and weapons design. Notably, while the Razi Institute is a fairly autonomous civilian entity, it is linked to both the Iranian Ministry of Health and the Ministry of Agriculture and is indirectly involved with the Iranian CBW weapons program and alignment. Crude Caspian cobra venom is centrifuged, frozen in a $-80\text{ }^{\circ}\text{C}$ deep freezer, and lyophilized at the Razi Institute.

Ostensibly, this product is used solely to attain an anti-venom horse serum. However, it is entirely plausible that an unknown portion of it is turned into a biological warfare agent alongside others developed in conjunction.

Highly virulent viruses. Deadly viruses that cause smallpox, influenza or hemorrhagic fevers might comprise components of Iran's second generation of biological warfare agents.

Smallpox: Infections of the smallpox virus were last recorded in Iran in 1972. The reference strain, IRN72_tbrz, is held at the CDC in the US. It is not known whether additional virus isolates were obtained from Iranian patients and kept in Iran. What is known is that in recent years, the analogous virus - the one that causes monkeypox - has been reviewed at Tarbiat Modares University in Tehran, an institution known for its relationship with the IRGC. In parallel, further viruses that constitute the causative agents of notorious hemorrhagic fevers like Ebola, Marburg, Rift Valley, Crimean-Congo, Chikungunia and dengue, were meticulously investigated at both Tarbiat Modares University and Islamic Azad University. The latter maintains close ties to the IRGC, particularly in terms of military research collaboration. It is not known whether the Ebola and Marburg viruses, which are exotic to Iran, have been obtained by it, but this is likely.

In 2007, a notable interface formed between Iran and Indonesia with regard to the highly pathogenic H5N1 avian influenza virus, which emerged indigenously in Indonesia. While the global average mortality rate for H5N1 was about 60% (in humans), the rate in Indonesia was as high as 85% during 2005-07. A confrontation with WHO arose when Indonesia refused to share local virus samples with the

organization. Iran took advantage and established a joint project with Indonesia to produce an H5N1 vaccine in Iran. The Iranian regime took possession of Indonesia's extremely virulent strains in the process.

Finally, though it appears not to have been attacked in 2025-26, mention should be made of the Baqiyatallah University of Medical Sciences and its associated Institute of Research for Military Medicine (co-located in Vanak, Tehran), which are affiliated with and operated by the IRGC. These are premier Iranian institutions, leading R&D in cardinal areas like neuroscience, genetics, and biotechnology. As for CBW, while these institutions publicly focus on defense against such weapons, they are also oriented towards offensive aspects, covering a range of typical chemical and bio-agents like the pathogens of plague, anthrax, tularemia, brucellosis, typhoid, cholera, botulism, staph-B enterotoxemia and certain fungal toxicoses. They also deal with traditional chemical warfare agents, including mustard, sarin, VX, soman, phosgene and cyanides.

By 2005, Iran already possessed sizable self-made stockpiles of operational CBW, composed of such traditional chem-bio warfare agents (plus ricin, aflatoxin and T-2 toxin). These agents were weaponized with various delivery systems, including aerial bombs, spraying tanks, unmanned aircraft, and unitary missile warheads. These constitute Iran's first-generation CBW. The systems concerned have been gradually upgraded ever since in terms of quality of the agents in the payloads, spreading mechanisms, and range.

Moreover, during the 2026 war, Iran demonstrated its mastery of the effective delivery of conventional cluster (bomblet) warheads, particularly warheads of ballistic missiles. In all probability, Iran tried over the past decade to weaponize cluster warheads with chemical and biological weapons, which would be a meaningful force multiplier.

If self-production of ballistic missiles is continuously blocked or halted in Iran, the regime may either convert residual stocks of conventional warheads into CB warheads or purchase ballistic missiles with empty warheads from China, Russia or North Korea for the purpose of chemically and biologically supplementing them. At least one of the three allies is likely to consent to such a supply request.

In addition to CB warheads, we must consider the possibility of Iranian radiological warheads, which is not negligible. As long as it is deprived of the ability to obtain nuclear weapons, Iran will maximize its efforts to achieve sub-

nuclear weapons of mass destruction, notwithstanding its position as a state party to the conventions banning such weapons.

The Iranian regime's prolonged and filthy maneuvering in these arenas will undoubtedly persist. The damage inflicted upon the six attacked facilities was considerable and important, certainly, but will not severely hamper Iran's renewed efforts to procure further upgrades to its CBW armaments.

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