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Medicalized **WEAPONS** & Modern **WAR**

by MICHAEL L. GROSS

“Medicalized” weapons—those that rely on advances in neuroscience, physiology, and pharmacology—offer the prospect of reducing casualties and protecting civilians. They could be especially useful in modern asymmetric wars in which conventional states are pitted against guerrilla or insurgent forces. But may physicians and other medical workers participate in their development?

Asymmetric warfare is creating a new frontier for bioethics as military organizations rush to develop nonlethal, medicalized weapons. Faced with small but increasingly sophisticated guerrilla organizations that intermingle at will with the civilian population, the United States and many of its allies are searching for ways to disable insurgents while minimizing harm to civilians. One avenue is to build increasingly sophisticated “precision-guided munitions”—“smart,” high-explosive bombs that, in

theory, zero in on and destroy their targets without widespread collateral damage. However, these weapons—the purview of electronics and ballistic experts—can only go so far. Very often, there are no clearly defined guerrilla targets, or, as often happens, the targets are destroyed early on.

Nonlethal weapons are an increasingly attractive option for rooting out insurgents without bringing catastrophic harm to civilians. Rather than disabling or killing enemy forces by causing traumatic injury, nonlethal weapons temporarily incapacitate their targets by causing physical distress, disorientation, or unconsciousness. These weapons are “medicalized” in that they rely on advances in neuroscience, physi-

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ology, and pharmacology and on the active participation of physicians and other medical workers. Not since international law prohibited the development and use of biological and chemical weapons (in 1972 and 1993, respectively) have medical personnel been so directly involved with the design, manufacture, and testing of a weapon. But medicalized weapons place medical practitioners in a bind. Ordinarily trained to relieve pain and suffering, they now face calls to help build weapons that cause some measure of harm, even if nonlethal and transient. Do the principles of medical ethics—particularly the axiom “do no harm”—permit medical personnel to build nonlethal weapons?

To answer this question, it is important to understand the nature of nonlethal weaponry, the solutions nonlethal weapons might provide during asymmetric conflict, the novelty of medicalized weapons and the kind of harm they can cause, and the obligations that medical ethics places upon medical workers asked to help develop these weapons. Drawing on the principle of “do no harm,” it seems clear to many observers that physicians should avoid weapons development at all costs. But there are no solid grounds for such a sweeping prohibition. On the contrary, nonlethal weapons offer the prospect of reducing casualties and protecting civilians during asymmetric war. Unlike ordinary weapons, however, many of the most promising nonlethal weapons require medical expertise. As a result, the medical community cannot easily distance itself from weapons development but should contribute its skill and knowledge to nonlethal weapons research.

The Nature of Nonlethal Weaponry

There are many kinds of nonlethal weapons on the drawing boards or at various stages of development. Biological weapons, categorically banned by the Biological Weapons

Convention in 1972, were the subject of considerable attention after the First World War. Some used anthrax, smallpox, and botulinum toxin—virulent pathogens that made for weapons of mass destruction. But scientists and doctors also devoted considerable energy to weaponizing nonlethal pathogens that would only *incapacitate* those affected. These pathogens include brucellosis, Q-

macology facilitate intelligence-gathering, enhance combat proficiency, and undermine enemy capabilities. Finally, the Active Denial System developed by the U.S. Army utilizes millimeter wave energy to penetrate the skin and cause disabling but transient pain without permanent damage. Far from science fiction, such weapons are a growing part of an advanced army’s arsenal as it confronts

Can physicians help build a weapon that might kill some of those it targets? The World Medical Association assumes that medical ethics forbids this. But does it? Don’t health care professionals imperil health all the time? And wouldn’t doctors and patients welcome a treatment that carried the kind of mortality and morbidity rate these weapons promise?

Fever, and Venezuelan equine encephalitis. This last disease, for example, is highly debilitating, afflicting nearly 100 percent of those infected with headaches, high fever, and weeks of fatigue, but has a mortality rate of less than 1 percent.¹ Both the United States and the Soviet Union successfully weaponized it as an incapacitating agent before ending their biological weapons programs when they ratified the Biological Weapons Convention.²

Research continues apace in other fields, however. Optical weapons—blinding lasers and flash grenades—cause temporary blindness and disorientation. Acoustical weapons, which have not yet been perfected, would employ inaudible infrasound to resonate in body cavities and cause disorientation, nausea, vomiting, and bowel spasms.³ Calmatives—chemical agents that depress the central nervous system—can cause unconsciousness or incapacitating hallucinations. Advances in neuroimaging and phar-

macology facilitate intelligence-gathering, enhance combat proficiency, and undermine enemy capabilities. Finally, the Active Denial System developed by the U.S. Army utilizes millimeter wave energy to penetrate the skin and cause disabling but transient pain without permanent damage. Far from science fiction, such weapons are a growing part of an advanced army’s arsenal as it confronts

The Role of Nonlethal Weapons in Asymmetric War

In many places around the globe, asymmetric war between a strong state and a weak nonstate actor is replacing armed conflict between two similarly equipped conventional armies. Although the weaker side fights with varying degrees of military sophistication—Iraqi insurgents used improvised explosive devices, while Hezbollah can fire long-range missiles, for example—nonstate actors in asymmetric wars share certain characteristics. In most cases, combatants fight without uniforms, while many civilians take a direct though part-time role in the fighting by storing or operating weapons, providing intelligence, and transporting men and materiel. The nonstate actor is not necessarily violating the laws of war, for the laws of war are painfully unclear on

these issues. Guerrilla armies operate under the cover of the civilian population to compensate for their conventional weakness. This is precisely the reasoning that led the international community to loosen the rules requiring guerrillas to wear uniforms.⁵

Unfortunately, the same concessions that make it easier for guerrillas to fight also place civilians at risk for increased harm, as the stronger side searches for ways to disable enemy combatants (as well as the civilians who aid them) without harming those civilians who are innocent. During the Second Lebanon War (2006), for example, the Israeli air force attacked a convoy fleeing the village of Marwaheen following a warning to civilians to evacuate the town within two hours. Sixteen people were killed immediately and seven more died later. Both the United Nations Human Rights Council and Human Rights Watch condemned the attacks for causing excessive, disproportionate, and unnecessary civilian casualties.⁶ In response, Israel argued that Hezbollah fighters in civilian clothes were taking advantage of civilian convoys to escape and regroup. This problem is potentially acute in asymmetric war. About nine hundred thousand Lebanese civilians fled the fighting during the Second Lebanon War, and it would have been easy for the five to seven thousand Hezbollah militiamen to mix among them, escape, and reorganize. Ordinarily, a retreating army is a vulnerable and important military target. In asymmetric warfare, however, attacking a retreating army is fraught with challenge because the inability to distinguish combatants from noncombatants makes it exceedingly difficult to disable the former without excessively harming the latter.

High explosives, however smart they are, cannot solve this problem. The Marwaheen attack was, in fact, a pinpoint strike. Could nonlethal weapons have done any better and disabled enemy combatants without killing civilians? One of the aims of nonlethal weaponry is to “shoot first

and ask questions later”—incapacitate an entire group of individuals and sort out the combatants from the noncombatants afterward. Anesthetic calmative compounds that depress the central nervous system and cause unconsciousness can do this. These chemical agents remain untested under battlefield conditions, have as yet no effective delivery system, and require the use of ground troops that nations are not always anxious to commit to battle. Nevertheless, many professional observers—the National Research Council among them—express a great deal of interest in chemical weapons that “offer the theoretical possibility of peacefully incapacitating combatants/agitators, reducing the need for the violence that is frequently associated with many of the current methods.”⁷

Calmatives are part of neuroscientific technologies that might also help military organizations to collect intelligence, enhance military prowess, and degrade enemy capabilities. To collect intelligence, analysts raise the prospect of using functional MRI (fMRI) and other neuroimaging devices to “provide insight into intelligence from captured military combatants, enhance cognition and memory of enemy soldiers [and] screen terrorism suspects at checkpoints.”⁸ Of direct benefit to combatants—particularly special operations forces, whose role is critical in asymmetric war—is the development of pharmaceuticals to sustain and enhance soldiers’ performance on the battlefield by mitigating the effects of fatigue and sleep deprivation.⁹ To degrade enemy capabilities, military planners are looking to utilize the benefits of calmatives and other nascent technologies. Future applications may see the development of “pharmacological cluster bombs” and nanotechnology to overcome the delivery problems associated with the current generation of calmative and opioid agents.¹⁰ All of these may prove useful for disabling combatants while safeguarding the welfare of noncombatants during asymmetric conflict.

Other field conditions call for an entirely different kind of nonlethal weapon. In the near future, the U.S. Army hopes to deploy the Active Denial System to disperse crowds, protect facilities from attack, and clear the battlefield of noncombatants. While common riot control agents such as tear gas are sometimes a useful form of crowd control, they are not always effective when armed combatants intermingle with civilians and don protective masks. When tear gas fails, one option is to use live ammunition or rubber bullets, but both may cause permanent injury. Looking like a large radar dish, the ADS, on the other hand, emits 95 GHz millimeter wave directed energy that just barely penetrates the surface of the skin and heats it to 55 degrees Celsius, a temperature that “exceeds the pain threshold but does not exceed the threshold for tissue damage.”¹¹ Although blistering may result when exposure exceeds one minute, people instinctively flee from the beam after a few seconds, making the ADS an effective system to disperse violent crowds threatening a check post or base perimeter.¹² The U.S. Army also envisions a significant role for ADS when troops must attack a position occupied by combatants and noncombatants. In this situation, “the ADS is employed first to deny the enemy effective use of their weapons,” and second to “delay/disrupt the counterattack’s maneuver upon friendly forces.” In the process, civilians are expected to flee, leaving only combatants to face armed troops. “The ADS,” concludes one U.S. Army assessment “will disrupt enemy movement and remove neutral civilians from the battlefield.”¹³

Under these circumstances, nonlethal weapons hope to reduce civilian casualties and protect noncombatants by inflicting less than lethal harm. They are expected to prove useful for an increasing number of military missions. But unlike traditional weapons, neither calmatives nor the ADS can be developed or tested without medical knowledge or the participation of

medical personnel. What is the duty of health care professionals in these circumstances?

The World Medical Association's *Regulations in Times of Armed Conflict* takes an unequivocal stand that precludes weapons development of any kind: "The primary task of the medical profession is to preserve health and save life. Hence it is deemed unethical for physicians to 1) weaken the physical or mental strength of a human being without therapeutic justification and 2) employ scientific knowledge to imperil health or destroy life."¹⁴ The U.S. Army textbook of military medical ethics takes an equally unambiguous stance; it urges medical professionals "to stay in the business of healing and not hurting, which includes not participating in or contributing to weapons research and development."¹⁵ "Doctors," concludes Vivienne Nathanson of the British Medical Association, "cannot remain doctors and be involved in developing weapons and weapons systems; that is an abuse of their knowledge and privileged place in society."¹⁶

Looking beyond physicians, Robin Coupland of the International Committee of the Red Cross makes a similar claim about the entire medical community:

There is a fundamental ethical dilemma for doctors. The development of this new generation of ["nonlethal"] weapons incorporates knowledge from the remarkable advances made in medical science; two examples are calmatives and eye attack lasers. . . . The medical community must guard against use of its knowledge for the purposes of weapon development.¹⁷

If the WMA might have been happy to simply remove physicians from weapons development and testing facilities, the ICRC makes this impossible. Coupland draws no distinction between health care professionals (doctors, nurses, or physician assistants) and medical scientists (mi-

crobiologists, physiologists, and pharmacologists). All are members of the "medical community," and none should lend a hand to the development of anything called a weapon. But if, as the National Research Council asserts, "the time is right to apply neuroscience understanding to applications that have military relevance," and this undertaking *requires* the active participation of neurologists, neurosurgeons, and psychiatrists, then the medical community faces a dilemma.¹⁸ What should it do when nonlethal weapons cannot be built without its assistance: refuse to help or cooperate?

lethal weapons, but the questions they raised pertain to nonlethal chemical weapons as well. These were medical questions that weapons designers never asked before. Addressing his staff at Britain's chemical and biological weapons facility in Porton Down, Paul Fildes pondered how to best disseminate biological and chemical agents:

Obviously, the respiratory track was the best portal for the entry of micro-organisms into the body. . . . While the gastrointestinal track was eminently susceptible to infection by a considerable number of pathogens, the military use of food

It makes no sense to view weapons development through the lens of *medical* ethics. To invoke a therapeutic justification presupposes a therapeutic relationship between a doctor and a patient. When patients are not present and no therapeutic context exists, one must look to another framework to decide whether causing harm is ethical.

The Medicalization of Weapons

U

ntil very recently, the medical community played absolutely no role in weapons development. High-explosive projectiles present only three questions—what is their accuracy, range, and payload?—and none of them are medical questions. But nonlethal weapons pose questions that only medical research and expertise can answer. These questions focus on "portals" of entry, delivery systems, and a weapon's effect on human beings.

Portals of Entry and Delivery. During World War II, weapons researchers discussed how best to deliver chemical and biological weapons. At the time, they were developing

and water contamination in biological warfare was considered to be logistically complex. . . . The eyes and skin were not particularly vulnerable, unlike the situation in chemical warfare. Clearly, the possibility that a biological warfare agent could be aerosolized from a munition or spray, and be shown to initiate an infection through the respiratory track, was the best basis for assessing the reality of biological warfare.¹⁹

Delivery is no less a problem for contemporary nonlethal weapons development, and detractors and supporters alike debate the merits of delivering neuropharmacological agents by ingestion, injection, inhalation, and topical application. Here, the

National Research Council advises the U.S. Army to “monitor rather than invest in [these key technologies] directly.”²⁰ The Army should, in other words, watch medical science closely and then adopt and adapt what it needs for military purposes.

Delivery is one problem, dosage is another. The ADS exploits a twenty-five-second physiological safety zone between the threshold of pain and the threshold of tissue damage. Similarly, nonlethal chemical weapons require knowledge of an agent’s “relative safety index” (or “therapeutic index”). This is the ratio of its lethal dose (defined as one that will kill more than 50 percent of those affected) to its effective dose (that which will incapacitate more than 50 percent of those affected). The greater the index, the more likely the weapon will remain nonlethal. Usually, these indices are very high. For fentanyl (a caliative probably used by the Russians to subdue Chechnyan rebels in Moscow in 2002) the index is 300—that is, a fatal dose is 300 times the dose required for incapacitation. For other caliatives, such as carfentanyl, the index is 10,600, making these superior nonlethal chemical agents. These data come from the medical literature and are based on animal and human testing.²¹ Human testing is essential for assessing the effects and effectiveness of all nonlethal weapons.

Human Testing. The medical community plays a significant role in nonlethal weapons testing. The U.S. Army, for example, developed a number of research protocols to assess the safety and efficacy of millimeter wave technology. Significant preliminary data about the effects of millimeter waves on humans and animals appeared in *Health Physics*, a journal of radiation safety for “health physicists, nuclear chemists, and physicians with an interest in nuclear and radiological medicine.”²² Drawing on these studies, the U.S. military developed a series of protocols for testing its weapon on humans. For example, protocols employ volunteers to test the effects of alcohol consumption on pain

thresholds (on the assumption that some ADS targets may be inebriated), to measure subjects’ tolerance to millimeter waves as a function of the beam’s power or of the area of skin exposed, and in general to test the effectiveness of the ADS system to repel crowds or protect military perimeters in urban and maritime settings. The protocols require an informed consent form, a detailed medical risk analysis, and constant monitoring by physicians before, after, and during the experiment.²³

The central role of medical data and human testing in the development of nonlethal weapons sharply distinguishes these weapons from conventional high explosives. Nonlethal weapons are clearly medicalized weapons. Yet this alone is not sufficient to argue that medicine should distance itself from their development. After all, if nonlethal weapons cause little harm—at least no more pain and discomfort than physicians cause when they routinely use anesthesia, chemotherapy, scalpels, and lasers—then there seems to be little reason for concern, particularly when we consider that nonlethal weaponry might save many lives.

Responses critical of a more expansive role for medicine in nonlethal weapons research take two forms. First, many argue that physicians—and everyone else for that matter—should stay away from nonlethal weapons because they can actually cause significant harm. The second and perhaps more interesting argument is that the harm they cause is, though nonlethal, nonetheless an affront to medicine because it is *medicalized*, and medicalized harm always causes unnecessary suffering.

Lethal, Sublethal, or Nonlethal?

Because many nonlethal weapons remain untested under battlefield conditions, it is difficult to answer critics who charge that, in practice, these weapons will prove far more than nonlethal. Critics of the ADS

system, for example, point out that millimeter waves remain nonlethal only insofar as those targeted can flee the beam’s effects. If they cannot (and no one yet knows how an angry mob will react to the intense pain they experience), then the operator must turn off the beam. If he does not, then the skin of those targeted may burn and blister.

While questions about the ADS will remain unanswered until U.S. forces deploy the system, critics argue that there is often sufficient evidence to be wary of any attempt to manufacture and use nonlethal weapons. One example comes from Vietnam, where U.S. troops used irritants and tear gas to flush North Vietnamese from tunnels and underground bunkers so that they could be shelled with artillery and cannon fire. Here, nonlethal agents functioned as a “force multiplier”: they *increased* the lethality and effectiveness of conventional weapons. Military doctrine may be able to differentiate between conventional and nonlethal warfare in theory, but in practice, critics argue, the two are merely opposite sides of the same lethal coin. And this is the best case scenario. In the worst case, nonlethal chemical weapons will open the door to a steady deterioration of the Chemical Weapons Convention and will eventually lead to the reintroduction of chemical weapons of mass destruction.²⁴

Finally, consider the outcome of the only notable attempt to use a caliative agent against urban guerrillas. When Chechnyan guerrillas seized a Moscow theatre in 2002 and held 850 hostages, the Russian authorities decided to subdue the insurgents by pumping the caliative fentanyl (or a fentanyl derivative) through the ventilation system. Almost immediately, everyone in the theater lost consciousness. All fifty terrorists were shot dead before they could regain consciousness. Unfortunately, 129 hostages also died. What happened? Critics charge that the episode points to the lethality of caliatives and the inability to control dosages and ef-

fects in a relatively confined space (not to mention on the open field).²⁵ Other analysts, however, note the Russian penchant for secrecy; the exact name of the calmativ was never divulged. Their own medical personnel were in the dark and, as a result, did not have enough antidote on hand.²⁶ Under more favorable conditions the outcome might have been much better.

The debate over the relative lethality of nonlethal weapons will not end here. However, it is important to note the difficulty of understanding available evidence before these weapons are battle-tested. Calmatives and the ADS are neither designed nor intended to be used as force multipliers; they aim rather at reducing civilian casualties. If they work as expected and save lives while causing minimal harm, then this part of the criticism collapses. Nonlethal weapons remain sufficiently nonlethal to leave room for the medical community to contribute to their development. But this still leaves one to consider the merits of a different argument that assumes nonlethal weapons may work as intended but still cause the kind of harm that physicians must avoid.

Nontherapeutic and Medicalized Harm

The World Medical Association, which regulates the conduct of medical personnel during armed conflict, concludes that it is unethical for physicians to “imperil health” or “weaken the physical or mental strength of a human being without therapeutic justification.” Nonlethal weapons clearly fail on the first account. They do not usually imperil health, but they are certainly lethal in some cases. Although nonlethal weapons are designed to incapacitate, the U.S. Joint Nonlethal Weapons Directorate has proposed a quantitative measure for nonlethality that would allow a “nonlethal” weapon to kill 0.5 percent of those affected and permanently injure another 0.5 percent.²⁷ In the absence of definitive

data, it remains unclear whether calmativ agents or the ADS meet or exceed this criterion. Nevertheless, can physicians help build a weapon that might kill some of those it targets? The WMA assumes that medical ethics forbids this.

But does it? Don’t health care professionals imperil health all the time? And in many cases, wouldn’t doctors and patients welcome a treatment that carried with it a combined mortality and morbidity rate of 1 percent? If they would, then the relatively few cases of lethal harm caused by nonlethal weapons are not the difficulty. The problem lies in the WMA’s second injunction, which forbids any action to “weaken the physical or men-

harmful or painful medical treatment, assuming that they save a person’s life when a conventional weapon would jeopardize it.

Weapons, however, are not medical treatments, and equating the two sounds perverse. It is for this reason that we have to consider weapons on their own merits: as a means for a military organization to project power and to achieve military and political objectives. Like any act of war, weapons development carries with it ethical considerations that push beyond the bounds of peacetime ethics, medical or otherwise. It makes no sense, in other words, to view weapons development through the lens of *medical* ethics. To invoke a

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tal strength of a human being without therapeutic justification.”

Therapeutic justification is the exception to the medical dictum, “Do no harm.” It allows health care professionals to harm patients if there is a good chance that treatment will save their lives without permanent, serious disability and with a minimum of pain and suffering. Just how good the chance must be, and what exactly constitutes serious disability, pain, and suffering, usually depends on the competent patient’s own evaluation. When patients are not competent, surrogate decision-makers may choose long-term benefits over short-term harm when this serves a patient’s best interest. The opening for nonlethal weapons is obvious: Nonlethal weapons are little different from

therapeutic justification presupposes a therapeutic relationship between a doctor and patient. Therapeutic justifications make sense only in this context: it is permissible to harm a sick patient only if it is therapeutically justified and in her best interests.

When patients are not present and no therapeutic context exists, one must look to another framework to decide whether causing harm is ethical. Certainly, a theory of therapeutic justification is not the proper perspective to use when deciding to harm another person in self-defense. A physician facing a rapist would not ask whether she requires a therapeutic justification to inflict harm. In this case, the physician is not acting in a medical capacity, and her professional obligations are irrelevant. In other

cases, too, the duties of citizenship supersede professional obligations.²⁸ A physician living in a community threatened by war may find cause to contribute to collective self-defense. If her medical expertise aids that effort in any appreciable way, then she must ask the difficult question that anyone asks during war: when and how is it permissible to harm another person?

The answer to this question depends on how one understands the nature of just war. This is far too vast a subject to discuss here; I only note that it is the answer a person gives to this question, not the answer given to questions about the limits of therapeutic harm, that is decisive. Invoking the prevailing standard of conduct during war suggests that just wars are wars of self-defense (and perhaps wars of humanitarian intervention also) and that just methods of warfare demand proportionate responses that seek to avoid excessive civilian casualties.²⁹ This is an oversimplification, but it offers the proper context to examine an individual's obligation to build weapons. When a particular weapons system is militarily necessary—that is, when it allows a nation to attain just political goals (self-defense or successful humanitarian intervention) by just means—and when certain individuals command the necessary expertise to build them, then these individuals incur a *prima facie* obligation to support weapons development.

Nonlethal weapons satisfy these criteria. Nonlethal weapons are not necessary or indispensable in the sense that another weapon is not available, but militarily and ethically necessary because they can sometimes accomplish similar goals at lower costs in human life. At the same time, they require medical professionals to build them. Putting aside the question about whether some nonlethal weapons such as caltrops may be lawfully used in armed conflict or law enforcement,³⁰ the only remaining question is whether nonlethal weapons in general are a just and lawful means to wage war, or whether

any medicalized weapons would cause superfluous injury and unnecessary suffering.

Superfluous Injury and Unnecessary Suffering

The Geneva Conventions clearly prohibit weapons that cause superfluous injury and unnecessary suffering:

1. In any armed conflict, the right of the Parties to the conflict to choose methods or means of warfare is *not* unlimited.
2. It is prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering.³¹

The concept of “unnecessary suffering” has both military and medical meanings. Militarily, the emphasis falls on necessity: “unnecessary suffering” refers to any means beyond those required to disable or disarm an enemy combatant and render him unable to fight. In some cases, one may inflict great harm and suffering to dislodge a well-entrenched or particularly tenacious enemy, while at other times anything beyond minimal force may be unnecessary. Unnecessary suffering, in the military sense, has no bearing on the level of pain a combatant may suffer. Medically, however, the emphasis falls on “suffering.” From this perspective, “unnecessary suffering” connotes unbearable or frightful pain and precludes intense suffering even if it is necessary to disarm an enemy.

Finding it difficult to define “unnecessary suffering” with any precision, most international conventions make due with prohibitions on certain kinds of weapons: hollow point bullets, poisoned weapons, asphyxiating gas, serrated bayonets, and blinding lasers. In 1997, the ICRC tried to quantify “unnecessary suffering” by suggesting that weapons cause “superfluous injury and unnecessary suffering” and thereby violate international

law when they bring about “specific disease, a specific abnormal physiological state, specific and permanent disability or specific disfigurement,” or a field mortality of more than 25 percent or hospital mortality of more than 5 percent.³²

For advocates of nonlethal weapons, mortality and disfigurement are not at issue. But any restriction that prohibits an abnormal “physiological or psychological state” undercuts any medicalized weapon, no matter how nonlethal it is. For this is what medicalized weapons do; they interfere with normal physiological and psychological processes and target the human anatomy. Humanitarian organizations find this particularly problematic because “most people,” as Coupland writes, “consider warfare waged with weapons developed in laboratories by biomedical scientists unacceptable. . . . The primary effect [of weapons],” he continues, “should not be to target a specific part of the human anatomy, physiology or biochemistry.”³³ With this in mind, the ICRC’s 2006 *Guide to the Legal Review of New Weapons, Means and Methods of Warfare* cautions against any weapon that “would cause anatomical injury or anatomical disability or disfigurement which are *specific to the design of the weapon*.”³⁴ This means that a weapon specifically designed to disfigure the human body, depress the central nervous system, trigger convulsions, induce unconsciousness, or heat the skin to painful temperatures is one that inflicts unnecessary suffering and superfluous injury and violates the Geneva Conventions, regardless of the magnitude or permanence of the harm it causes. This is a sweeping claim.³⁵ If valid, it means that any medicalized weapon violates humanitarian law.

One way to consider the ICRC claim is to invoke the military meaning of unnecessary suffering. Here, the criticism of medicalized weapons is straightforward: they cause harm that is not militarily necessary. This assumes that there are other methods to achieve the ends that nonlethal

weapons seek. Critics of chemical nonlethal weapons often make this point, but their solution is to suggest an alternative nonlethal weapon—such as the ADS. This was reflected in the view of the Council on Foreign Relations in 2004.³⁶ It was concerned not so much with the harm that caltrops may cause as with the likelihood that any permissible chemical weapon, no matter how nonlethal, opens a door that will eventually lead nations to build chemical weapons of mass destruction. This concern is difficult to evaluate. As warfare changes and the international community wrestles with many changing norms, there is no reason to think it will slide down a slippery slope rather than construct firm red lines around the use of different weapons in various situations. Certainly, successful attempts to prohibit antipersonnel land mines and cluster bombs demonstrate the resolve to ban weapons that greatly imperil civilians. But while chemical weapons proliferation is certainly a concern for the Red Cross, it does not speak to the unnecessary suffering and superfluous injury that other nonchemical medicalized weapons cause.

Instead, it seems that the ICRC harbors a stronger, as-yet-unarticulated fear of weapons that manipulate the human body in ways that are, perhaps, unnatural. Here, the medical dimension of “unnecessary suffering” comes into play. In his novel *Saturday*, Ian McEwan describes a chance encounter between a mugger and a surgeon. The mugger is desperately ill and the surgeon knows it, and just as the potential for violence escalates, the assailant understands that his victim can help him. The situation then changes dramatically. Now, writes McEwan, “they are together . . . in a world not of the medical but of the magical. When you’re diseased it is unwise to abuse the shaman.”³⁷ So the mugger backs off.

This brief description of medicine in an isolated episode of hostility and conflict suggests a way to understand the Red Cross connection between

nonlethal, medicalized weapons and unnecessary suffering. The problem for nonlethal weapons may not be one of suffering in the sense of unendurable or frightful pain, but of something far more subtle. Jonathan Moreno asks whether neuroweapons that modify the brain do not put us into “special territory” where we are “overstepping some natural line and jeopardizing our essential nature or personhood.”³⁸ This is a real fear. When weapons push beyond blunt trauma, blood loss, and death—when they can cause a genetically engineered viral disease or interfere with neural networks or depress the central

reasoning, are the last people you want to build weapons.

The Last (But Only) People to Build Weapons

Doctors may be shamans and medicalized weapons may be magic and, for this reason alone, it might be a good idea for medical professionals to stay away from building weapons. But they cannot keep their distance forever. In the small world of nonlethal weapons, two facts are inescapable. First, medical expertise and personnel are necessary to develop and test weapons designed specifically

If the feeling that something is amiss about mixing medicine and weapons development is warranted, it should not stem from uneasiness about magic but from the lack of empirical data about how nonlethal weapons perform. As the data accrue, physicians must assess this evidence on its own merit; and, like any citizen, they must also evaluate the war they are called upon to aid.

nervous system or shut down sight or induce hallucinations—then they have, in some sense, moved from the medical to the magical. Medicalized weapons are, in this sense, magical weapons, the most fearsome of all. They inflict harm that is not merely painful but in some way insidious.

Consider, then, the specter of shamanhood that McEwan raises in the scene above. Health care professionals are entrusted with the means to prevent sickness and stall death. Because these same means may serve malevolent ends, the medical community must reassure us with oaths and rituals that it will not cross the line. Otherwise, we cannot give doctors our trust. The lay community, too, must remain on guard and wary lest the shaman garner more power than he already has. Doctors, by this

to cause temporary incapacitation and avoid long-lasting harm. Second, the nonlethal weapons of the type described here are military and humanitarian necessities.

The first fact is indisputable. Some wonder whether it might be possible to build nonlethal weapons without the help of medical doctors and restrict weapons design, development, and testing instead to medical *scientists*, but there is no nonlethal weapons program that can do this. Medical oversight, in the very least, is crucial to test devices that flirt with the limits of human endurance. Even if one might isolate medical doctors from weapons research (as some hoped to do during and after World War II by restricting physicians to “defensive” biological and chemical weapons research), this becomes im-

possible if we consider the entire medical *community*, which includes health care professionals and medical scientists alike. They may be the last people you want to build weapons but, sometimes, they are the only ones who can.

The second fact—the military and humanitarian necessity of nonlethal weapons—is, of course, only a claim. Underlying it is an assumption that nonlethal weapons provide a “force continuum” between using high explosives and doing nothing. If massive use of force brings unacceptable harm to civilians and doing nothing causes unacceptable military harm, then nonlethal weapons may offer an option that mitigates both outcomes. However, nonlethal weapons may also make it easier to resort to force (even nonlethal force) while precluding the search for diplomatic or other options. Like many of the pitfalls and dangers associated with the development of nonlethal weaponry, this claim, too, remains unresolved until calmatives and millimeter wave weapons are used under battlefield conditions.

Nonlethal weaponry, however, is not a panacea. It cannot destroy hard assets, nor does it provide much of a deterrent. Without strong and overpowering conventional weapons, it is doubtful that anesthetizing agents, neuroweapons, or millimeter wave energy devices alone will deter a determined adversary. Nevertheless, most nations are acutely aware of their obligation to protect noncombatants, and nonlethal weapons offer an option that may spare some civilians some of the agony of war. Civilians are always at risk during war, but all the more so in wars in which combatants and noncombatants cannot be distinguished. Attacking civilians in order to save them presents a new challenge for an international legal regime that prohibits deliberate attacks upon civilians, and it is just one of the many questions nonlethal warfare raises.

Potential humanitarian and military benefits notwithstanding, the

medical community continues to harbor misgivings about weapons development. On close inspection, many of these are difficult to sustain. Nevertheless, some still feel that there is something amiss about mixing medicine and weapons development. If this feeling is warranted, it should not stem from uneasiness about magic or shamans but from the lack of empirical data about how nonlethal weapons eventually perform. As the data accrue, physicians—just like any weapons designer—must assess this evidence on its own merit. And just like any citizen, they must also evaluate the war they are called upon to aid. If the data prove convincing and the cause of war is just, then those with the necessary expertise should contribute to weapons development. But if the data prove dubious or the war unjust, then their duty is to desist and to do their utmost to frustrate national policy. Members of the medical community are uniquely situated to evaluate the harm that medicalized weapons can cause. This does not mean they should avoid weapons research at all costs. Rather, it makes theirs an important voice in the public debate that must take place when nations go to war.

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