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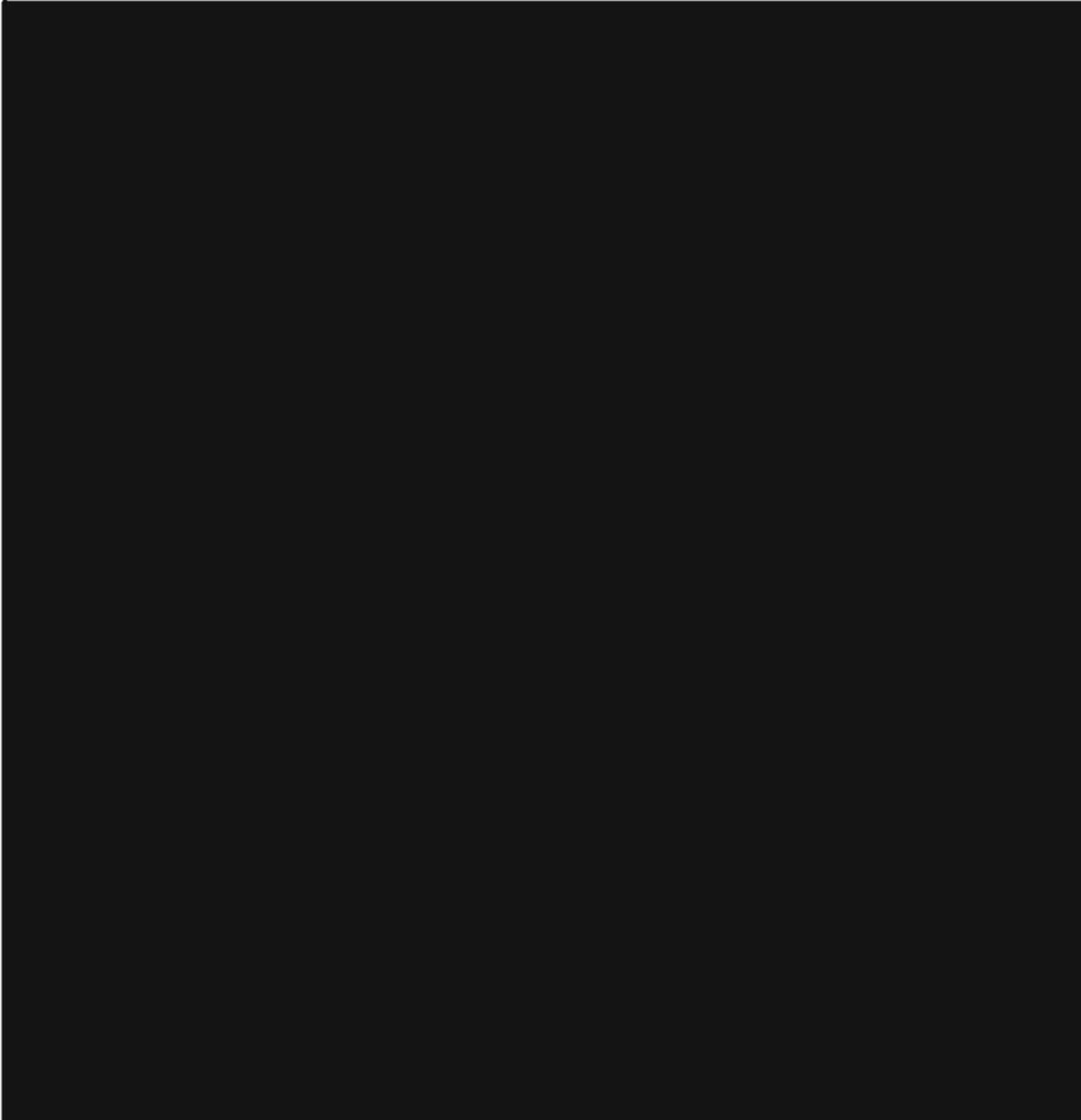
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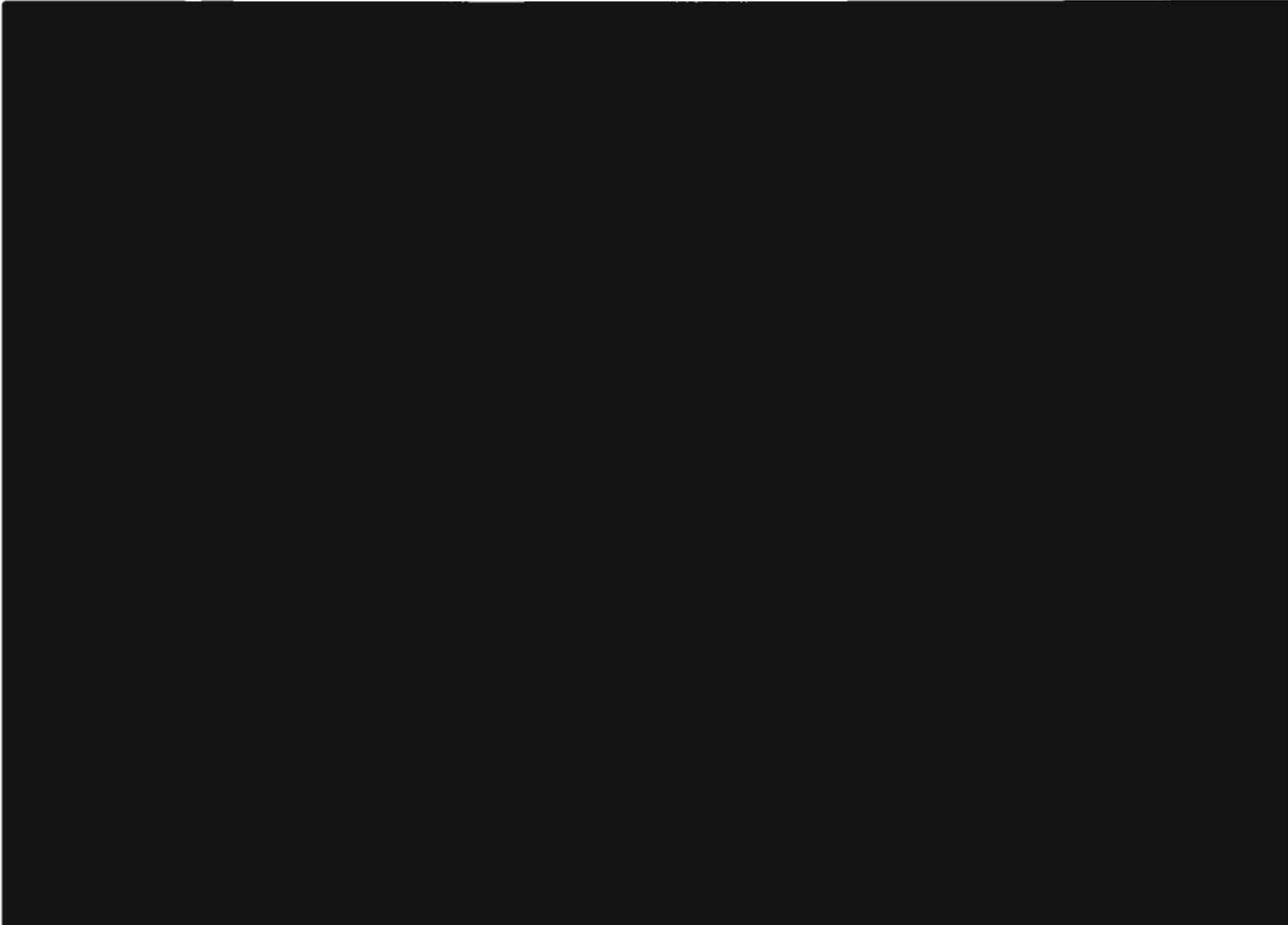
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## The neurological consequences of explosives

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### Abstract

Neurological injuries produced by explosive blasts are the result of a cascade of events that begin with the initial explosion and evolve from the secondary, tertiary, and quaternary effects that the explosion engenders [Lavonis EJ. Blast Injuries. EMedicine.htm]. Only the results of the primary blast are predictable, and subsequent actions ripple outward in an increasingly random and chance sequence. This article reviews and explains how the ensuing chain of circumstances injures the nervous system, and what examining physicians should anticipate when they treat these patients.

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### 1. Introduction

The rapid chemical conversion of a solid or liquid into a gas results in a release of energy that produces an explosion. Propellants, like gunpowder, are designed to release energy slowly, while high explosives are designed to detonate quickly [2]. High explosives are integral to the current weapons of choice for terrorists and are the subject of this paper.

For the purpose of terror, explosive devices can be divided into four main categories: those which are projected or propelled to the target, those which explode passively when the target sets off a trigger, those that sit passively until detonated by a combatant in a remote and secure location, and those that are deliberately designed, transported and detonated in a site that is chosen to produce the greatest degree of physiological and psychological trauma and terror.

The first category consists of bombs, missiles, and projectiles. The second group is made up of the traditional land mines and unexploded, but still “live”, ordnance, which detonate only if the victim sets off the trigger. The third and fourth groups have evolved in modern insurgencies. Simple electronic technologies allow a terrorist to directly visualize

a target and remotely detonate a passive explosive. Those who transport the weapons to the target site may detonate the fourth group and may be part of the actual weapon. Since the third and fourth groups are the preferred weapons of terrorists, these will often be designed to maximize injuries at the site of the explosions and to create psychological panic in the targeted society.

The chain of events that begin with the blast determines the neurological injuries that the victims receive. The initial blast occurrences proceed in a predictable manner, while later ones involve more random factors. Because actual patients will have multiple site and multi-organ injuries, treating professionals will be faced with multidimensional injuries [3]. In order to understand how the injuries occur, one must understand the cascade of blast-related events (Table 1).

### 2. The primary blast injuries

#### 2.1. The physics

Conventional explosives generate a biphasic blast wave that spreads from its primary point source. This is described mathematically as a *Friedlander Wave Form* [4]. The first phase is a high-pressure *shock wave* of very brief duration, followed the second phase *blast wind*, or air in motion [5].

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Table 1  
Classifying blast injuries by mechanism of injury [1]

1. Primary injuries are caused by the blast wave generated by the explosion.
2. Secondary injuries are caused when objects that are set in motion by the blast strike the victim.
3. Tertiary injuries occur when the victim is blown against other moving or stationary objects by the force of the blast.
4. Quaternary injuries are the result of the effects of smoke, environmental debris, delayed onset of infection, collapsing buildings, and other environmental considerations [1].

These blast winds are often referred to metaphorically as “The Winds of War.” The expression arose during the US Civil War, when observers noted men who were dead on the battlefield, with no visible wounds.

The size of the explosive, the rapidity of the conversion from gas to solid state, and whether or not the blast occurs in the open air or in an enclosed space will determine the initial characteristics of the blast wave [2]. Such blast waves are potentially more damaging when they occur under water, since water is denser than air [6]. Because terrorist explosions are virtually always air blasts, this paper will be limited to the consequences of blasts in that medium.

### 2.2. The mechanics

Injuries caused by the initial blast are the direct result of blast overpressure on tissue. This outcome differs between solid organs and those that are hollow and air filled. Air is more compressible than water, so air-filled structures, like the lungs, gastrointestinal tract and middle ear, are affected by this shock wave and blast wind combination.

Proximity to the site of the detonation is paramount. The intensity of the explosive pressure wave declines with the cube root of the distance from the detonation. Therefore, someone 5 m from the blast site will receive nine times more overpressure than someone at 10 m. For explosives containing 1–20 kg of TNT, people greater than 6 m from the blast site do not experience substantial primary blast injuries [7]. The effectiveness of these smaller explosives is magnified by detonation within a closed space, within a corridor that will focus the blast effects, or by including objects designed to become secondary projectiles. Because blast waves are reflected by and reverberate against solid surfaces, someone next to a wall will have increased primary blast injuries because of the enhanced pressure differences and the production of standing waves [8].

Enhanced-blast explosive devices disseminate the explosive first and then trigger it, causing secondary explosions that increase the area from which the high-pressure wave radiates, prolong the duration of the overpressurization phase, and increase the total energy transmitted by the explosion [5].

Explosions that occur in water or enclosed spaces, such as buildings or lightly constructed vehicles, will cause more serious injuries. Mortality from primary blast injuries in

closed spaces can increase by over 100% compared to the results of detonations in open spaces [9].

### 2.3. The consequences

Primary blast injuries are caused by barotrauma—either overpressurization or underpressurization relative to atmospheric pressure. Primary blast injuries most commonly involve air-filled organs and air–fluid interfaces. Body armor does not protect against the barotraumata of primary blast injury [10]. Organs are damaged by dynamic pressure changes at tissue-density (air–fluid) interfaces due to the interaction of a high-frequency stress wave and a lower frequency shear wave [5,11] (Table 2).

Pulmonary barotrauma is the most fatal primary blast injury. Pressure differentials across the alveolar–capillary interface cause disruption, hemorrhage, pulmonary contusion (appearing as a bilobar “butterfly” pattern on chest radiographs), pneumothorax, hemothorax, pneumomediastinum, and subcutaneous emphysema [12–14]. The immediate onset of pulmonary edema with frothing at the mouth (associated with bilateral radiographic “whiteout”) carries a grave prognosis [5]. These injuries can lead to systemic air embolism with ischemic results, hypoxia due to the inability of the lung to exchange gases, and free radical-associated injuries such as thrombosis, lipoyxygenation, and disseminated intravascular coagulation.

Primary blast injuries to the brain and spinal cord include blast wave-induced concussion as well as barotrauma caused by acute gas embolism. Air embolism can produce ischemia and infarction of the brain and spinal cord [5]. Loss of consciousness and coup/contrecoup injuries formerly were considered secondary or tertiary injuries, but with the increased use of body armor in the military, damage to the central nervous system after an explosion has been increasingly attributed to the direct effects of the blast [5,15,16].

Tympanic membrane rupture, hemotympanum, and dislocation or fracture of ossicles occurs at this phase. The tympanic membrane is the structure injured most frequently, and at the lowest pressure of all the organs, by the primary blast effects. The eardrum thus represents a site for detecting primary effects of blasts [12]. An increase in pressure of as little as 5 psi above atmospheric pressure (1 atm is equivalent to 14.7 psi, or 760 mm Hg) can rupture the human eardrum [17]. Temporary neurapraxia in the receptor organs of the ear, manifested by deafness, tinnitus, and vertigo, characterizes rupture of the eardrum, which should be suspected

Table 2  
Organs affected by primary blast effects [5,11]

1. Lungs blast lung.
2. Tympanic membranes rupture.
3. Blast wave-induced concussion/contusion of the central nervous system.
4. Air embolism in blast lung with cerebral infarction.
5. Blast wave-induced ocular injuries [5,11].

even when the tympanic membrane cannot be seen after a blast incident. If dynamic overpressures are high enough, the ossicles of the middle ear can be dislocated. Traumatic disruption of the oval or round window can cause permanent hearing loss. In contrast, pressure gradients of 56 to 76 psi (3.8 to 5.2 atm) are needed to cause damage to other organs [18]. If there is no rupture of the tympanic membrane, then primary effects of blasts on other air-containing organs is unlikely [5].

Primary blast injuries to the eye include rupture of the globe, serous retinitis, and hyphema [5].

#### 2.4. The secondary blast injuries

The primary blast wave propels objects into people. Depending on where these projectiles strike the individual, any part of the nervous system can be affected in an immediate and delayed fashion. Some of the fragments occur due to damage to structures at the blast site, while others are produced intrinsically by the design of the weapon. These produce blunt and penetrating type injuries [5]. Proximity to the primary explosive site, interposing structures, and chance determine what parts of the nervous system are injured.

### 3. The tertiary blast injuries

High-energy explosions produce these injuries by propelling the individual through space and into other objects. Any part of the nervous system can be affected, both immediately and in delayed fashion, depending on the speed of the projection, the forces generated by the sudden deceleration, and how the body hits other projected and fixed objects. Usually the individual who sustains tertiary blast injuries is close to the site of the explosion, or is small in body mass, or the explosion is focused through a narrow opening. Children are especially vulnerable [18]. These injuries include skull fractures, open and closed head and spinal cord trauma, cerebral evisceration in children, contusions and concussion of nervous tissue, and peripheral nerve injuries due to traumatic limb amputations or the ischemia produced by edema associated with crush injury-induced compartment syndromes. The characteristic sign of the compartment syndrome is pain out of proportion to the injury. Mortality in those whose rescue is delayed by rubble and other hindrances to access is directly influenced by the sequelae of crush and compartment injuries [5].

### 4. The quaternary blast injuries

These are the most random. These involve injuries caused by circumstances such as the collapse of structures onto the person, the effects of toxic and noxious materials that are released, and the effects of fire. These include radiation exposure, chemical and thermal burns, toxic inhalation and exposure, hypoxia and asphyxiation from fire, poisoning by carbon monoxide and/or cyanide from incomplete combus-

tion, and inhalation of aerosolized pollutants such as coal dust and asbestos. Additional crush injuries occur with collapse or displacement of structures and heavy objects. Vehicles are required to concentrate even high-performance explosives in amounts need to produce explosions of sufficient magnitude to collapse a building [19,20].

### 5. The evolution of the neurological disorders caused by explosives

The immediate injuries relate to the effects of baropressure, blunt and penetrating trauma, hypoxia and ischemia, severance and evulsions of nerve roots, plexuses, and peripheral nerves, and contusion, concussion and evisceration of nervous tissues. These manifest clinically as pain, altered consciousness, cognitive impairment, loss of function, and epilepsy. As much as possible, these are attended to during the initial phases of treatment, but some are not obvious until the patient regains consciousness and cognition.

Traumatic brain injury caused by passively and remotely detonated explosives accounts for a larger proportion of military casualties than in other wars [21]. Soldiers protected by body armor have fewer penetrating injuries of the nervous system, as compared to the civilians and those caught without protection. The severity of their wounds will differ. Injuries occur through gaps in the armor. The extent of secondary, tertiary, and quaternary injuries depends on whether the victims were in an open space, in a closed vehicle, in a building that collapses, or exposed to toxic agents. Late effects include PTSD, mood, anxiety, and panic disorders, epilepsy, and infections with antibiotic resistant bacteria that are peculiar to certain geographic locations. Multiple antibiotic-resistant *Acinetobacter baumannii* infections are described as an epidemic among individuals wounded in Iraq, as compared to Afghanistan [22]. One fatal case of *A. baumannii* meningitis has been reported in the media [23].

Different syndromes are identified as the effects of the primary trauma-hemorrhage, edema, and tissue disruption. Dyspraxia, dysphasia, executive dysfunctions, paralysis, deficits and dysfunctions of special senses, and mood disorders emerge and evolve as awareness improves, and as the nervous system attempts to function based on its premorbid connections and abilities.

Physicians at Walter Reed Army Medical Center categorize the severity of traumatic brain injury (TBI) according to the duration of loss of consciousness and post-traumatic amnesia. Mild TBI is defined as an injury that causes loss of consciousness for less than 1 h or amnesia lasting less than 24 h. Moderate TBI produces loss of consciousness lasting between 1 and 24 h or post-traumatic amnesia for 1 to 7 days. Severe TBI causes loss of consciousness for more than 24 h or post-traumatic amnesia for more than 1 week. Patients with mild TBI usually do not have visible abnormalities on brain imaging, while moderate

or severe TBI patients may have punctuate hemorrhages in the corpus callosum and other regions, as well as evidence of bleeding or swelling [21].

Susan Okey summarizes the symptoms of the patients and the findings of the staff as follows: "Soldiers with TBI often have symptoms and findings affecting several areas of brain function. Headaches, sleep disturbances, and sensitivity to light and noise are common symptoms. Cognitive changes, diagnosed on mental-status examination or through neuropsychological testing, may include disturbances in attention, memory, or language, as well as delayed reaction time during problem solving. Often, the most troubling symptoms are behavioral ones: mood changes, depression, anxiety, impulsiveness, emotional outbursts, or inappropriate laughter. Some symptoms of TBI overlap with those of post-traumatic stress disorder... (pp. 2045–2046.)" [21] Other authors note the differences between veterans with post-traumatic stress disorder (PTSD) depending on whether or not they experienced blast injuries [15].

Multiple injuries complicate recovery because of the concurrence of cognitive, affective, attention, memory, and special sensory deficits. If symptomatic epilepsy develops, medication side effects play a role, as do the side effects medications for sleep, pain, and affective disorders. The stability of the injured individual's social network also influences the time to maximum medical improvement and the degree of recovery. Because the wounds often involve penetration of the body by dirty fragments of foreign material as well as body parts, years of infections and surgical revisions can occur, with evolution of psychosocial and affective problems, as well as known conditions like phantom pains.

The delayed psychological repercussions of terrorist acts to individuals and to a society—those that are due to pure terror—are difficult to measure and to quantify. These effects can linger for a lifetime.

## 6. Treatment and management strategies

The initial strategies for response involve two triage teams, one on site, and one at the hospitals to which survivors are sent. Victims who are not breathing at the site, who have 100% body burns, or who have fixed and dilated pupils, do not survive, and resuscitation is discouraged. The walking wounded will take themselves for attention, and

Table 3  
Neuropsychiatric sequelae of traumatic brain injury [29]

1. The Postconcussion Syndrome
2. Personality changes
3. Posttraumatic headache
4. Frontal lobe syndromes: convexity lesions; orbitofrontal lesions
5. Temporal lobe syndromes: memory impairments; affective disorders; psychoses; interictal personality disorders in epileptics
6. Thalamic Syndromes
7. Agitation during coma recovery [29]

Table 4  
Prediction of outcome [29]

1. The Rule of Severity: the extent and degree of the cerebral insult, based on actual brain damage and length and depth of coma.
2. The Rule of Nonspecificity: the extent to which elements external to the injury itself, such as age, sex, laterality, sex, genetic proclivities, and other factors, influence the effects of the location and extent of the lesion. This influences the overt physical and neurological consequences of the injury.
3. The Law of Reserve: the extent of premorbid resources such as intelligence, mental stability and family support. This determines the premorbid level of function, the psychological reserve, and the individual areas of premorbid weakness.
4. The Post Treatment Environment: this can promote stability and recovery, or instability and deterioration [29].

this is where the secondary triage assures that the most severely wounded, who usually arrive later from the scene, receive the more critical immediate hospital attention before those who arrive injured, but awake and ambulatory [2,5,7,9,10,24–26].

The direct injuries to brain, spinal cord, nerve plexi, and peripheral nerves are initially treated in standard fashion. Because debris from the blast will continue to be present, sequential surgeries should be expected in order to deal with the problems they produce [5]. Practitioners at the US Veterans Administration and the US Department of Defense stress the need for a rehabilitation-focused blast injury program and for optimization of care for combat amputees. Their models are described in three recent publications [27–29]. Medications for treatment of epilepsy and headaches will vary depending on availability in the home country. Medicines with fewer cognitive side effects will be preferred over the older ones that can compound problems already caused by blast injuries.

The neuropsychiatric sequelae of traumatic brain injury are more diverse (Table 3) [30]. Evaluation of traumatic brain injury involves four steps (Table 4). The *Trajectory of Recovery* can continue for several years, and treatment of the delayed neurobehavioral sequelae can last for the patient's lifetime [27]. Medications should be chosen to minimize cognitive and somatic side effects, to the degree that a wider choice of medicines is available in the home country.

There are also a series of neurobehavioral sequelae that can be delayed in onset. The treating staff must be aware of these and anticipate their emergence. Mood disorders, epilepsy, and de novo memory deficits can arise within the

Table 5  
Delayed neurobehavioral sequelae of traumatic brain injury [30]

1. Affective disorders, especially depression, occur in the first 1 or 2 years after the injury.
2. Memory deficits may arise de novo after 2 years.
3. Posttraumatic epilepsy.
4. Posttraumatic psychosis, which occurs at a similar frequency as posttraumatic epilepsy, can occur within the first 10 years after the injury.
5. Dementia, which can evolve over the remainder of the individual's lifetime [30].

first two years, while psychosis can emerge up to ten years after the injury, and dementia even later during the rest of the individual's life [31]. (Table 5).

The World Health Organization (WHO) stresses that the barriers to participation in communities originate primarily from social and cultural attitudes, rather than from the impairments of the injuries. The WHO emphasizes “demedicalising” disability, in favor of an approach that works more closely with the family through community based rehabilitation projects [32,33]. Because poverty and disability are inextricably linked, community participation is a vital part of social and economic regeneration, equality, and human rights [33].

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- 7.1 Any deviation from the terms laid down in this document must be agreed, in writing, by ARC.
- 7.2 The instructing party shall give immediate written notification of any meeting, hearing, or other appointment at which ARC attendance is, or may be, required.
- 7.3 If the client fails to attend any arranged meeting, or make an arranged telephone call, then ARC reserves the right to charge for consequential downtime.
- 7.4 The instructing party is responsible for ensuring that the ARC expert is legally able to undertake the work specified, and testify in the pertinent court(s), within the instructing party's jurisdiction.
- 7.5 Any new work instructions must be communicated to, and agreed by, ARC in writing at least seven business days prior to commencement of any such work. ARC reserves the right to maintain control of the work schedule, and any time set aside for other ARC clients shall take precedence over new work.
- 7.6 In instances where work is postponed for reasons beyond the control of ARC, then ARC reserves the right to charge normal rates for any idle time resulting from such delay.
- 7.7 ARC periodically revises the Schedule of Fees, and the Terms & Conditions of Business laid down in this document. ARC reserves the right to charge the revised rates, and apply new terms, when lengthy assignments necessitate such action. The client will be given at least seven business days written notice of the implementation of any such changes.
- 7.8 ARC reserves the right to withdraw from any assignment (without penalty) if, at any time, ARC believes that the client is in breach of these ARC Terms of Business. Under such circumstances the client shall pay all fees due to ARC within one calendar month of ARC's withdrawal from the assignment.
- 7.9 In the event that any of the terms & conditions in this agreement are ruled unenforceable by a court, then all other conditions shall remain binding upon the client.
- 7.10 Immediately ARC commences work on an assignment, the instructing party shall be deemed to have agreed to be bound by all the terms and conditions laid down in this document, irrespective of whether or not they have signed a written agreement.

- 7.11 At ARC's discretion, one or more of the Terms & Conditions laid down in this document may be waived (temporarily or permanently). Such action will not constitute a change in the Terms & Conditions of Business, and ARC shall retain the right to enforce the conditions of this agreement at any time.
- 7.12 If it is required that work be observed and/or recorded via audio and/or visual means, then ARC reserves the right to terminate the assignment without penalty. Any observation and/or audio-visual recording shall be at the discretion, and direction, of ARC. Recording within the ARC secure facility is generally not permissible.

## 8 Definitions

- 8.1 For the purpose of any dealings or contract with ARC, the terms 'client' and 'instructing party' shall be defined as the instructing attorney, insurance company, or whatever corporate or government entity is responsible for paying ARC's invoices.
- 8.2 The term 'ARC' is the accepted abbreviation for 'Athena Research & Consulting LLC'.
- 8.3 In relation to the conditions laid down in this document, the terms 'ARC' and 'Athena Research & Consulting LLC' may (at ARC's discretion) refer to both the legal business entity and/or any employee or associate thereof.
- 8.4 The term 'court', as used in this document, and any dealings with ARC, shall be defined as the venue of any criminal, civil, or military trial; hearing, deposition, or tribunal; or the venue of any critical meeting which is essential to the work being performed by ARC.
- 8.5 'Court attendance' shall be defined as commencing when the ARC consultant arrives at the courthouse, or other such venue, as previously arranged / agreed with the client.



**DEPARTMENT OF DEFENSE  
OFFICE OF THE CHIEF PROSECUTOR  
1610 DEFENSE PENTAGON  
WASHINGTON, DC 20301-1610**

24 June 2008

From: Major<sup>3</sup> [REDACTED] USMC, Prosecutor, Office of Military  
Commissions

To: Office of the Convening Authority

SUBJECT: *UNITED STATES V. KHADR* – REQUEST FOR APPOINTMENT OF  
EXPERT WITNESS DR. BRIAN WILLIAMS

1. Defense Counsel in the case of U.S. v. Khadr have requested approval of Dr. Brian Williams as an expert witness on the structure, nature and activities of al Qaeda in Afghanistan, as well as the structure, nature and activities of other militant groups based in Afghanistan in 2001-2002, and their relationship to al Qaeda. The Defense requests an authorization of 50 hours of Dr. William's time at a rate of \$125.00 per hour for up to \$6,250 in fees.
2. Although the Prosecution disputes the accuracy of the Defense proffer of Dr. William's testimony, at the present time the Prosecution does not oppose approval of production of Dr. Williams to consult with the Defense and provide testimony at trial. The Prosecution, of course, reserves the right to challenge the relevance of Dr. Williams' testimony after reviewing the report referenced in the Defense request and interviewing Dr. Williams.
3. The Prosecution notes that it does not believe 50 hours of Dr. Williams' time is required to consult with the Defense and prepare for trial. Absent additional justification, the Prosecution recommends approval of no more than 25 hours of Dr. Williams' time to prepare for his testimony.
4. The Prosecution recommends that any request for authorization of additional hours be denied.

3

[REDACTED]  
Major, USMC  
Prosecutor  
Office of Military Commissions



DEPARTMENT OF DEFENSE  
OFFICE OF THE CHIEF DEFENSE COUNSEL  
OFFICE OF MILITARY COMMISSIONS

30 June 2008

MEMORANDUM FOR THE CONVENING AUTHORITY

Subj: *UNITED STATES v. KHADR* – DEFENSE REQUEST FOR PRODUCTION OF  
EXPERT WITNESS SEAN WATTS

Ref: (a) Government's Response to the Defense's Motion to Dismiss Charges I & II (Murder & Attempted Murder), D008-D-009, dated 14 December 2007

Encl: (1) Curriculum Vitae of Sean Watts  
(2) MC Form 13-1

1. The defense in the case of *United States v. Omar Khadr* requests the Convening Authority to approve Mr. Sean Watts as an expert witness in the field of the law of war.

2. Qualifications: Professor Watts is an associate professor of law at Creighton University Law School, where he teaches, among other subjects, military law. He served as an officer in the United States Army from 1992 to 2007. Initially, he served as a Regular Army Armor Officer in a Tank Battalion. After attending law school under the Army's Funded Legal Education Program, he served as a Judge Advocate from 1999 to 2007. During his service he was a professor of the law of war and international law at the Army Judge Advocate's General School from 2004 to 2007. He has authored more than 20 academic articles and papers on the law of war and international law.

3. Expert consultant's address and telephone number:

3 [REDACTED]

Tel: 3 [REDACTED]  
seanwatts@creighton.edu

4. Synopsis of expected testimony:

a. Relevance:

i. Charges I and II against Mr. Khadr are framed as "Murder in Violation of the Law of War" and "Attempted Murder in Violation of the Law of War." (Charge Sheet). In the Manual for Military Commissions the elements for murder in violation of the law of war are:

- (1) One or more persons are dead;
- (2) The death of the persons resulted from the act or omission of the accused;
- (3) The killing was unlawful;
- (4) The accused intended to kill the person or persons;
- (5) The killing was in violation of the law of war; and

(6) The killing took place in the context of and was associated with an armed conflict.

MMC, Part IV, para. 6(a)(15)(b). The provision of the MMC addressing attempts, Part IV, para. 4, makes punishable the attempt to commit any crime punishable by the MCA and forms the basis for Charge II.

ii. Element 5 of Charge I requires the government to prove beyond a reasonable doubt that the “killing was in violation of the law of war.” The second element of attempt – that the act was done with the specific intent to commit a certain offense under the M.C.A. – incorporates this element into Charge II. MMC, Part IV, para. 4(b)(2). The MMC, therefore, has turned a question of law into a factual element that must be proven to the members beyond a reasonable doubt at trial. *See, e.g., Jones v. United States*, 526 U.S. 227, 232 (1999) (“[E]lements must be charged in the indictment, submitted to a jury, and proven by the Government beyond a reasonable doubt.”). By invoking the customary law of war as an element of the offense, the government “must accept as a consequence the obligation to establish by proof at trial the existence and notice of the custom that has been violated.” *United States v. Appel*, 31 M.J. 314, 320 (C.A.A.F. 1990) (UCMJ Art. 134 violations, which invoke the violation of custom as a substantive element, require the presentation of proof to the members of the existence and nature of that custom).

iii. Such a capacious element as “in violation of the law of war” requires the government to show “conclusive proof that the offence is supposed to depend, not upon the particular provisions of any municipal code, but upon the law of nations, both for its definition and punishment.” *United States v. Smith*, 18 U.S. 153, 162 (1820); *see also Hamdan v. Rumsfeld*, 126 S.Ct. 2749, 2780 (2006) (plurality opinion) (Congress may define crimes whose elements “‘incorporated by reference’ the common law of war, which may render triable by military commission certain offenses not defined by statute. When, however, neither the elements of the offense nor the range of permissible punishments is defined by statute or treaty, the precedent must be plain and unambiguous.”) (citation omitted). The means by which the government may prove to the members what conduct violates the customary law of war is “ascertained by consulting the works of jurists, writing professedly on public law; or by the general usage and practice of nations; or by judicial decisions recognising (sic) and enforcing that law.” *Id.* at 161; *see also Kadic v. Karadzic*, 70 F.3d 232, 238-39 (2d Cir. 1995) (“[C]ourts ascertaining the content of the law of nations ‘must interpret international law not as it was in 1789, but as it has evolved and exists among the nations of the world today.’”).

iv. Here, Mr. Khadr is alleged to have “murdered” and attempted to “murder” U.S. and coalition forces in the context of an armed conflict. Professor Watts will testify that the customary law of war prohibitions on killing take two forms: certain means of warfare are banned, and certain objects of attack are forbidden. Professor Watts will testify that soldiers are not protected targets (unless they are, for example, *hors de combat*) and that killing or attempting to kill enemy soldiers is not a war crime, unless done by prohibited means. In fact, he will testify that attacks on soldiers are an unambiguous and perhaps defining aspect of armed

conflict.<sup>1</sup> The charge against Mr. Khadr does not allege that he murdered a protected person or killed using prohibited means. Therefore, Professor Watts' testimony will provide a basis for the members to find that the alleged killing and attempted killing is not "in violation of the law of war" – a required element of Charges I and II.

v. Professor Watts testimony will also rebut the government's apparent theory of liability, which depends upon the assertion that "Unlawful or unprivileged combatants—such as Khadr—violate the laws of war when they commit war-like acts, such as murder." *See* Government's Response to the Defense's Motion to Dismiss Charges I & II (Murder & Attempted Murder), D008-D-009, dated 14 December 2007, para. 6(B)(ii)(g) (ref. (a)).

A. Professor Watts will explain to the Commission that this theory arises out of a fundamental misunderstanding of the significance of "lawful" and "unlawful" combatant status. Professor Watts will testify that one's combatant status determines whether the combatant is entitled to combatant immunity from *domestic* prosecution. Generally speaking, lawful combatants have combatant immunity and unlawful combatants do not. Combatant immunity renders a person immune from domestic liability for acts that would ordinarily be punishable under domestic law, such as killing.

B. By contrast, unprivileged or unlawful combatants do not have combatant immunity. Therefore, when they kill a combatant, they must face the normal consequences of doing so, which is possible prosecution for murder under *domestic* law. Combatant immunity does not bear on whether any killing a combatant commits violates the law of war as the government contends.

C. Rather, Professor Watts will testify that for an attack to be "in violation of the law of war," as both the MCA and the MMC elements require, the violation must arise not from the status of the perpetrator, but the status of the victim or the means by which the victim is attacked. He will show how this principle has developed throughout the customary law of war and as it is distilled in U.S. doctrine. *See, e.g.,* THE LAW OF LAND WARFARE, FM 27-10, at ¶¶ 28-38; *See also* Norman A. Goheer, *The Unilateral Creation of International Law During the "War on Terror": Murder by an Unprivileged Belligerent is not a War Crime*, Bepress Legal Series Working Paper 1871, at 12 (Nov. 8, 2006), available at <http://law.bepress.com/expresso/eps/1871> ("[a] war crime inherently requires an overt infraction of the law of war, not just committing a domestic crime without combatant immunity).

vi. Professor Watts' testimony is therefore directly relevant and material to rebutting the government's attempt to prove beyond a reasonable doubt that Mr. Khadr committed or attempted any "killing in violation of the law of war."

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<sup>1</sup> *See, e.g.,* Peter Rowe, *Murder and the Law of War*, 42 N. Ir. Legal Q. 216 (1991) ("[A] fundamental effect of war is the killing of enemy soldiers.").

## b. Necessity:

i. To prove that Mr. Khadr's alleged conduct satisfies the fifth element of MMC, Part IV, para. 6(a)(15)(b), the government must prove beyond a reasonable doubt the existence of an unambiguous prohibition in "the treaties and customs known collectively as the laws of war." *Hamdi v. Rumsfeld*, 542 U.S. 507, 548 (2004); *see also al-Marri v. Wright*, 487 F.3d 160, 178 (4th Cir. 2007) (defining the "law of war" as "treaty obligations including the Hague and Geneva Conventions and customary principles developed alongside them.").

ii. Unqualified "murder" and "attempted murder" are not listed as offenses in the Hague or Geneva Conventions—two treaties the Supreme Court has called "the major treaties on the law of war." *Hamdan v. Rumsfeld*, 126 S. Ct. 2749, 2781 (2006); *see also al-Marri*, 487 F.3d at 178. The government must therefore prove beyond a reasonable doubt that Mr. Khadr's conduct violated some customary law of war.

iii. As the CAAF has held with respect to charges under UCMJ Art. 134, where breach of a military custom constitutes an element of the offense, "testimony must be offered by a knowledgeable witness—subject to cross-examination—about that custom." *United States v. Wales*, 31 M.J. 301 (C.M.A. 1990). "To require less is to allow the factfinder to make a determination that the custom exists without any indication on the record as to what that custom is." *Id.* In the federal courts as well, experts are routinely called to testify as to the substance of foreign and international law. *See, e.g., Vietnam Ass'n for Victims of Agent Orange v. Dow Chemical Co.*, 517 F.3d 104 (2d Cir. 2008); *Haarhuis v. Kunnan Enterprises, Ltd.*, 177 F.3d 1007, 1014 (D.C. Cir. 1999).

iv. As the Supreme Court held in *Dynes v. Hoover*, 20 How. 65, 82 (1857), proving military law and custom is an appropriate subject for experts. Professor Watts is one of "those who have studied the law" and his testimony is both relevant and necessary to rebutting the government's theory as to an element of Charges I and II.

## 5. Estimated Cost:

## a. Total hours/days and total cost:

Professor Watts's fees are \$250.00 per hour plus expenses for consultation, analysis and/or review. Professor Watts will require time to review the government's theory of what constitutes "killing in violation of the law of war" and prepare an adequate presentation to the members on the degree to which it is supported by the relevant international sources. He will also require time to be consulted by counsel in the case and to testify at trial. The defense, therefore, requests a maximum authorization of 50 hours, excluding travel time to and from GTMO, be allotted to Professor Watts resulting in authorization for up to \$15,000 in fees, excluding travel.

## b. Total days TDY at the per diem rate (such as travel days and casual status):