



ARMED FORCES INSTITUTE OF PATHOLOGY
Office of the Armed Forces Medical Examiner
1413 Research Blvd., Bldg. 102
Rockville, MD 20850
1-301-319-0000



FINAL AUTOPSY REPORT

Name: BTB Mahmud, Karwan Muhammad Ali	Autopsy No.: (b)(6)
ISN: (b)(6)	AFIP No.: (b)(6)
Date of Birth (b)(6) 1980	Rank: Detainee
Date of Death (b)(6) 2007	Place of Death: Iraq
Date of Autopsy: 13 Apr 2007 @ 1200	Place of Autopsy: Port Mortuary
Date of Report: 19 June 2007	Dover AFB, DE

Circumstances of Death: This 26 year-old Iraqi detainee was found unresponsive by other detainees and subsequently removed from life-support 4 days later after medical intervention.

Authorization for Autopsy: Office of the Armed Forces Medical Examiner, IAW 10 USC 1471

Identification: Presumptive identification is established by a wrist identification band. Post-mortem fingerprints, dental examination, and a specimen suitable for DNA analysis are obtained.

CAUSE OF DEATH: **Left Ventricular Hypertrophy with Focal Subendocardial Interstitial and Replacement Fibrosis**

MANNER OF DEATH: **Natural**

FINAL AUTOPSY DIAGNOSES:

- I. **No evidence of significant recent injury**
- II. **Evidence of natural disease:**
 - A. **Diffuse neuronal hypoxic/ischemic changes in the cerebrum and cerebellum**
 - B. **Cardiomegaly, 440 grams**
 - C. **Subendocardial coagulative necrosis and multifocal single cell contraction band necrosis, left ventricle**
 - D. **Left ventricular hypertrophy with focal subendocardial interstitial and replacement fibrosis**
 - E. **Bronchopneumonia with bilateral pulmonary congestion (1010 grams right, 830 grams left)**
 - F. **Bilateral pleural effusion (100 ml right, 50 ml left)**
 - G. **Pericardial effusion (50 ml)**
 - H. **Peritoneal effusion (50 ml)**
- III. **Evidence of medical intervention:**
 - A. **Nasogastric tube, orogastric tube, endotracheal tube, large-bore intravenous catheter left neck, Foley catheter, multiple needle puncture sites upper and lower extremities with associated contusions, EKG leads (3) on torso, defibrillator pad outlines (2) on chest, and two separate bags of intravenous fluids (one of normal saline and one containing morphine sulfate)**
- IV. **Identifying marks or tattoos: Scars of the right hand, right forearm, and right foot**
- V. **Toxicology (AFIP):**
 - A. **Volatiles: No ethanol is detected in the blood and vitreous fluid**
 - B. **Drugs: Lorazepam and 1-Hydroxymidazolam are detected in the urine but not in the blood. Morphine is detected in the urine and quantitated in the liver at 0.43 mg/kg**
 - C. **Carbon Monoxide: The carboxyhemoglobin saturation in the blood is 1%¹**
 - D. **Cyanide: No cyanide is detected in the blood**

¹ Carboxyhemoglobin saturations of 0-3% are expected for non-smokers.

EXTERNAL EXAMINATION

The body is that of a well-developed, well-nourished appearing, 66 inch tall, 140 pound Middle Eastern male whose appearance is consistent with the reported age of 26 years. Lividity is on the posterior ears and neck, posterior torso and posterior lower extremities and fixed. Rigor is passing, and the temperature is that of the refrigeration unit.

The scalp is covered with 2-inch long straight black hair in a normal distribution. Facial hair consists of a goatee and moustache. The irides are brown, the corneae are cloudy, the conjunctivae are pale, the sclerae are white and the pupils are round and equal in diameter. The external auditory canals are clear. The ears are not pierced. The nares are patent. The nose and maxillae are palpably stable. The teeth appear natural and in good condition. There is a 0.5 cm abrasion on the lower gingival.

The neck is straight, and the trachea is midline and mobile. The chest is symmetric. The abdomen is soft and flat. The genitalia are those of a normal adult male. Pubic hair is present in a normal distribution. The buttocks and anus are unremarkable.

The upper extremities are diffusely edematous. The fingernails are intact. The lower extremities are symmetric and without clubbing or edema.

CLOTHING AND PERSONAL EFFECTS

The following clothing items and personal effects accompany the body at the time of autopsy:

- Blue long-sleeve T-shirt
- White T-shirt
- Black sweatpants
- Green scrub pants
- White socks (2)
- Green towel

MEDICAL INTERVENTION

- Nasogastric tube
- Orogastric tube
- Endotracheal tube
- Large-bore intravenous catheter left neck with associated underlying soft tissue hemorrhage
- Foley catheter
- Multiple needle puncture sites upper and lower extremities with associated contusions
- EKG leads (3) on torso
- Defibrillator pad outlines (2) on chest
- One bag of intravenous normal saline
- One bag of intravenous fluid with morphine sulfate

RADIOGRAPHS

A complete set of postmortem radiographs is obtained and demonstrates no fractures and no internal metal fragments

INTERNAL EXAMINATION**HEAD:**

The calvarium is intact, as is the dura mater beneath it. Clear cerebrospinal fluid surrounds the 1350 gm brain (fresh weight). Please see Neuropathology Addendum. There are no skull fractures.

NECK:

Layer-wise dissection of the anterior and posterior neck structures reveals no injury. The thyroid cartilage and hyoid bone are intact. The larynx is lined by intact white mucosa. The thyroid gland is symmetric and red-brown, without cystic or nodular change. The tongue is free of bite marks, hemorrhage, or other injuries.

BODY CAVITIES:

The ribs, sternum, and vertebral bodies are visibly and palpably intact. There are bilateral pleural effusions (100 ml right, 50 ml left). There is a pericardial effusion (50 ml). There is a peritoneal effusion (50 ml). The organs occupy their usual anatomic positions.

RESPIRATORY SYSTEM:

The right and left lungs weigh 1010 and 830 gm, respectively. The external surfaces are smooth and deep red-purple. The pulmonary parenchyma is severely congested and edematous. Focal areas of consolidation are present.

CARDIOVASCULAR SYSTEM:

The 440 gm heart is contained in an intact pericardial sac. Please see Cardiovascular Pathology Addendum. The aorta gives rise to three intact and patent arch vessels. The renal and mesenteric vessels are unremarkable.

LIVER & BILIARY SYSTEM:

The 1800 gm liver has an intact, smooth capsule and a sharp anterior border. The parenchyma is tan-brown and congested, with the usual lobular architecture. No mass lesions or other abnormalities are seen. The gallbladder contains 20 ml of green-black bile and no stones. The mucosal surface is green and velvety. The extrahepatic biliary tree is patent.

SPLEEN:

The 360 gm spleen has a smooth, intact, red-purple capsule. The parenchyma is maroon and congested, with distinct Malpighian corpuscles.

PANCREAS:

The pancreas is firm and yellow-tan, with the usual lobular architecture. No mass lesions or other abnormalities are seen.

ADRENALS:

The right and left adrenal glands are symmetric, with bright yellow cortices and gray medullae. No masses or areas of hemorrhage are identified.

GENITOURINARY SYSTEM:

The right and left kidneys weigh 140 and 170 gm, respectively. The external surfaces of the kidneys are intact and smooth. The cut surfaces are red-tan and congested, with uniformly thick cortices and sharp corticomedullary junctions. The pelves are unremarkable and the ureters are normal in course and caliber. Gray-pink bladder mucosa overlies an intact bladder wall. The bladder contains 100 ml of yellow urine. The prostate is normal in size, with lobular, yellow-tan parenchyma. The seminal vesicles are unremarkable. The testes are free of mass lesions, contusions, or other abnormalities

GASTROINTESTINAL TRACT:

The esophagus is intact and lined by smooth, gray-white mucosa. The stomach contains approximately 5 ml of brown liquid. The gastric wall is intact. The duodenum, loops of small bowel and colon are unremarkable. The appendix is present.

MUSCULOSKELETAL SYSTEM:

There are no bone or joint abnormalities. Skeletal muscle development is normal. Cut downs of the upper and lower extremities and back are unremarkable.

MICROSCOPIC EXAMINATION

- Lung: One section of lung demonstrates bronchopneumonia; another section of lung demonstrates pulmonary edema
- Liver: No significant microscopic abnormalities
- Kidney: No significant microscopic abnormalities

ADDITIONAL PROCEDURES

- Documentary photographs are taken by OAFME staff photographers
- Full body radiographs are obtained
- Specimens retained for toxicological testing and/or DNA identification are: spleen, liver, blood, bile, urine, gastric contents, vitreous fluid, psoas muscle, adipose tissue, lung and kidney
- The dissected organs are forwarded with body.
- Selected portions of organs are retained in formalin, with preparation of histological slides of the lungs, liver and kidney
- Personal effects are released to the appropriate mortuary operations representatives
- The heart and brain are submitted for further examination by cardiovascular pathology and neuropathology, respectively
- Re-association of the heart (Dover # 9450) and the brain (Dover # 9451)

OPINION

This 26 year-old Iraqi detainee died of left ventricular hypertrophy with focal subendocardial interstitial and replacement fibrosis. There was no evidence of recent significant injury or bruising on the head. Per investigative reports, there were conflicting reports of possible head trauma when the deceased was examined at two different medical treatment facilities in Iraq. A head CT scan at one facility reportedly demonstrated "severe anoxic brain injury with herniation, cephalohematoma in scalp right occipital and left parietal". Hypoxic changes in the brain can result in herniation, however there was no evidence of blunt force trauma or herniation at the time of autopsy. The heart demonstrated enlargement of the left ventricle, which has been associated with fatal arrhythmias. The brain demonstrated changes consistent with a decrease in blood flow, which could occur as a result of a cardiac arrhythmia. Microscopic sections of one of the lungs demonstrated focal bronchopneumonia, which most likely developed while the deceased was hospitalized for 4 days. Sections of the liver and kidney were unremarkable. Toxicological testing was negative for ethanol and cyanide. The carboxyhemoglobin saturation in the blood was 1%. Two drugs associated with resuscitation, lorazepam and 1-Hydroxymidazolam, were detected in the urine. A third drug associated with resuscitation, morphine, was detected in the urine and quantitated in the liver at a concentration consistent with therapeutic dosing. The manner of death is natural.

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(b)(6) **Medical Examiner**

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(b)(6) **Medical Examiner** (b)(6)

NEUROPATHOLOGY ADDENDUM

(b)(6)

BRAIN, AUTOPSY: DIFFUSE HYPOXIC/ISCHEMIC CHANGES

We examined the approximately 1380-gram formalin-fixed brain submitted in reference to this case.

The dura is unremarkable without hemorrhages or masses. The leptomeninges are translucent without hemorrhages. The cerebral hemispheres are symmetrical. The gyral pattern is normal. The circle of Willis has a normal adult configuration without aneurysms, significant atherosclerosis, or sites of occlusion. The cranial nerves, cerebellum, and brainstem are unremarkable. The optic chiasm is gray and soft. There is no evidence of uncal, tonsillar, or subfalcine herniation. Serial coronal sections of the cerebrum show a cortical ribbon of normal thickness, well demarcated from subjacent white matter. Myelination is normal. The ventricular system is of normal size and shape. The basal ganglia, hippocampi, thalami, and hypothalamus are unremarkable. Serial sectioning of the cerebellum shows some dusky discoloration. The left cerebellar tonsil is more prominent than the right. The brainstem is unremarkable. The substantia nigra and locus ceruleus are normally pigmented for age. The aqueduct is patent. The spinal cord is not submitted, but the uppermost cervical cord and cervicomedullary junction are unremarkable.

Summary of microscopic sections: 1. left middle frontal gyrus. 2. left cingulate gyrus. 3. left superior/middle temporal gyri. 4. mamillary bodies. 5. left basal ganglia. 6. optic chiasm. 7. right thalamus. 8. left parietal lobule. 9. left hippocampus. 10. vermis. 11. right hippocampus. 12. left cerebellar dentate nucleus. 13. left cerebellar tonsil. 14. right cerebellar tonsil. 15. dusky right cerebellum. 16. dusky left cerebellum. 17. occipital lobe. 18. substantia nigra. 19. pons. 20. medulla.

The tissue was processed in paraffin; a section prepared from each paraffin block was stained with H&E. Additional sections prepared from selected blocks were stained with GMS and PAS.

Microscopic sections demonstrate diffuse neuronal hypoxic/ischemic changes in the cerebrum and cerebellum. Purkinje cell loss is noted with developed Bergmann gliosis. Neutrophils are present in the optic chiasm. The left thalamus has focal intravascular branching structures that are PAS positive and GMS negative. This may represent fibrin. The underlying cause of the diffuse hypoxic/ischemic changes is undetermined.

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6/13/2007

CARDIOVASCULAR PATHOLOGY ADDENDUM

FINAL DIAGNOSIS

DIAGNOSIS: (b)(6)

- 1. Subendocardial coagulative necrosis and multifocal single cell contraction band necrosis, left ventricle**
- 2. Left ventricular hypertrophy with focal subendocardial interstitial and replacement fibrosis**

History: 26 year old Iraqi detainee found unresponsive by other detainees, resuscitated and later removed from life support

Heart: 440 grams, per contributor; normal epicardial fat; probe patent foramen ovale; concentric left ventricular hypertrophy: left ventricular cavity diameter 30 mm, left ventricular free wall thickness 17 mm, ventricular septum thickness 18 mm; right ventricular dilatation: right ventricle thickness 5 mm, without gross scars or abnormal fat infiltrates; grossly unremarkable valves and endocardium; subendocardial hemorrhage, ventricular septum and posteromedial papillary muscle; histologic sections show left ventricular myocyte hypertrophy with focal subendocardial interstitial and replacement fibrosis, posterior and septal left ventricle; coagulative necrosis, posteromedial papillary muscle and posterior septum; multifocal single cell contraction band necrosis (brain death lesions)

Coronary arteries: Normal ostia, right dominance; no gross atherosclerosis

Comment: The subendocardial necrosis and multifocal single cell contraction band necrosis are secondary to anoxic brain injury and catecholamine release following a period of hypoperfusion. The cause of the initial cardiac arrest is uncertain, but may be due to arrhythmia associated with left ventricular hypertrophy and subendocardial fibrosis.

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Cardiovascular Pathologist

CERTIFICATE OF DEATH (OVERSEAS) Acte de décès (D'Outre-Mer)			
NAME OF DECEASED (Last, First, Middle) Nom du décédé (Nom et prénoms) Mahmud, BTB Karwan, Muhammad Ali		GRADE Grade	BRANCH OF SERVICE Arme Civilian
ORGANIZATION Organisation Iraqi Detainee		NATION (e.g. United States) Pays Iraq	DATE OF BIRTH Date de naissance (b)(6) 1980
			SOCIAL SECURITY NUMBER Numéro de l'Assurance Social (b)(6)
			SEX Sexe <input checked="" type="checkbox"/> MALE <input type="checkbox"/> FEMALE
RACE Race		MARITAL STATUS Etat Civil	
<input checked="" type="checkbox"/> CAUCASOID Causcasique		<input type="checkbox"/> SINGLE Célibataire	<input type="checkbox"/> DIVORCED Divorcé
<input type="checkbox"/> NEGROID Négride		<input type="checkbox"/> MARRIED Marié	<input type="checkbox"/> SEPARATED Séparé
<input type="checkbox"/> OTHER (Specify) Autre (Spécifier)		<input type="checkbox"/> WIDOWED Veuf	<input type="checkbox"/> JEWISH Juif
RELIGION Culte		OTHER (Specify) Autre (Spécifier)	
<input checked="" type="checkbox"/> PROTESTANT Protestant		<input checked="" type="checkbox"/>	
<input type="checkbox"/> CATHOLIC Catholique			
<input type="checkbox"/> JEWISH Juif			
NAME OF NEXT OF KIN Nom du plus proche parent		RELATIONSHIP TO DECEASED Parenté du décédé avec le sus	
STREET ADDRESS Domicile à (Rue)		CITY OR TOWN OR STATE (Include ZIP Code) Ville (Code postal compris)	
MEDICAL STATEMENT Déclaration médicale			
CAUSE OF DEATH (Enter only one cause per line) Cause du décès (N'indiquer qu'une cause par ligne)			INTERVAL BETWEEN ONSET AND DEATH Intervalle entre l'attaque et le décès
DISEASE OR CONDITION DIRECTLY LEADING TO DEATH Maladie ou condition directement responsable de la mort.		Left ventricular hypertrophy with focal subendocardial interstitial and replacement fibrosis	
ANTECEDENT CAUSES Symptômes précurseurs de la mort.	MORBID CONDITION, IF ANY, LEADING TO PRIMARY CAUSE Condition morbide, s'il y a lieu, menant à la cause primaire		
	UNDERLYING CAUSE, IF ANY, GIVING RISE TO PRIMARY CAUSE Condition morbide, s'il y a lieu, menant à la cause primaire		
OTHER SIGNIFICANT CONDITIONS Autres conditions significatives			
MODE OF DEATH Condition de décès	AUTOPSY PERFORMED Autopsie effectuée <input checked="" type="checkbox"/> YES Oui <input type="checkbox"/> NO Non	CIRCUMSTANCES SURROUNDING DEATH DUE TO EXTERNAL CAUSES Circonstances de la mort suscitées par des causes extérieures	
<input checked="" type="checkbox"/> NATURAL Mort naturelle	MAJOR FINDINGS OF AUTOPSY Conclusions principales de l'autopsie		
<input type="checkbox"/> ACCIDENT Mort accidentelle			
<input type="checkbox"/> SUICIDE Suicide	NAME OF PATHOLOGIST Nom du pathologiste (b)(6)		
<input type="checkbox"/> HOMICIDE Homicide	SIGNATURE (b)(6)	DATE 13 April 2007	AVIATION ACCIDENT Accident à Avion <input type="checkbox"/> YES Oui <input checked="" type="checkbox"/> NO Non
DATE OF DEATH (day, month, year) Date de décès (le jour, le mois, l'année)	PLACE OF DEATH Lieu de décès		
(b)(6) 2007	Camp Bucca Iraq		
I HAVE VIEWED THE REMAINS OF THE DECEASED AND DEATH OCCURRED AT THE TIME INDICATED AND FROM THE CAUSES AS STATED ABOVE. J'ai examiné les restes mortels du dé funtrel je conclus que le décès est survenu à l'heure indiquée et à, la suite des causes énumérées ci-dessus.			
NAME OF MEDICAL OFFICER Nom du médecin militaire ou du médecin sanitaire		TITLE OR DEGREE Titre ou diplôme	
(b)(6)		Medical Examiner	
GRADE Grade	INSTALLATION OR ADDRESS Installation ou adresse		
(b)(6)	Dover AFB, Dover DE		
DATE Date	SIGNATURE		
6/21/2007	(b)(6)		
<small>1 State disease, injury or complication which caused death, but not mode of death. 2 State conditions contributing to the death, but not related to the disease or condition causing death. 3 Préciser la nature de la maladie, de la blessure ou de la complication qui a contribué à la mort, mais non la manière de mourir, telle qu'un arrêt du coeur, etc. 4 Préciser la condition qui a contribué à la mort, mais n'ayant aucun rapport avec la maladie ou la condition qui a provoqué la mort.</small>			

DD FORM 1 APR 77 2064

REPLACES DA FORM 3585, 1 JAN 72 AND DA FORM 3865-R(PAS), 26 SEP 75, WHICH ARE OBSOLETE.

MEDCOM 0912

(REMOVE, REVERSE AND RE-INSERT CARBONS BEFORE COMPLETING THIS SIDE)

DISPOSITION OF REMAINS			
NAME OF MORTICIAN PREPARING REMAINS	GRADE	LICENSE NUMBER AND STATE	OTHER
INSTALLATION OR ADDRESS	DATE	SIGNATURE	
NAME OF CEMETERY OR CREMATORY	LOCATION OF CEMETERY OR CREMATORY		
TYPE OF DISPOSTION		DATE OF DISPOSTION	
REGISTRATION OF VITAL STATISTICS			
REGISTRY <i>(Town and Country)</i>	DATE REGISTERED	FILE NUMBER	
		STATE	OTHER
NAME OF FUNERAL DIRECTOR	ADDRESS		
SIGNATURE OF AUTHORIZED INDIVIDUAL			

DD FORM 2064, APR 1977 (BACK)

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