

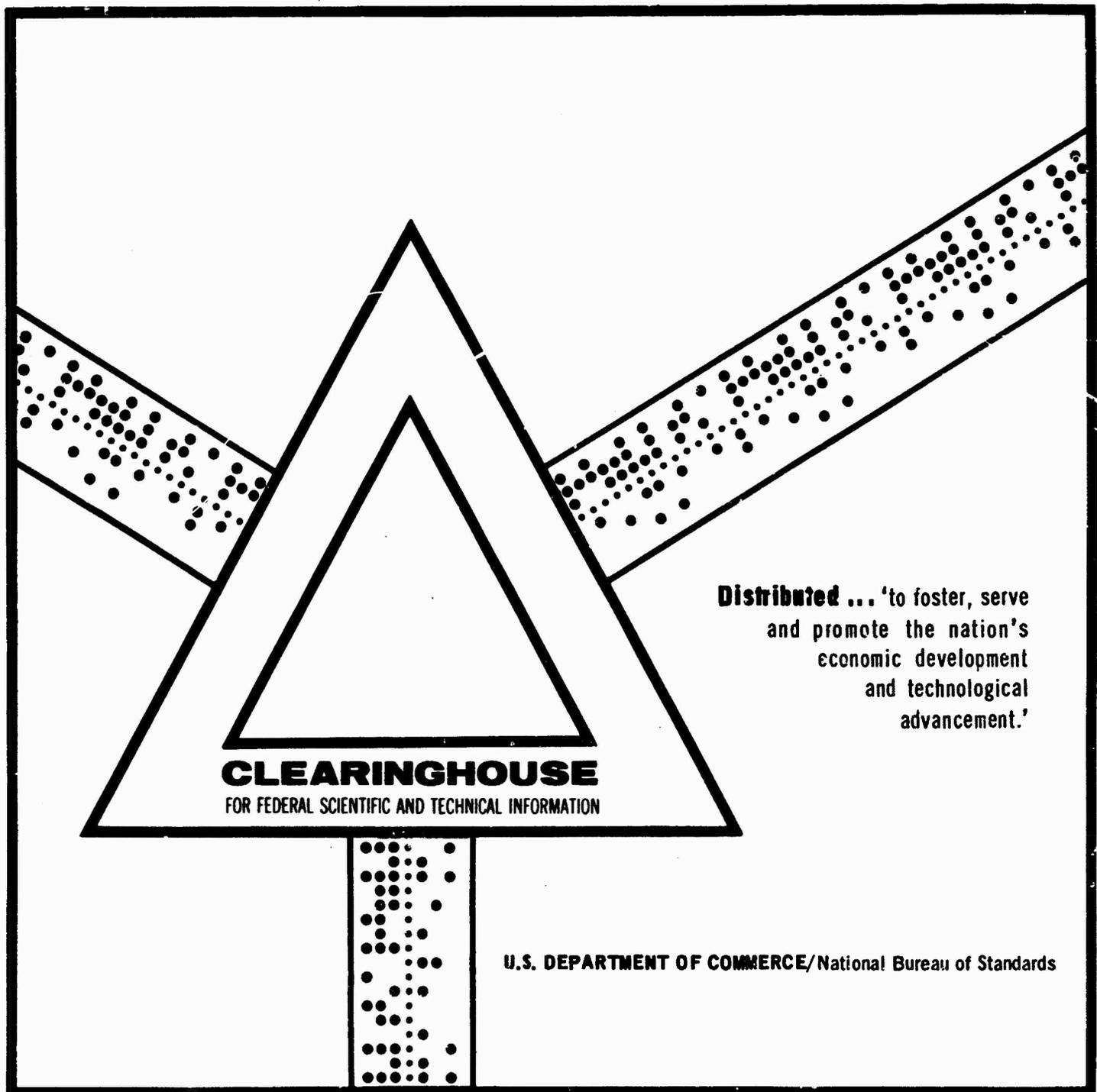
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COMBAT HEAD INJURY PROJECT, FOLLOW-UP PHASE.  
STATISTICAL STUDIES OF COMBAT HEAD INJURY

William F. Caveness

Columbia University  
New York, New York

24 November 1969



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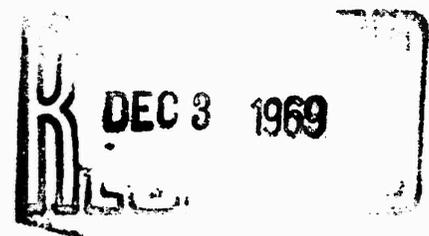
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13. ABSTRACT			
<p><i>T. 11</i>  This report covers: (1) the development and conduct of a study of the acute phase of cranio-cerebral trauma, incurred in combat or supportive activities during the Korean Campaign, and the evolving sequelae over the subsequent 15 years; (2) a comparative study of sequelae from injuries incurred in World War I, World War II and Korea; and (3) a registry of head and spinal cord injuries incurred in Vietnam. ( ) ←</p>			

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**REPORT OF INVENTIONS AND SUBCONTRACTS**  
(Pursuant to "Patent Rights" Contract Clause)

Form Approved  
Budget Bureau No. 22-R160

**INSTRUCTIONS TO CONTRACTOR**

This form may be used for INTERIM and FINAL reports, and when used shall be completed and forwarded to the Contracting Officer in triplicate.

An INTERIM report shall be submitted at least every twelve months, commencing with the date of the contract, and should include only those inventions and subcontracts for which complete information has not previously been reported.

A FINAL report shall be submitted as soon as practicable after the work under the contract is complete and shall include (a) a summary of all inventions required by the contract to be reported, including all inventions previously reported and any inventions since the last INTERIM report; and (b) any required information for subcontracts which has not previously been reported.

**1. NAME AND ADDRESS OF CONTRACTOR**

Columbia University  
New York, New York

**2. CONTRACT NUMBER**

NONR- 4728 (00)

**3. TYPE OF REPORT (check one)**

a. INTERIM  b. FINAL

**SECTION I - INVENTIONS ("Subject Inventions" required to be reported by the "Patent Rights" clause)**

**4. INVENTION DATA (check one)**

a. THERE WERE NO INVENTIONS WHICH REASONABLY APPEAR TO BE PATENTABLE

b. LISTED BELOW ARE INVENTIONS WHICH REASONABLY APPEAR TO BE PATENTABLE. ANY INVENTION DISCLOSURES WHICH HAVE NOT BEEN PREVIOUSLY SUBMITTED TO THE CONTRACTING OFFICER ARE ATTACHED TO THIS REPORT.

(i) NAME OF INVENTOR	(ii) TITLE OF INVENTION	(iii) PATENT APPLICATION SERIAL NUMBER AND CONTRACTOR'S DOCKET NO.	(iv) CONTRACTOR HAS FILED OR WILL FILE U.S. PATENT APPLICATION.		(v) CONFIRMATORY LICENSE OR ASSIGNMENT HAS BEEN FORWARDED TO CONTRACTING OFFICER	
			YES	NO	YES	NO

**SECTION II - SUBCONTRACTS (Containing a "Patent Rights" clause)**

**5. LISTED BELOW IS INFORMATION REQUIRED BUT NOT PREVIOUSLY REPORTED FOR SUBCONTRACTS. (If not applicable, write "None".)**

(i) NAME AND ADDRESS OF SUBCONTRACTOR	(ii) SUBCONTRACT NUMBER	(iii) DATE CLAUSE FURNISHED TO CONTRACTING OFFICER	(iv) DATE SUBCONTRACT COMPLETED

**SECTION III - CERTIFICATE**

CONTRACTOR CERTIFIES THAT THIS REPORT OF INVENTIONS AND SUBCONTRACTS, INCLUDING ANY ATTACHMENTS, IS CORRECT TO THE BEST OF THE CONTRACTOR'S KNOWLEDGE AND BELIEF.

DATE Nov. 24, 1969	NAME AND TITLE OF AUTHORIZED OFFICIAL (Print or Type) William F. Caveness, M.D. Associate Professor of Clinical Neurology	SIGNATURE <i>William F. Caveness</i>
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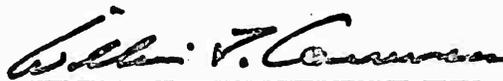
This is to certify that to the best of my knowledge and belief no patentable inventions or discoveries were made in the course of the research under Grants NONR 4728 (00), NONR (G) 00036-64, NONR (G) 00011-63, NONR 2690 (00) and NONR 266 (26) from the period 15 May 1953 to 30 September 1968.



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William F. Caveness, M.D.  
Responsible Investigator

As the Responsible Investigator, I certify that, to the best of my knowledge and belief, the work of NONR 4728 (00), NONR (G) 00036-64, NONR (G) 00011-63, NONR 2690 (00) and NONR 265 (26) did not generate, furnish or provide any classified material during the period from 15 May 1953 to 30 September 1968.



William F. Caveness  
William F. Caveness, M.D.  
Responsible Investigator

FINAL REPORT FOR: NONR 4728(00)  
effective 1 October 1964  
to 30 September 1968

NONR 2690(00)  
effective 1 September 1958  
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to 30 September 1964

NONR(G) 00011-63  
effective 1 September 1962  
to 31 August 1963

15 November 1969



William Fields Caveness  
Responsible Investigator

Titles: Statistical Studies of Combat Head Injury  
and  
Combat Head Injury Project, Follow-up Phase

Objective: To better understand the relation between cranio-cerebral trauma and its sequelae.

Narrative Summary:

I. Inception of Project

In the Spring of 1953 the Bureau of Medicine and Surgery, U.S. Navy, initiated a prospective study of head injuries and their sequelae. The material had been, or was to be, derived from cranio-cerebral trauma associated with combat and supporting activities. The method included:

- a) The establishment of the first U.S. Navy Neurological Team whose mission was to participate in the care of, and provide precise observations on, head trauma during the acute phase of injury. (Attachment #1) This mobile unit was assigned to the Commander Naval Forces, Far East, that it might serve in conjunction with the neurosurgical units aboard the Hospital Ships off Inchon or in the First Marine Division, in Korea.
- b) The assignment of a Chief of Neurology with supporting staff to the Neurological-Neurosurgical Service at the U.S. Naval Hospital, Yokosuka, Japan, that could continue the observations begun aboard the Hospital Ships or in the field.
- c) The establishment of a research unit at the Neurological Institute, Columbia University, College of Physicians and Surgeons, whose mission was to assemble the data from the acute phase of injury and provide surveillance of the developing or receding sequelae during the ensuing five years. This unit, designated Combat Head Injury Project, Follow-up Phase, was made possible through a contract with Columbia University [NONR 266(26)] by O.N.R. with funds provided by the Bureau of Medicine and Surgery, Neuropsychiatric Branch. The project design provided a smooth flow of data between the field units

on active military duty and the research unit within a university setting. (Attachment #2)

In developing the protocol for this effort the immediately preceding experience, 23 months on active duty in Japan and Korea, of the principal investigator, the expertise within the Bureau of Medicine and Surgery and outside consultants, were utilized.

## II. Assembly of Data from the Acute Phase of Injury

In 1951-52, the principal investigator participated in the care of 341 cases of head trauma incurred in combat or supporting activity. From 250 of these there were adequately recorded clinical and laboratory findings that were assembled in the Research Unit. Supplementary data were secured from the Records Division, Bureau of Medicine and Surgery, that all cases might be comparable.

In 1951-52, the neurosurgeon aboard the U.S.S. Consolation (Lt. Henry R. Liss (MC) USNR) participated in the care of 54 additional cases. The original records and all personal notes were incorporated in the study. (Dr. Liss had trained at Columbia with the principal investigator and after discharge from military duty worked in the Research Unit for two years.)

In 1953 the Mobile Neurological Team and the Neurological Staff at Yokosuka, Japan, carried out comprehensive evaluations on 86 patients, that were added to the study. Note: The cessation of hostilities brought to a close the collection of data in Korea and Japan. There was thus a total of 390 cases injured in the Far East. Two hundred seventy were the result of missile wounds, 111 of non-missile wounds.

In November 1953, members of the Neurological Team reported at the U.S. Naval Hospital, San Diego, where they continued the observations on the acute phase of injury in non-combat head trauma. The data from 57 of these cases were added to the study.

From all sources there were acceptable data on 447 casualties. Of these 158 had received penetrating (dural penetration) injuries, 290 closed injuries (dura intact).

The salient clinical and laboratory findings were coded and transferred to IBM cards. All data coded was tabulated with particular reference to the degree of structural defect, functional derangement and therapeutic effort. The original tracings of 1,095 electroencephalograms were filed for subsequent analyses.

Critical Comment: While the cases accepted into the study were considered comparable, and fairly representative of injuries incurred in combat and supporting activities, they do not represent the uniformity or depth in observations that would have been possible had the team been able to see 1,000 cases, as originally planned.

Reports: U.S. Navy Photographic Report - The use of electroencephalography in the management of combat head injuries, MN 8057, 1954.

Surgical management of acute combat head injuries. Fighting men who receive head injuries in combat are shown being borne by litter, jeep ambulance and finally helicopted to deck of a U.S. Navy Hospital Ship; course of treatment, with use of electroencephalography in determining patient progress is shown. Subsequent to treatment on hospital ships, transfer to shore-based hospitals for further care is depicted.

Publication:

W. F. Caveness, The use of electroencephalography in the management of acute combat head injury. Trans. Am. Neurol. Assoc., 1954.

III. Follow-up Studies, 1953-58

Of the 447 patients studied during the acute phase of injury, 23 died (16 of causes related to the injury, 7 from extraneous causes). Of the surviving 424, 17 were Republic of Korea and other United Nations troops, and not accessible. Therefore, a total of 407

cases (271 closed and 136 penetrating injuries) were available for follow-up studies. The following methods were employed:

- a) Personal correspondence and a general questionnaire were directed to all suitable patients. Postal contact was established with 402. Specific questionnaires were then used to document comments indicating posttraumatic sequelae with special reference to epilepsy.
- b) Interviews and physical examinations: One hundred six of the more seriously injured men were retained on the Temporary Disability Retirement List. These received periodic physical examinations in Naval Hospitals at Oakland, California; San Diego, California; Bremerton, Washington; Great Lakes, Illinois; Pensacola, Florida; Charleston, South Carolina; Bethesda, Maryland; and St. Albans, New York, until their permanent retirement. At these examinations a member from the head injury project supplemented the neurological evaluation and obtained copies of all findings.
- c) Medical information from the Veterans Administration: This agency with the cooperation of the National Research Council, authorized a plan whereby the project gained access to its medical files on the men in the study upon their separation from military service and registration with the Veterans Administration. Such additional information became available on 326 men during this period.
- d) Field study. The American National Red Cross assigned a medical social worker, Mrs. Alice S. Peterson, for six months to the research unit, and through its chapter staff conducted field interviews with 281 of the men. This added social, economic and related data to their files. Similar information was gathered regarding 100 control subjects, non-head injured U.S. Marine personnel of comparable age stationed in the Far East in 1951-53.

Critical Comment: The follow-up for the first five years included a review of the original field and hospital records in 100% of the cases, questionnaires in 90.6%, personal correspondence in 37.5%, periodic physical examinations in 25.5%, additional interviews in

24.5%, an American Red Cross field study in 69.0% plus 100 controls, and Veterans Administration records in 66.5%. Attention was directed to the stabilized neurological deficit, posttraumatic epilepsy, posttraumatic syndrome and social and economic failures as these appeared in this interval.

From the preceding it is apparent that the best medical coverage was in the more seriously injured that could be retained on temporary retirement and examined at 18 month intervals by the same staff from the Research Unit. The Veterans Administration's records were of great value in preserving continuity, but the examinations reported were uneven as to detail and as to orientation of the responsible physician. The reliability of the postal inquiries was enhanced by the first-hand knowledge of the initial phase of injury, but still subject to the deficiencies of such contacts. It should be noted that the rapport with this group of patients was strengthened by their knowledge that they could appeal to the Research Unit at any time for any unofficial aid that the Unit could provide. The follow through on this was made possible by the excellent cooperation of the Bureau of Medicine and Surgery and physicians in Veterans Administration hospitals. The field study of injured and controls provided invaluable data that could not otherwise have been obtained.

Publications:

- W. F. Caveness, Electroencephalography in head injury. *Clinical Neurology, Congress of Neurological Surgeons, Vol. II. Chapter VII, pp. 116-160. Williams & Wilkins, Baltimore, 1954.*
- G. N. Raines, A. S. Peterson, H. R. Liss, W. F. Caveness, Social and economic adjustment following head injuries. *Trans. Am. Neurol. Assoc., 1957.*
- W. F. Caveness, Kai C. Nielsen, Sequelae of cerebral concussion. *N.Y. State J. Med., 61(II): June 1, 1961.*
- W. F. Caveness, H. R. Liss, incidence of posttraumatic epilepsy. *Epilepsia, 2:123-129, 1961.*

#### IV. Follow-up Studies, 1959-64

The studies were continued with the aid of an equipment loan contract NONR 2690(00) and a grant NONR(G) 00036-64. Supplemental funds were provided by the Walter C. Teagle Foundation.

- a) Additional data was acquired through periodic certified mail, a review of entries in Veterans Administration records and, in special instances, personal telephone calls. Of part time aid in this were Drs. Verne S. Caviness, Eugene Meyer, and James Mac. D. Watson. Dr. Watson, a former associate at Columbia, joined the Veterans Association during this period. Contact was maintained with 356 men, 197 of whom had received missile wounds, 159 blast and non-missile wounds. The parameter of posttraumatic epilepsy received especial attention ten years after injury, actually 9 to 11 years. The overall incidence of epilepsy (one or more attacks) was 30.6%. In the missile injured it was 42.1%, in the blast and non-missile injured 16.4%. More important than the incidence was the natural history that disclosed a cessation of attacks in half of the involved cases over this period of time.
- b) To better evaluate the significance of changing factors, i.e., the character of wounds, complications, and therapeutic effort, a comparative study was conducted of the sequelae of head injuries received in World War I, World War II, and Korea. This included a reappraisal of the British material from World War I by Dr. Peter B. Ascroft and of that from the U.S. Army in World War II by Dr. A. Earl Walker. The opportunity to work with Dr. Ascroft was made possible by an ONR sponsored trip to England and Scotland in 1960, and by the London Office of ONR, an introduction to Lt-General Sir W. Alexander D. Drummond, KBE, CB, QHS, Director General of the Army Medical Services who provided access to the records in the Ministry of Pensions.

Critical Comment: It was apparent that longitudinal studies, limited to five years was insufficient for proper evaluation of the natural history of sequelae. As regards epilepsy, ten years is somewhat

short when the criteria of cessation is two years without an attack. However, the monitoring of the latter provided information of prognostic significance that had not previously been matched in the literature. The comparison of the findings from three major conflicts over a 40 year span brought us up short. There was not the dramatic drop in incidence that had been anticipated with the advent of earlier and more definitive surgical debridement and better control of infection. Search for other factors will have to be conducted in the future.

#### Publications:

- W. F. Caveness, Onset and cessation of fits following cranio-cerebral trauma. J. Neurosurg., Vol. XX, No. 7, July 1963.
- W. F. Caveness, Posttraumatic epilepsy. Chapter 21 of Neurological Surgery of Trauma, Korean Campaign, Office of Surgeon General, U.S. Army, 1965.
- W. F. Caveness, Clinical manifestations and basic mechanisms. Chapter 22 of Neurological Surgery of Trauma, Korean Campaign, Office of Surgeon General, U.S. Army, 1965.
- W. F. Caveness, A. E. Walker, Peter B. Ascroft, Incidence of posttraumatic epilepsy in Korean veterans as compared with those from World War I and World War II. J. Neurosurg., 2(XIX): February, 1962, pp. 122-129.

#### V. Follow-up Studies, 1965-68

The observations were continued with the aid of NONR 4728(00) and additional support from the Walter C. Teagle Foundation and the National Institutes of Health.

Material from the Korean Campaign: These data were subjected to more definitive analysis that provided greater insight into the recession or change in neurological deficits. In addition, mathematical models were constructed, by Dr. Max Woodbury, to enhance the predictability in cessation or persistence of convulsive disorders.

The number of cases being followed was insufficient to provide statistically significant analyses of subgroups, for example, the

difference in sequelae from closed and penetrating injuries of the parietal lobe. Similarly, the mathematical models of sequelae were limited in parameters by the limitation in cases. To provide greater depth in the material from the Korean Campaign, the current status of U.S. Army head injury casualties was determined in conjunction with their surgeon at the time of injury, Dr. Arnold M. Meirowsky (Col MC USA Ret). Dr. Meirowsky was Neurosurgical Consultant to the Far East Command during 1950-52 and his experience in the field overlapped that of the principal investigator for 18 months, with frequent exchanges between the two. Six hundred of his cases were processed in an exactly similar manner, as regards the acute phase of injury, as those cases already accepted in the study. The follow-up was conducted with similar personal correspondence, questionnaires and abstraction of Veterans Administration files. The in-hospital examinations, while on temporary retirement, were, of course, not possible. All data was coded and transferred to IBM cards. This was completed in 1966.

Critical Comment: With the acceptance of the additional Army cases it was thought that the information coded for the acute phase of injury was hard data. It was thought that the follow-up information from the Army cases was less certain than that from the Marine and Navy cases because it was (a) derived entirely from correspondence and Veterans Administration records; and (b) it was assembled after ten years, rather than at sequential intervals. To make all cases comparable as to the existing sequelae it was deemed necessary that they be subjected to a uniform and comprehensive medical examination in hospital preceded by a field study by trained social workers.

Field Study: In 1967-68, the American National Red Cross, through its Service to Military Families, under the direction of Mrs. Astha Dresser, conducted field interviews with 873 head injured men from the combined roster and 121 controls. The protocol was devised by the principal investigator, Mrs. Dresser and Mr. Seymore Jablon, of the National Research Council, with particular reference to the work status of the injured and the controls. The data from this survey is now being processed by the National Research Council through a contract with the National Institutes of Health.

Examinations in Hospital: A protocol for in-hospital appraisal of the same casualties and controls was developed by the principal investigator and consultants. An approach to the Veterans Administration in 1967 for their cooperation in this study was received with reluctance to commit personnel or facilities. The protocol was further developed in conjunction with six heads of neurological or neurosurgical departments, strategically located throughout the country. Support for its execution was sought in 1968 from the National Institute of Neurological Diseases and Blindness but an ad hoc Review Committee failed to approve funding. Nevertheless, the Harvard-M.I.T. component thought the plan of sufficient merit to seek and obtain funds from the John A. Hartford Foundation to conduct their part of the study that involves some 200 men and 30 controls. This has been underway for one year and may be extended to encompass the total population of injured and controls.

Critical Comment: The results of the Field Study will provide an accurate account of the present day full employment, sheltered employment or no employment of casualties from the Korean Campaign with an indication of the influence of the character of the injury upon the work status.

The examinations at Harvard and M.I.T. under the direction of Drs. Raymond D. Adams and Hans-Lukas Teuber will provide fresh insight into the mechanisms underlying symptoms of the posttraumatic syndrome and subtle impairment of intellectual function. While neurological deficits and the course of convulsive disorders will be determined, the full population will need to be examined for a definitive evaluation of the natural history of these sequelae.

World War I Studies: In the Hirnverletzenheim in Munich, Germany, there are files of head injured men that contain detailed information concerning head injuries received in World War I and their subsequent examinations at this hospital devoted to their care. These data are more orderly arranged and extend over a much longer period than any World War I data found in Great Britain or the United States. ONR sponsored a feasibility study of these records by the principal investigator and Dr. Verne S. Caviness in 1961. As a result of this a full

scale review of 1,000 of these case histories has been conducted by the principal investigator with Drs. Caviness and A. Earl Walker in cooperation with Drs. Karl Heinz Leuchs and Helga Lechtape Gruter, at the Hirnverietzenheim and Max Plank Institute of Munich. All data was transferred to IBM cards in 1965.

Critical Comment: In addition to the references to the articles by Dr. Caviness, the principal investigator with Drs. Walker and Leuchs have prepared a manuscript: "The Effect of Head Injury on Life Expectancy". The principal finding is a reduction by five years of the longevity of those with head injury and fits as compared with a non-head injured control group. These represent limited analyses. The full evaluation of this material of itself and in comparison with that from more recent conflicts remains to be done.

Vietnam Studies: In 1966 a registry of head and spinal cord injuries occurring in Vietnam was devised at the request of V. Adm. Robert B. Brown, (MC) USN, Surg. Gen. USN. It was developed with the cooperation of Brig. Gen. George J. Hayes, (MC) USA, Off. of the Surg. Gen., Dept. of the Army, and Col. Homer Woosley, (MC) USAF, Off. of the Surg. Gen., USAF. It was introduced in the field in 1967.

The form used is an updated abstraction from those used in the latter part of the Korean Campaign. (Attachment #3) This is not yet an "official" Government form and its printing cost has been defrayed from ONR funds.

They are filled out by the Army field surgeons and forwarded to my office or to the Naval Surgeon General's office and thence to my office. Here they are xeroxed and complete sets are distributed to the offices of the surgeons general. Periodically these are accompanied by simple analyses of the salient features of the injuries. (Attachment #4)

The most significant yield to date has been the development of a new helmet based on the recorded site and depth of injuries. This came about through the efforts of Gen. Hayes and engineers at the Edgewood Arsenal.

In summary, this registry assures some uniformity in data collections and identifies cases for present and future studies by the military, the Veterans Administration, and others with serious interests in the aftereffects of CNS trauma who may be granted access to these files and the pertinent medical records.

Critical Comment: This is not nor was it intended to be a substitute for a Research Unit in the combat area. The delineation of brain destruction prior to and subsequent to repair that has been apparent in these reports is excellent. The delineation in alteration in consciousness, retrograde and anterograde amnesia, as well as sequential steps in recovery of neurological function, leave something to be desired. Finally, the return does not represent a total account, being deficient in closed, non-missile injuries and inoperative deaths. However, the 1,705 cases reported to date represent a signal contribution by the military surgeons.

Publications:

W. F. Caveness, Posttraumatic sequelae. Chapter 17, Head Injury Conference Proceedings, 1966, pp. 209-219.

V. S. Caviness, Epilepsy and cranio-cerebral injury of warfare. Chapter 18, Head Injury Conference Proceedings, 1966, pp. 220-234.

V. S. Caviness, Epilepsy: A late effect of head injury. Chapter 21, Late Effects of Head Injury, 1969, pp. 193-200.

A. C. Dresser, Work status following head injury: Observations on social and economic adjustments. Chapter 36, Late Effects of Head Injury, 1969, pp. 389-397.

VI. Acknowledgement

It would be inappropriate to conclude this report without a recognition of the critical importance of the administrative support and/or technical assistance of the following:

Far East Force Surgeons, U.S. Navy  
RADM R. M. Gillett MC USN (Ret)  
RADM O.B. Morrison MC USN (Deceased)

Bureau of Medicine and Surgery, Department of the Navy  
Capt. George N. Raines MC USN (Deceased)  
Dr. Howard T. Karsner (Ret)  
Capt. R. S. Hermann MSC USN (Ret)  
Capt. John E. Rasmussen MSC USN

Office of Naval Research, Washington  
Capt. Wm. E. Ludwick DC USN  
Capt. James A. English MC USN  
Dr. Joseph F. Saunders  
Mrs. P. H. Tenniswood

Office of Naval Research, New York  
Dr. John E. Flynn (Deceased)

Office of Naval Research, London:  
Capt. J. H. Stover, Jr. MC USN

DEPARTMENT OF THE NAVY  
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WASHINGTON 25, D.C.

OPNAV 5440  
Op-103F  
Ser 109P10  
25 Mar 1953

RESTRICTED  
SECURITY INFORMATION

OPNAV NOTICE 5440

From: Chief of Naval Operations  
To: Distribution List

Subj: U. S. Navy Neurological Team #1; establishment of

1. Purpose. To formally establish a mobile neurological team for duty in the Far East.
2. Establishment. Effective when directed by Commander in Chief, U.S. Pacific Fleet, U. S. Navy Neurological Survey Team #1 is hereby established, under an Officer in Charge, as a mobile unit in the Pacific Fleet assigned to Commander Naval Forces, Far East.
3. Mission. To augment medical support in combat or other hazardous naval operations by providing specially trained personnel to assist in the care and evaluation of head injury casualties.
4. Personnel. By separate correspondence an allocation of two (2) Code 2100, one (1) Code 2300, and two (2) enlisted billets will be established for this team.
5. Cancellation. This notice is cancelled when it has served its purpose.

F. S. LOW  
Deputy Chief of Naval Operations  
(Logistics)

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OP-213

AUTHENTICATED BY:

R. E. BERRY, CDR. (RSP)

REGIONAL RESPONSIBILITY for the COLLECTION and ANALYSIS of DATA

in the COMBAT HEAD INJURY PROJECT

<p>SHIP</p> <p>USS Consolation (AH15) USS Repose (AH16) USS Haven (AH12)</p>	<p>1st day thru 14th day 5 weeks</p>	<p>Mobile Neurological Team attached to COMNAVFE</p> <p>Dr. John S. Meyer 2nd Neurologist Psychologist EEG Technician Adm. Technician</p>	<p>Initial evaluation</p> <p>Compilation of clinical &amp; laboratory findings Coding sheets, e.e.g. samples and additional note in special jacket</p> <p>Daily evaluation for 14 days</p> <p>Transfer of data to USNH Yokosuka, Japan</p>
<p>SHORE</p> <p>USN Hospital Yokosuka, Japan</p>	<p>2nd week thru 12th week</p>	<p>Neurological Staff attached to hospital</p> <p>Dr. Donald L. Mulder 2nd Neurologist 3rd Neurologist Psychologist EEG Technician Adm. Technician</p>	<p>Weekly evaluations added</p> <p>Overall supervision of field data collection</p> <p>With transfer of patient to clusa, or return to duty, special jacket is mailed directly to Neurological Institute of New York</p>
<p>MAINLAND</p> <p>Neurological Institute of New York</p>	<p>6th month 18th month 36th month</p>	<p>Central Research Staff attached to the Neurological Institute of New York</p> <p>Dr. William F. Caveness Research Associate Administrative Assistant Secretary</p>	<p>Assembly &amp; analysis of data from the acute phase</p> <p>Periodic re-examinations at USN Hospitals in U.S. during chronic phase.</p> <p>Compilation of clinical &amp; laboratory findings</p> <p>Correlation of sequelae with injury</p>

Write, Check or Circle  
Items below as indicated

# HEAD and SPINAL CORD INJURY

Provisional Form (2-68 Rev.)

Attachment #3

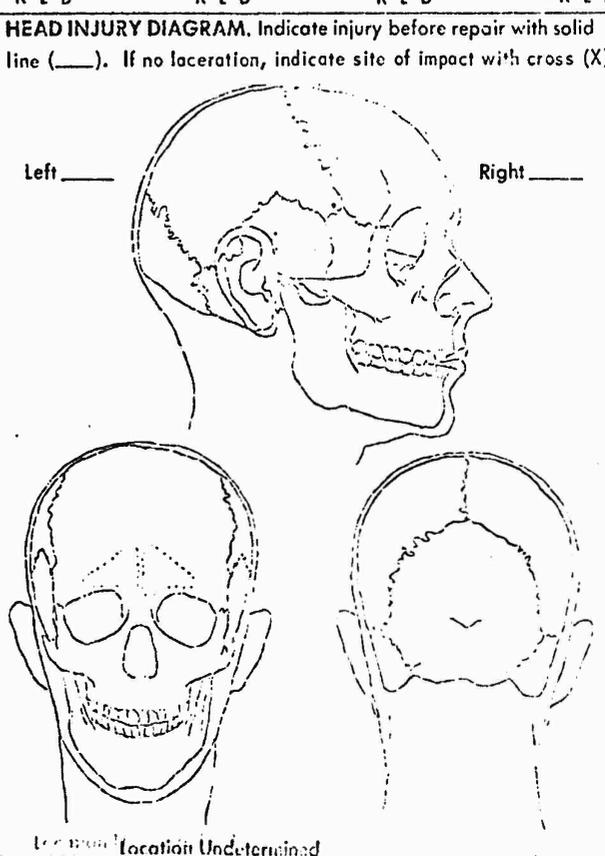
SIDE 1

FILL OUT THIS SIDE FIRST

1. Hospital or Station				2. Date and Time of Admission		
3. Patient's Name		4. Age	5. Rank	6. Serial Number		7. Branch of Service
8. Permanent Address			9. Next of Kin		10. Address of Next of Kin	

INFORMATION SOURCE			<input type="checkbox"/> FIELD TAG	<input type="checkbox"/> VERBALIM (from patient)	
INJURY	11. Date of Injury	12. Time of Injury	13. Where Injured (Geographic)		
	14. How Injured (Agent)	15. Immediate Loss In: _____ Consciousness _____ Vision _____ Speech _____ Use of Hands or Feet			
	16. Supplemental Information About Injury				17. Wearing Helmet _____ Yes _____ No

EXAMINATION	18. Date and Time of Examination		19. Examining Officer		
	20. Mental Status (Note resolution or deterioration in progress notes)				
	_____ Responds to pain    _____ Responds to command    _____ Responds appropriately to environment    _____ Recalls circumstances of injury _____ Recalls ongoing events    _____ Other (specify)				
	21. Cranial Nerves: DEFICIT		I II	III IV VI	V VII VIII IX X XI XII
	_____ R		---	---	---
	_____ No Deficit		L	---	---
	22. Motor System: DEFICIT		R	_____ face	_____ arm
	_____ No Deficit		L	_____ face	_____ arm
	23. Sensory System: DEFICIT		R	_____ face	_____ arm
	_____ No Deficit		L	_____ face	_____ arm
24. Reflexes (Circle)		Biceps	Triceps	Knee	
		↑ ↓ - N	↑ ↓ - N	↑ ↓ - N	
		R L B	R L B	R L B	
			Ankle	ABd	
			↑ ↓ - N	↑ ↓ - N	
			R L B	R L B	
			CREM	Plantor	
			↑ ↓ - N	↑ ↓ - N	
			R L B	R L B	
25. Meningeal Signs		26. Handedness			
		_____ Right _____ Left			
27. BP	28. Pulse	29. Respiration	30. Temperature		
31. LOCATION and EXTENT of WOUND PRIOR to DEBRIDEMENT (Include both closed and penetrating injuries. Describe.)					
32. Associated Injuries					
33. X-Ray Findings					
34. Other Lab Findings (LP, etc.)					
35. EEG		mo.	day	yr.	
No _____ Yes _____					
36. Remarks					





HEAD AND SPINAL CORD INJURIES -- VIETNAMBranch of Service of Patient

Army	1,138
Navy	61
Marines	398
Air Force	21
Other	55
Unknown	32
	<u>1,705</u>

Injuries Reported by Month

<u>1967</u>		<u>1968</u>		<u>1969</u>	
January	10	January	64	January	13
February	16	February	75	February	40
March	58	March	50	March	56
April	44	April	54	April	4
May	81	May	81	May	53
June	25	June	90	June	62
July	43	July	71	July	51
August	52	August	97	August	62
September	55	September	68	September	63
October	50	October	35	October	18
November	42	November	38	November	4
December	53	December	27		<u>426</u>
	<u>529</u>		<u>750</u>		

Deaths Reported - 78

November 1969

HEAD AND SPINAL CORD INJURIES -- VIETNAM

ARMY HOSPITALS REPORTING

1967 - 1969

Branch of Service of Patient

Army	969
Navy	27
Marines	11
Air Force	13
Other	5
Unknown	28
	<u>1,053</u>

Type of Injury

	<u>Missile</u>	<u>Non-Missile</u>	<u>Total</u>
Head Injury, Penetrating	652	33	685
Head Injury, Non-Penetrating	123	50	173
Spinal Cord Injury	151	24	175
Head and Spinal Cord Injury	12	8	20
	<u>938</u>	<u>115</u>	<u>1,053</u>

Deaths Reported - 24

HEAD AND SPINAL CORD INJURIES -- VIETNAMNAVY HOSPITALS REPORTING1967 - 1969Branch of Service of Patient

Army	169
Navy	34
Marines	387
Air Force	8
Other	50
Unknown	4
	<u>652</u>

Type of Injury

	<u>Missile</u>	<u>Non-Missile</u>	<u>Total</u>
Head Injury, Penetrating	420	12	432
Head Injury, Non-Penetrating	80	25	105
Spinal Cord Injury	87	19	106
Head and Spinal Cord Injury	7	2	9
	<u>594</u>	<u>58</u>	<u>652</u>

Deaths Reported - 54

November 1969

HEAD INJURIES -- VIETNAM (1,395 men)

	<u>Number of Men</u>	<u>Percent</u>
<u>Missile</u>	1,275	91.4
Dura intact	203	15.9
Dura penetrated	1,072	84.1
<u>Non-Missile</u>	120	8.6
Dura intact	75	62.5
Dura penetrated	45	37.5
Dura intact (total)	278	20.0
Dura penetrated (total)	1,117	80.0