

ARMY MEDICAL SERVICE

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# PROGRAM PROGRESS REPORT

3rd QUARTER  
FY 1966



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OFFICE OF THE SURGEON GENERAL  
DEPARTMENT OF THE ARMY

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1. Military Internal Medicine

a. A comprehensive post transfusion hepatitis study is currently under way to determine the effect of modified gamma globulin added to blood in vitro. As of 14 January 1966, 1,235 patients were under study of whom 844 had received transfusions. No case of jaundice was observed, although several cases of anicteric hepatitis occurred in the study group. Post transfusion jaundice was seen at the same hospital in 9 patients who, for various reasons in keeping with the protocol, were not eligible for the study. A total of 460 patients received gamma globulin intravenously with no adverse reaction. It is planned to continue to study with the addition of 2 groups of patients who might be at higher risk of acquiring post transfusion hepatitis than the current study population.

b. First in the Egyptian epidemic in 1947, and more precisely since 1961 in the Philippines, the possible significance of an antitoxic, as contrasted with antibacterial immunity to cholera has been pointed out by the occurrence of mild and subclinical infections. In these cases there seems to be sufficient antitoxic immunity so that infection may be tolerated without or with only mild symptoms. This component of effective immunity will be investigated. Disease produced in the rabbit ileal loop model is a true toxemia. Studies currently under way indicate that it should be possible to produce immunizing preparations of known toxic antigen content and when necessary, to fortify them with purified toxin antigen.

c. In the development of a suitable intravenous nutriment, animal screening tests of emulsions of cottonseed oil have established that cottonseed oil must be modified by essentially complete removal of pigments and minor polar components. The effect of electrolytes on the stability of emulsions apparently is influenced by the type of oil used as the lipid phase and by the difference in composition or purity of the stabilizing agent. Emulsions of cottonseed oil stabilized with pure egg lecithin or with crude egg phosphatides were more stable than those of soybean oil stabilized with the same emulsifiers. The development of analytical procedures suitable for fresh crude egg phosphatides may permit their use as the stabilizer in emulsions prepared with pigment-free cottonseed oil as the lipid phase.

2. Military Environmental Medicine

a. A study to determine the effect of low body temperature on trained performance and an analysis of the cause or causes of performance failure at critical body temperatures have been completed. The behavioral analysis included operant procedures for heat reinforcement and shock escape. The critical body temperature for performance of the hypothermic rat was 23-25°C, which is several degrees above the level of complete motor collapse.

b. A critical problem for the U.S. military services is that the answer to the following question is unknown: "To what extent are the operational capabilities of an unacclimatized combat unit impaired by emergency deployment at high terrestrial altitude?" To attempt to resolve this problem, a troop exercise is planned from mid-July to mid-August 1966 in the region around Summit Lake Flats near Mt. Evans, Colorado (mean altitude 13,000 ft. or higher). Several staff members of the U.S. Army Medical Research Institute of Environmental Medicine

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participating as observers will collect physiological and biochemical data and measure physical performance capabilities of the participating troops.

### 3. Military Psychophysiology

a. The Acoustic Reflex Ear Defender System (AREDS) developed at the Army Medical Research Laboratory, Fort Knox, Kentucky, is now in the advanced development stage by the Army Material Command, with continuing assistance given by the AMEDS. The AREDS will be identified as MX-7307 and will be compatible with and subject to the same logistic controls as the AN-VIC-1 system.

b. An impulse noise device, permitting controlled variations in the rate of on-set and peak duration of very intense sounds, has been installed at the Fort Knox Laboratory. This device permits controlled laboratory studies of the effect on hearing of sequential exposure to the noise of Army weapons. To insure extremely high reliability of the device further refinements will probably become necessary during the next quarter.

c. A microphone and reading system for detailed analysis of the noise of weapons has been tested with the cooperation of the Army Material Command. It has a very short response inertial (about 2 microseconds) which makes noise analysis at least 5 times more accurate than that obtained previously with other equipment.

d. Screening devices to test combat soldiers' depth perception have been developed to the point that comparisons with standard equipment may be done.

e. Studies of the manner in which visual images are processed by humans have suggested that electrical brain activity, as recorded from the occipital cortex in high frequency optic nerve activity, is elicited by patterned light arriving at the eye. In this manner, the variegated patterns of impulses produced by targets may be processed by the central nervous system, thus becoming the basis for perception and determining the conditions under which military targets may be rapidly identified.

### 4. Aviation Medicine

a. The toxicity of airborne contaminants from propellants for Army weapons systems is being assessed in various Army helicopters, with particular interest in the armed Chinook. New measurement techniques have been developed for assessment of carbon monoxide levels in the air under the turbulent atmospheric conditions of helicopters in flight with doors open and with doors closed. Preliminary data indicate that for short periods carbon monoxide may reach concentrations of 100 parts per million and that such levels may adversely affect performance of animals as well as performance of humans in such tasks as the discrimination of duration of an auditory signal. Additional studies are in progress to confirm these data and to assess the possible affect on performance of transitory substances such as free radicals.

b. Work continues on cardiovascular responses to the stress of Army parachuting operations and the assessment of hazardous conditions in aircraft such as noise levels, deficiencies of helicopter communication systems, and night operations.

5. Combat Surgery

a. A degree of tolerance to shock has been attained in animal experiments. This induced tolerance to shock is associated with decreased plasma catecholamines, decreased peripheral resistance, and an increased cardiac output. Visceral organ flow remains at near normal levels. Dogs tolerant to either hemorrhagic, endotoxin, or cardiac shock, are tolerant to all other forms of shock. Light and electron microscopy studies show the preservation of tissues in tolerant dogs, with maintenance of intact cellular membranes and subcellular particles.

b. In transplantation studies in animals, it has been demonstrated that repeated intravenous infusion of subcellular transplantation antigen from a pool of donors, coupled with a brief course of immune suppressive therapy, will induce significant (up to 3 times) prolongation of skin allograft survival. Neither the antigen infusion nor the immune suppression regimen alone is effective.

c. Observations on patients with fulminating peritonitis indicated elevated cardiac outputs to maintain normal metabolic conditions. This was related to an elevated caloric energy expenditure from fever and increased respiratory work. Similar findings were made in extensively burned patients when they became infected. Failure to meet the increased demand because of hypovolemia, sepsis, myocardial insufficiency, or hypoxia, resulted in a metabolic situation similar to shock. Comparison of hemodynamics of a normal leg versus one with an abscess indicates that the inflammatory area serves as an A-V shunt.

6. Military Psychiatry

a. Further analyses of psychiatric and biochemical data, obtained on recruits in the basic training cycle at Fort Dix, are in progress. Some of these recruits develop adenovirus illnesses requiring hospitalization, whereas others do not; the preliminary finding that the onset of symptoms may be predicted by as much as 3 days is being confirmed. This prediction may be made independently from the psychiatric evaluation or from the biochemical data, but greater accuracy is being obtained when the 2 data sources are combined. These studies will continue through the summer of 1966.

b. The efficiency of individual soldiers, squads, companies, and battalion level units are being assessed in field maneuvers. One measure which appears to have value in predicting individual or group performance efficiency is the degree of involvement a soldier has with other members of his group. Those individuals who may be described as "least-preferred co-workers" appear to affect group performance adversely.

c. Additional studies are in progress on new techniques in psychotherapy, such as the use of delayed feedback in patients with communication difficulties. Studies on the affect of applied preventive psychiatry concepts in mental hygiene clinics at CONARC installations will continue through the next quarter.

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### 7. Oral and Maxillofacial Sciences

a. Due to the restoration of deferred funds, contractual investigations were expanded, particularly studies on the repair of maxillofacial bones and on the simplification of techniques for field dental laboratories.

b. A feasibility study was initiated on the use of computers and photogrammetry for the screening and recording of data on the oral status of the troops. Formerly this task was performed at great expense in time for both the troops and professional personnel. Automation of certain time consuming dental laboratory procedures also will be considered.

### 8. Ionizing Radiation Injury - Prevention and Treatment

a. The Chief of Research and Development announced on 18 February 1966, the U.S. Army position on acceptable interim criteria of protection by antiradiation drugs, in resolution of the In-Process Review held on 11 October 1965.

b. The security restrictions on the antiradiation drug development program have been liberalized. This will permit publication in the open literature, and should markedly stimulate investigations by university scientists.

c. Contracts for the screening of chemicals for antiradiation activity were renewed with the Toxicity Laboratory, University of Chicago, and with the Woodard Research Corporation. These renewals have provided for an increase in the screening rate from a previous total of 4,000 chemicals per year to a new total of 6,000 chemicals per year.

### 9. Communicable Diseases and Immunology

a. Guinea pigs pre-treated by starvation and opium, and inoculated with heavy doses of vibrio cholera, showed acute enteritis with degenerative lesions of endothelial cells of the lamina propria. Focal cardiac, hepatic, and pancreatic lesions were also observed. These findings suggest a systemic toxic effect.

b. In a fungus survey, soil samples were collected from 140 places in Thailand (representing 70 of the 71 provinces). No pathogenic fungi were recovered from inoculated animals but, using the hair bait technique, 39 percent showed microsporum gypseum (keratinophilic fungi).

c. Hamsters infected with plasmodium berghei showed two abnormal populations in studies of red cell volumes and osmotic response.

d. Acute cholecystitis has been produced in normal guinea pigs injected intraperitoneally with 1.0 ml. tincture of opium. Inflammation was caused by spasm of the sphincter of Oddi, with resultant obstruction and stasis.

e. Nineteen "immune" Maaca mulatta monkeys and 2 controls were infected with cercariae of schistosoma mansoni. Controls received 5,000 cercariae and died 54 and 56 days later. Test animals were challenged with 50-5,000 cercariae (one received 50,000); none died. Many cercariae

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penetrated, but their migration and development was greatly reduced. The number of young worms in the "immune" monkeys began to decline after 2 months; after 3 months all worms had disappeared. At necropsy there was an average of 6 mature worms, while control animals had over 1,000 each.

f. Humans and rats respond to the stress of infection by an increased percentage of unbound thyroxin. However, in contrast to the infected rat, neither a depression of thyroid function nor a pituitary depression (TSH levels) is found in man.

g. Monkeys were fed 4 doses of a living hybrid strain of E. coli-shigella flexneri 2a and were challenged with virulent shigella flexneri 2a 10 days and 30 days after the last dose of vaccine. Control animals perished, but immunized animals survived and the organism seemed unable to penetrate into the intestinal mucosa.

10. Field Medical Equipment and Drugs

a. Arthropod and Rodent Control Equipment, CDOG 1439d(21). There are 14 items under development in this task. All of the items will be considered at an In-Process Review early in the fourth quarter FY66. Prototypes of the Dispenser, Liquid, Insecticide, Rotary Wing Aircraft and Pump, and Aircraft Loading were shipped to Vietnam in February 1966 for use in malaria control. These items were service tested in Vietnam in the third quarter FY66.

b. Wet-Bulb Globe Temperature Kit, Electronic, No CDOG Reference. Development has been completed. The task will be recommended for termination in the fourth quarter FY66.

c. X-Ray Apparatus, Lightweight, Field, CDOG 149d(3). Service testing was initiated in the third quarter FY66 and will be completed early in the fourth quarter FY66. Test data will be evaluated, and the item will be scheduled for type classification action in the fourth quarter FY66.

d. Resuscitator, Field Type Model, CDOG 149d(1). Modifications have been completed, and prototypes are being engineer tested at Aberdeen Proving Grounds and Edgewood Arsenal. Service Testing will be initiated in the fourth quarter FY66.

e. Sterilizer, Pressure, Fuel Heated, Lightweight, Field, CDOG 149d(4). This item was approved for type classification at the AMEDS Technical Materiel Committee meeting in March 1966. The development task was terminated.

f. Bed, Folding, Hospital, Field, CDOG 149d(19). Twenty prototypes were shipped to the MUST assembly for outfitting and evaluation in December 1965. Engineer testing was initiated in December 1965, and service testing will begin in the fourth quarter FY66.

g. Field, Dental X-Ray Processing Unit, Self-Contained, CDOG 149d(6). A prototype was evaluated at the manufacturer's plant in the third quarter FY66; some additional modifications to the prototype were required. A plant inspection will be made early in the fourth quarter FY66 and delivery of the prototype is expected by the end of the fourth quarter FY66.



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h. Litter, Inflatable, CDOG 149d(10). Proposals for development have been evaluated. A contract award will be made early in the fourth quarter FY66.

i. Lightweight Field Water Distiller, CDOG 149d(8). This item is now in the Engineer Design Phase. A contract was awarded to initiate studies to determine if the characteristics of the system regarding performance, size, ruggedness, and reliability can be fulfilled within the desired specifications. Development is concurrent with that of the Plastic Container with Dried Electrolyte, (paragraph j. below).

J. Plastic Container with Dried Electrolytes, CDOG 149d(7). This item is now in the Engineer Design Phase. A contract has been awarded to initiate studies to determine if the characteristics of the system regarding performance, size, ruggedness, and reliability can be fulfilled within the desired specifications.

k. Armored Aid Station Vehicle Kit, No CDOG reference. Development was completed. This task will be recommended for termination in the fourth quarter FY66.

l. Litter Device for Helicopter Hoisting Operations, SDR in process. The prototype was completed in the third quarter FY66. Engineer and Service Testing will be initiated early in the fourth quarter FY66. Limited production and type classification is expected by the end of the fourth quarter FY66.

m. Audiometer, Speech, No CDOG reference. A review of this task revealed that there is no longer any requirement to continue development. Termination of this task will be recommended at the AMEDS Technical Materiel Committee meeting in the fourth quarter FY66.

n. Medical Officer's Entry Kit, SDR in process. The approved SDR has not yet been received; however, some development is anticipated during the current fiscal year.

o. Aidman's Entry Kit, SDR in process. The approved SDR has not yet been received. It is expected, however, that development will begin during the current fiscal year.

p. Family of Immediate Containers for FSC 6505 (Drugs, Biologicals, and Official Reagents), SDR in process. This task was approved for development at the AMEDS Technical Committee meeting in December 1965. In the development of this item, a study conducted by the University of Connecticut will be considered. This study considers drug/container compatibility with a view towards the development of a family of plastic containers of specific sizes and shapes suitable for packaging drugs for field use.

q. Sink Unit, Scrub, Field, CDOG 1439d(3). During the quarter, engineer testing was completed. Service testing will be initiated early in the fourth quarter FY66. Type classification is scheduled for the first quarter FY67.

r. Light, Surgical, Operating, Field, CDOG 1439d(3). Engineer testing and service testing will be completed in the fourth quarter FY66. Type classification is scheduled for the first quarter FY67.

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s. X-ray Processing Unit, Field, Medical X-ray Film, CDOG 149d(3). Service testing was initiated in the third quarter FY66 and will be completed and type classified early in the fourth quarter FY66.

t. Container, Storage, and Preservation, Temperature Controlled, Field, CDOG 1439d(3). Engineer testing was completed and service tests are in the final stage of completion. This item is scheduled for type classification in the fourth quarter FY66.

u. Table, Surgical, Operating, Field, CDOG 1439d(3). A recent review of the prototype revealed the need for additional modifications to this item. Contract negotiations are under way to accomplish the modifications and procure an additional prototype. Delivery is expected in the second quarter FY67.

v. Box, Whole Blood, Shipping, Small, Disposable. Two unsolicited proposals were received during the third quarter FY66 pertaining to this item which are being evaluated to determine their feasibility and scope.

w. Refrigerator, Hermetic Type, Blood and Biological, Field, CDOG 1439d(3). The Technical Characteristics have been redefined and forwarded to USACDC - Medical Service Agency for consideration and the preparation of an SDR. Further action has been held back pending the decision by USACDC.

x. Autopsy Kit, Lightweight, Field, Portable, CDOG 149d(9). Bid-proposals for development were received and are being evaluated. A decision on the approach to development will be made and action initiated in the fourth quarter FY66.

y. Dental Treatment Set, Hand Carried, Forward Areas, SDR in process. A DA approved SDR was received during the second quarter. The consolidation of Task 3A643324D820.09, Handpiece, Dental, with Self-Contained Power Unit with this task was approved at an IPR in December 1965. The Technical Characteristics of both tasks were consolidated. Proposals for bids were completed in March 1966 and forwarded for submission to the manufacturers. It is expected that a contract award to initiate development will be made by the end of the fourth quarter FY66.

z. Analgesic Compound Without Sedative Effect, SDR in process. The Technical Characteristics have been prepared and approved. A proposal has been received and is under consideration at this time. An award of the contract for development is expected to be made in the first quarter FY67.

aa. Test & Evaluation Activity - Fort Sam Houston, Texas. This activity prepared Service Test Plans and collected service test results and data and forwarded them, through the Office of The Surgeon General, to this Headquarters.

11. Contracts and Grants

a. At the close of the third quarter FY66, there were 590 current contracts being administered by the R&D Command. Of these 38 were new awards during the quarter.

b. There were 64 current grants in effect during the third quarter, of which 15 were new grants totaling \$334,643.