Report Number IV

MED 50 of Agent 233-7

Final Report

By

Herbert W. Copelan, M.D.

March 1969

Medical Research Laboratories
Directorate of Laboratories
Edgewood Arsenal, Maryland 21010
DAAA 15-68-C-0627

Ivy Research Laboratories, Inc.
H.U.P. Duhring Laboratories
36th and Spruce Sts.
Phila., Pa. 19104

Report Number IV

MED 30 of Agent 233-7

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Summary

This report describes results of studies to determine the dose for the minimal central or orthostatic hypotensive effect of Agent 233-7. The experiments were performed with human volunteers and followed the general procedure prescribed by the Medical Research Laboratories.

Agent 233-7 was administered intramuscularly to adult male prisoner volunteers. Dosage started at one microgram per kilogram (ug/kg) and was raised by increments according to protocol until the maximum specified dose of 10.0 ug/kg was reached. There was no significant central or peripheral effect at any dosage. Physiological measures and toxicity studies also disclosed no significant effects.

Vital signs, NF performance and general behavior after injection were measured hourly for the first 8 hours, at 2-hour intervals for the next 4 hours, and then at 4-hour intervals for the duration of the 24-hour experiment. Time estimation was measured at 1.5, 6.5, 7.5, 8.5 and 24 hours after injection. Central effect was measured by NF performance. The criterion specified for minimal central effect was a reduction, compared to control performance, of more than 25% in the lowest average obtainable by selecting the lowest 3 of any 5 consecutive scores at the test intervals. The criterion specified for minimal orthostatic hypotensive effect was a reduction in the 5-minute standing mean arterial blood pressure (diastolic plus 1/3 pulse pressure) of 10 mm. Hg compared to the supine pressure.

RESULTS

1. Effects

There was no significant central or peripheral effect at any dosage. Table I lists the name and dosage for all subjects tested.

TABLE I

Name and Dosage of Subjects Tested with Intramuscular 233-7

Name	Dosage
[redacted]	1.0
	1.0
	1.4
	1.4
	2.0
	2.0
	2.8
	2.8
	3.8
	3.8
	5.4
	5.4
	7.5
	7.5
	10.0
	10.0

2. Toxicity

Toxicological studies were performed at 24 and at 48 hours, at approximately 7 days and 4 weeks after injection. These studies consisted of red and white cell measures, urinalysis, BUN, transaminase, alkaline phosphatase and bilirubin fractions. There were no abnormalities suggesting any toxic effect of agent 233-7. Occasional slight changes were within the range of technical variation or were due to conditions other than the agent, particularly chronic serum hepatitis apparently related to previous intravenous use of narcotics and other drugs.

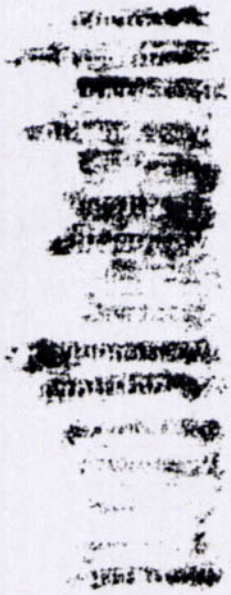
The larger doses produced mild local discomfort at the injection site lasting about 2 to 4 hours. This was probably the result of the volume of the injected fluid.

CONCLUSIONS

1. Agent 233-7 administered intramuscularly in dosages up to 10.0 ug/kg produced no significant central or peripheral effect.

2. There were no toxic effects.

Herbert W. Copelan, M. D.



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Report Number VI

MED 50 of Agent 926

Final Report

By

Herbert W. Copelan, M. D.

July 1969

Medical Research Laboratories
Directorate of Laboratories
Edgewood Arsenal, Maryland 21010
DAAA 15-68-C-0627

Ivy Research Laboratories, Inc.
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Summary

This report describes results of studies to determine the intravenous dose of Agent 926 necessary to produce nausea and vomiting in man. The experiments followed the method prescribed by the Medical Research Laboratories.

The agent was administered to adult male inmate volunteers at Holmesburg Prison, Philadelphia. Dosage started at 0.05 microgram per kilogram (ug/kg) and was raised by 40% increments to a dose of 1.0 ug/kg. Nausea occurred at a dose of 0.74 ug/kg and emesis at 1.0 ug/kg. These were the dominant symptoms. Mild sedation also occurred. There was no significant peripheral effect or toxicity.

Minimal Effective Dose Determination for Agent 926

INTRODUCTION

Agent 926 was tested at Holmesburg Prison, Philadelphia to determine the dose that would produce nausea and vomiting. The experiments started 5 May 1969 and ended 23 July 1969. The study was conducted according to the general protocol draft of 9 July 1964 prepared by the Medical Research Laboratories (MRL) as modified by MRL Research Plan 17,109 of 27 February 1969.

METHOD

Subjects were adult male inmate volunteers, 21 to 34 years of age. All subjects had at least 8 years of formal education, the ability to perform at least 20 simple addition problems in 3 minutes, no evidence of psychosis or significant neurosis according to the Minnesota Multiphasic Personality Inventory (University of Minnesota, 1943), no history of arrest for violent acts and good health by clinical and laboratory examination. Twenty subjects were used for the 22 trials in the study. An interval longer than the prescribed 30-day minimum separated the trials for the two subjects who participated twice. Subjects entered the testing area the afternoon preceding the test day and remained there until the following morning. Subjects were tested in individual rooms. Before the agent was administered, series of control measures were obtained for pupil size; vital signs, including blood pressure and pulse supine and after standing; and performance on the Numerical Facility Test (NF) of the Hogg Foundation for Mental Health, 1956.

The agent was injected intravenously on the morning of the test day in a concentration of 5, 10 or 20 mg. per milliliter. Doses started at 0.05 microgram per kilogram (ug/kg) and were raised by 40% increments, according to the protocol, up to doses of 1.0 ug/kg. In accord with safety precautions specified by MRL, no more than two subjects were tested initially at each dose level. Increments were made only after laboratory studies at specified intervals indicated absence of toxicity.

TABLE I

NAME, DOSE AND RESULTS FOR INTRAVENOUS AGENT 926

Name	Dose	Nausea	Vomiting
[redacted]	0.05	-	-
[redacted]	0.05	-	-
[redacted]	0.07	-	-
[redacted]	0.07	-	-
[redacted]	0.10	-	-
[redacted]	0.10	-	-
[redacted]	0.14	-	-
[redacted]	0.14	-	-
[redacted]	0.19	-	-
[redacted]	0.19	-	-
[redacted]	0.27	-	-
[redacted]	0.27	-	-
[redacted]	0.38	(+) *	-
[redacted]	0.38	-	-
[redacted]	0.53	-	-
[redacted]	0.53	-	-
[redacted]	0.74	+	-
[redacted]	0.74	+	-
[redacted]	1.0	+	-
[redacted]	1.0	+	+
[redacted]	1.0	+	+
[redacted]	1.0	+	+

(+) * Result probably affected by unrelated gastrointestinal discomfort. (see tex

The time relationships for nausea and vomiting are presented in Table II. This table also indicates the subjects' activity, which may have influenced the results.

- TABLE II -

Time Relationships for Nausea and Vomiting [redacted] Intravenous Agent 926

Name	Dose	Time in Minutes for Onset and End of Nausea / [redacted]		Activity
[redacted]	0.38	2.5 - 30	[redacted]	Recumbent
[redacted]	0.54	- - - - -	[redacted]	Recumbent
[redacted]	0.54	- - - - -	[redacted]	Recumbent
[redacted]	0.74	2.5 - 14	[redacted]	Recumbent
[redacted]	0.74	2.5 - 20	[redacted]	Recumbent
[redacted]	1.0	4.5 - 30	[redacted]	Recumbent
[redacted]	1.0	2.7 - 12	7.7 - 10 *	Recumbent (Stood at 7 min:
[redacted]	1.0	3 - 9.5	4.3 - 6.5	Sitting & Stand
[redacted]	1.0	1.7 - 10	2.7 - 5.5	Sitting & Stand

* Treated with Tigan (200 mg. i.m.) at 8.7 minutes.

Nausea was first reported between two and three minutes after injection for most of the affected subjects, and one subject, after 1.0 ug/kg, noted the symptom as early as one minute forty-five seconds. In this small series, however, the average onset time did not occur earlier for the higher dosage level. The period of nausea for subjects who did not vomit ended about 20 minutes after injection. Among the three such subjects the symptom persisted longer for the one man at 1.0 ug/kg than for the two at 0.74 ug/kg. Thus, the duration of nausea, at least when present without vomiting, may be greater with increasing dosage. Vomiting seemed to relieve the nausea and in such subjects the symptom ended earlier, at approximately 10 minutes after injection.

When vomiting occurred, it usually began promptly after the onset of nausea. There was a delay of 5 minutes after the start of nausea for the first subject who vomited. He had originally been kept recumbent, but he did vomit almost immediately after standing. The other two subjects, who were not recumbent, vomited about one minute after reporting nausea. Standing always aggravated nausea or precipitated vomiting. The one subject who did not vomit after 1.0 ug/kg had been allowed to remain recumbent throughout the experiment. Vomiting or wretching usually lasted two or three minutes.

One subject was treated with Tigan, 200 mg. i.m., one minute after the onset of vomiting. Although this drug might have been an effective antidote, and it did produce some drowsiness, the prompt improvement of nausea after vomiting among untreated subjects makes it difficult to assess the effect of Tigan in this experiment.

Sedation was the other consistent effect, but it was mild and much less significant than the nausea and vomiting. This symptom was noted earlier when subjects were recumbent and, in these instances, occurred at approximately the same time as the nausea. The two subjects who were not recumbent did not report sedation until after they had vomited and nausea was decreasing. It is probable that these strong and unpleasant symptoms obscured the milder sedative effect.

The speech of most of the affected subjects was softened in intensity but remained clear. This may have resulted from a combination of sedation and disinterest in speaking during unpleasant symptoms. Some subjects appeared mildly unsteady on walking, and this also may have been a manifestation of sedation or marked nausea. A few subjects reported a sensation of "highness," as if they were mildly intoxicated or had received a narcotic. One subject mentioned this after fifteen seconds but the validity of his report is questionable. Generally this symptom occurred closer in time to the sedation.

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This report describes results of studies to determine the intravenous dose of Agent 926 necessary to produce nausea and vomiting in man. The experiments followed the method prescribed by the Medical Research Laboratories.

The agent was administered to adult male inmate volunteers at Holmesburg Prison, Philadelphia. Dosage started at 0.05 microgram per kilogram (ug/kg) and was raised by 40% increments to a dose of 1.0 ug/kg. Nausea occurred at a dose of 0.74 ug/kg and emesis at 1.0 ug/kg. These were the dominant symptoms. Mild sedation also occurred. There was no significant peripheral effect or toxicity.

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Report Number VII

ID 50 of Agent 926

Final Report

By

Herbert W. Copelan, M. D.

Principal Investigator

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Medical Research Laboratories
Edgewood Arsenal
Edgewood Arsenal, Maryland 21010

13. ABSTRACT

This report describes the results of studies to determine the intravenous dose of Agent 926 necessary to produce an incapacitating effect in man. The experiments followed the method prescribed by the Medical Research Laboratories. The experiments were terminated prematurely because of syncope which occurred in the fourth subject studied.

The agent was administered to adult male inmate volunteers at Holmesburg Prison, Philadelphia. Dosage at 1.2 microgram per kilogram (ug/kg) produced either sedation or nausea and wretching with one type of reaction or the other clearly dominant. There was no significant peripheral effect or toxicity.

Indian wrestling performance was tested and seemed a reliable and valid measure of central effect.

DD FORM 1473

APPENDIX:

Report on Subject [redacted]

Agent 926

At 0957 on 22 May 1970, Subject No. [redacted] a 35 year old white man, 6 feet 3 inches tall and 207.5 pounds, received an intravenous 118.2 ug dose of Agent 926 in a volume of 2.3 ml normal saline (Dosage: 1.2 ug/kg; Concentration: 50 ug/ml.). About 30 seconds after injection he reported nausea while sitting on the 6-inch high edge of his cot. He wretched at about 45 seconds and slumped forward. He was immediately rolled back on the bed and his legs were elevated. He was ashen, unconscious and motionless. His skin was not moist. No radial, precordial or cervical pulsation was seen or felt. About 1 minute after injection, or 15 seconds after being placed in the supine position without response, 2 or 3 precordial blows were given and regular sternal compression was started. Mouth to nose ventilation was begun some 30 seconds after the start of sternal compression. The patient responded after another 15 seconds with turning of his head, a return of facial expression and a palpable radial pulse. A sinus arrhythmia was palpable and a normal jugular pulse was visible. Atropine sulfate, 0.4 mg, was given deep I. M. with massage at 7 minutes after the injection and an additional 0.3 mg at 11 minutes 45 seconds. The patient remained nauseated and wretched frequently until about 36 minutes after injection with these symptoms gradually subsiding during the last 10 minutes of this period. By this time he had become fully conscious and mentally clear. The subject was kept supine with his legs elevated for 2 hours and was kept at rest for another 6 hours. An electrocardiogram taken about 2 hours after injection was normal and unchanged from the control tracing. Blood pressure was normal when taken at 2 hours and subsequently.

[redacted]

SUMMARY:

A 35 year old subject had an apparent syncopal reaction precipitated by wretching after I. V. injection of Agent 926. The mechanism of syncope was probably asystole or a marked sinus bradycardia in a subject who may have been predisposed to syncope.

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attenuate the effects of LSD. Available evidence indicated that all policies regarding the use of volunteer subjects were observed.

One of the contracts was awarded in 1961 to North American Aviation's Medical Department to test "Aircraft Performance Decrement Resulting from Ingestion of BZ." Two reports regarding that contract stated that 19 company employees volunteered as subjects in the experiment. The reports also stated that each volunteer was given a complete medical examination and was required to sign an individual volunteer agreement before taking part in the tests.

One contract was awarded to the Indiana University in 1951 for the purpose of studying "The Physiological Effects of Atropine and Potential Atropine Substitutes." The seven reports regarding that contract did not reveal any information regarding screening or selection of volunteers. The absence of such details was not unusual as the contract predates publication of DOD and Army policies governing use of volunteers in medical research. The studies apparently dealt primarily with chemical research. However, there was evidence of seven volunteers used in atropine studies.

Six separate contracts were awarded to the University of Pennsylvania. The initial contract (1951) was for "Study of Chemical Warfare Casualties in Man." Reports of that contract indicated that volunteers were not used and the principal effort was chemical research with one exception. On one occasion, six firemen were accidently exposed to an unknown substance, and that exposure was reportedly investigated under the terms of that contract. The second contract was a study of "Influence of Morphine and Demerol on the Respiratory Response of Man". Review of eight progress reports available regarding that contract revealed that approximately 40 volunteers were used in conjunction with morphine and demerol drug tests. The reports did not reveal the source of those volunteers or any evidence regarding the screening, selection, or execution of volunteer agreements.

The third and fourth contracts involved the "Evaluation in Animals and Man, Drug and Drug Mixtures Intended for use in Preventing or Treating CW Casualties." The four reports available regarding these contracts indicated that 10 volunteers received scopolamine, atropine, and morphine. Again, no evidence was found to reflect the source of volunteers or other matters concerning selection and medical preparations that preceded the use of volunteers.

The fifth and sixth contracts were awarded in the mid and late 1960s to conduct experiments of "Threshold Doses in Humans and Evaluation of Drugs in Man." Review of 55 progress reports revealed that approximately 320

INMATES

inmates at Holmesburg Prison were tested with 16 different chemical agents including ditan, atropine, scopolamine and various experimental glycolate agents.

Since glycolates have not been previously described in this report, a brief description is provided at this point. "The glycolates cause incapacitation by interfering with muscarinic functions (i.e., activation of smooth muscle and secretory glands) and the central nervous system functions of acetylcoline; they depress or inhibit nervous activity. In addition to delirium, there is physical incoordination, blurred vision, inhibition of sweating and salivation, rapid heart rate, elevated blood pressure, increased body temperature, and, at high doses, vomiting, prostration, and stupor or coma. The onset time may be minutes or hours, depending on the structure of the compound, and the duration, hours or days. The effects may be reversed almost completely by treatment with physostigmine or other centrally active cholinesterase inhibitors such as VX."[13]

The largest dollar value contract (DA 18-035-AMC-126(A)) of the six awarded to the University of Pennsylvania was different than any of the previous contracts with the other universities. In fact, the records and reports indicated that there were three major differences. First, it was the first known contract that the Medical Research Laboratories entered into involving prison inmates. Secondly, it was the first indication found that the contract investigators may not have been fully prepared to conduct experiments with humans at the outset of the program. Finally, the records of the execution of that contract indicated that one of the purposes of the contract was to allow military medical investigators to conduct experiments using prison inmates as their subjects. Indications of the unpreparedness of the contractors medical investigators was reflected in a 5 November 1964 report of a visit by the Chemical Corps Medical Contract Project Officer, Edgewood Arsenal, to the contractors' facilities. That report held that: "Throughout the entire three-day period, testing was hampered by equipment, such as needles, syringes, and alcohol sponges, not being readily available. On the second day of testing no medical personnel, other than ourselves, were present, nor did any appear, or make contact with us prior to our leaving Friday afternoon." The report also stated: "It is our opinion that in order for this program to be successful, there needs to be guidance and supervision of the testing by the contractors. This is especially important in this early stage of the program for training of the nursing personnel and establishing standard operating procedures."[14] Another report of a visit by the Edgewood Arsenal Project Officer to Holmesburg Prison in March 1966, held that the competence of the contractor staff and facilities were adequate, thus, indicating that improvements had been made in the one and a half years between the reported

volunteer experiments. However, in March 1972, a fire within the prison damaged facilities and equipment located on the prison grounds which belonged to the prison, Ivy Research Laboratories and the Army. Because of the fire and of criticism of Ivy Research by the Prison Board, the contract was terminated in February 1973. No work on volunteers had been done since February 1971.[17]

One of the contracts was awarded to American Institute for Research, Silver Spring, MD in 1964. The objective of the contract was to develop a comprehensive test battery to measure the effects of incapacitating agents on the abilities basic to performance of militarily relevant tasks. Review of seven reports available regarding the contract indicated that the American Institute investigators conducted psychoactive chemical compound experiments on military volunteers. It was not clear from the reports if the volunteers came from Edgewood Arsenal or elsewhere or if the experiments were conducted at Edgewood Arsenal. Moreover, the only agent mentioned in the reports was EA 3580, a glycolate. Other studies conducted under the terms of the contract appeared to focus on academic type testing to determine the validity of the screening and selection process used to determine which military volunteers were eligible to receive psychochemical drugs.

In 1955 an Army grant (DA18-108-CML-5596) was provided to Tulane University, Department of Psychiatry and Neurology, for research in abnormal brain functioning as related to mental illness. The few Army records available regarding the experiments conducted under the terms of the Army grant revealed that mental patients, normal volunteers and neurological patients were used by the Tulane medical investigators. The actual terms of the grant were not found and therefore no determination was made concerning the grantees' compliance with Department of the Army policies nor could any judgment be made as to the quality of consent rendered by the patients. One particular experiment involved giving LSD and mescaline to mental patients who previously had wire electrodes implanted in their brains. Reports indicated that the research group believed that a basic biochemical abnormality was responsible for the bizarre behavior demonstrated by many psychotic patients; and that the wire electrodes served a twofold purpose: to record electrical abnormalities in patients' brains, and to stimulate patients brains in hope of curing or ameliorating the patients' problem. The reports suggested that the implantation of electrodes was financed under a grant from the Commonwealth Foundation and not the Army grant. Finally, it was not clear what the Chemical Corps interests in the experiments were at the time, although, it was surmised that their interest did not go beyond gathering evidence of the effects of LSD and mescaline in humans. Some credence was lent to that belief by the reports provided the Chemical Corps, which did not discuss the implantation procedures, purpose or effect; rather they stressed the effects of the drugs.[18]

Three contracts were awarded Baylor University for experiments with physical incapacitating agents in human subjects. The five reports concerning the contracts established that the volunteers were screened, selected and medically examined in accordance with Army policy directives. The experiments involved the use of adult volunteers of both sexes with therapeutic drugs such as demerol, morphine and scopolamine.

One of the contracts involving physical incapacitating agents was awarded to the Institute for Behavioral Research to study "Drug effects and complex behavioral repertories under conditions of full environmental control." Experiments under that contract primarily involved monkeys and baboons. However, there was evidence of some volunteer experiments with sedatives or tranquilizers such as seconal, dimethyl tryptamine and chlorpromazine.

The remainder of the contracts were not involved in psychochemical drug studies. Mount Sinai Hospital was awarded four contracts to conduct studies of patients with hypothalamic diseases; neither drugs nor volunteers were involved. Louisiana State University was awarded two contracts to conduct studies of poisoning and effects of organic phosphate insecticides in man and animals. Those studies involved the investigation of accidental exposures and did not include the use of drugs or volunteers. The Maryland Medical-Legal Foundation was awarded a contract to study cases of botulism intoxication throughout the country. They collected data and apparently paid victims (called volunteers in their reports) for blood samples. Hahnemann Medical College and Hospital was awarded four different contracts for evaluation of blocking agents (chemical compound used to attenuate the effects of drugs or chemical agents). They used volunteer subjects extensively; progress reports reflected that they used no coercion or enticement to gain volunteers and followed stringent medical safeguards in every human test. New York University was awarded two contracts which involved collection of data on patients with endocrinalogic disorders (disorder of the glands). No drugs or volunteers were involved in those studies.

The data upon which this chapter was based was found in various Army files; no effort was made to search the contractors files or to request the contractors assistance in contributing data that may have been available in their files. Moreover, research for this chapter did not include contracts with chemical companies or laboratories for the development, synthesis or procurement of chemical compounds or equipment.

Finally, with the exception of the Holmesburg Prison inmates and an occasional mention in contract reports, the names of volunteer subjects

CONTRACT CHART

CONTRACTOR	DATES START	DATES END	COST	CONTRACT NR.	PURPOSE OF CONTRACT	NR. OF VOLUNTEERS	CATEGORY CONTRACT
1. American Inst. for Research	07/01/64	10/23/67	$192,096	DA18-035-AMC-282(A)	Develop tests to measure affects of incapacitating agents	102	I
2. Baylor University	10/01/61	09/30/62	6,552	DA-CML-18-C-36	Study effects of Analgesic drugs on respiratory center and circulation in humans	31	I
3. " "	1964	1967	44,000	DA18-108-AMC-149(A)		Unk.	I
4. " "	06/02/65	06/30/68	44,000	DA18-035-AMC-397(A)		18	I
5. Hahnemann Medical College	06/26/61	07/31/66	277,863	DA18-108-CML-6623(A)	Evaluation of Therapeutic Compounds in animals and humans	None	M
6. " " "	05/24/67	04/24/68	50,060	DAAA15-67-C-0489		65	M
7. " " "	06/11/68	12/11/68	25,000	DAAA-1567-C-0489-0641-0295		26	M
8. " " "	01/06/69	03/06/70	49,775	DAAA15-69-C-0295		26	M
9. Inst. for Behavioral Research	10/01/62	12/31/65	156,681	DA18-108-AMC-26(A)	Drug Effects and Complex behavioral repertories	10	I
10. Indiana University	06/51	09/53	Unk.	DA18-108-CML-2397	The Physiological effects of Atropine & Atropine Substitutes	7	I
11. Ivy Research Labs., Inc.	06/28/68	12/01/69	78,135	DAAA-15-68-C-0627	To determine threshold dose effects in man	94	I
12. " " " "	03/70	09/71	48,700	DAAA-15-68-C-0324		Unk.	I

	CONTRACTOR	DATE START	DATE END	COST	CONTRACT NR.	PURPOSE OF CONTRACT	NR. OF VOLUNTEERS	CATEGORY CONTRACT
13.	Johns Hopkins Univ.	02/25/60	07/14/65	$ 91,115	DA18-108-405-CML-704(A)	Determine effects of drugs and CW agents on the EEG	None	N
14.	" " "				DA18-109-CML-6609(A)		Unk.	N
15.	" " "	11/19/51	01/31/55	152,525	DA18-108-CML-3014	Treatment of injury by GB and mustard effects	10	N
16.	" " "	02/01/55	02/25/60	18,000	DA18-108-405-CML-704	Studies on EEG Method to aid in evaluation of drugs	None	N
17.	Louisiana State Univ.	05/21/54	07/31/58	51,452	DA18-108-405-CML-37	Clinical Pathological and Pathophysiological studies in anticholinesterase poisoning	Unk.	N
18.	" " "	07/01/55	07/31/58		DA18-108-CML-5473		None	N
19.	Maryland Medical-Legal Foundation	10/11/63	09/07/66	149,530	DA18-035-AMC-102(A)	Search for new Incapacitating Agents	None	N
20.	Mount Sinai Hospital	07/01/64	09/30/66	37,064	DA18-035-AMC-281(A)	Hypothalamic Control of Adrenocortical Function	None	N
21.	" " "	06/01/63	04/31/64	24,378	DA18-103-AMC-147(A)		None	N
22.	" " "	12/12/67	12/11/69	34,022	DAMA15-68-C-0244		None	N
23.	" " "	11/17/66	11/16/67	20,900	DAMA15-67C-0189		22	N
24.	North American Aviation	09/25/61	06/15/62	31,840	DA18-108-CML-6644	Pilot Performance tests with [illegible]	18	I
25.	New York State Psychiatric Institute	10/09/51	02/28/53	19,807	DA18-108-CML-2913	Determine psychological effects of psychological chemical agents on human subjects	Unk.	I

	CONTRACTOR	DATES START	DATES END	COST	CONTRACT NR.	PURPOSE OF CONTRACT	NR. OF VOLUNTEERS	CATEGORY CONTRACT
26.	N.Y. State Psychiatric Inst.	10/09/51	02/28/53	$ 12,444	DA18-108-CML-2914	Determine psychological effects of psychological chemical agents on human subjects	8	I
27.	" " " "	03/19/53	03/10/54	11,832	DA18-108-CML-4915		6	I
28.	New York University	07/01/63	06/30/64	10,550	DA18-108-AMC-187(A)	Endocrinologic effects of altered consciousness	None	N
29.	" " "	08/01/64	07/31/66	30,480	DA18-035-AMC-304(A)		Unk.	N
30.	Research Foundation for Mental Hygiene, Inc.	12/53	09/30/57	142,739	DA18-108-CML-5198	Psychiatric and Therapeutic studies of compounds	12	I
31.	Research Foundation for Mental Hygiene, Inc.	09/57	09/59	25,000	DA18-108-405-CML-49	Mental behavior of humen with certain agents	65	I
32.	Tulane University	1955	Unk.	53,795	DA18-108-CML-5596	Study behavior during adminis-tration, LSD-25 & mescaline	6	I
33.	Univ. of Colorado	06/51	09/54	64,295	DA18-108-CML-2412	Investigation and testing of nerve agent casualties; evaluation of therapy and antidotes	None	N
34.	" " "	09/21/54	09/30/58	74,736	DA18-108-CML-5586		None	N
35.	" " "	09/01/58	03/31/61	36,542	DA18-108-405-CML-264		None	N
36.	Univ. of Maryland	03/18/50	06/30/54	114,605	DA18-108-CML-632	Psychological Studies of effects of CW agents; candidate thera-peutic agents and CW agents effects on humans	None	N

	CONTRACTOR	DATES START	DATES END	COST	CONTRACT NR.	PURPOSE OF CONTRACT	NR. OF VOLUNTEERS	CATEGORY CONTRACT
37.	Univ. of Maryland	06/06/54	06/30/57	$ 63,178	DA18-108-CML-5519		Unk.	I
38.	" " "	03/14/57	08/31/60	89,897	DA18-108-CML-6337		117	I
39.	Univ. of Pennsylvania	04/15/51	07/01/55	98,894	DA18-108-CML-2212	Study of CW casualties in man	None	I
40.	" " "	07/01/55	04/60	75,029	DA18-108-CML-5752	Research of chemicals and CW casualties in man	40	I
41.	" " "	12/15/61	12/14/62	14,990	DA-CML-18-108-G-46	Experimental basis for treating CW casualties	None	I
42.	" " "	06/01/63	09/30/66	59,135	DA18-108-AMC-143(A)	Evaluation of drugs in man	10	I
43.	" " "	03/01/64	03/31/67	326,840	DA18-035-AMC-126(A)	Threshold doses in humans	320	I
44.	" " "	11/66	12/68	37,800	DAAA-15-67-C-0154	Evaluation of drugs in man	Unk.	
45.	University of Utah	04/03/54	08/31/57	37,873	DA18-108-CML-5421	Study effects of CW agents as personnel hazard	40	II
46.	" " "	09/05/57	07/31/59	25,000	DA18-108-405-CML-60	Therapeutic effects of chemical compounds	2	II
47.	Univ. of Washington	04/10/57	11/30/62	221,529	DA18-108-405-CML-6364	Neurological Action of CW Agents	19	I
48.	" " "				DA18-108-405-CML-79		Unk.	I
						Estimated Total	1074	

50,561

FOOTNOTES

CHAPTER X

1. Contract, DA 18-108-CML-632, University of Maryland, 18 May 1950.

2. Report of Medical Committee, Chemical Corps Advisory Counsel, held on 30 September and 1 October 1954.

3. Chemical Corps Medical Laboratories, Special Report (CMSLR No. 71) First Psychochemical Conference, held on 12 May 1954.

4. Chemical Corps Medical Laboratories, Letter, subject: Use of Volunteers in Research, dated 24 July 1953.

5. Secretary of the Army Memorandum, subject: Use of Volunteers in Research, dated 5 November 1953.

6. Hahnemann Medical College and Hospital, Philadelphia, PA, Contract, DA 18-108-CML-7723(A), dated 26 June 1961.

7. Statement by Charles D. Ablard, Army General Counsel, before Investigations Subcommittee, House Armed Services, dated 8 September 1975.

8. Memorandum for ASA (R&D), subject: Senate Select Committee Discussion - Information Memorandum, from TIG.

9. CRDL TM 22-13 Report of February 1957.

10. Edgewood Arsenal Report of 10 November 1964, subject: Report on Trip to Holmesburg City Prison on 5 November 1964 to begin Practice Drug Testing on Prisoner Volunteers.

Ft. Detrick

11. Medical Research Laboratory Memorandum, subject: Report of Visit to Holmesburg Prison, Holmesburg, PA, dated 24 March 1966. Report of Treatment, dated 28 March 1966 attached.

12. Medical Research Laboratory Report, subject: Visit to Contractor, Contract, DA 18-035-AMC-126(A), University of Pennsylvania, dated 10 May 1966, 20 May 1966, 24 May 1966, 11 October 1966, and 26 October 1966.

13. Edgewood Arsenal Technical Report, EATR 4210, The Search for Toxic Chemical Agents, November 1969, page 139.

14. Edgewood Arsenal Counsel Disposition Form, subject: Contract, DA 18-035-AMC-126(A), dated 11 October 1966, attached Memorandum for Record, dated 21 October 1966.

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15. Medical Research of Chemical Compounds Fact Sheet Ø2, Army-LSD Research and Other Chemical Classes, dated 21 July 1975.

16. Contract, DAAA 15-70-C-0324, to Ivy Research Laboratories, Inc., for Threshold Doeses in Humans Annex 1: Listing of Toxic Chemical Agents.

17. Edgewood Arsenal Letter to Director of Procurement, subject: Ivy Research Laboratories, Inc. Contract, DAAA 15-70-C-0324, dated 9 February 1973.

18. Department of the Army, Office of The Surgeon General Memorandum, subject: Review of Reports on Department of the Army Grant, DA 18-108-CML 5596, to the Department of Psychiatry and Neurology, Tulane University, 1955-59 - Information Memorandum, dated 22 August 1975.

19. Edgewood Arsenal Special Publication EASP 1800-2, Chemical Agents in DOD Contracts, dated February 1972.