MESIMUTED

OSD1.940627.019

## MEDICAL . SERVICE

# RESEARCH PROGRAM



P/R 919

DO NOT BEWONE LIFE COL人

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U. S. C., Sections 793 and 794. The transmission or the revelation of its contents in any manner to an unauthorised person is prohibited by law.

IJULY-3I DECEMBER 1950

MEDICAL RESEARCH AND DEVELOPMENT BOARD
OFFICE OF THE SURGEON GENERAL
U. S. ARMY

- AFOTOMETED

By



ENTRY 346A - RDB, RESOURCES DIVILION, ROPORTS & STATISTICS BRANCH PROGRESS ROPORTS, DEC 1954

BOX # 28

# TABLE OF CONTENTS

DECEMBER 1950 Reports Control
Symbol DDRDB-3
(CSGLD-346 later)

(2002)	40 IMU
SURGERY - 59	Deze
59-01 - Investigations, Authorized	Page
6-59-01-01 - Analysis of Medical Records	1
59-02 - Devices, Prosthetic	
6-59-02-01 - Army Prosthetics Research Program	3
6-59-02-02 - Surgical Braces	6
6-59-02-06 - Atlas Project	8
50-05 - Eye, Ear, Nose & Throat	
6-59-03-01 - Ophthalmology Mesearch Program	9
6-59-03-02 - Contant Lenses	11
59-08 - Radiology, Rountgenology	
6-59-08-01 - Prevention of Growth of Mair in Skin Grafts; Irradiation	13
6-59-08-05 - Medical Aspects of Atomic Bomb	14
6-59-08-04 - Radiation and Thermal Burns	15
(-59-08-05 - Ionization Effects	22
6-59-08-06 - Mutritional Maquirements in Radiation Injury	26
6-59-08-08 - X-Ray Therapy, 1000-XV	26
6-59-08-09 - Thermal Effects of an Atomic Explosion, Manuscript	29
6-59-08-10 - Irradiation on Ensyme Systems, Effects of	30
6-59-08-11 - Thermal Burns	32
59-09 - Resuscitation, Americalogy	
6-59-09-01 - Anesthesia & Mesusoftation (title being changed)	33
6-59-08-02 - Investigation of Sedatives	35
6-59-09-08 - Amerikasia Death Rate	41
6-59-09-Q4 - Formed Blood Elements	42
6-59-09-05 - Weurolegic Complications of Spinsl Anesthesia	
6-59-09-06 - Preservation of Blood for Transfusion	46
G-50 00 00 First or of Children Chromatal Co.	50
6-59-09-07 - Physiologic Studies of Traumatic & Operative Shock	57
6-59-09-08 - Studies on Blood Volume	61
6-59-09-09 - Blood Coagulation	63
59-10 - Specialties 5-59-10-01 - Gase Records, Battle Wounds, MTO	•
5.50.10-02 - The temperature of Parkey	64
6-59-10-02 - Intremedullary Pixation of Fractures	65
6-59-10-05 - Europeaher Mails in the Freatment of Mon-Union of Fractures	65
6-59-10-04 - Vein Ligation - Acute Arterial Occlusion	67
6-59-10-06 - Traumatic Aurgery	69
59-11 - Special	
6-59-11-01 - Climical Effects of Fibrinolytic and Pus-Liquefying Enzyme	8 74
6-59-11-02 - Renal Dyefunction following Thermal Injury	7 <b>7</b>
6-59-11-03 - Tissue Hemolyeins	81
6-59-11-04 - Reversible Electrolyte Imbalance in Shock	82
59-12 - The repoutios	
6-59-12-05 - Butrition and Anemia in Wound Healing	. 83



RG 330, Socratury OF Defence ENTRY 346A - RDB, RESOURCES DIVILION, REPORTS & STATISTICS BRANCH PROCRESS REPORTS, DEC 1946- 1954 Box #



SURGERY (cont'd.)	age
-59-12-06 - Wound Healing	85
-59-12-07 - Irreversible Shock	90
-59-12-08 - Clinical Effects of Burn Freatment	91
-59-12-09 - Application of NewMethods of Treatment to Extensive Thermal Burns	92
-59-12-10 - Purification of Toxins & Other Antigens of the Gas Gangrene	
Group of Clostridia	96
-89-12-11 - Debridement of Burned Tissue by Enzymatic Means	99
the contraction of the contracti	103
-59-12-13 - Tissue Culture Studies in Relation to Thermal Injury and	
Epithelisation	105
3-50-12-14 - Transplantation of Skin	107
3-59-12-15 - Pyruvic Acid Treatment of Burns	109
	110
3-59-12-17 - Anomia & Menal Function	111
3-59-12-18 - Isolation of Prothrombin, Prothrombin Activators, &	
Platelets	113
5-59-12-19 - Adrenocortical Fractions following Surgical frauma	115
INTERNAL MEDICINE - 60	
50-02 - Cardiology	
5-60-02-01 - Froblems Dealing with Heart & Circulation	116
50-93 - Dermatology	
5-50-03-01 - Antibiotic Therapy of Certain Virus & Coccogenous Infections	118
50-04 - Diseases, Communicable	
5-60-04-01 - Asute and Chromic Infectious Hepatitis	119
60-06 - Resignant 6-60-06-04 - Experimental Equipment, Explorations, & Preliminary Screening	124
	,
60-00 - Metabelic	
6-80-08-08 - Studies on Diseases of the Liver	125
6-60-09-05 - Studies of the Liver in Disease & Injury	131
6-60-09-04 - Protein and Amino-Aeid Metabolism in Liver Disease	135
6-60-00-06 - Studies on Infectious Mepatitis	137
6-60-09-06 - Dietary Factors & Hermones in Liver Disease	141
6-60-09-07 - Effects of Pantothemic Acid on Environmental Stress in Han	
6-60-09-08 - Hormonsi, Metabolic, & Mutritional Factors in Liver Disease	
6-60-09-09 - Steroid Excretion in Patients with Liver Disease	148
6-60-09-10 - Carbohydrate Ensymatic Systems	149
60-10 - Neurology, Neuropsychiatry	
8-60-10-02 - Neurocirculatory Asthenia, Anxiety Neurosis, & Allied State	
6-60-10-03 - Nerve Injuries	152
6-60-10-04 - Fundamental Physiologic Factors in Neurotic Patterns of	
Behavior	154
6-60-10-07 - Objective Aids in Assessment of Personnel	160
6-60-10-08 - Visual Perception	162



27 - 200 - 94

ENTRY 346A - RDB, RESOURCES DIVILION, ROPORTS & STATISTICS BRANCH PROGRESS ROYOUTS, DEC 1946- 1954

Box #28



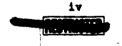
P	age	INTERNAL MEDICINE - 60 (cont'd.)	Page
_	85	6-60-10-09 - Chemical Factors affecting Physiology & Pathology of	
	90	Nervous Function	166
	91	e_en_10_10 - Analysis of Data on Psychiatric Problems in Army	167
mal	-	6-60-10-11 - Vision & its Relation to Accidents & Errors in Judgment	168
	92	0-00-10-11	
*ne		60-11 - Wutrition	
	96	8-60-11-01 - Techniques for Mutritional Surveys of Large Populations	169
	99	5-50-11-02 - Diet in Relation to Physical Efficiency	171
	103	6-60-11-03 - Symptoms of Deficiency Disease	174
ì		s_so_ll_04 - Therapeutic Diets, Protein Reinforcement of	177
	105	5-60-11-07 - Hutritional & Metabolic Problems in Health & Disease	179
	107	6-50-11-09 - Acclimatization to the Cold in Relation to Vitamin C Met	A5-
	109	olism and Endocrines	183
	110	6-60-11-12 - Relation of Choline to Nutritional Edema & Anomia	184 186
	111	6-50-11-13 - Mutritional Requirements - Report	191
		6-60-11-14 - Fat Emulsions for Intravenous Mutrition	191
	113	6-60-11-15 - Intravenous Wutrition	193
	115		
		60-13 - The repeutics	195
		6-60-13-03 - ACM, Armour Laboratories (purchase)	196
		6-60-13-04 - Chemotherapy of Pathogenic Agents	204
	116	6-60-13-05 - The rapy of Chronic Malaria	208
		6-60-13-08 - Clinical Trials of Antibiodics	212
		6-60-13-09 - Agranulocytosis	214
tions	118	6-60-13-12 - Bacterial and Fungous Infections of the Skin	219
		6-60-13-15 - Blood and Plasme Substitutes	224
		6-60-13-15 - Research on Antimelarials	201
	119	and the second s	
		60-15 - Tuberculosis	225
		6-60-15-01 - Thoracio Disease and Injury	
Sureso	124	40.14 - V	
		60-16 - Venercal 6-60-16-01 - Syphilis, False-Positive Blood Tests for	234
		6-60-16-02 - Syphilis, Laboratory Diagnosis of	238
	125	6-60-16-03 - Oral Penicillin in Prevention of Gonorrhea	240
	131	0-00-10-09 - ALT LAUTOTTTU	
	135	PREVISITIVE : EDICINE - 61	
	137		
	141	61-01 - Investigations, Authorised	
Han		6-61-01-01 - Mearing Test hethods, Development of	241
0850		6-61-01-02 - Hearing Diagnostic Instruments	242
	148	6-61-01-03 - Ethylene Oride as Sterilizing Medium	24€
	149	0-01-01-00	
		61-03 - Communicable Disease	
		6-51-03-03 - Studies in Influensa	247
;tates		C-61-03-04 - Influensa Virus Strain Study	254
	152	s_s1_05_05 - Influenca Studies	257
r .	154	6-f1-05-06 - Studies on Infectious Repatitis, Polio, etc.	260
	154	6-61-05-07 - Hepatitis, Measles, and Numps	267
	160	G-61-03-08 - Menguo and Japanece-B Encephalitis	271
	162	a and an area areas	

iii

RG 330, Socretury OF Defense Entry 346A - RDB, ROSOURCOS DIVILION, ROPORTS & STATISTICS BRANCH PRODROSS ROPORTS, DEC 1954 Box # 20



PREVENTIVE REDICINE - 61 (cont'd.)	Page
-61-03-09 - Typhus Fever	276
-61-03-10 - Infectious Hepatitis	280
G-61-03-11 - Virus Encephalitides	283
-61-03-12 - Infectious and Respiratory Diseases	286
3-61-03-15 - Acute Respiratory Diseases	291
-61-03-16 - Blood Complement in Immunity	296
-51-03-18 - Coscidioides Immitis Infection	299
5-61-03-19 - Acute and Chronic Diseases of the Liver	305
3-61-03-20 - Epidemic Mepatitis	307
3-61-03-21 - Everch for North American Animal Susceptiolo to Hepatitis	309
3-61-05-22 - Influense Immunisation	314
3-61-03-28 - Virus and Rickettsial Diseases	318
3-61-03-24 - Pield Studies outside U. S. on Control of Infectious Dis-	
eases of Military Importance	335
3-61-03-27 - Antiviral Substances in Respiratory Tract	341
-61-03-28 - Influenza Vaccine	344
3-61-03-29 - Viral Hepatitis	348
** ** ** *	
1-04 - Entomology	
5-61-04-04 - Insect Cuticle	357
23 Of The Administration of the Control of the Cont	
71-00 - Epidemiology	
-C1-O5-O2 - Streptococcal Diseares	352
3-61-05-03 - Diarrheal and Other Enterio Diseases	359
5-21-C5-94 - Salmonella Infections	360
3-C1-05-C5 - Epidemiologic Fattern for Influenza	362
5-61-05-08 - Epidemiology of Salmonella Infections	365
5-61-05-07 - Amediasis	366
51-06 - Health, Public	
6-61-06-01 - Mutrition Survey, Western Europe (final)	367
31-09 - Irramology	
S-C1-09-01 - Typhoid Fever	370
5-C1-09-02 - Japanese Encephalitis Vaccine	378
6-61-05-03 - Dacillary Dysentery	385
6-61-09-04 - Antigen-Antibody Reaction	388
6-61-09-05 - Immunisation against Gas Gangrene	390
6-61-09-06 - Substances to Increase Stability of Immunizing Agents	392
6-61-09-08 - Allergy following Vaccination	395
C-61-09-09 - Scrub Typhus Vaccine	398
6-61-09-10 - Pundamental Immunity	400
G-61-09-11 - Immunology of the Major & Minor Blood Groups	404
G-61-09-12 - Diphthoria in Adults	406
6-61-09-13 - Parenteral Agents	409
6-61-09-14 - Immunization against Infection by Mumps	411
6-61-09-15 - Immunity in Influence	418
6-61-09-16 - "M" Substance produced by Streptococci	421
6-61-09-17 - Development & Isolation of Certain Immunologic Factors	405
from Streptococcus	423



27 JUNE 94

10.44

RG 330, Socretimey OF Detember
Entry 346A - RDB, Resources Division,
Reports & Statistics Bremich Progress
Reports, Dec 1946-1954
Box # 28

		PREVENTIVE MEDICINE - 61 (cont'd.)	Page
	Page	6-61-09-18 - Atoxic Proteins of Diphtheria Bacillus	424
	60	6-61-09-19 - Fibrinolytic Enzymes in Experimental Pneumococcal Menin-	
	469	gitis	427
y	470	6-61-09-20 - Streptococcal Bactericidos	429
		61-12 - Parasitology	
	471	6-61-12-01 - Serodiagnosis of Parasitic Diseases	430
		6-61-12-02 - Molluscacides	433
	473	61-13 - Sanitation, Environmental	
	-70	6-61-13-01 - Ventilation and Heating of Arctic Shelters	434
		6-61-13-03 - Human Wastes in the Arctic and Sub-Arctic	436
		61-14 - Toxicology	
	474	6-61-14-01 - Health Hazards of Military Chemicals	437
	476		
	477	61-15 - Venereal Disease	
	478 482	6-61-15-01 - Phenylarsenoxide for Prevention of Venereal Disease	438
	484	VETERINARY - 62	
		62-01 - Investigations, Authorized	
1	486	6-62-01-01 - Possible Effects on Food & Food-Producing Animals of the	Use
		of Atomic Weapons	439
	488	62-02 - Analysis, Laboratory Inspection, & Storage of Dairy & Meat Pro	ducts
.i.c		6-62-02-02 - Development & Evaluation of Methods & Materials used in	
	ر 492	Examination of Food Products	442
ans of		62-04 - Bacteriology	
	495	6-62-04-01 - Bacterial & Protozoan Diseases of Military Significance	
	50 <b>0</b>	Occurring in Animals and Animal Parasites	444
		And the state of t	•••
	50 <b>3</b>	62-05 - Diseases of Animals	
	50 <b>4</b>	6-62-05-07 - Viral & Rickettsial Diseases of Military Significance	449
	507	Harbored in Animals and Animal Parasites	447
		6-62-05-08 - Rabies	452
	508	DENTISTRY - 33	
	513	63-01 - Investigations, Authorized	
су	514	6-63-01-02 - Research on Dental Materials	453
ntal		6-65-01-03 - Cephalometric Studies	455
	516	6-63-01-04 - Clinical & Laboratory lests on Dental Amalgam	456
	52 <b>4</b>	Off Off Bodd States	
nnel		63-05 - Pathology 6-63-05-01 - Dental Caries	457
	526	6-63-05-02 - Role of Proteclytic Microorganisms in Dental Caries	461
	<b>63</b> 0	6-63-05-03 - Cytologic Studies of Oral Epithelium	464
8	532	6-63-05-04 Histochemical Studies of Dental Tissues	466
	537	A-00-00-07 HTEAAAssoniesant AAACTAR OF DOMINGT STORMOR	100
	540	_	

RG 330, SOCRETARY OF DETENSE ENTRY 346A - RDB, RESOURCES DIVISION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1954 Box # NND 813064 BT CST 94

#### DECTRICTED

#### TABLE OF CONTENTS (cont'd.)

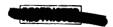
DENTISTRY - 63 (cont'd.	- 63 (cont'd.	J
-------------------------	---------------	---

	Page
63-06 - Periodontia	
6-63-06-01 - Research in Periodontal Disease	469
6-63-06-02 - Periodontal Disease & Other Aspects of Oral Pathology	470
63-07 - Physiology	
6-63-07-01 - Fluorine in Nutrition, Essentiality of	471
63-08 - Preventive	
6-63-08-01 - Fluorine and Dental Caries	473
THE ASSESSMENT OF THE PARTY OF	
BASIC MEDICAL SCIENCE - 64	
64-01 - Investigations, Authorized	
6-64-01-01 - Advisory Services, NRC	474
6-64-01-02 - Exchange of Information	476
6-64-01-02 - Hepatectomized Frogs	477
6-64-01-03 - Research on Thirst	478
6-64-01-04 - Serum Proteins in Liver Disease	482
6-64-01-05 - Medical Indexing	484
0-04-01-09 - Magreet Tracktiff	
64-06 - Biophysics and Physics	
6-64-06-02 - Radiation Chemistry of Organic Molecules in Solution	486
C-03-00-07 - ymm/marger apprint at a -Danger and a	
64-09 - Pathology	
6-64-09-02 - Regeneration of the Liver	488
6-64-09-03 - Connective Tissue in Different Nutritional & Metabolic	
Conditions	492
6-64-09-04 - Acute Effect of Radium Chloride upon Hemopoietic Organs of	
the White Rat	495
6-64-09-05 - Liver Damage, Study of by Vital Staining	500
0 01 00 00 -1-01 0	
64-11 - Psychology	
6-64-11-02 - Tank Turret Controls	503
6-64-11-03 - Prediction of Success in Medical Residency Training	504
6-64-11-05 - Qualifications & Training of Rangefinder Operators	507
64-12 - Physiology	
6-64-12-02 - Cold, Study of Physiologic Effects of	508
6-64-12-03 - High Temperatures, Physiologic Effects of	513
6-64-12-05 - Studies of Body Measurements as they Affect Efficiency	514
6-64-12-06 - Body Reactions & Requirements under Varied Environmental	<b>53.0</b>
and Climatic Conditions	516
6-64-12-07 - Fatigue in Relation to Military Tasks	524
6-64-12-08 - Physiologic & Psychologic Problems of Military Personnel	
in Relation to Task & Environment	526
6-64-12-10 - Peripheral Nerve Injuries	530
6-64-12-11 - Research in Peripheral Vascular Diseases and Injuries	532
6-64-12-12 - Peripheral Blood Vessels	537
6-64-12-13 - Effects of Warming & Cooling on Body Temperature &	F 4 -
Circulation	540

VI MEDIMOTED

27 2000 94

RG 330, Socretary OF Detensed Entry 3464 - RDB, Resources Division, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1946- 1954 Box #



		BASIC MEDICAL SCIENCE - 64 (cont'd.)	Page
	Page	Ft. Churchill	542
		6-64-12-16 - Overhead Expenses, Ft. Churchill 6-64-12-17 - Infused Red Cells as a Source of Protein in Man	5 <b>42</b>
	469	6-64-12-18 - Irreversible Shock	546
	470	6-64-12-18 - Ifreversible Shock 6-64-12-19 - Catabolic Reaction to Injury, Investigation of	548
		6-64-12-19 - Carabolic Reaction to Injury, investigation of 6-64-12-22 - Cerebral Edema	555
		6-64-12-24 - Renal Insufficiency	559
	471	6-64-12-26 - Electrolytic Composition of Thermal Sweat	561
		6-64-12-27 - Relation of Physical Training to Operational Performance	562
		6-64-12-27 - Asiation of Physical Haining to Operational Performance	302
	473	MAINTENANCE, OPERATING & SERVICING EQUIPMENT - 89	
		89-01 - Investigations, Authorized	
		6-89-01-01 - Maintenance & Improvement of Research Equipment-	563
	474	DACTA DECEMBER AS	
	476	BASIC RESEARCH - 99	
	477		
	478	09-02 - Wound Ballistics	F 0 4
	482	6-99-02-01 - Wound Ballistics	564
	484	6-99-02-03 - Acute Arterial Injuries under Battle Conditions	568
	486		
.0	<b>4</b> 88	2117	
_	492	·	
ins of	495		
	500		
	503		
	504		
	507		
	30.		
	508	•	
	513		
сy	514		
ntal			

516 5**24** 

nnel

vii

### DECIDACIEN

RG 330, Socretary OF Detense ENTRY 346A - RDB, RESOURCES DIVISION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1954 Box #28



#### INDEX OF ARTICLES BY NAME OF INVESTIGATOR

Allen, H. (NWU)	91	Grundfest	152
Allen, J. G. (Chicago)	22	<sup>G</sup> yorgy	141
Altemeier (gas gangrene)	390		
Altemeier (burns)	103	Halstead	160
Alving	204	Ham	486
Avery (canceled)	421	Hamburger	427
		Hammon	283
Bean (47)	146	Hanson	167
Bean (396) (canceled)	305	Hardy (Florida)	365
Beard	418	Hardy (Pa.)	115
Becks	473	Harvey	109
Beecher (sedatives)	3 <b>5</b>	Havens (445 & 60)	137
Beecher (anesthesia)	41	Havens (403 & 62)	280
Berry (final)	461	Hay (now Howard)	
Blades	33	Heidelberger	296
Blocker	105	Hollenback	456
Bloom	222	Holmes	478
Breed	57	Howard	90
Burch	5 <b>3</b> 7	Howes (wound healing)	85
Burnett	559	Howes (debridement)	99
		•	
Capps	348	Ivy (canceled)	477
Churchill (final)	64		
Conn	561	Katz	540
Соре	32	Krampitz	357
Curnen	362		•••
		Langer (final)	29
Davidson	135	Larkey	484
Day	471	Levenson	193
DeBakey (history)	1	Levy	116
DeBakey (renal dysfunction)	77	Loosli	246
DeBakey (arterial injs)	568	Lucke	307
DeGowin	50		•
Dingle	286	MacLeod	291
Dohan	148	Magill	254
Dripps	46	Mahoney	63
		Malmo	154
Edsall	406	Mayerson	61
Elderfield	224	McGuinness	411
Elkin	532	McKee	257
Engel, Milton (Chicago)	466	McMullen	433
Engel, R. W. (Ala.)	184	Meiklejohn	344
Evans, E. I.	15	Meyer	340
Evans, Joseph	55 <b>5</b>	Miller	
		Milstone	162 113
Francis	247	urte coue	113
		Nachmansohn	166
Goldman	470	Nacumansonn Neofe	
Goodner	392	noot a	131
Greene	107	Oughterson	14
		OMPTION BOTT	1.4

27 2000 94

RG 330, SOCRETARY OF DEFENSE DIVISION, ENTRY 346A-RDB, RESOURCES DIVISION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1946-1954

Box # 28

	TM	TO XT	ARTICLES	BY NAME OF	INVESTIGATOR	(cont'd.)
152		JIII OI		•		
141	Pappenheime r			42 <b>4</b> 260		
	Paul			13		
160	Pendergrass			96		
486	Pillemer			21 <del>4</del>		
427	Pillsbury			214		
283				143		
167	Ralli	•	-4-1	42		
365	Ravdin (formed bld	e Temer	nts) Cimol	67		
115	Ravdin (vein ligati	ron) (	inai)	488		
109	Ravdin (regen of 1	rver)		149		
137	Reinhold			111		
280	Re lman			350		
	Richards			530		
296	Richter Roofe			495		
456	Rose			341		
478	Rousselot			110		
90						
85	Sabin			271		
99	Salk			31 <b>4</b>		
4.55	Scherp			429		
477	Shaffer, James			366		
540	Shaffer, Morris			360		
540	Smelser			11		
357	Smith, Charles	- •		299		
	Smith, Hugh (compl	eted)		65		
29	Snyder			276 191		
484	Stare			267		
193 116	Stokes			504		
246	Strong			50		
307	Strumia(blood)		- \	212		
30,	Strumia (agranulo	зусовт	<b>s</b> /	212		
291	Tillett (enzymes)			7 <b>4</b>		
254	Tillett (streptoc	( Buppe		423		
63		,		482		
154	Turne r			-,		
61	77			73		
411	Vars					
257	Walker		•	82		
433	Walter			92		
344	Watson, C. J.			125		
340	Watson, Dennis			370		
162	Watt			359		
113	Weinmann			464		
	White			150		
166	Williams, W. Lane	1		500		
131	Woodward			3 <b>3</b> 5		
14	Yaglou			434		
	-					

האווייווסווי

27 June 94

RG 330, SOCRETARY OF DEFENSE ENTRY 346A - RDB, RESOURCES DIVISION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1946- 1954 Box # 28

6-59-03-02

of the soluions.

water when a nicker and

on the eye.

cause diffracy slight corneal
the perforabecame reduced

e to hypotonio prence with

with corneal perienced me elements ion becomes fore diffract he cornea are: r bundles of interfibrillar fraction. It location in

in the corneal ay a role apacity, and ntact-lens tained that

orneal change the pericornree with the as yet frag-

work and
s possible
ervice conctronic (styDallos method;
glasses; and

10 enlisted uses. Dr. dy to work March and s lenses they for compari-

JRDB PORM 1A. 1 APR 1947

ge 2 of 2

	DĽ	CTI	JO.	Ш	
EC.		(4)	N.		 į

Dr. Pendergrass U. Pennsylvania

PROGRESS REPORT (C) U. Pennsylvania							
RESEARCH AND DEVELOPMENT PROJECT CAR	-(NEM-BROJECTS) S. SEC. U	1. PROJ. NO. 6-59-08-01					
1. PROJECT TITLE Radiation Injury	The state of the s	B. REPORT DATESO Dec 50					
6. BASIC PIELD OR SUBJECT	7. SUB FIELD OR SU	BJECT SUB GROUP					
		AW-6					
S. COGNIZANT AGENCY	12. CONTRACTOR AND/OR LABORA	TORY CONTRACT/W. O. NO.					
9. DIRECTING AGENCY							
10. REQUESTING AGENCY	13. RELATED PROJECTS	17. EST. COMPL. DATES					
		DES.					
11. PARTICIPATION AND/OR COORDINATION		DEV.					
	14. DATE APPROVED	OP. RVAI.					
		Py 18. PISCAL EST'S.					
19.	16. PRIORITY 16.						
26. REQUIREMENT AND/OR JUSTIFICATION							
a. No change.							
b. No change.							
11. RRIEF OF PROJECT AND OBJECTIVE							
a. thru d. No change.	act covered was the in-	restinators have developed					
e. Background. During the past several years the investigators have developed e gross index of protection against local radiation which consists, briefly, of							
radiating the hind leg of a rat in a control group and in a treated group to							
measure the protective effect of materials such as pitressin, rutin, aureomyoin,							
sodium cyanide, dinitrophenol, epinephrine, and miscellaneous intracellular enzyme system inhibitors. The experiments have indicated that the protective action							
demonstrated by certain compounds so far seems to evolve around vasoconstriction							
and oxygen tension of the local tissues. It is manifest that the tissues of the							
leg are not those particularly susceptible to variations in oxygen tension and							
accordingly are not considered as sensitive as other types, especially glandular tissue. In general, they have developed a testing technique by which materials							
which promise protection again	st local ionising radiati	on can be reasonably well					
soreened.							
It was proposed to extend as the testicular tissues of t	this work to involve a make the inclusion	ore sensitive tissue such					
determinations, principally th	e known and measurable or	Tyme systems.					
determinations, principally the known and measurable ensyme systems.  Progress. No report was received.							
f. Future. It is planned to have this study evaluated and reviewed by the							
National Research Council.							
g. Reports. None listed, this period.							
1	Tra t P	Y. T. C.					
22. JRDB SN. FC.	IC & P.	A. 1. C.					

DECIDICITO

RG 330, SOCRETARY OF DEFENSE ENTRY 346A - RDB, ROSOURCOS DIVISION, ROPORTS & STATISTICS BRANCH PROGRESS ROPORTS, DEC 1954 BOX#

13

PAGE 1 OF 1 PAGES



IND 813064

Dr. Oughterson (no university)

1. PROJECT TITLE	-(NEW-PROJECTS) 2. SEC. U	3. PROJ. NO. 6-59-08-03
Medical Aspects o	f Atomio Bomb - Report	6. REPORT DATEST Dec 5
6. BASIC PIBLD OR SUBJECT	7. SUB FIELD OR S	SUBJECT SUB GROUP
		AW-6
8. COGNIZANT AGENCY	12. CONTRACTOR AND/OR LABOR	RATORY CONTRACT/W. O. NO
9. DIRECTING AGENCY		
O. REQUESTING AGENCY	13. RELATED PROJECTS	17. EST. COMPL. DATE
		RES
1. PARTICIPATION AND/OR COORDINATION		DEV.
	14. DATE APPROVED	TEST OP EVAL
		Fy 18. FISCAL EST'
9.	15. PRIORITY 16.	
REQUIREMENT AND/OR JUSTIFICATION		
• No change.		
. No change.		
. Background. Tentative che	apter-headings of this h	oook are: Introduction,
Background. Tentative che datastrophic Effects, Nature & beervations, Effects on Plant ummary & Recommendations./ Beche need for accuracy and secun onsequent slowing of the work; ditors and the slowness of the count of the physics involved f that section were prepared for that more rapid progress in this oprepare the final draft; he ects of radiation was being prinal draft in June 1950./ Partatistical—was to be checked art IV, "Clinical & Pathological for the material has been published in the progress. No report was a progress. No report was a constant of the manuscript was a constant of the constant	Incidence of Casualties & Animal Life, The Propagate of the importance rity, much checking of me delay has also resulted authors to complete the in an atomic bomb will for review by Dr. Ralph is highly technical field agreed to do this. A repared. Part II, "Cate t III, "Incidence of Cate by Dr. Cuyler Hammond, to Observations," was lare that in the American Journal of the control of the contro	s, Clinical and Pathological of Reconstruction, and of the subject-matter and material has been done, with the sections. A concise the included. Four draft E. Lapp. It was decided to could be made if he were chapter on the biologic exastrophic Effects," was insualties—much of which in who was out of the country gely completed, and most armal of Pathology. Com-
Background. Tentative che atastrophic Effects, Nature & bservations, Effects on Plant ummary & Recommendations./ Beche need for accuracy and secun onsequent slowing of the work; ditors and the slowness of the count of the physics involved f that section were prepared f hat more rapid progress in the oprepare the final draft; he ects of radiation was being prinal draft in June 1950./ Partatistical—was to be checked art IV, "Clinical & Pathologic f the material has been publis letion of the manuscript was a Future. Specific plans has complete this manuscript.	Incidence of Casualties & Animal Life, The Propagate of the importance rity, much checking of me delay has also resulted authors to complete the in an atomic bomb will for review by Dr. Ralph is highly technical field agreed to do this. A repared. Part II, "Cate t III, "Incidence of Cate by Dr. Cuyler Hammond, to Observations," was lare that in the American Journal of the control of the contro	s, Clinical and Pathological of the subject-matter and saterial has been done, with the sections. A concise the included. Four draft E. Lapp. It was decided to could be made if he were chapter on the biologic exastrophic Effects," was insualties—much of which in who was out of the country gely completed, and most armal of Pathology. Com-
Background. Tentative che atastrophic Effects, Nature & bservations, Effects on Plant ummary & Recommendations. Becker and securonsequent slowing of the work; ditors and the slowness of the count of the physics involved that section were prepared for that section were prepared for the prepared for adiation was being prinal draft in June 1950. Partatistical—was to be checked art IV, "Clinical & Pathological the material has been published in the material has been published since.  Progress. No report was respectively.	Incidence of Casualties & Animal Life, The Propagate of the importance rity, much checking of me delay has also resulted authors to complete the in an atomic bomb will for review by Dr. Ralph is highly technical field agreed to do this. A repared. Part II, "Cate t III, "Incidence of Cate by Dr. Cuyler Hammond, to Observations," was lare that in the American Journal of the control of the contro	s, Clinical and Pathological of the subject-matter and atterial has been done, with the sections. A concise the included. Four draft E. Lapp. It was decided to could be made if he were chapter on the biologic exastrophic Effects," was insualties—much of which in who was out of the country gely completed, and most armal of Pathology. Com-
Background. Tentative che atastrophic Effects, Nature & bservations, Effects on Plant ummary & Recommendations./ Beche need for accuracy and secun onsequent slowing of the work; ditors and the slowness of the count of the physics involved f that section were prepared f hat more rapid progress in the oprepare the final draft; he ects of radiation was being prinal draft in June 1950./ Partatistical—was to be checked art IV, "Clinical & Pathologic f the material has been publis letion of the manuscript was a Future. Specific plans has complete this manuscript.	Incidence of Casualties & Animal Life, The Propagate of the importance rity, much checking of me delay has also resulted authors to complete the in an atomic bomb will for review by Dr. Ralph is highly technical field agreed to do this. A repared. Part II, "Cate t III, "Incidence of Cate by Dr. Cuyler Hammond, to Observations," was lare that in the American Journal of the control of the contro	s, Clinical and Pathological of the subject-matter and atterial has been done, with the sections. A concise the included. Four draft E. Lapp. It was decided to could be made if he were chapter on the biologic exastrophic Effects," was insualties—much of which in who was out of the country gely completed, and most armal of Pathology. Com-
Background. Tentative che datastrophic Effects, Nature & bservations, Effects on Plant ummary & Recommendations./ Beche need for accuracy and secun onsequent slowing of the work; ditors and the slowness of the count of the physics involved that section were prepared for that section were prepared for the prepare the final draft; he ects of radiation was being prinal draft in June 1950./ Partatistical—was to be checked art IV, "Clinical & Pathological for the material has been published ince.  Progress. No report was refuture. Specific plans has complete this manuscript.	Incidence of Casualties & Animal Life, The Propagate of the importance rity, much checking of me delay has also resulted authors to complete the in an atomic bomb will for review by Dr. Ralph is highly technical field agreed to do this. A repared. Part II, "Cate t III, "Incidence of Cate by Dr. Cuyler Hammond, to Observations," was lare that in the American Journal of the control of the contro	s, Clinical and Pathological of the subject-matter and atterial has been done, with the sections. A concise the included. Four draft E. Lapp. It was decided to could be made if he were chapter on the biologic exastrophic Effects," was insualties—much of which in who was out of the country gely completed, and most armal of Pathology. Com-
atastrophic Effects on Plant beer vations, Effects on Plant furmary & Recommendations. Because the need for accuracy and secund consequent slowing of the work; ditors and the slowness of the account of the physics involved that section were prepared for that section were prepared for the prepared for the prepared for the final draft; he ects of radiation was being profinal draft in June 1950. Particularly, "Clinical & Pathological for the material has been published in the since.  Progress. No report was refuture. Specific plans has complete this manuscript.	Incidence of Casualties & Animal Life, The Propagate of the importance rity, much checking of me delay has also resulted authors to complete the in an atomic bomb will for review by Dr. Ralph is highly technical field agreed to do this. A repared. Part II, "Cate t III, "Incidence of Cate by Dr. Cuyler Hammond, to Observations," was lare that in the American Journal of the control of the contro	s, Clinical and Pathological of the subject-matter and atterial has been done, with the sections. A concise the included. Four draft E. Lapp. It was decided to could be made if he were chapter on the biologic exastrophic Effects," was insualties—much of which in who was out of the country gely completed, and most armal of Pathology. Com-

27 June 94

RG 330, SOCRETARY OF DEFENSE ENTRY 346A - RDB, RESOURCES DIVISION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1946- 1954 Box # 28

Dr. E. I. Evans

Med. College Va

AW-6

CONTRACT/W. O. NO.

17. EST. COMPL. DATES

OP RVAL V. 18. PISCAL EST'S.

-59

B. REPORT DATE 31

PRS

DRV. TRST

thterson versity) PROGRESS REPORT (C) RESEARCH AND DEVELOPMENT 4 59-08-03 1. PROJECT TITLE DATEST Dec 50 Rediation and Thermal Burns 6. BASIC PIBLD OR SUBJECT AW-6 12. CONTRACTOR AND/OR LABORATORY ONTRACT/W. O. NO. S. COGNIZANT AGENCY S. DIRECTING AGENCY EST. COMPL. DATES 10. REQUESTING AGENCY 13. RELATED PROJECTS 11. PARTICIPATION AND/OR COORDINATION 14. DATE APPROVED PVAL 18. PISCAL EST'S 15. PRIORITY T 16. 20. REQUIREMENT AND/OR JUSTIFICATION No change. No change. Ъ. 21. BRIEF OF PROJECT AND OBJECTIVE a. through d. No change. The report of December 1949 described in detail the plans Background. oduction, and set-up of the various departments collaborating in this study. Pathologic port given below covers the period January through December 1950. ruction, and Progress. An atomic bomb explosion releases an enormous quantity of -matter and (blast, radiation, gamma and neutron) and ordinary heat. Observation en done, with by competent observers on the results of the explosion at Hiroshima indicate ness of the that immediately in the region of the hypocentre of an air burst the energy A concise release is so great that, in general, animal or vegetable life cannot survive, Four drafts but that the attenuation of the radiation flux from the centre outward is great enough so that at around 2100 yards only a small amount of radiation as decided s if he were damage is inflicted. However, in this region the heat of the flash is still biologic ef so great that moderately severe burns result. ots," was in It has been felt that in the search for methods of improved medical and of which is surgical care for atomic bomb victims, the greatest effort should be pushed the country. for those victims who happen to be in the 1500 to 2500 yard zone. According , and most ly, most of the experimental studies being conducted here have had as their 2 purpose the elucidation of the mechanism of injury caused by combining heat with minimal amounts of ionizing radiation in the experimental animal; Com has been in the clinic, every effort has been made to use human burn material in order to work out simpler and more efficient methods for the care of mass ing made burn casualties. I. Biophysics Group: Following the initial survey of the problem of thermal and radiation injury concerned with atomic bomb explosions, it appeared highly desirable to have available a powerful source of ionizing radiation which would allow a high dosage rate in a very short period of After many conferences here and abroad it was decided to secure a time. 22. JRDB SN. PC. 10 & P. SEC DECIDIOTED FION 15

PAGE 1 OF 7 PAGES

Tī.

27 - 2000 = 94 RG 330, Socretary OF Defense ENTRY 34 CM - RDB REZOURCES DIVITION, ROPORTS & STATISTICS BRANCH PROGRESS ROPORTS, DEC 1946- 1954 Box #



Rediction and Thermal Burns

6-59-08-04

one-million-volt beryllium-window x-ray tube. Early efforts to calibrate this equipment by ordinary radiologic methods failed; strenuous efforts to develop better methods for calibration of this type of equipment were successful. Later this equipment was calibrated by calorimetric means using the constant flow calorimetric technique. These two studies were reported under the following titles: (a) "Million-Volt-Beryllium-Window X-Ray Equipment for Biophysical and Biochemical Research." by Ham and Trout; (b) "High Intensity X-Ray Dosimetry by Calorimetric Means," by Ham, Williams, Schmidt and Smith.

The thophysics group has made much of the equipment employed for experimental burns; supervised all experimental work involving the use of radioactive isotopes; and made a double slit. Nier-type mass spectrometer for metabolic studies in the human with stable isotopes.

II. Experimental Surgery: It was early recognised that a method for producing standard and uniform thermal injury in the dog was necessary to understand some of the important phases of disturbances following thermal injury. Accordingly, a serious effort was made for the past 18 months to develop a standard burn technique in the dog. This is reported as: "A Standard Burn—Method of Production and Observations on the Blood Picture Following Its Production in Dogs!" by Brooks, Robinett, and Evans.

It is believed that this standard experimental method has allowed accurate estimates of the relations of the extent of body surface burned to plasma and red cell loss, the influence of death of burn on healing time, etc.

plasma and red cell loss, the influence of depth of burn on heeling time, etc.

A study of the details of the response to the stendard burn in 38 normal dogs followed from the time of burning to healing provided a valuable tool for the evaluation of combined effects of radiation and thermal injury. Accordingly, preliminary experiments were done on the effect of 100r and 25r external radiation as a complicating factor in the standard 20 per cent burn in the dog. Preliminary data indicate that the addition of 100r external body radiation (approximately 1800 yards, Hiroshima-type bomb) alters considerably the response of the dog to the standard burn. Whereas the mortality to the 20 per cent burn alone is very low (around 10 per cent) when 100r external body radiation is given immediately before or immediately after the thermal injury, the combined effects become quite lethal (78 per cent). Cursory observations on the possible cause of death in these animals indicate that blood-stream infection with beta hemolytic streptococcus may play a role, but not enough data have been collected to allow a firm statement.

The combined 100r external body radiation and the 20 per cent standard burn in the dog result in a rather sharp drop in white blood cell count. There is almost complete disappearance of the lymphocytes from the circulating blood. Autopsies of all dogs dying as a result of this combined injury have indicated no distinct cause of death; it should be pointed out that in no way do these animals resemble those in which 400r - 600r alone has been used except for the pronounced effect on the myeloblastic elements of the bone marrow.

Following these studies on the combined effects of the standard 20 per cent burn and 100r external body radiation, preliminary observations were made on the combined effect of burn and of only 35r external body radiation.

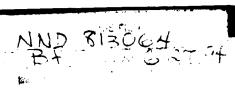
16

Page 2 of 7



RG 330, SOCRETARY OF DEFENSE DIVILION, ENTRY 346A - RDB, ROSOURCOS DIVILION, ROPORTS & STATISTICS BRANCH PROGRESS ROPORTS, DEC 1946- 1954

BOX #



	6-	-59-08-04	adiation and Therma	il Burns		(	5-59-08-04		
	renuous	calibrate efforts to	he data collected a mount of external b	o far indicate to	hat the addition of y have a pronounced	effect on	the myelo-		
<u> </u>	quipment	Water	mount vi		<u> </u>			·	
7									
J									
i	_								
		7.2							
<u>.</u>									
2	la_								
r									
<u> </u>									
J.									
		<b>-</b> ,							
	<u> </u>	I do							
;									
*						- X			
	Year II								
	T								
\$	_								
- <u>.</u> <b>1</b>									
(=									
	_ \ <u></u>								
4									

.

Radiation and Thermal Burns

6-59-08-04

B. Dextran in Burn Shock: During the past 18 months the use of Swedish dextran in place of ordinary plasma has been studied in 46 severely-burned patients. Dextran was given in the same amounts required by the formula described above for plasma; the same amount of salt solutions was given also. These observations indicate that dextran is a safe and effective plasma substitute for burn shock. In most patients an early and steady wrine output was attained when proper amounts of dextran were infused. No evidences were seen of adverse effects (liver or kidney) of dextran, nor were any accompanying allergic phenomena noted. These preliminary observations indicated the investigators that it is likely that dextran may safely be stockpiled for emergency use in the treatment of mass burn casualties. These studies were an important past of those that allowed the National Research Council to advise the Department of Defense to stockpile dextran. A detailed report on dextran in burn shock is in preparation.

C. The Universal Protective Dressing: The closed dressing principle for the treatment of extensive burns has been widely accepted for hospital use since its introduction by Allen and Koch in 1942. Its chief drawbacks in the treatment of mass burn casualties would be that presently-available dressings make the method time-consuming and require relatively well trained medical personnel. For this reason (with the cooperation of Dr. John Henderson, Johnson & Johnson Company), a single one-piece large burn dressing for extensive burns was developed. This dressing was used on approximately 80 burns in the past 8 months, and in the experience to date it has proved to be a highly valuable method for the immediate emergency care of the severely-burned patient.

The dressing donsists of an inner layer of dry, fine surgical gause (36 x44 gauge); an intermediate filler of 1 inch of cotton and 30 layers of cellulose, the outer 6 layers of which are treated to make them water-repellent; and an outer layer of water-repellent material. There were problems of sticking of the dry inner surface to the burn wound even when the dressing was left in place for as long as 14 days. The requirements set forth for this type of dressing for military and civilian defense use seem to be adequately met. This dressing will soon be produced commercially.

D. The Anemia of Thermal Injury: 1. Moderate to severe secondary anemia accompanies extensive thermal injury in man. This anemia has proved refractive to all measures except whole-blood transfusions. Because anemia in the burn patient results in non-healing of the burn wound and other important disturbances, it is considered to be one of the more serious problems to be dealt with in a research program on burns leading to more adequate care of mass casualties in atomic warfare. Accordingly, serious attention has been given to this problem in the clinical studies here.

Seventeen severely-burned patients were selected for study of the henclysis of the red blood cell. Urine and fecal urobilinogen studies were made with coproporphyrin estimations. This study indicates strongly that hemolysis is a significant factor in the anemia which accompanies burns. 2. <u>Liver Function in Severe Burns</u>: Since no study of hemoglobin metabolism in the severely burned patient would be satisfactory or complete without a study of the liver function of the same patient, an attempt was made to study liver function in 15 of the 17 burned patients on whom hemoglobin studies were made. In all deep burns studied there appeared to be a significant alteration of liver

Page 4 of 7

יבוסטוועניון

18

27 2000 94

RG 330, Socretary OF Defense Division, ENTRY 346A - RDB, RESOURCES DIVISION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1946- 1954
Box #

MEDIMOTES

6-59-08-04

Radiation and Thermal Burns

6-59-08-04

use of Swedish rely-burned is formula desgiven also. The plasma subtrine output vidences were any accompanynaticated the implied for studies were ouncil to add report on

g principle or hospital f drawbacks in vailable dresstrained medinn Henderson, ing for extensly 80 burns and to be a severely-burned

wal gause (36 yers of cellu--repellent; dems of stickssing was left this type of .tely met.

s proved rese anemia in
her important
blems to be
te care of
on has been

of the hemoes were made that hemolysis 2. Liver Func-1 the severely of the liver function in 5. In all of liver function as determined by ordinary laboratory investigations. The liver dysfunction appeared very early after the burn had been received and was not affected by any of the therapeutic means employed. It was concluded that because of the liver dysfunction seen early after burning, attention should be
directed at its prevention as well as its treatment. 3. Tagged Glycine Studies in Dogs: Following the studies of Rittenberg, Shemin, and London it has
become apparent that N-btagged hemin is a powerful tool for the study of hemoglobin metabolism in man. Remlizing the superiority of this tool
over all others for the study of red blood cell production and destruction in
the burned patient, the investigators secured the equipment, personnel, and
methods to allow the use of N-b in the study of the anemia of thermal injury.

The first portion of the past 18 months was spent in the development and building of a Nier-type mass spectrometer, the development of chemical methods in the laboratory for the estimation of N<sup>15</sup> in hemin samples, etc.

Progress was necessarily slow in the beginning, but this study is now well under way. In the past 4 months preliminary observations have been made with this tool in the study of anemia of thermal injury in the standard burn dog. Tagged N15 glycine has been fed to 2 animals in the normal and burned state, each animal acting as his own control. Preliminary observations indicate already that the production of hemoglobin in the normal dog runs a similar course to that in man but that after burning there is a tremendous reduction in the rate of hemoglobin synthesis (with the 2 dogs studied, the rate of new red cell formation was approximately only 15 per cent of that found in the normal state). That this was not due to interference with absorption of the tagged glycine from the gut or abnormal excretion by urinary and fecal routes is indicated by the fact that the figures for these estimations are the same for both the normal and burned state. This all points to seriously disturbed hemoglobin synthesis following burning. Insufficient data in this experiment have been collected to warrant further discussion here. The investigators believe that they have in the M15 tagged red cell a powerful tool for the study of the mechanism of the anemia which accompanies burns.

E. The Stress Response and Related Adrenocortical Functions in Burns. Following announcements of the apparent advantage of treating severely-burned patients with ACTH, studies on the stress response in such patients were begun here.

Since it was recognized that for any rational approach to treating burn patients with ACTH or Cortisone baseline control studies would have to be done on the admenocortical response in the burn patient without such therapy, every effort has been made in the past 5 months to study burned patinets under carefully controlled conditions in order to obtain these data. These studies have included the ecsinophil count response to burns in various age groups and of various extents of body surface involved. An attempt has been made to correlate the ecsinophil response to other measures of adrenal function such as potassium excretion, sodium retention, dimesis, oedema of the burn region, nitrogen excretion and, more recently, corticosteroid and ketosteroid excretion. Finally, serious attempts have been made to study the effect of ACTH therapy on the fate of massive homografts in 3 severely burned patients. These studies were reported as: "Stress Response and Related Adrenocortical Function in Burns," by Butterfield and Evans.

page 5 of 7

19

27 - 200 = 94

RG 330, Socretney OF Detensed
ENTRY 346A - RDB, RESOURCES DIVISION,
REPORTS & STATISTICS BRANCH PROGRESS
REPORTS, DEC 1946- 1954
Box #

NND 813067 34



Radiation and Thermal Burns

6-59-08-04

A CONTRACTOR OF THE PARTY OF TH

f. Future. I. Biophysics. A. High Temperature Studies: A 24-inch Army searchlight was obtained for use as a source of heat for experiments in man. The accurate calibration of the heat output from this lamp at various distances will occupy the attention of the biophysics group for some time. Human and Dog Burns: Attempts will be made to cross-calibrate the experimental burn in the dog and man (volunteers) with certain heat-sensitive paper and clothe already under study by the Quartermaster Corps. The biophy-

sice group will be very useful in efforts to learn more about contact burning. Experimental Surgery: A. The standard burn mentioned earlier was produced by a relatively low temperature burning iron placed against the dog's skin for a relatively long period of time (60°C, for one minute). This is a "low temperature burn" such as is seen in civilian practice in burns caused by hot water or steam; the atomic bomb thermal injury is produced by a rela-The producttively high temperature acting for only a short period of time. ion and study of experimental high temperature burns in dogs will be studied, therefore, for an estimate of the relative plasma and red cell loss in high temperature burns, healing time, etc. These studies will be undertaken when the searchlight has been calibrated accurately and there is a constant output for each burn. Preliminary observations already made indicate that it will be feasible to produce a high temperature, deep second degree burn with the

arc lamp in approximately 2 to 3 seconds.

B. As indicated above, considerable progress has been made in the compa rison of a standard burn with a standard burn complicated by minimal external body radiation. Several phases of this work greatly need clarification if a better understanding of the problem and proper therapeutic methods for bomb victims in case of attack are to result. One of the most important of these is a complete bacteriologic survey of the burn wound, the air of the kennels, the dogs' saliva, blood cultures, etc. At present such studies are hindered

by lack of bacteriologic aid, a problem which may soon be solved.

When the baseline studies on the affect of combining minimal radiation and standard burns are completed various therapeutic aids such as penicillin, aureomycim, and terramycin will be tested; in the experiments with 100r the effects of the several plasma substitutes and whole blood and plasma of the

dog will also be studied.

C. Clinical Burn Surgery: The study of the influence of dextran in the prevention and treatment of burn shock can be completed soon; the relation of molecular size of the dextran employed to the extent of plasma volume expansion remains to be determined. Clinical trials of dextran of 3 different moleoular ranges have already been begun. .

As soon as polyvinyl pyrrolidone becomes available for clinical trials its use as an anti-shock agent in the severely-burned patient will be studied. An attempt will be made to correlate the molecular range of the FVP used with

the extent of plasma volume expansion in normal human subjects.

At the recent meeting on the universal protective dressing it was obvious that a cheap and efficient bandage to go with this dressing must be developed rapidly. Clinical trials have been made of a few different types of bandage, and there is indication that a satisfactory one can be produced for 25¢ to 30¢ for a 6-yard, 6-inch bandage.

20

page 6 of 7



27 2000 94 RG 330, SUCRETARY OF DEFENSE ENTRY 34PM - RDB , REZONECEZ DIVITION! ROPORTS DE PIUL- 1954 Box # 28

NND 813064

RESTRICTED

Radiation and Thermal Burns

6-59-08-04

24-inch Army iments in man. various disome time. brate the excat-sensitive The biophycontact burning. ed earlier was gainst the dog's e). This is a burns caused ced by a rela-The productll be studied, loss in high adertaken when constant output that it will

59-08-04

ie in the companimal external fication if a lods for bomb tant of these of the kennels, are hindered d. al radiation as penicillin, ith 100r the lasma of the

ourn with the

dextran in the he relation of volume expans ifferent mole—

nical trials ill be studied. FVP used with

it was obvious; be developed as of bandage, I for 25¢ to In the program on anemia, tagged N<sup>15</sup> studies on the human are in progress. It is hoped that red cell formation and destruction can be studied in at least 6 burn patients in the next year. Doctor Ham's laboratory will make serious efforts to carry this study forward by N<sup>15</sup> analyses of fecal stercobilin. There are at least 3 metabolic sources of stercobilin; the largest, about 70 per cent, appears to come from the destruction of hemoglobin. Because of the possibility that myoglobin may be a source of some stercobilin in the burn patient, attention will be devoted to this problem; such studies may amplify knowledge of the cause of the rather marked "hemolytic phase" in the first few weeks after burning.

One series of observations indicates that with the open exposure method of treatment in the severely burned patient the red cell destruction may be somewhat less than with the closed. It is hoped to observe at least 5 more severely-burned patients treated by the exposure method to learn of its possible beneficial role in lessening the anemia of severe burns.

Control observations on the stress response in severely-burned patients will continue. When enough data have been collected, burn patients in the early phase will be treated with cortisone and ACTH. In the later burn phases the effect of ACTH and cortisone on joint mobility, scar tissue, burn contractures, etc., will be studied.

pr. Mote of Armour Laboratories has indicated the importance of continuing observations on the effect of ACTH on homografts in burned patients here. He was impressed that one patient now being studied has the best homograft result so far achieved. At least 3 more burn patients will be studied similarly if possible.

Page 7 of 7

21

DECIDICIED

RG 330, SOCRETORY OF DEFENSE ENTRY 346A - RDB, RESOURCES DIVISION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1946- 1954 Box # NND 813064

SMITTED PION

Dr. J.G.Allen University of Chicago

Ionizat

herent (

later by ing of marrow ( formly 1

periphen

mature (

ed will Th evaluate

clotting

changes

handlin. tion Med

of the

tory we

from the

inhibite

irradia

sidered

radiatio

Transful

weight (

affect t proteim

trol er

fusions

SEARCH AND DEVELOPMENT PROJECT SERO PROJECT TITLE  Ionization Effection			3. PKOJ. NO. 6-59-08-05	ap
S. BASIC FIELD OR SUBJECT		PIELD OF SUBJE	5. REPORT DATE 31 Decent Sub Group	c 50 Th
8. COGNIZANT AGENCY 9. DIRECTING AGENCY	12. CONTRACTOR	AND/OR LABORATOR	RY CONTRACT/W. O	
O. REQUESTING AGENCY  1. PARTICIPATION AND/OR COORDINATION	13. RELATED PRO	ECTS	17. EST. COMPL. D. RES. DEV.	ATES 27 ul
	14. DATE APPROVE	şt.	Py 18. PISCAL P	ST'S.
9.	15. PRIORITY	16.		in
20. REQUIREMENT AND/OR JUSTIFICATION  a. No change				er am

No change

21. RRIEF OF PROJECT AND OBJECTIVE

a. through d. No change.

e. Background. Exercise Tolerance Following Irradiation. A series of 200 rats was separated into groups of 20 each and allowed to swim daily until exhausted. The time of swimming was considered to be a measure of exercisetolerance. For the average rat during the control period, this was approximately three hours. In groups of 20 these animals were exposed to a single dose of x-radiation at: 50r, 100r, 200r, 300r, 400r, 500r, 600r, 700r, and (two groups) 800r. All animals receiving more than 300r showed a marked reduction in exercise-tolerance within the first 24 hours after exposure. There after the animals swam with increasing efficiency until they reached their control levels. Three to 10 days after irradiation-exposure the animals exposed to 500-800r showed a second sharp decline which was persistent./ Mutrition. In a series of metabolic studies on irradiated dogs (450r) increases in nitrogen-excretion were pronounced during the first 24 to 48 hours following irradiation. This figure then returned to normal but increased during the last three to four days of life. The plasma-protein concentration fell steadily from day 1, and the total quantity was frequently below 4 gm. per cent. The greatest decline was in serum albumin. There was a pre-mortal rise in the protein nitrogen which appeared to be the result of an increase in polypeptides rather than in actual proteins. Also anemia became pronounce ed and the cellular hemoglobin as determined by blood-volume measures fre quently fell to 20 per cent or less of the control value. The animals did not eat after the 5th or 6th day. Their condition was further complicated by diarrhea and vomiting. / Anoxia. Anoxia, in some cases severe, developed between the 4th and 12th days following irradiation. The many factors

JRDB FORM 1A. 1 APR 1947

RESTRICTED ATTOR

Y. I. C. PAGE 1 OF 4 PAGES

27 June 94

RG 330, Socretney OF Defense ENTRY 346A - RDB, ROSOURCOS Division, REPORTS & STATISTICS BRANCH PROGRESS ROPORTS, DEC 1946- 1954 Box # 28

NND 813064

DECEMBER

llen
y of Chicago

Ionization Effects

6-59-08-05

6-59-03-05 apparently contributing to this state included anemia, fever, a decreased exygen-combining power, venous stasis, and altered permeability of membranes.

So this anoxemic state could be rectified in part by the administration of ORT DATE 31 Dec toluidine blue (an oxidant) or the administration of oxygen. Infection, AW-5 Infection was more real than apparent. Organisms were cultured from heartblood of mice and dogs. Presumably the organisms gained entrance to the blood stream through the intestinal tract (which was frequently ulcerated) or through CONTRACT/V. O. NO. the respiratory system. In addition, it was found that antibody titer was reduced after irradiation and contributed to infection. There was evidence that some degree of protection was afforded through the administration of strepto-17. EST. COMPL. DATES sycin during the post-irradiation period. A study of pathologic sections from alcerated areas showed that the tissue was unable to produce an inflammatory RPS type of reaction; i.e., the leucocytic response was must evident although bacterial organisms could be seen frequently in the tissue. / Fluid Balance. Studies DEV TRST were completed on changes in blood-volume, extracellular fluid, and total body water in dogs following irradiation. In general the data indicated a decrease in plasma-volume and increase in extracellular fluid and total body water. During this work, however, the selective diffusion of these various agents in different tissues was clearly demonstrated. For example, the content of sulfanil-mide in the red cells exceeded that of a comparable volume of plasma. While the data obtained were reproducible, conclusions must be guarded because of inperent difficulties with the methods employed. This problem will be studied later by different techniques. / Protection. In protective experiments, shielding of the bone marrow, even of as little as 5 to 15 per cent of the total bone marrow of the body, enabled animals to survive doses which were otherwise uniformly fatal. This was not due to the cellular elements contributed to the peripheral blood; it strongly suggests that there are humoral factors, the nature of which is unknown, which are extremely important and which if protect-

ed will increase survival rate to a remarkable degree. The in-vitro clotting determination of whole blood was investigated and sated. Data were accumulated to show the manner in which the whole-blood evaluated. clotting-time is affected by variations in the experimental conditions and by changes in the clotting-time technique. Of particular importance in achieving maximal usefulness of the test is careful venipuncture technique and meticulous handling of the unclotted blood. / Summary of the Irradiation Effect on Coaghlation Mechanism. The individual and collective roles and possible significance of the various changes seen in the irradiation that were studied in this laboratory were discussed. An attempt was made to isolate an inhibitory substance from the blood of irradiated animals. The possible origin and fate of clotting inhibitors were considered in the light of current knowledge. The effects of irradiation thrombocytopenia and direct damage to the capillary bed are considered as changes capable to altering the hemostatic mechanism following irradiation./ Whole-Blood Transfusions in Total-Body K-Irradiation Injury.
Transfusions of whole blood in sufficient amounts, about 5-10 ml./kg. body Transfusions of whole blood in sufficient total-body irradiation but do not weight daily, overcome the ansaia of 450r total-body irradiation but do not affect the leukopenia or thrombocytopenia in dogs. While the total plasma protein level is maintained better in the transfused animals than in a control group, the plasma albumin levels show less elevation. Whole-blood transfusions to the irradiated animal fail to prolong the survival time.

Page 2 of 4

23

DECTRICTED

exerciseas approxio a single 700r, and marked re sure. There hed their animals stent./ jor) increases urs following iring the i fell gs. per -mortal 1 increase pronounc res fremals did plicated developed tors

I. C.

ies of 200

ly until ex-

27 JUNE 94

RG 330, Socretney OF Detense ENTRY 346A - RDB, RESOURCES DIVISION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1954 Box # 28



Ionization Effects

6-59-08-05

Treatment of the Irradiation Syndrome with Aureomycin. Aureomycin is more effective in increasing the survival time of dogs following total-body x-irradiation than any other agent investigated. While aureomycin apparently is capable of decreasing the bacteremia of a dog given 300r total-body irradiation, it seems unable to influence the bacteremia of dogs given 450r. Aureomycin does not produce any significant alteration in the chemical or hematologic determinations made on these snimels nor in their appearance at postmortem examination./
Nethod of Preservation of Plasma to Incidence of Homolgous Serum Jaundice. No
recognized cases of homolgous serum jaundice or hepatitis occurred in patients given pooled human plasma which had been stored in liquid state without preserva-tive at 78-96°F. for three months or more prior to administration. A survey of the previous reports of transmissible hepatitis from human blood products disclosed that the method of preservation for these products was also highly suitable for the preservation of any virus that may have been present.

Progress. Reference has been made to the observation in this laboratory that shielding the head or the liver had a protective effect in a dog exposed to 450r irradiation. This report deals with 20 animals in which the head was shielded at the time of total-body exposure to 450r. Ten dogs irradiated during this same period with 450r total-body x-ray had no shielding, and all died between the 5th and 12th days. These served only to control survival periods and were not paired controls for this study. Unselected animals from the pound were exposed within less than a week after receipt. They were not subjected to the usual quarantine, vaccination, and de-worming procedures. A series of 157 irradiated 450r dogs which received no treatment was used for controls. Comment. Two features about this series of animals appear unusual and somewhat unexpected. First is the extent to which shielding of the skull alone seemed to protect the animal from the ravages of irradiation of the rest of the body. The results obtained might have been improved had a better group of animals been available for irradiation. In the survivors the general condition of the animal was excellent in most instances throughout the three months! period of observation. Second, bleeding, even about the teeth, was strictly absent. The clotting-times in these surviving head-shielded animals were prolonged, but to a lesser extent than in the 5 shielded animals which died, or in comparison with the total-body exposures of the 157 controls. In this connection the plate-let counts in the head-shielded survivors, as well as in the 5 which died, closely paralleled those of the untreated total-body irradiated dogs. The fact that the 15 shielded animals had a thrombocytopenia comparable to that in the animals which died, but nevertheless did not bleed, raises again the question as to the contributing role of platelets in the hemorrhagic syndrome of irradiation. It must be pointed out, however, that internal bleeding in these 15 shielded animals may have occurred but was overlooked, since none of these animals was sacrificed.

These observations seem to implicate the hemopoietic system as a primary disturbance responsible for death in these 450r unshielded animals; and to indicate that many of the other disturbances such as diarrhea, infection, and loss of appetite either fail to occur or are much less evident when the head is shielded. It is probable that by head-shielding the L.D. 100 x-ray dose in

Page 5 of 4

24

DECTRICTED

27 2000 94

RG 330, Socretury OF Defense ENTRY 346A - RDB, RESOURCES DIVILION, ROPORTS & STATISTICS BRANCH PROGRESS

ROPORTS, DEC 1946- 1954

Box #

1

#### DECTRICATED

.08--05

n is more
-body x-irradiatly is capable
dation, it
compain does
ogic determinamexamination./
Jaundice. No
d in patients
ithout preserva- A survey of
products dis- o highly suit-

s laboratory dog exposed the head was radiated during all died ival periods from the pound t subjected to series of 157 trols./ 1 and somewhat alone seemed of the body. of animals iition of the 3' period of 7 absent. The onged, but to comparison ction the plateich died, logs. The .e to that in in the queslyndrome of ling in these ne of these

is a primary i; and to 'ection, and in the head -ray dose in

age 3 of 4

Ionisation Effects

6-59-08-05

the dog can be nearly doubled. It has thus far been the most effective means encountered for protecting the dog exposed to 450r. Compared with post-irradiation therapeutic procedures, head-shielding is unique. Perhaps more significant than the survival rate are some of the physiologic and pathologic implications that such observations pose. It is planned to study the 15 surviving animals as follows: shield the pelvis in 7 and deliver 450r to the remaining part of the body; and expose the other 2 to 450r without any protection.

- f. Future. As indicated above.
- g. Reports. Volume IV-A, Head Shielding. "Effect of Head Shielding in 20 Dogs Exposed to 450r Total Body Irradiation."

Page 4 of 4

CATALOGICA CONTRACTOR

25

RG 330, Socretney OF DEFENSE ENTRY 346A - RDB, ROJOURGOT DIVISION, ROPORTS & STATISTICS BRANCH PROGROSS ROPORTS, DEC 1946- 1954 Box # NND 813064

CORESS REPORT (C)

Medical Nutrition Lab Chicago; and Dr. Evans, Med. Coll. of Virginia

PROGRESS REPO	id (c)	710	Med. Čoll.	of Virginia
RESEARCH AND DEVELOPMENT PROJECT-CARD-(N	HEN-BRONE	(18) L SEC. U	3. M.W. NO	6-59-08-06
1. PROJECT TITLE Nutritional Requirement	ents in	Radiation Inju	7	ORI DATES 1 Dec 50
6. BASIC PIELD OR SUBJECT		V. SUB PARLO ON SU		AW-6
8. COGNIZANT AGENCY	12. Conta	Horo Advortation	ATORY	CONTRACT/V. O. NO.
9. DIRECTING AGENCY	1			
10. PEQUESTING AGENCY	13. 15147	ed rightons	<del></del>	17. EST. COMPL. DATES
11. PARTICIPATION AND/OR COORDINATION	†		1	DEV.
				TEST
	14. 0476	1 PPROVED		Py 18. PISCAL EST'S.
	15. PATO:	111 16.		19. F13CAL 801 G.
19.				
26. PEQUIREMENT AND/OR JUSTIFICATION				
a. No change. b. No change.				
a. thru d. No change.  e. Background. Normal mongrel d body) x-irradiation. No adjuvant totals and differentials, hematocritimes, and fibrinolysis were followas a marked drop in white blood c and slower drop in hematocrits. Pately prolonged. Hemorrhagic mani Spontaneous fibrinolysis of recalc not observed after irradiation. Edeaths occurring in the second weekly the Pathology Division in Chicathe direct counting of dog eosinop preceding report.  Progress. Ashby Counts in Do	therapy rits, pl. owed. C. cells an Prothrom ifestati cified p Eleven o. ek. The ago. Eor phils war	was given. Whatelets, clott complete autops d platelets in the consequence of the 12 dogs of the	hite blood ing times, ies were pe a few days ng times we al except i clotted wh studied die ctions are og Blood.  Details wer serologic	cell counts, prothrombin orformed. There is with a lesser ore only moder-in the lungs. The blood was ed, most of the being examined A method for e given in the quantitative
identification of infused red cells systems for the suspension of red because of high free counts found. antisera was also discarded becaus attempts made to perform Ashby cou in homologous serum and dog (Coomb best method has been the use of ly for the suspension of the red cell which hemolyzes A cells rapidly bu cided, therefore, to absorb the do tempt to remove the hemolysin. (Cavailable. The Bagglutinogen occ	is in do, cells w. Wet so of the unts with os) serun yophilizes. Antiut cells og anti-	gs was developed are tried. The erum for both a necessary did he saline washed an were not suced antisera will i-A serum has a lacking A, more against were used become to be the saline to be th	ed. Both se former was uspension lution introduced cells cessful. Sth wet auto a nonspecific slowly.  CD red celause BCD ce	aline and serum as discarded of cells and coduced. resuspended of far, the clogous serum ic hemolysin It was de- ls in an at-

JRDB PORM 1A, 1 APR 1947

22. JRDB SN.

DECIDICIED FION

IC & P.

PAGE 1 OF 2 PAGES

RG 330, Socretney OF Detense ENTRY 346A - RDB, RESOURCES DIVISION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1954 Box # 28

WND 813064

District

tion Lab )r. Evans, Virginia

9-08-06

AW-6

NTRACT/V. O. NO.

ST. CONPL. DATES

E. FISCAL EST'S.

Nutritional Requirements in Radiation Injury

6-59-08-06

was inactivated in the dried anti-A sera but not when fresh autologous serum was used for the suspension of the red cells. By this method satisfactory Ashby counts can be made. Metabolism after Thermal Burns and Radiation Injury. Observations on various hematologic and metabolic functions following radiation (100 r) and thermal injury (20 per cent deep 2°) in dogs were made. The hematologic observations include: red blood cell counts, white blood cell counts, differentials, hemoglobins, hematocrits, plasma volumes, platelets, and ecsinophils. Metabolic observations include body weights, nitrogen intake and output (BSP retention, thymol turbidity, thymol flocculation, cephalin flocculation, serum bilirubin direct and indirect, and prothrombin times). Observations on four dogs were given in the last report; since then three additional dogs have been studied. N15 glycine was given orally at appropriate times as a tracer to two of the dogs. These samples are now being analyzed in the mass spectrometer. The data from these studies will be reported in detail later. Survey and Review. An extensive survey of the literature on the metabolic and nutritional sequelae of thermal burns and radiation injury was made and a critical review written for the Subcommittee on Radiation and Thermal Burns of the NRC Committee on Therapeutic Nutrition.

Future. Additional animals (dogs and other species) will be studied, with  $x^{15}$  glycine as a tracer. The possible role of proteolytic enzymes (and anti-proteolytic enzymes) as well as antibiotics will be investigated.

Reports. "The Treatment of Burns," Lund and Levenson. Nelson's System of

NND 813064 BF CST94

	SEC MEDIMUTED TION
PROGRESS	REPORT (C)

Army Medical Cental

RESEARCH AND DEVELOPMENT PROJECT CARD	(WEW-PROJECTS) 2. SEC. II	3. PROJ. NO. 6-59-08-08
1. PROJECT TITLE X-ray Therapy, 100		5. REPORT DATES 1 Dec 50
6. BASIC PIBLD OR SUBJECT	7. SUB PIELO OR SU	BJECT SUB GROUP PO-16
8. COGNIZANT AGENCY	12. CONTRACTOR AND/OR LABORA	CONTRACT/W. O. NO.
9. DIRECTING AGENCY	7	
10. PRQUESTING AGENCY	13. RELATED PROJECTS	17. EST. COMPL. DATES
11. PARTICIPATION AND/OR COORDINATION		RES. DEV. TEST
	14. DATE APPROVED	OP EVAL. Fy 18. FISCAL EST'S.
	15. PRIORITY 16.	
Completed; study terminated b	y MSTC 15 January 1951.	
20. REQUIREMENT AND/OR JUSTIFICATION		

21. RRIBP OF PROJECT AND OBJECTIVE

Final Report. This study was approved 31 August 1948. Pertinent information was tabulated on the following numbers of cases: testicular tumors, 178; Hodgkin's disease, 244; brain tumors, 37; lymphosarcoma, 80; pituitary tumors, 16; carcinoma of the nasopharynx, 24; and carcinoma of the cervix uteri, 51.

Three clinical scientific papers were prepared and presented to radiologic societies:

"Irradiation Damage of the Intestines following 1000 KV Roentgen Therapy. Evaluation of Tolerance Dose," Amory and Brick; presented at the meeting of the Eastern Radiological Society, March 1949, and published in Radiology, 56:49-57, January 1951. Twenty cases receiving unusually large amounts of radiation to the abdomen are presented. Roentgenographic changes not previously described are dicussed and illustrated. It was concluded that the normal intestine of the adult male can tolerate 4,500 to 5,000 r, 1000-KV irradiation therapy without permanes disability.

"Million Volt X-ray Therapy of Brain Tumors," by Major Keene M. Wallace, MC

presented at the same meeting.

"Irradiation Effect on the Stomach following 1,000 KV Radiation Therapy," by Wallace and Wallace; presented at a national meeting of pathologists.

Study was made of about 50 cases developing radiation pneumonitis and pulmonary fibrosis following 1000-KV irradiation for treatment of diseases such as Hodgkin's, lymphosarcoma, carcinoma of the breast, testes, lung, and esophagus A striking difference was shown in distribution of the fibrosis and a more string sharp demarcation between pathologic and normal pulmonary fibrosis after 200-KV therapy. This difference had not been described previously.

A 4-month check of the effectiveness of radiation-protection methods in the hospital showed them to be highly efficient except in one section, where cor-

rective changes were made immediately.

22. JRDB | SN. | PC. | IC & P. | X. | I. | C.

JRDB FORM 1A, 1 APR 1947

SEC DECIDICATED TION

PAGE 1 OF 1 PAGES

RG 330, Socretney OF Defense ENTRY 34UA - RDB, RESOURCES DIVISION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1946- 1954 BOX # 28



PROGRESS REPORT (C)

Dr. Langer

rmy Medical Cen.

10. 6-59-08-08 PORT DATES 1 Dec 5 P0-16 CONTRACT/W. O. NO 17. EST. COMPL. DATE RES DEV. TEST 18. PISCAL EST

at information w , 178; Hodgkin's nors, 16; carcin 51.

ed to radiologic

entgen Therapy. meeting of the ology, 56:49-57, f radiation to t described are d tine of the adul without permana

ne M. Wallace, &

ation Therapy," ologists. monitis and pul diseases such as , and esophagus and a more str ibrosis after sly. on methods in the on, where cor-

Υ.	ī.	c.
PAGE	L OF	I PAG

RESEARCH AND DEVELOPMENT PROJECT-CARD-	HEN-BROTE	\$18) F SEC. A	3. M.W. NO.	6-59-08-	09
1. PROJECT TITLE Thermal Effects of	an Atom	ic Explosion			
(Manuscript) 6. BASIC FIELD OR SUBJECT		Y. DOLD VIELD ON SUBA	BCT SUB GRO		
					AV:-6
8. COGNIZANT AGENCY	18. Com	Moros Amoros Editorari	ORY	CONTRACT	W. O. NO.
	Dr.	Langer (Purchase	e Order)	1	
9. DIRECTING AGENCY	7	,			
10. REQUESTING AGENCY	18.8814	ISS MUSCIS		17. 551. CON	L. VITES
	10.0014	ISS MOSCIS		17. EST. CON	L. Vines
10. REQUESTING AGENCY  11. PARTICIPATION AND/OR COORDINATION	19.9814	res majeris			L. DITES
				218.	L. Vinis
		THEORED		PER. DEV. TEST	
	14. 9478	1974GFR		RES. DEV. TRST	
		1974GFR		PER. DEV. TEST	
	14, 0476	TPROPER		PER. DEV. TEST	

21. RRIEF OF FROJECT AND OBJECTIVE FINAL REPORT. The manuscript entitled "A Study of the Physical Basis of Burn roduction with Applications to the Defensive Reactions to An Atomic Bomb Air Burst," which was produced under this project, has been multilithed and is now available in booklet-form for distribution.

The author states that in this report the mechanism of burns has been developed in much more complete form than ever before, with the protein denaturation hypothesis of skin destruction proposed by Loritz and denriques used as a base. The results so far give strong support for this hypothesis and provide a powerful method for anticipating the details of burn production in atomic air attack. These details will serve, along lines illustrated in the text, in the formulation of a doctrine for evasive action in case of an air burst and in the design of pro tective clothing and equipment as well.

It is stated that the arguments have often been too brief for good exposition, but to go into full detail would have lengthened the report unduly. important to have the present form perused by those seriously occupied in the field and to learn what reactions follow, in order to judge the form the next study should take. If a particular element is especially interesting, the analysis should be repeated in greater detail and with greater accuracy. In this, slide-rule methods were used throughout; machine calculations might well te included in a future report.

1. Tc. IC & P. 22. JANB SN. PC. PAGE I OF I PAGES JRDB PORM IA. 1 APR 1947 DECIDICIED

27 JUNE 94

RG 330, Socretiney OF Defense ENTRY 346A - RDB, RESOURCES DIVISION, ROPORTS & STATISTICS BRANCH PROGRESS ROPORTS, DEC 1946- 1954 Box #

IND 813064

PERTUITA

AMSFRL, Ft. Knox

	zyme Systems, Effects of	5. REPORT DATE 31 Dec 5
6. BASIC PIBLD OR SUBJECT	V. SUB FIELD OR SUBJECT	AW-6
8. COGNIZANT AGENCY	12. CONTRACTOR AND/OR LABORATORY	CONTRACT/W. O. NO.
9. DIRECTING AGENCY 10. REQUESTING AGENCY	13. BELATED PROJECTS	17. EST. COMPL. DATES
11. PARTICIPATION AND/OR COORDINATION	-	PES. DEV.
	14. DATE APPROVED	OP EVAL Fy 18. PISCAL EST'S.
19.	18. PRIORITY 16.	

- ъ. No change.

21 BRIEF OF PROJECT AND OBJECTIVE

a. thru d. No change.

Background. This study was approved in October 1949 in order to determine the effects of irradiation on oxidase and proteolytic ensyme systems and adrenal and thyroid activity. A detailed outline of study was reported in December 1949; it was planned to study the following systems and activities in irradiated mice: cytochroms-cytochroms oxidase system; hexokinase and adenosine triphosphate systems; adrenal activity; and thyroid activity. / A collaborative study with Dr. Pendergrass was undertaken on the protective effect of pitressin and epinephrine against local (leg) reaction produced by x-radiation (2000 r) in rats./ Mice were subjected to whole-body x-radiation totaling 800 r/air delivered in 15 minutes. Preliminary results indicated that this amount of radiation produced a definite depression of the succinic acid dehydrogenase activity of the liver nea the time of death. In the kidney the enzyme activity did not vary significantly from that of the control group. There was no significant alteration of the hexokinase activity in muscle or kidney after irradiation when compared with the control group. The liver showed no definite change in the inorganic phosphate after irradiation. There was a slight but definite decrease in the readily hydrolysable phosphate content up to the 5th day following irradiation. An abrupt increase occurred near the time of death. The kidney showed no definite change in the inorganic, and only slight decrease in the labile, phosphate The muscle showed a definite increase in inorganic phosphate content; a sligh but definite decline in the labile phosphate up to the 3rd day following irrad iation; and then a gradual continuous rise above normal until the time of deat Progress. The protective effect of pitressin and epinephrine apparently

is due to local tissue anoxia produced by these substances. It has been repor ed that injection of pitressin will produce anaerobic conditions in the muscl Administration of epinephrine causes an immediate increase in the oxygen-22. JRDB SN. PC. IC & P.

JRDB PORM 1A, 1 APR 1947

PEOTRICIEN

PAGE I OP 2 PAGES

27 JUNE 94

RG 330, Socretary OF Defense ENTRY 34CM - RDB RESOURCES DIVILION, ROPORTS : STATISTICS BRANCH PROGROSS ROPORTS : DEC 1946- 1954 Box #

Irrad:

consu tions admin pitre chrom admin anoxi

of th x-ir: tion thos iste gate

g.

RL, Ft. Knox

0. 6-59-08-10

PORT DATE 31 Dec 50

AW-6

CONTRACT/W. O. NO.

RES.
DEV.
TPST
OP EVAL

Py 18, PISCAL EST'S.

r to determine ons and adrenal n December 1949; rradiated mice: iphosphate systudy with Dr. and epinephrine rats./ Mice ered in 15 min-1 produced e ! the liver near / significantly ion of the hexed with the unio phosphate ne readily ition. An d no defin-.. , phosphate mt; a slight lowing irrad time of deat apparently s been repor n the muscle oxygeni. I. C. PAGE 1 OF 2 PAGES

Irradiation on Enzyme Systems, Rffects of

6-59-08-10

consumption of muscle tissue, thus producing a temporary anoxia. These assumptions are supported by the results of the effect of pitressin- or epinephrine-administration on the cytochrome exidase activity of muscle. Administration of pitressin produced an inhibition, and of epinephrine an acceleration, of cytochrome exidase activity. Results on the phosphate-distribution of muscle after administration of either pitressin or epinephrine also indicate a temporary local anoxia in the muscle tissue.

f. Future. The possible relationship between radiation-sensitivity and degree of the anoxic state of the organism will be studied. The effect of total-body x-irradiation on the cytochrome oxidase activity and on the phosphate-distribution of the liver is being studied in rats. These results will be compared with those obtained in mice. The possible protective effect of various agents administered either prior to or after irradiation (total-body) is also being investigated.

g. Reports. None.

Page 2 of 2

31

27 JUNE 94

reterye

RG 330, SOCRETARY OF DETENSE ENTRY 346A - RDB, RESOURCES DIVILION, REPORTS & STRTISTICS BRANCH PROGRESS REPORTS, DEC 1954 Box #

Dr. Cope

PROGRESS RE ESEARCH AND DEVELOPMENT—PROJECT—CARD		IJ 3.	. PROJ. NO. 6-59-08-11
1. PROJECT TITLE Thermal Burns	- (REB PROGESTOR	<u> </u>	
6. BASIC PIBLD OR SUBJECT	I 7 SUR PIR	D OR SUBJECT	5. REPORT DATES 1 Dec 5
6. BASIC FIELD OR SUBJECT	7.505		AW-6
B. COGNIZANT AGENCY	12. CONTRACTOR AND/O	R LABORATORY	CONTRACT/W. O. NO
P. DIRECTING AGENCY			
D. REQUESTING AGENCY	13. RELATED PROJECTS		17. EST. COMPL. DATE
L. PARTICIPATION AND/OR COORDINATION			DEV.
	14. DATE APPROVED		OP RVAL Fy 18. FISCAL EST
9.	15. PRIORITY	16.	
O. REQUIREMENT AND/OR JUSTIPICATION			
a. No change.			
b. No change.			
			O. W. and D. annuch
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
It is reported under the	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the "Intracellular Chang	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the	following title ar ges in Trauma Deple	d numbers:	
The reporting agency for It is reported under the	following title ar ges in Trauma Deple	d numbers:	

Washington National Record Center Office of the Army Surgeon General Record Group 112

Accession #: A57 - 70

Box #:

1

File:

Research Program, 1 July - 31 December 1950

· AH 10-03 Dr. Ravdin MEDTHIGTED ITION U. Pa. PROGRESS RE PORT (C) 31 Dec 50 3. PROJ. NO. 6-59-10-04 EXEMPLE AND DEVELOPMENT PROJECT CARD (NEW PROJECTS) 2. SEC. PO-11 5. REPORT DATE 31 Dec 50 Vein Ligation - Acute Arterial Occlusion ACT/W. O. NO. 7. SUB PIELD OF SUBJECT MIC PIELD OR SUBJECT PO-16 COCULIANT AGENCY 12. CONTRACTOR AND/OR LABORATORY CONTRACT/W. O. NO. COMPL. DATES LEUCTING AGENCY COURSTING AGENCY 13. RELATED PROJECTS 17. EST. COMPL. DATES RES ISCAL EST'S. FARTICIPATION AND/OR COORDINATION DEV. \* TEST 14. DATE APPROVED OP EVAL V 18. FISCAL EST'S 15. PRIORITY Completed; this is the final report. ALSOUIREMENT AND/OR JUSTIFICATION **1** tant in it of or AL MIRP OF PROJECT AND OBJECTIVE . Ortho The following is the final report on this study. of treat :h non-Kety's radiosodium clearance method was used to evaluate calf-muscle lullary circulation in various circumstances. A value called "k", representing the ith rate of disappearance of Na 24 from the site of injection, was obtained. The estigat tests were done at room temperature under standard conditions of rest and Dr. posture. The normal range of "k" in 46 determinations was 0.018 to 0.076. ublished with a mean of 0.040. The mean of 11 determinations in arteriosclerosis was 0.027 with a range of 0.013 to 0.044. In 9 normal subjects, after exercise of the gastrocnemius by plantar flexion, the "k" increased from 0.033 to 0.046. Then the anterior leg muscles were exercised by dorsiflexion, the "k" of the antagonistic gastrocnemius decreased from 0.049 to 0.038 in 7 experiments./ These results indicated that the method was capable of reflecting changes in the calf-muscle circulation of man. The exercise experiments indicate that in exercised extremity the circulation is reduced in antagonistic muscles and that blood by some mechanism is shunted toward the tissue of higher metabolic activity. Study of Calf-Muscle Circulation in Postoperative Patients. Studies of calfmuscle circulation in postoperative patients were made to observe whether there is any circulatory change in this region which predisposes to phlebothrombosis. There was no significant difference in the mean pre- and postoperative "k:s" of 45 patients undergoing major surgical procedures, indicating that operation does not adversely affect calf-muscle circulation. Individually there was such variation between the pre- and postoperative "k" that only a postoperative change greater than 0.037 would appear to be significant. individual variation represents one of the difficulties in using the test to 22. JPnB SN. IC & P.

RESTRIUTED TION

JEDB FORM 1A, 1 APR 1947

PAGE 1 OF 2 PAGES

Vein Ligation - Acute Arterial Occlusion

6-59-10-04

predict postoperative phlebitis. The mean "k" in 9 patients with definite postoperative phlebothrombosis was 0.045. Three patients had low "k's", and 6 had normal or high "k's". Of 4 patients studied after superficial femoral vein ligation for phlebothrombosis, 1 had a low "k" and 3 were normal. The mean "k" of 6 patients with questionable phlebothrombosis was 0.039; 1 patient in this group had a low "k" of 0.023, but his preoperative "k" of 0.015 was also low. "K's" were done on 3 patients before the onset of clinical phlebothrombosis; none was low enough to indicate the onset of phlebothrombosis. It appears, therefore, that the clearance of sodium in the presence of phlebitis is not markedly reduced and in some cases may actually be increased./ In summary, operation does not adversely affect calf-muscle circulation. The clearance of sodium from the calf muscles cannot be used for the diagnosis of postoperative phlebothrombosis.

Effects of Direct Heat and Priscoline on Calf-Muscle Circulation. In 12 normal subjects the mean "k" of the control left leg was 0.047 and of the right leg after direct heating by electric pads, 0.041. In 8 normal subjects the mean "k" of the control left leg was 0.045, and of the right leg after intravenous priscoline, 0.032. These results indicate that increasing skin blood flow with direct heat or intravenous priscoline reduces effective calf-muscle circulation. Effects of Reflex Heat. Following application of heating pads to the trunk of 14 normal individuals, the mean "k" in the calf muscles was unchanged over previous determinations made under control conditions. At the same time there was a uniform increase of skin temperatures of the thumbs.

Effect of Common-Duct Distention on the Myocardial Circulation of Dogs. Kety's method was applied to the study of myocardial circulation in dogs. Coronary artery ligation reduced markedly the clearance of sodium from the myocardium. When intravenous sodium cyanide was used to produce anoxia, the clearance of sodium was markedly increased. These results indicated that the method was capable of reflecting changes in the coronary circulation. After the cystic duct and the distal end of the common duct were ligated, a cannula was placed within the lumen of the common duct. Na 24 Cl. .5 cc., was injected into the myocardium and a controlled clearance obtained for 45 seconds. The common duct was then rapidly distended with physiologic saline. In 8 experiments the "k" decreased in each case after common-duct distention. The mean "k" before distention was 0.683, and after distention, 0.519. The blood pressure also dropped in each case after distention. In two dogs after bilateral vagotomy in the neck no change was observed in the "k" or blood pressure after common-duct distention.

Report. "Calf Muscle Blood Flow, Pre and Postoperatively and During Various Normal and Pathologic States," Reese, Darrow, and Cullen; accepted for publication in Surgery, Gynecology, and Obstetrics," June 1951 issue.

Two other reports being prepared will be submitted.

Page 2 of 2

68

DECEMBER

RESEARCH 1. PROJEC

& BASIC

& COGNIZ

10. PROUES

11. PARTIC

.

19,

M. PROUIRI

b. iio

thru

Richa ar

bac

influence

therized the hind tion is lamark ours.

perin, tered thing to the tion to the

time the sr phine with surn. Hing one h

ultin

Dr. Pillsbury

Bacti

both react so fr explo veile rrepa:

and ar Consta arned Value attent Cortis ed by ions o and que of sucl ibly in of Gren **pp**ort

est pre

that Co: sal fie 7. **e**ple s re nec tadies

Pro Pro has ha

leopr etanh) egenor

ler in ilons; lone o

liculi

are

on le

ident

msit

atou spe the

Progre	ess nepo	FL CONTION	Univ		of Pennsylv	
RESEARCH AND DEVELOPMENT PROJECT CARD (	NEW PROJE	CTS) 2. SEC.		3. PROJ. N	0.6-60-13-1	2
1. PROJECT TITLE Bacterial and Fungor	ıs Infec	tions of	the Skin	11		
					PORT DATEST D	ec
6. BASIC FIELD OR SUBJECT		7. SUB FIRI	TO OR SUBJE	CL SOR CK	Ollh	
					PO-16	
8. COGNIZANT AGENCY	12. CONT	RACTOR AND/OF	RLABORATOR	₹Ÿ	CONTRACT/W	. O. NO.
					}	
9. DIRECTING AGENCY						
10. REQUESTING AGENCY	13. RELA	TED PROJECTS			17. EST. COMPL	DATES
					RES.	
11. PARTICIPATION AND/OR COORDINATION	1				DEV.	
	14 0400	1.615.0116.			TEST	
	14. DATE	APPROVED			OP. EVAL	
	15. PRIO	DITV	16.	*	Fy 18. FISCAL	EST
19.	113. FRIO	RILI	110.		<del>                                     </del>	
20. REQUIREMENT AND/OR JUSTIFICATION	<u> </u>					
a. No change						
b. No change						
21. BRIEF OF PROJECT AND OBJECTIVE						
a. thru d. No change.			4. 9			
e. Beckground. Factors possibly						
surfaces" and progress made toward. Bacterial infections. W						
under such conditions? How rapi						4 h
these questions which should be						
It is becoming apparent that the						
and sensitization to such bacter						
ism of chronic and prolonged den					)1 the meen	34-
2. Interference with sweat					nrolonged	
moisture on the skin have in pro	ducing	interferer	nce with	the swe	ating mech	ani <b>s</b>
and in producing subsequent infl	ammetor	v changesi	Studie	es sun	norted join	t- 20
ly by this contract and a grant						
questionably that moistening of	the ski	n for 24 t	to 48 hor	urs prod	luces local	
blocking of the ewest ducts wit	th awest	retention	n and in	flammat	ion in many	in-
dividuals. When even mildly irr	citant 1	ocal appli	cations	are mad	ie. includi:	ng _
market and the second of the second of the			** 1	3		[G

that of adhesive tape, this effect is increased. Under conditions of a warm environment, or in the case of sweating of the hands and feet and emotional tension, a fairly high percentage of individuals will develop mild to severe inflammatory changes. The methods of prevention are fairly clear, although not always practical; studies are therefore being directed toward preventing this sweat-duct blockage, and finding an internal medication to reduce sweat flow without undesirable physiologic side-effects.

3. The effect of fungous infections, and how often fungous infections are concerned in processes of this sort. In this connection, a new highlyspecific stein for furgi, something never available previously, has been developed. It can be used even in small laboratories, and is applicable to FC. IC & P.

JRDB FORM 1A, 1 APP 1947

SECU RESTRICTED '10"

PAGE OP 5

214

#### RESTRICTED

erial and Fungous Infections of the Skin

6-60-13-12

superficial and deep fungous infections. It appears that inflammatory tions on moist skin surfaces are not caused by fungous infections nearly requertly as had been supposed. Nevertheless, there has been constant loring or developing of better fungicides because there is no good one albele. Studies thus far indicate that the effectiveness of the fatty acid carstions now in use in the armed forces is greatly overrated.

- antiperspirant preparations have received study under controlled conditions.

  Stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations.

  Stant lookout is kept for new preparations which may be of value to the

  stant lookout is kept for new preparations.

  Stant lookout is kept for new preparations which may
- 5. Studies of x-ray and Grenz-ray therapy in various inflammatory erupts of the skin have been continued. X-ray therapy has a highly uncertain
  questionable effect on such eruptions. It is felt that the installation
  f such units in general hospitals overseas cannot be justified, except possbly in one hospital in a large stable Theater (if there be such). The effects
  f Grenz-ray appear to be superior but temporary. (This study is now being
  prorted elsewhere.)
- 6. The mechanisms of induced sensitization of the skin are of the greatt practical importance, and little is known about them. It is in this field
  that most of the "basic" studies are being carried out. It is now apparent
  that Cortisone and ACTH have only temporary palliative effects, but these may
  mable us to obtain more exact knowledge of the mechanisms involved. This gentral field is of great potential practical importance in military medicine.
- 7. Preliminary studies leading to the development of a truly specific imple serologic test for syphilis have been carried out, and these studies have necessarily involved basic work in the life cycles, spirochetes. These studies have now reached the point where they should either be expanded or dropped entirely.

Progress. Bacterial Sensitization. More bacterial entigens of various kinds have been and are being prepared, such as bacterial polysaccharides, mcleoprotein, ground whole cells, and filtrate concentrates from a variety of stanhlococci, streptococci, and other bacteria from dermatologic lesions. intogenous vaccines are also being prepared by various methods. These will te used to determine the state of sensitivity of a series of patients and mormal controls and for experimental disensitization of patients. Of particular interest are the following groups of subjects: Children with pyogenic lesions; adults without pyogenic lesions; adults with a series of specific lesions of pyogenic or suspected pyogenic cause, including impetigo and ecthyma, folliculitis and sycosis, furunculosis and hydroadenitis, secondarily infected eczemetous eruptions of all kinds, and acne. Two aspects of the problem de-First, tissue-culture technics are being used to deter serve special mention. mine the sensitivity of buffy coat cells to bacterial antigens, as a gauge of tissue sensitivity; second, the so-called bacteriostatic antibodies in whole blood are being used to determine strain-specificity of infections. Parallel work on laboratory animals is planned. The importance of this work is clearly evident when it is realized upon how flimmy a base the diagnosis of bacterial sensitivity and desensitization therapy now rests.

Page 2 of 5

DECEMBER

pui

¿cor

cor

nc Ce i

(con

Process of the state of the sta

Bacterial and Fungous Infections of the Skin

6-60-13-12

It is proposed to continuo the survey of the normal skin flora, which is now near completion, and to continue work with the specific objective of determining the specific ecologic factors which are responsible for the type end stability of the flora on the skin and specific skin sites. This project relates to the whole question of the effect of sweating, sebum output, etc., on the bacteria of the skin. The immediate objective, now being pursued, is to determine the range of tolerance of normal skin bacteria to temperature, pH, and desiccation; and to determine their response to fatty acids, etc., as nutriment on the one hand and bacteriostatic agents on the other. Various related questions, such as the role of skin charge in the effectiveness of detergents and the relationship of keratin to bacteriostatic effect of other skin components, are being investigated simultaneously.

Knowledge of methods of prevention and treatment of fungous infections is still very incomplete. It is unquestionably related to the maintenance of a dry surface on the skin, and with prevention of disturbances of sweat physiology. Powders containing various fatty acids as antifungal agents, on which much experimental work was done during World War II, have the adventage of being non-irritating and relatively non-sensitizing. However, their in-vitro effects on fungi cannot be confirmed clinically in studies here, and further more these compounds are inectivated in regard to antifungal activity by 3 to 5 per cent of blood serum, and hence are probably entirely useless in vesicular or oozing phases of fungous infections. Whether the answer to fungous infections of the human skin will be through a chemical applied externally is cuestionable, but further efforts to find a more satisfactory antifungal agent seem indicated. In addition, it is becoming apparent that the administration of various antibodies produces marked changes in the fungous flora of the skin of man, and of the internal organs of animals (and possibly man). Studies of these effects are considered of great practical importance, and are outlined:

1. The clinical and experimental study of a wide variety of industrial antifungal agents with potential application to man is being continued (wholly supported by other sources). This program should be of considerable potential value to the armed services in their search for practical therapeutic aids for treating common skin disorders such as ringworm.

2. Fungous infections as a complication of antibiotic therapy. The wide spread use of aureomycin, chloromycetin, penicillin, and terramycin as chemotherapeutic agents has been attended by an unexpected complication. The incidence of oral thrush in patients receiving these antibiotics has greatly in creased. Monilial bronchitis and pneumonitis of a threatening and even fatal character have occurred. Serious mycotic infections have developed during antibiotic therapy, even with such non-virulent species as Aspergillus fumigatus, an ordinary saprophyte. The study being continued relates to the med anism by which antibiotic therapy predisposes to fungus infection. Two poss ibilities are to be considered: (1) The stimulating metabolic effect of the antibiotic on the fungus, thereby enhancing its growth; (2) The elimination of bacterial competitors which would normally hold the fungi in check. It has been shown that the stimulatory effect of aureomycin (published by others) on the growth of Candida albicans is factitial. It depends on the presence of the phosphate ion which is an incidental component of the vehicle of the sureomycin censule. As a result of work here, the manufacturers of aureomyci have already eliminated phosphates from their preparation.

Experiments are in progress to measure the possible stimulating effect

Page 3 of 5

reamore.

COTDIOTED

terial and Fungous Infections of the Skin

6-60-13-12

rified aureomycin, penicillin, chloromycetin, and terramycin on fungi under itrolled conditions in vitro. It is likely that the elimination of bacterial betition is more important. A routine survey of the fungal and bacterial lers of the mouth and rectum of individuals in the University Hospital reliving any one or a combination of these antibiotics is being undertaken. Altit is clear that large numbers of fungi may be isolated from a great jority of such persons. This contrasts strikingly with the findings in the strol group.

The effect of the antibiotic therapy on the fungous flora of experimentl animals and their susceptibility to mycotic infection will be studied.

3. The most recent experiments dealing with the effect of aureomycin on calliasis in mice have produced results which make it necessary to reconsider the manner in which the phenomenon under discussion is brought about. It has been found, for instance, that when a suspension of Candida albicans is made in a solution containing aureomycin, the intraperitoneal injection of this impension results in widespread peritoneal lesions. Practically no lesions occur when the suspension is made up in saline solution. Furthermore, if mice infected intraperitoneally with C. albicans are given parenteral injections of infected intraperitoneally with C. albicans are given parenteral injections of infected intraperitoneally with C. albicans are given parenteral injections of infected intraperitoneally with C. albicans are given parenteral injections of infected intraperitoneally with C. albicans are given parenteral injections of infected intraperitoneal capacity may ordinarily be considered steriled to competitors since the paritoneal capacity may ordinarily be considered steriled.

ial competitors since the peritoneal cavity may ordinarily be considered sterile.

The phenomenon under discussion is undoubtly not peculiar to aureomycin,

at the same and a contract that the same and a same and

Bacterial and Fungous Infections of the Skin

6-60-13-12

the skin-reactions and eliminates the interfering inflammatory process resulting from other methods of hair-removal (plucking, barium sulfide, etc.) f. Future. Studies will be continued as indicated under Progress. g. Reports. "Anhidrosis, An Etiologic Interpretation," Shelley, Horvath, and Pillsbury, Med., 29:195-224, 1950.

Fige 5 of 5

218

RESTRICTED

RE3 1. 6.

H | - |

19. 20. 8.

He e. tr ul de (U pr lo th is

th

8 c 6 · Pl e ·

te an ur ca 21.

CO

PROGRESS REPORT (NC)

RESEARCH AND DEVELOPMENT PROJECT-GARD-(N	EH-PROJECTO) Z. SEC. U	3. PROJ. NO.	6-64-12-12
1. PROJECT TITLE Peripheral Blood Ves	sels	1	
	7. SUB PIELD OF SUBJ		RT DATE 30 Jn 50
6. BASIC FIELD OR SUBJECT	1.300 (1820 OF BODG	201 040 0101	P0-11
8. COGNIZANT AGENCY	12. CONTRACTOR AND/OR LABORATO	DRY	CONTRACT/W. O. NO.
9. DIRECTING AGENCY	1		
The state of the s			1
10. REQUESTING AGENCY	13. RELATED PROJECTS		17. EST. COMPL. DATES
	[		DES.
11. PARTICIPATION AND/OR COORDINATION		1	DRV.
	14. DATE APPROVED		OP RVAL
			Py 18. PISCAL BST'S.
	15, PRIORITY 16,		
19.			
20. PEQUIREMENT AND/OR JUSTIFICATION			
21. RRIEF OF PROJECT AND OBJECTIVE			<del>,</del>
	derstanding of disturban	nce in ele	ctrolyte physi-
ology in normal man and in subject			
state, the behavior of several el			
isotopes, in control subjects, su			
Radiomercury (Hg 203, 205; tag	5.		
cuhydrin) was studied with refere body, decline in serum concentrat			
travenous catheterization was emp			
hepatic, and extremital arteriove			
levels obtained after oral admini	istration of the diureti	c in caps	ular form were
also determined.			
Radiochloride (Cl <sup>36</sup> ; ta == 2 termine the biologic decay period			
concentration, and recovery rates	b (urinary excretion re	Similar s	tudies are now
in progress in humans, both in co			
failure and other edematous state	es. The effects of inte	ke and dr	ugs on these
measurements are being studied.			
Earlier studies with radiose			
and further observations are cont	templated. Technical pr	oblems de	aling with
methods of assaying radioisotopes have been reported.	s and some of the physic	al proble	ms encountered
As time permits, studies are	being carried out conc	erning th	e untake of
various elements by erythrocytes,			
may be tested various antidiureti	c substances believed t	o be conc	erned with
the pathogenesis of congestive he			
edematous states. This model may	then be used to assay	other sub	
22. JRDB SN. PC.	IC & P.		Y. I. C.
JRDB PORM IA, 1 APR 1947	453		PAGE 1 OF 2 PAGES

27 June 94 RG 330, SOCRETARY OF DEFENSE ENTRY 346A - RDB, RESOURCES DIVISION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1946- 1954

Peripheral Blood Vessels

6-64-12-12

derived in the future.

Studies with the vectoroardiogram are progressing satisfactorily. The normal spatial vectorcardiogram is and will continue to be under observation because of its extreme variability. The patterns for left ventricular hypertrophy and right and left ventricular bundle branch block have been studied sufficiently to define them generally. These data indicate that the more or less empiric criteria for their electrocardiographic identification is in need of modification. It is hoped that additional studies will yield a more precise definition.

Mr. J. A. Cronwich has practically completed a movable unit which will allow recordings to be made in the wards of Charity Hospital as well as in the laboratory. Various types of electrical interference, which have offered the greatest difficulty, have delayed completion of the apparatus, but it is hoped that the unit will be in operation by autumn. Certain standardization factors have been defined for use in spatial vectorcardiography. Reports of these and other aspects of the problem are in press or in preparation for publication.

In addition to these main programs, several young persons have been in training in various aspects of cardiology to which the research program has contributed significantly. For example, Dr. F. J. Kelly, who is on an American Heart Association Fellowship, has completed a study of the rates of diffusion of radiosodium, radiomercury, and radiochloride across the blister surface of the normal human skin and across that of patients with congestive heart failure. This study, now in preparation for publication, has contributed to a better understanding of the exchange rates and related phenomena of electrolytes across the walls of blood vessels.

Other studies have been concerned with determinations of venous pressure in the superficial veins and the larger veins of the thorax and abdomen of normal resting man which are accessible by means of the cardiac catheter.

- f. Future Plans. Studies as indicated above will be continued.
- g. Detailed Reports. "Regression of a Radioactive Mercurial Diuretic from the Plasma of Man," Nature, 165:640, April 25, 1949.
  "A Stereoscopic Method for Obtaining Spatial Vectorcardiogram," Cronvich,

Abildskov, Jackson, and Burch (in press).

"An Approximate Derivation for Stereoscopic Vectorcardiograms with the Equilateral Tetrahedron," Cronvich, Abildskov, Jackson, and Burch (in press).
"A Derivation for Stereoscopic Vectorcardiograms and Analysis of Vector-

cardiograms by High-Speed Motion Pictures," Burch, Cronvich, Abildskov, and Jack on (in press).

"The Transfer of Radioactive Mercury across a Membrane Produced by the Application of Cantharides to the Skin of Man," Kelly, Swedberg, and Harp, J. Clin. Investigation (in press).

Page 2 of 2

454 MOTAUTE

27 June 94

RG 330, Socretary OF DEFENSE DIVILION, ROPORTS & STATISTICS BRANCH PROGRESS ROPORTS, DEC 1946- 1954 Box #



3. PROJ. NO. 6-64-01-04 RESEARCH AND DEVELOPMENT PROJECT-CARD-(NEW PROJECTS) 1. SEC. U 1. PROJECT TITLE Serum Proteins in Liver Disease B. REPORT DATE 31 7. SUR PISOD OR SUBJECT 6. BASIC FIELD OR SUBJECT PO-16 8. COGNIZANT AGENCY 12. CONTRACTOR AND/OR LABORATORY CONTRACT/W. O. NO. 9. DIRECTING AGENCY 10. REQUESTING AGENCY 18. RELATED PROJECTS 17. RST. COMPL. DATES RES 11. PARTICIPATION AND/OR COORDINATION DEV. TRST 14. DATE APPROVED OP EVAL. 15. PRIORITY 19. 20. REQUIREMENT AND/OR JUSTIFICATION No change. No change. b.

#### 21. BRIBP OF PROJECT AND OBJECTIVE

a. thru d. No change.

Background. In a study of the mechanism of the thymol turbidity test an unsuspected globulinemia existing in certain clinical disorders was observed./ Analyses were completed of experiments in which samples of normal and pathologic sera were centrifuged at 800 rps for four hours. Plastic tubes were used; after being quick-frozen each tube was cut at 10 levels to permit physical and chemical analyses, with particular reference to the distribution of protein./ experiments were done with a lower rate of centrifugation especially to catch the rapidly-sedimenting beta-globulin which has sedimentation constant of 20 S. The experiments suggest that this beta-globulin may influence the thymol turbidity test./ Ultracentrifugal studies confirmed previous reports that the serum bilirubin and injected bromsulfalein are largely bound to the albumin fraction. Entirely satisfactory electrophoretic patterns were obtained. / Serum Proteins and Lipids in Patients with Liver Disease. After four hours' exposure in a centrifu al field of 200,000 G., certain proteins sediment differentially. Separation is accomplished as described above; a new technique requiring only one slicing and analysis of two specimens increased the number of determinations for study./ In liver disease, lipoprotein complexes which float higher in the tube at lower specific gravities than those of normal serum appeared to be present; and a phosphorus containing lipid, which in normal serum sinks to the bottom, is decreased in hepatitis. / The x-protein of McFarlane was studied. Preliminary experiments showed that electrophoretically it consists of albumin and betaglobulin; chemically it contains a large part of the serum cholesterol and phospholipid of normals; and ultramicroscopically it consists of or at least in associated with large numbers of ultramicroscopic spheres. It was planned to correlate the changes found in "floatable" lipoproteins in liver disease with x-protein concentrations. Preliminary observations suggested that in liver 22. JRDB SN. IC & P. 1.

JRDB PORM IA. 1 APR 1947

SEG RESTRICTED AS 101

PAGE 1 OF 2 PAGES

DECTDICTED

Serum Proteins in Liver Disease

r

6-64-01-04

isease the amount of lipid occurring as x-protein is increased in comparison with the normal.///It was established that, in the main, fat and lipid compounds are distributed in the column of centrifugate according to their density. beavier proteins sedimenting create a density gradient and the lipid compounds tend to find their own density-level. / Although there is a high degree of parallelism in the distribution of cholesterol and lipid phosphorus in the upper MIF of the tube, there is little similarity in distribution in the lower half. This shows clearly that there are phospholipid compounds which are not associted with cholesterol. / When the distribution in the column of centrifugate o When the distribution in the column of centrifugate of albumin, globulins, neutral fat, cholesterol esters, free cholesterol, and phospholipids was determined in serum of normal persons, the results fell into consistent patterns. / The sera of patients with acute hepatitis frequently show an excessive quantity of low-density fat lipid compound in the density This material may be related to a diminished rate of removal sone 1.005-1.015. from the blood by the liver.

Progress. Work has been principally along two lines: detailed analyses of data preparatory to publication, and initiation of study by the investigators' procedure of the physiology of lipid phosphorus with P32./ The distribution in the column of centrifugate of normal serum of total protein nitrogen, specific gravity, albumin, globulins (as a group), free cholesterol, cholesterol esters, lipid phosphorus, neutral fat, and total lipids has been intensely studied statistically, and mean curves of distribution established with standard deviations at each of the 10 levels. These analyses show clearly that the distribution of lipids in hepatitis serum deviates from the normal pattern in a highly significant fashion. / Additional procedures have been used in providing a more complete description of the low-density lipids found in increased concentration in hepatitis serum./ A better understanding has been reached of the mechanisms of sedimentation and flotation underlying the distribution of proteins and lipids. It is hoped that this will lead to a more satisfactory mathematical expression of the factors determining the distribution of both substances. / Study of the interrelationships between the various lipid constituents at certain levels of the column of centrifugate shows that the lipid composition of the centrifugate at these levels may be described with small error by mathematical formulae derived in this project. / Experiments with radioactive phosphorus have been carried out on three normal subjects and one case of polycythemia which show that the rate of labeling of lipid phosphorus is especially rapid at some levels in the column of centrifugate and occurs at a low rate in other levels. These studies encourage the belief that this method separates lipids into components, some of which have highly specific functions. Theories have been formulated as subjects of future experiments which relate these components to the function of the liver.

Future. Studies will be continued as indicated. f.

Reports. The following manuscripts are being prepared under title, "Study of Serum Proteins and Lipids with the Aid of the Quantity Ultracentrifuge:" I. Procedure and Principal Features of Distribution of Protein and Lipids in the Centrifugate of Undiluted Normal Serum; II. The Mechanisms of Redistribution of Proteins and Lipids of Undiluted Serum; III. The Protein and Lipid Composition of the Ultracentrifugate of Normal Individuals; IV. The Serum Lipids in Acute Hepatitis; V. The Organization of the Cream Layer of Serum of Normal Individuals in a Post Absorptive State, and after a Lipid-Rich Meal, and from Patients with Hepatitis and Miscellaneous Disease States; VI. Organization of Lipids other than Cream Layer of Serum of Normal Individuals in a Post Absorptive State; VII. Differential Tagging of Lipid Phosphorus with PS2.

PECTDIOTEN

483

5

-11

the juncmuscle ion of ated. a arterial y obshe intraf genlocalemerg-

s in a passible h vasktremity.

mpathdisease
se
th reovet this
nts

> Extremi; June

ital 31:765DECTRICATED

Dr. Burch Tulane University

SEARCH AND DEVELOPMENT PROJECT CARD		W.NUE-64-12-12
. PROJECT TITLE Peripheral Blood V	escela	B. REPORT DATEST Dect
BASIC PIELD OR BUBUECT	1. SUB PIECO OF SUBJECT SU	P0-11
. COGNIZANT AGENCY	12. CONTRACTOR AND/OR LABORATORY	CONTRACT/W. O. N
DIBECTING AGENCY		
16. REQUESTING AGENCY	IN. RELATED PROJECTS	17. EST. COMPL. DAT
11. PARTICIPATION AND/OR COORDINATION		_RES.
		DEV.
	14. DATE APPROVED	OP TVAI
		Fy 18. FISCAL EST
	15. IPIONITY 16.	
·		
. No change . No change		
ade until they have reached th		avoids misinter-
retation or erroneous reports eriments have been completed. iven of articles with the follodium in Normal Hen, in Patien	In the report of December 194 owing titles: "The Biologic I	9 summaries were eczy Periods of

Diuretic.\*

For a better understanding of disturbance in electrolyte physiology in normal man and in subjects with congestive heart failure as an abnormal state, the behavior of several elements was observed by the use of radio-isotopes in control subjects, subjects with congestive neart failure, and subjects with

Pressure During Various Stages of Chronic Congestive Heart Failure; " Environmental Conditions which Initiate Sweating in Resting Man;" and "Concentration-Time Course in the Plasme of Man of Radiomercury Introduced as a Mercurial

other edematous states.

Radiomercury (Hg203.205; the 45 days) labeling a mercurial diuretic (Mercuhydrin) was studied with reference to the duration of its retention in the body, decline in serum concentration rates of turnover, and distribution. Intravenous catheterization was employed to determine the time-course of renal, heratic, and extremital arteriovenous differences. Urinary excretion and serum levels obtained after oral administration of the fluretic in capsular form were also determined.

Radiochloride (C135; the x 106 yes.) was studied in dogs in order to

22. JPDB SN. FC. IC & P. Y. I. C.

JRDB FORM 1A. 1 APR 1947

MOTHOLD ACTOR 537

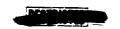
PAGE 1 OF 3 PAGES

RG 330, Socretary OF Detense RG 330, Socretary OF Detense Division, Entry 3464 - RDB, Resources Division, Reports & Stratistics Breaker Prochess Reports, Dec 1954

Box #

of 5

MND BIZCEA



Peripheral Blood Vescels

6-64-12-12

determine the biologic decay periods (urinary excretion rates, decline in serum concentration, and recovery rates) and chloride space. Similar studies were in progress in mimans, both in controls and in patients with congestive heart failure and other edematous states. The effects of intake and drugs on these measurements were being studied.

Earlier studies with radiosodium (Na<sup>22</sup>; t) yrs.) had been reported, and further observations were contemplated. Technical problems dealing with methods of assaying radioisotopes and some of the physical problems encountered had been reported.

As time nermitted, studies were being done concerning the uptake of various elements by erythrocytes, in an effort to establish a model with which may be tested various antidiuratic substances believed to be concerned with the pathogenesis of congestive heart failure, retention of electrolytes, and edematous states.

This model may then be used to assay other substances derived in the future. Studies with the vectorcardiogram were progressing satisfactorily. The normal spatial vectorcordingram was being observed because of its extreme variability. The patterns for left ventricular mypertrophy and right and left ventricular bundle branch block were studied sufficiently to define them generally. These date indicated that the more or less empiric criteria for their electrocardiographic identification needed modification. It was hoped that additional studies would yield a more precise definition.

Mr. Cronwich had nearly completed a movable unit which would allow recordings to be made in the wards of a hospital as well as in the laboratory. Verious types of electric interference, which had offered the greatest difficulty, delayed completion of the apparatus. Certain standardization factors had been defined for use in spatial vectorcardiography. Reports of these and other aspects of the problem were in press or in preparation for publication.

In addition to these main programs, several young persons were trained in various aspects of cardiology to which the research program had contributed significantly. For example, Dr. F. J. Kelly, completed a study of the rates of diffusion of radiosodium, radiomercury, and radiochloride across the blister surface of the normal human skin and across that of patients with congestive heart feilure. This study, which was being prepared for publication, contri-buted to a better understanding of the exchange rates and related phenomena of electrolytes across the walls of blood vessels.

Other studies concerned determinations of venous pressure in the superficial veins and the larger veins of the thorax and abdomen of normal resting man which are accessible by means of the cardiac catheter.

Progress. The following is a summary of an article entitled "The Spatial

Vectorcardiogram in Right Bundle Branch Block," by Abildskov et al.

The QRS sE-loops of twenty-four subjects with electroardiographic evidence of right bundle branch block were described. The records were divided into 3 groups, on the basis of clinical and roentgenographic evidence of wentricular hypertrophy.

The QRS sE-loops of the subjects with left ventricular hypertrophy and right bundle branch block exhibited considerable similarity, suggesting that it may be possible to recognize this combination of lesions by spatial vectorcardingrams.

Records obtained from small groups of subjects with isolated right ventricular hypertrophy and right bundle branch block and with right bundle branch block not associated with cardiac enlargement seemed to have bese distinctive Page 2 of 3

538

Periphe:

featurce cardiogra The of Temper investige

heart fai

By c

respirato stages of trol subj ive failu atmospher RH) for p The failure" monary ra Gallon rk stress of heart fai tolerance controls. vironment uniform &

Thes disease d need for f. Futu Act it w. new propo Council :

Repo

27 JUNE 94 RG 330, Socretary Or Defense ENTRY 346A - RDB, ROSOURCOS DIVISION, ROPORTS : DEC 1946- 1954 Box # 28

-

Peripheral Blood Vessels

6-6-12-12

idies tive es on

2

ted, with intered

various elebe tested enesis ates. ure. The e varift ventrially. ectro-

record-Vericulty, d been er as-

itional

ned in ted stem of ster tive ntrienm of

pereting

patial

ridence .nto 3 cular

that tector

ventrirench ctive 3 features and indicate the desirability of further study of the spatial vector-cardiogram in these states.

"The Response of Patients with Congestive Heart Failure to Acute Elevation of Temperature and Humidity," by Dr. G. S. Berenson. Observations were made to investigate the intolerance of patients with cardiac disease and congestive heart failure to stress of a hot and mumid environment.

By clinical methods, including measurements of blood pressure, cardiac and respiratory rates, and rectal and skin temperatures, 13 patients in various stages of congestive failure were studied. Comparisons were made with 13 control subjects. In 3 experiments, 1 control subject and 1 patient with congestive failure were studied simultaneously. Following observations in comfortable atmospheric conditions, response to a hot and humid atmosphere (40 ± 2° C, 85% RE) for periods of 40 to 114 minutes was noted.

The heated surroundings precipitated scute attacks of "left Ventricular failure" (cardisc asthma) characterized by severs dysphea, orthophea, and pulmonary rales, associated with apprehension in 5 subjects with cardiac disease. Gallon rhythm developed or was accentuated in 9 patients. Ability to withstand stress of a hot, humid environment was definitely less in subjects with congestive heart failure. This group exhibited primarily cardiovascular and pulmonary intolerance, whereas many central nervous system disturbances developed in the controls, who were able to endure sufficiently prolonged exposures to the environment. The cardiovascular reactions in control subjects tended to be more uniform and were characterized especially by elevation of pulse pressure.

These experiments indicate that patients with certain types of cardiac disease do not tolerate well a hot and humid atmosphere and also suggest the need for control environmental atmosphere during therapy.

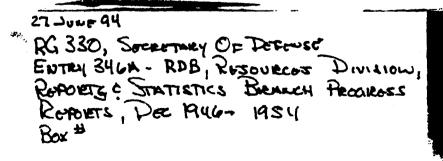
f. Future. Since the present contract was negotiated under the War Powers Act it will be necessary to draw up another contract for future work. That new proposal will be referred in the usual manner to the Wational Research Council for evaluation.

g. Reports. As shown under Progress.

Page 3 of 3

COMMUTAL

. 3:



-

NND 813064



#### 99-02-03

O. Fate
o four
the antergrew under
ined; howc technique,
r of arterr as long
32 by the
eing made
orm a fib-

ation of
herent disnt bacterned to innd others.
eries of
will be
erial
rocurement
ial injur, however,
aken from
ransplant
entiel

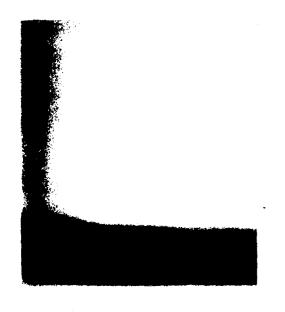
#### DISTRIBUTION LIST

Executive Officer, SGO
Medical Consultants Division, SGO
Neuropsychiatry Consultants Division, SGO
Surgical Consultants Division, SGO
Freventive Medicine Division, SGO (Med. Intelligence & Env. San. Branches)
Supply Division, SGO
Dental Division, SGO
Medical Plans and Operations Division, SGO
Medical Plans and Operations Division, SGO
Medical Plans and Operations Division, SGO
Ristorical Division, Army Medical Library
Editor, Bulletin of the Army Medical Department
Technical Information Officer, SGO
RCAMC Liaisen Charactery, Lawrence, Mass.
Redical Library (Acquisitions Division & Documents Section)
RCAMC Liaisen Calculation, SGO
RCAMC

571

acements.

of 3



RG 330, Socretney OF DEFENSE ENTRY 346A - RDB, RESOURCES DIVITION, REPORTS & STATISTICS BRANCH PROGRESS REPORTS, DEC 1946- 1954 Box #

NND BIRDGH TH

#### DISTRIBUTION (cont'd.)

Lt. Cdr. P. T. Rees, Department of the Navy Medical Limison Officer, Defence Research Member, Canadian Joint Staff, D. C. Medical Section, GHQ, Far East Command, APO 500, San Francisco CO, 406th Med. Gen. Lab., APO 500, San Francisco Air Materiel Command, Aero Medical Lab., Wright Field, Dayton, Ohio Air Materiel Command, Aero Medical Lab., Wright Field, Dayton, Ohio School of Aviation Medicine, Randolph Field, Texas Chairman, Division of Medical Sciences, NRC Dr. Darling, Division of Medical Sciences, NRC Mrs. Mildred S. Ragan, Cte on Survey of Food & Nutrition Research, NRC QM Food & Container Institute, Chicago Director, Research Reports, Military Planning Division, CQMG Quartermaster General, R&D Branch, Military Planning Division Librarian, Medical Library, Veterans Administration Librarian, Research & Development Board Intalligence Division. GSUSA. Intelligence Group, Scientific Branch Librarian, Medical Library, Veterans Administration
Librarian, Research & Development Board
Intelligence Division, GSUSA, Intelligence Group, Scientific Branch
Procurement Planning Branch, Logistics Division, GSUSA
Research & Development Group, Logistics Division, GSUSA (Dev Br.)
Director of Logistics, GSUSA, R&D Group
Medical Division, Army Chemical Center, Md.
Chief, Engineering & Technical Service, Signal Corps
Engineer Board, Fort Belvoir, Va.
R&D Division, Chief of Engineers, Washington, D. C.
Chief of Ordnance, R&D Service
Civil Aeromautics Administration, Medical Division
Assistant Military Attache (Medical), American Embassy, London
Col. H. C. Hine, Jr., c/o Director of Wespons & Dev., Whitehall, London
Exchange Information Section, Research Grants Div, NIH; and Library, NIH
Department of Commerce, Office of Technical Services
Transportation Officer, Chemical Corps, Camp Detrick, Md. (Tech. Library)
Dr. Walter R. Kirner, Chemical-Biological Coordination Center, NRC
Div. of Military Applications, Mil. Ln. Cte to Atomic Emergy Commission
Medical Liaison Officer, British Joint Services Mission, 1910 K St., N. W.
Capt. Curtis Artz, Surgical Service, Brooke GH, BAMC
Armed Forces Staff College, Norfolk, Va.
Dr. C. F. Schwidt, University of Pa. School of Medicine, Philadelphia
Dr. E. F. Adolph, School of Medicine & Dentistry, University of Rochester, MY
Dr. D. H. K. Lee, Isaiah Bowman Sohl of Geography, Johns Hopkins U, Baltimore
Dr. E. M. Landis, Harvard U. School of Medicine, Boston
Dr. L. Eichna, College of Medicine, MYU, New York City
Dr. L. P. Herrington, John B. Fierce Foundation, Yale, New Haven
Major W. F. Sheely, Medical Research Division, Office of Air Surgeon

#### Director, Logistics Div, GSUSA

Director, Logistics Div, GSUSA

Chf Naval Op, ATT: Op-344H

BuMed & Surg, Mavy, ATT: Res Div

BuMed & Surg, Mavy, ATT: Res Div

BuOrd, RAD Div, Mavy

Bu Supplies & Acets, Mavy, OL-5H

Chf, R/E Div, TC

ONR, Project Status Br

Director, Maval Research Lab

Commandant, Marine Corps

Department of AF Liprary, AF Base, Air University, Maxwell Field, Alabama

Chief, Standards Frank, Procurement Group, Logistics Division, GSUSA

Lt. Col. William E. Jennings, Cornell U., Ithaca, New York

CO, Trans. Dev. & Experimental Sta., NYPOE, Brooklyn

27 2000 94

RG 330, Socretary OF Defense ENTRY 346A - RDB, ROSOURCOZ DIVILION, ROPORTS & STATISTICS BRANCH PROGRESS ROPORTS, DEC 1946- 1954 Box #

Chf Naval Op, ATT: Op-344H

NND BIZORA

c.



#### DISTRIBUTION (cont'd.)

Chief, RAD Div, OAC/S, G-4, RAD Planning Br, Rm 3B 487 Chief, Procurement Div, OAC/S, G-4, Standards Br, Rm 2B 654 Chief, R&D Div, OAC/S, G-4 (Dr. Gard), Rm 3b 466 CG, Engineer R&D Laboratories, Ft pelvoir, Va. CO, Arctic Test Branch, AFF, APO 733, Scattle CO, Army Map Service, D. C., ATT: ESID Snow, Ice & Permafrost Research Establishment, PC Bldg, St. Faul, Minn. Chief of Naval Operations, Op-3423 BuOrd, R&D Div, Records Section-Code Rex 2, D. C. BuOrd, Technical Library Code Ad-3 BuS&A, R&D Br, Code S-06 ONR, Project Status Br, Code 2060, ARL Special Devices Center, ONR, Sands Point, LI Hq, USAF, Control Br, DOSD, Rm 4D 327 RALD Corporation, 1500 4th Street, Santa Monica, California Human Resources Research Labs, Bolling al Base AU Euman Resources Research Institute, Maxwell AFB, Ala.
Arctic Aeromedical Laboratory, APO 731, Seat de
Hq, Human Resources Research Center, ATC, Lackhand aFB, San Antonio
Human Resources Research Center, Det 1, Randolph AFB, San Antonio
Human Resources Research Center, Det 2, Mather AFB, Sacramento
Human Resources Research Center, Det 3, Chanute AFB, Rantoul, Ill.
Medical Safety Br, Flying Safety Div, Fld Ofc of Air Insp. Langley Field
CG, AMC, Wright-Patterson AFB, Dayton, ATF: MIREAX-6
CG, AMC, Wright-Patterson AFB, Dayton, ATT: MORRIAL
CG, AMC, Wright-Fatterson AFB, Dayton, ATT: MORRIAL
CG, AMC, Wright-Fatterson AFB, Dayton, ATT: MORRIAL AU Euman Resources Research Institute, Maxwell AFB, Ala. CG, AMC, Wright-Fatterson AFB, Dayton, ATT: MOREMAN

27 2000 94

RG 330, Socretary OF Defense ENTEN 3464 - RDB RESOURCES REPORTS & STATISTICS BRANCH PROGRESS ROPOLETS, DEC 1946- 1954 Box #