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VOL. NO. #1

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FOLDER # 928 FALLOUT, GENERAL

CERTIFICATE ~~CONFIDENTIAL~~

I CERTIFY THAT I HAVE HAD ACCESS TO THE ATTACHED FILE ON THE DATES INDICATED BELOW, AND THAT NO PAPERS OR OTHER MATERIAL WERE REMOVED FROM THE FILE WHILE IN MY POSSESSION. PLEASE NOTE: TO BE CERTIFIED BY EACH PERSON USING THIS FILE.

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BKE-44

CONFIRMED TO BE UNCLASSIFIED BY
DNA, CHIEF, ISTS
John F. Bilbe
Date: 20 July 1994

DASAMD 928

27 AUG 1959

SUBJECT: Funding of Studies at the Medical College of Virginia

TO: The Surgeon General
Department of the Army
Washington 25, D. C.
ATTN: Research and Development Division

1. Reference is made to application for research grant received from the Medical College of Virginia for the research project entitled, "Evaluation of Thermal Lesions of the Ocular Fundus in Rabbits and Man."

2. The Defense Atomic Support Agency (DASA) agrees to furnish the Surgeon General, Fiscal Year 1960 funds in the amount of $7,940.70 for the prosecution of the research project outlined in the application for the research grant. It is requested that this research be funded contractually rather than on a grant basis.

3. Change No. 4 to allotment advice 10-7150 is being issued to the Walter Reed Army Medical Center under separate cover.

4. In connection with this project, it is requested that:

a. Your office arrange for the submission of DD Form 613 to the Director of Defense Research and Engineering with a copy to DASA, showing the DASA as a participating agency in the program, and that one copy be forwarded directly to DASA, Attention: Deputy Chief of Staff, Weapons Effects and Tests.

b. The DASA be furnished with a copy of the project directive.

c. The DASA be furnished five (5) copies of quarterly progress reports.

OFFICE SYMBOL	1.	2.	3.	4.	5.
GRADE AND SURNAME OF COORDINATING OFFICERS					

E69034

DRAFTER IDENTIFICATION: _____ _____ _____ _____ _____
Rank or Grade Surname Initials of Typist Rm No Tel Ext

DASAMD 928
SUBJECT: Funding of Studies at the Medical College of Virginia

d. Prior to publication and distribution, reports, technical documents or papers, prepared in connection with this project or as a result of this project, be submitted to this headquarters for review, security classification, approval for publication, provision of a distribution list, and assignment of, and instructions for use of, DASA control numbers. Additional distribution may be made at the discretion of the monitoring Service agency subject to appropriate security regulations.

e. Approval of this headquarters be obtained prior to the purchase of any item of capital equipment whose acquisition cost is $500.00 or more. In each case where an item of capital equipment costing more than this amount is proposed to be purchased, this headquarters will ascertain whether or not the equipment required or a suitable substitute is available within DASA assets. Therefore, each such request should specify the item by stock number, model, nomenclature, and manufacturer.

f. For items of capital equipment costing less than $500.00 the Service agency project officer determines whether the best interests of the Government will be served in terms of cost and time by local procurement or by acquisition from Field Command, DASA controlled assets. This equipment, available to all contracting agencies, is listed in the "Catalog of DASA Test Equipment and Related Items," prepared and published by Commander, Field Command, DASA, Albuquerque, New Mexico, ATTN: FCWT2. A copy of the catalog may be obtained from Commander, Field Command.

5. All capital property furnished by DASA for use in connection with the work and/or purchased with project funds will be appropriately marked, maintained, and accounted for under the provisions of applicable property accounting procedures. Upon termination of the project, ownership of such property will be determined by negotiation with your headquarters. In order to effect such negotiation, it is requested that upon conclusion of the project, Headquarters, DASA be furnished an inventory of all such property purchased with project funds, the inventory to show serial number, make, model, manufacturer, and condition.

the retinal burn problem. Control Number 84090 applies

K. M.

M/R: This proposal from the Department of Ophthalmolgy, Medical College of Virginia, has been furnished primarily at the instigation of this headquarters to supply some early and urgently needed information in the field of retinal burns. The people as listed in this proposal have the necessary equipment and experience to carry out such work. In addition they are an extremely diligent group of workers that can provide the necessary information as requested by this hq. While waiting for this proposal to be approved several members of this group have proceeded on their own and have already made extensive headway in this pgm. A recent visit to MCV by Capt. Barton and Lt. Wray indicated that this proposal will give a running start to the solution of

Copies furnished: Medical College of Virginia Walter Reed Army Medical Center

OFFICE SYMBOL	1. DASAMD	2. DASAET	3. DASABF	4. DASALG	5. DASAAG
GRADE AND SURNAME OF COORDINATING OFFICERS	Capt Barton	[illegible]	[illegible]	[illegible]	EDWARD N. PARKER Rear Admiral, USN Chief

DRAFTER IDENTIFICATION: CAPTAIN JOHNNY M. BARTON 8/19/59(bdj) IB684C 76786
Rank or Grade Surname Initials of Typist Rm No Tel Ext

CONFIRMED TO BE UNCLASSIFIED BY
DNA, CHIEF, ISTS
John F. Bilsky
Date: 20 July 1994

Application for Research Grant

Defence Atomic Support Agency, Washington 25, D. C.

Title: "Evaluation of Thermal Lesions of the Ocular Fundus in Rabbits and Man"

Name and Title of Research Program Director	Address
DuPont Guerry, III, M.D. Professor and Chairman Department of Ophthalmology	2015 Monument Avenue Richmond, Virginia
Name of Institution	**Address**
Medical College of Virginia	1200 East Broad Street Richmond 19, Virginia
Name of Department	**Address**
Department of Ophthalmology	Medical College of Virginia Box 262 Richmond 19, Virginia
Name of Department Head	**Address**
DuPont Guerry, III, M.D.	2015 Monument Avenue Richmond, Virginia
Name of Financial Director	**Address**
W. F. Tompkins Comptroller	Medical College of Virginia Richmond 19, Virginia
Name and Title of Official Authorized to Sign for Institution	**Address**
Dr. R. Blackwell Smith, Jr. President	Medical College of Virginia Richmond 19, Virginia

President

Research Director

Cost:

A. **Salaries:**

DuPont Guerry, III, M.D.	$ ——.	
Herbert Wiesinger, M.D.	——.	
Walter J. Geeraets, M.D.	——.	
Dr. William T. Ham, Jr.	——.	
Guy Chan, M.D.	——.	
Pearl Bazacos	——.	
Charles Blue, Research Assistant (one-fourth time)	1,000.00	
F. H. Schmidt	——.	
R. C. Williams	——.	
R. S. Ruffin	——.	
Dr. Malcolm Turner	——.	
Overhead calculated at 26.07% of salaries according to recent contracts with office of the Surgeon General	260.70	
TOTAL SALARIES		$ 1,260.70

B. **Supplies and Equipment:**

Electronic device and shutter system for Zeiss light coagulator (approx.)	1,500.00	
2 Replacement high pressure Xenon bulbs	900.00	
70 Rabbits ($4. each)	280.00	
Food and maintenance for rabbits for approximately 6 months ($ .10 per day)	1,260.00	
48 Rabbit cages	1,500.00	
1 Precision rotary microtome	740.00	
TOTAL SUPPLIES AND EQUIPMENT		6,180.00

C. **Travel, Communication, Miscellaneous:** 500.00

TOTAL $ 7,940.70

Expected Duration of Study: Twelve months

BUDGET

Subject of Study: Evaluation of Thermal Lesions of the Ocular Fundus in Rabbits and Man

Institution: Medical College of Virginia

Address: Department of Ophthalmology
M.C.V. Station
1200 E. Broad Street
Richmond, Virginia

Personnel:

Principal Investigators:

DuPont Guerry, III, M.D.

Herbert Wiesinger, M.D.

Walter J. Geeraets, M.D.

Consultants:

Dr. William T. Ham, Jr.
Dr. Malcolm Turner

Co-Workers:

Guy Chan, M.D.
Pearl Bazacos
Charles Blue
F. H. Schmidt
R. C. Williams
R. S. Ruffin

Facilities Available:

1 Zeiss light coagulator

3 Research laboratories, including laboratory for eye pathology

Evaluation of Thermal Lesions of the Ocular Fundus in Rabbits and Man

I. Research Plan

A. Specific Aims:

To ascertain the thermal threshold for production of chorioretinal burns in man, as compared to rabbit. Only such lesions as can be produced by irradiances sufficient to produce lesions in less than 250 ms will be studied. The relation of irradiance and image size upon the threshold will be studied.

B. Method of Procedure:

Instrumentation. The Zeiss light coagulator will be used as a light source. Previous calibrations of this instrument with the water flow calorimeter have shown a possible maximum irradiance of 1.9 cal/cm^2/sec at the cornea which makes possible a calculated dose at the retina of up to 90 cal/cm^2/sec . Although the water flow calorimeter utilized for this calibration had previously been cross calibrated against standards from NRDL and NML, another calibration just before this study starts should be carried out by one of these standards. The Zeiss light coagulator makes possible an almost continuous range of irradiance from 0.5 cal/cm^2/sec. to the maximum. The only alteration necessary to make this instrument applicable for this study is a timing device which can easily be incorporated. It is contemplated to measure exposure times electronically to milliseconds. 6 different size apertures are incorporated

in the machine to study the influence of retinal image size upon threshold.

The study will be divided into three main experimental groups:

a. Light transmission through the ocular media compared with the light transmission through the ocular media plus retina and choroid. The main questions in this block are:

(1) to determine the part of the spectrum which is most active in the structures of the ocular fundus in producing coagulation of the tissue, i.e., the wavelength with highest absorption in the different layers of the fundus.

(2) to find the ocular structures which are most involved in heat absorbancy.

The transmission will be measured in a range from 350 up to 1400 m wavelength. In this way, the absorbancy for the most specific wavelength of the spectrum in retina and choroid can be detected. Both curves will be plotted against a control blank.

Method: The pupils of the rabbit eyes are dilated to a maximum, and the rabbit is then sacrificed by a 1:1000 epinephrine solution, in order to prevent miosis after enucleation of the globe. After enucleation, a 9 mm. trephine hole is made extending through the sclera of the posterior pole of the globe. Sclera and choroid are separated by blunt dissection, using a blunt, slightly curved spatula. The scleral flap is excised with scleral scissors. The eye is then placed in a special container, allowing the cornea to hang freely down and with the scleral

opening on top. Both ends of the container are closed by glass caps and the container is placed in a Beckmann D K for transmission studies as described above. Thereafter, the choroid and sclera underlying the scleral hole are resected and the transmission through the globe measured in the same way as before. The blank control is then taken through the container without the globe and used as correction. The factor of blood flow is not considered in this study.

b. Histological examination of produced burn lesions in the fundus.

The main questions in this study are:

(1) to determine the lowest light intensity which is able to produce histological observable changes in human and rabbit eyes at a given exposure time and image size.

(2) to compare produced lesions in the posterior part of the eyes with those produced in the periphery

(3) to find a relationship between different degrees of ocular fundus lesions and the energy necessary to produce them

For all animal experiments male chinchilla grey rabbits will be used, weighing between 2 and 3 kg. Only those animals which present a medium pigmented fundus under ophthalmoscopic examination will be selected for light transmission and light coagulation studies. Rabbits with a lightly or darkly pigmented fundus will be discarded from the experiment.

A calibrated Zeiss light coagulator will be used and

its spectral distribution determined. The instrument is provided with an electronic shutter in order to achieve the most accurate exposure times.

The fundus lesions will be produced with 8 different light intensities, 5 different apertures and 2 different exposure times. The various combinations employed are products of the variables which are tabulated as follows:

Intensities	Diaphragm	Exposure Time	Enucleation After Exposure
1	0.5	10 ms	0
2			
3	1.5		3 Days
4		100 ms	
5	3.0		1 Week
6			2 Weeks
7	4.5	500 ms	3 Weeks
8	3.0		4 Weeks

The products of permutations and combinations of the first 3 factors will provide 120 different degrees of thermal energy.

The produced lesions will be recorded by fundus photographs immediately before enucleation of the eyes for histological studies. Enucleation is planned in 8 different time intervals after exposure.

Comparative studies will be made on rabbit and human eyes in respect to pigment distribution, absorbing spectrum and the different physical (optical) properties.

c. Experiment in Man

A number of patients receiving light coagulation treatment for various conditions will be utilized in this study.

In cases of retinal detachment, tumors, neovascularization, etc., it is frequently necessary to place one or more burns into clinically normal appearing areas of the retina.

By obtaining data on the burn threshold of human retinas as compared with the rabbit, one should be able to calculate more realistically the retinal hazard to man from atomic fireballs. Most calculations in the past have used extrapolations of rabbit data which may or may not be correct.

The following data can be obtained from these human burns:

1. By carefully measuring exposure times at a given intensity and aperture, the thermal dose necessary to produce a lesion of certain clinical characteristics can be calculated.
2. By placing some subclinical exposures that do not produce any ophthalmoscopically visible lesions, a safe range of thermal intensity can be arrived at. Between the calculated dose for a mild clinical lesion and a "safe dose" probably lies the E. D. 50.
3. By exposing different human eyes to exposures of the same intensity, time and aperture and observing the result individual variations will become apparent. Also comparing data obtained under No. 1 of individual eyes will add in the evaluation of difference from eye to eye such factors as fundus pigmentation and refractive errors should be responsible for individual variations.

4. Clinical observations, after being substantiated by fundus photography, should bring about clinical differences in the healing phase of a burn between rabbit and man. Such factors as post-burn edema, pigmentation and atrophy will be investigated as to time of appearance and severity.

d. Facilities Available.

The facilities of the Department of Ophthalmology, including the eye pathology laboratory, are available for this study. A Zeiss light coagulator is available. There is ample room for experimental animals in the animal house of the Medical College.

Previous Work Done on This Project.

Extensive work on the thermal threshold of the rabbit retina has been done previously in this laboratory. A high intensity carbon arc light source was used for this experiment. The results of this work are summarized in the paper entitled, "Flash Burns in the Rabbit Retina: As a Means of Evaluating the Retinal Hazard from Nuclear Weapons" in the American Journal of O hthalmology.

Personal Publications Related to This Work.

Ham, W. T., Jr., Wiesinger, H., Guerry, DuPont, III, Schmidt, F. H. Williams, R. C., Ruffin, R. S., and Shaffer, M. C.: Experimental Production of Flash Burns in the Rabbit Retina. Amer. J. Ophthalm., 43: 711 (May) 1957.

Ham, W. T., Jr., Wiesinger, H., Schmidt, F. H., Williams, R. C., Ruffin, R. S., Shaffer, M. C. and Guerry, DuPont, III: Flash Burns in the Rabbit Retina: As a Means of Evaluating the Retinal Hazard from Nuclear Weapons. Amer. J. Ophthalm. 46:, No. 5, Part I, November, 1958.

Guerry, D., III, and Wiesinger, H.: Experiences with Light Coagulation. Trans. Amer. Ophthalm. Soc. and Amer. J. Ophthalm., 1958.

Guerry, D., III, Wiesinger, H. and Ham, W. T., Jr.: Photocoagulation of the Retina. Report of a Successfully Treated Case of Angiomatosis Retinae. Amer. J. Ophthalm. 46 (4), 463, Oct. 1958.

Wiesinger, H., Schmidt, F. H., Williams, R. C., Tiller, C. O., Ruffin, R. S., Guerry, D., and Ham, W. T., Jr.: The Transmission of Light Through the Ocular Media of the Rabbit Eye. Amer. J. Ophthalm. 42: 907 (Dec.) 1956.

Results Obtained by Others.

Buettner, K., and Rose, H. W.: Eye Hazards from an Atomic Bomb. Sight-Saving Review, 23: 1, 1953.

Byrnes, V. A., Brown, D. V. L., Rose, H. W., and Cibis, P. A.: Chorioretinal Lesions Due to Thermal Radiation from the Atomic Bomb. Arch. Ophth., 55: 909 (June) 1956.

Rose, H. W., Brown, D. V. L., Byrnes, V. A., and Cibis, P. A.: Human Chorioretinal Burns from Atomic Fireballs. Arch. Ophth. 55: 205 (Feb.) 1956.