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Committee on Growth
NATIONAL RESEARCH COUNCIL
2101 Constitution Avenue
Washington 25, D.C.

Acting for the

AMERICAN CANCER SOCIETY

APPLICATION FOR A GRANT IN CANCER RESEARCH

(Submit in duplicate, retain third copy)

Date: August 1, 1954

1. Name of Institution: University of California Medical Center, School of Medicine, Department of Medicine,
2. Address of Institution: 405 Hilgard Avenue, Los Angeles 24, California
3. Name, official position and address of responsible investigator: Samuel H. Bassett, M.D., Chief, Research Service, Veterans Administration Center, Los Angeles; and Clinical Professor of Medicine, University of California Medical Center, Los Angeles.

Principal Investigator: Clyde A. Dubbs, Ph.D., Biochemist, Metabolic Research Unit, Veterans Administration Center. Los Angeles.

Associate Investigator: William S. Adams, M.D., Associate Professor of Medicine, University of California Medical Center, Los Angeles; and Attending Physician, Veterans Administration Center, Los Angeles.

4. Subject of investigation: (Brief title of project)

Chemical Studies on Human Plasma Proteins in Abnormal Conditions.

a. Background and present state of problem.

While there have been numerous electrophoretic studies on human plasma proteins in abnormal conditions (determining the contents of albumin, fibrinogen, alpha₁, alpha₂, Beta and Gamma globulins and abnormal components), chemical fractionation of the amino acid content that could profitably accompany and extend the clinical findings have been largely neglected. Some notable exceptions include the comprehensive amino acid analyses by many investigators of urinary Bence-Jones Proteins (methionine deficient (1)) and most recently similar analyses of abnormal plasma fractions as prepared by conventional salt fractionation of myeloma plasma (2). Recent technical advances in fractionation procedure (3,4) now make more thorough investigation along these lines entirely possible and desirable.

Earlier studies of ion-binding, which indicated for example that myeloma proteins may have greatly increased calcium-binding activity (5), should also be followed up now by more reliable fractionation and analytical procedures (3,6,7) and can be guided by the extensive ion-protein work of Klotz (8) and others on normal proteins.

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References
1.

4. (Continued)

b. Plan of attack.

We desire to isolate and study relatively pure protein subfractions, many of which may prove characteristic and most significant in a given disease. Satisfactory information cannot be obtained merely by determining the average properties of gross fractions in which the significant subfractions may often remain masked by bulk proteins.

Multiple myeloma and other plasma characterized by profound protein abnormalities are amply available to us. This plasma, and a normal plasma for comparative purposes, will be fractionated simultaneously by the very mild, but effective, electrophoresis-convection procedure (3). Early runs can provide perhaps four gross fractions (albumin, alpha, beta, and gamma globulins) for preliminary study, followed by more thorough subfractions as later indicated. Others (3) have demonstrated that at least eight distinct subfractions of bovine gamma-globulins can be prepared by electrophoresis-convection, and have also given evidence that production of artifacts is minimized in the process.

After preliminary physicochemical characterization of each fraction by standard electrophoretic procedures (for homogeneity and several physical constants), primary attention will focus on (a) amino acid composition, (qualitative analysis by small-scale paper chromatography; quantitative analysis by the Moore and Stein elution ion-exchange column (4)) and (b) ion-binding properties. Binding capacity and bond strength, especially for calcium, will be determined by equilibrium dialysis (6) and one or two new rapid ion-exchange methods; one of these will be developed in our laboratory, based on Schubert's ion-exchange equilibrium method (7). The effect of varying pH and electrolyte composition will also be studied.

c. Significance in cancer research and the relation of anticipated results to more general problems in this field.

The bizarre electrophoretic patterns of the plasma proteins that have been reported in Multiple Myeloma and some other malignant states (9) suggest but do not prove that abnormal proteins may be characteristic of these conditions. For example, it is not certain whether the unusually high protein concentrations observed particularly in the beta and gamma regions of the electrophoretic spectrum are actually due to abnormal proteins or to increases in concentration of normally occurring plasma constituents which are usually present in such small amounts that they escape identification. A better resolution of the problem may be achieved by studying the amino acid composition which is prerequisite to understanding how any protein, normal or abnormal, is synthesized by the body. The amino acid composition of a protein as well as their spatial relationships within the protein molecule determine the ion-binding activity and this apparently simulates on a simplified scale the same phenomena that are involved in enzyme-substrate and antibody-antigen interactions. Ion-binding is, moreover, a prime regulator of mineral metabolism; and in multiple myeloma, calcium-binding activity of protein may play a leading role in the generalized process of bone decalcification that is characteristic of this disease.

A new method for the determination of protein-bound calcium possibly suitable for routine work may develop as a result of this study.

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2. Grisolia, Frances T., Cohen, P. P. Amino Acid Analysis of Serum Proteins in Multiple Myeloma. *Cancer Research*, 13, 851 (1953).
3. Cann, J. R., Brown, R. A., Kirkwood, J. G., Application of Electrophoresis-Convection to the Fractionation of Bovine Gamma-Globulin. *J. Biol. Chem.*, 181, 161 (1949).
4. Moore, S., Stein, W. H., Chromatography of Amino Acids on Sulfonated Polystyrene Resins. *J. Biol. Chem.*, 192, 663 (1951).
5. Rawson, A. J., Sunderman, F. W., Studies in Serum Electrolytes. XV. The Calcium-Binding Property of the Serum Proteins (Multiple Myeloma, Lymphogranuloma Venereum and Sarcoidosis), *J. Clin. Inv.*, 27, 82 (1948).
6. Katz, S., Klotz, I. M. Interactions of Calcium with Serum Albumin. *Arch. Bioch. Bioph.*, 44, 351, (1953).
7. Schubert, J. Ion Exchange Studies on Complex Ions as a Function of Temperature, Ionic Strength, and Presence of Formaldehyde. *J. Physical Chem.*, 56, 113, (1952).
8. Klotz, I. M. Nature of Some Ion-Protein Complexes. *Cold Spring Harbor Symposium Quan. Biol.*, 14, 97 (1950).
9. Adams, William S., Alling, E.L. and Lawrence, J.S. Multiple Myeloma, its Clinical and Laboratory Diagnosis with Emphasis on Electrophoretic Abnormalities. *Amer. J. Med.*, VI:2, pp. 141 (1949)

5. Requirements for investigation:

a. Personnel (professional and technical assistants. Briefly indicate duties and approximate annual salaries).

1. Senior Laboratory Technician (Chemistry)

Duties: To perform, under general technical supervision and according to specified procedures (with freedom to vary and improve any details of procedure):

- (a) Electrophoresis-convection fractionation
- (b) Paper chromatographic analysis
- (c) Elution ion-exchange chromatographic analysis
- (d) Calcium and other mineral determinations
- (e) Associated Work.

Salary: Approximate per year

\$3,900

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5. (Continued)

2. Part-Time Research Assistant

Duties: To prepare charts and grafts, assisting in laboratory duties, library research, plus such other duties as may be required by the investigators during the course of our study.

Salary: Per year - 50% time

\$2,000
\$5,900
<u>531</u>
\$6,431

9% S.E.R.S.

b. Materials (equipment and supplies)

1. Equipment:

- (a) Automatic Fractionation Collector, approximately.
- (b) Refrigeration Unit
- (c) Constant Temperature Circulation Bath

\$1,000
600
<u>300</u>
\$1,900

2. Supplies:

Glassware, chemicals, photographs, charts
Ion-exchange resins, amino acids

\$ 250
\$ 250

6. Amount desired:

	1st Year
a. Professional assistants (including institution's contribution to annuity plan)	None
b. Technical assistants (including institution's contribution to annuity plan).	\$ 6,431
c. Equipment	\$ 1,900
d. Supplies	\$ 250
e. Travel to attend meetings of scientific national societies mostly held on the East Coast	\$ 500
f. Contingent fund (not to include institutional overhead)	\$ 250
Total	\$ 9,331
Institutional overhead desired (not to exceed 8% of total).	\$
Total	\$10,077.48

Applications are considered during the winter of each year and grants recommended become effective the following 1 July.

7. Nature of Institutional collaboration in this work:

- a. Funds and sources presently available to your group or Institution for investigations in this same field.

Salary of Responsible Investigator paid by the Veterans Administration
Salary of Principal Investigator, Biochemist, in the amount of \$6,740 contributed by the Veterans Administration, Research and Education Service.

Most of the laboratory equipment and supplies which will be required are to be furnished by the Veterans Administration.

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7. (Continued)

- b. Concise description of institutional facilities available for this investigation.

Ample clinical material (Metabolic balance ward; entire hospital, VA Center)

Tiselius Electrophoresis Apparatus, Research Model, American Instrument Co. (and services of biochemist assigned thereto)

Beckman D U Spectrophotometer, Flame attachment (for mineral and other determinations)

Coleman Universal Spectrophotometer

General Chromatographic Equipment

Space and facilities of Metabolic Unit

8. Do you have other projects for which you are responsible, or in which you are participating? Specify:

Body water studies, using deuterium oxide isotope dilution procedures.

Flame photometric studies; elimination of interference problem in mineral analysis by a simple general type of procedure.

- a. To what other sources have you applied for support of this project?

None

- b. What grants have you previously received for this work?

None

9. Brief biography of principal investigator and professional assistants:

- a. Responsible Investigator: Samuel H. Bassett, M.D.-See Attached Exhibit No.I

- b. Principal Investigator: Clyde A. Dubbs, Ph.D.
Born:

Education: B.S. Chemistry, California Inst. of Technology, 1943
Ph.D. Bio-Organic Chemistry, Plant Physiology,
California Institute of Technology, 1946

Positions: 1946 Research Assistant in Biology (Biochemistry)
California Institute of Technology
1947-48 Research Assoc. in Bacteriology & Parasitology
(Biochemistry), University of Southern California,
Medical School.
1948- Biochemist, Research Service, V.A. Center

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9. (Continued)

b. (Continued)

Societies: American Chemical Society
American Association for the Advancement of Science
American Association of Clinical Chemists
Botanical Society of America
"Certified Clinical Chemist" American Board of Clinical Chemists (1952).

c. Associate Investigator: William S. Adams, M.D.-See Attached Exhibit No. II

10. Bibliography of principal investigator and professional assistants. (not more than 15 publications including those pertinent to this application.)

a. Responsible Investigator: Samuel H. Bassett, M.D.-See Attached Exhibit No.III

b. Principal Investigator: Clyde A. Dubbs, Ph.D.

1. Dubbs, C. A., Universal Microapparatus; Filtration, Extraction, Reflux, Distillation, Homogenization, and Drying in the Same Apparatus. Anal. Chem., 21, 1273 (1949).
2. Dubbs, C.A., Improved Apparatus for Radiobiological Syntheses, Science, 109, 571 (1949).
3. Dubbs, C.A., Increased Sensitivity for the Perkin-Elmer Flame Photometer, Anal. Chem., 24, 1654 (1952).
4. Dubbs, C.A., Determination of Deuterium, Anal. Chem., 25, 828 (1953).

c. Associate Investigator: William S. Adams, M.D. -See Attached Exhibit No. IV

11. Additional information which it is desired to offer may be given in this space and on extra sheets.

This work is carried out in the Veterans Administration Hospitals through collaboration of the University of California Medical Center at Los Angeles with the Veterans Administration.

Application approved by competent
Executive Officer of Institution

(Name: Printed or Typed)

(Signature)

(Official Title)

Samuel H Bassett
(Signature of Investigator
SAMUEL H. BASSETT, M.D.
Clinical Professor of Medicine

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This application, if endorsed by the Committee on Growth of the National Research Council will be recommended to the AMERICAN CANCER SOCIETY as the basis for a research grant from the SOCIETY. Under the terms of a contract between the AMERICAN CANCER SOCIETY and the National Academy of Sciences for its agency, the National Research Council, professional aspects of the work conducted under the grant will be a responsibility of the Committee on Growth; while financial aspects will be a responsibility of the AMERICAN CANCER SOCIETY.

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Exhibit No. I

Samuel Hopkins Bassett

Born - U.S. Citizen
Married 1927 to - 2 children

Education:

Cornell University, Ithaca, N.Y. - Premed. A.B. June 1920
Cornell University, Med. College, N.Y. - M.D. June 1924

Employment:

1920-21 Cornell University Medical College, Ithaca - Assistant in Anatomy
1924-25 Reconstruction Hospital, New York, N.Y. - Interne
1925-26 New York Hospital, New York, N.Y. - Jr. Asst. Physician
Ambulance Surgeon; Sr. Asst. Physician; House Physician
1927 Lane Hospital, San Francisco, Cal. - Asst. Res. Physician
1927-28 Strong Memorial Hospital, Rochester, N.Y. - Resident Physician
and Instructor in Medicine
1928-30 University of Rochester, School of Medicine and Dentistry, Rochester,
N.Y. - Instructor in Medicine
1930-41 University of Rochester, School of Medicine and Dentistry, Rochester,
N.Y. - Assistant Professor of Medicine
1941-48 University of Rochester, School of Medicine and Dentistry, Rochester,
N.Y. - Associate Professor of Medicine
1945-48 University of Rochester, Atomic Energy Project - Head of Section
on Human Metabolism
1948 Veterans Administration Center, Los Angeles 25, California -
Chief, Research Service
1948 School of Medicine, University of California at Los Angeles -
Clinical Professor of Medicine

Membership in Scholarly Societies:

American Medical Association
Medical Society of State of New York
Rochester Academy of Medicine
American Society for Clinical Investigation
New York Academy of Sciences
Certified American Board of Internal Medicine
Rochester Chapter of Sigma Xi
Alpha Omega Alpha
Society for Experimental Biology and Medicine,
Southern California Section
Western Society for Clinical Research
Member of the Josiah Macy Jr. Foundation Conference Group on
Metabolic Interrelations, 1948 to 1953

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Exhibit No. II

William Sprague Adams

Born -
Married

- U.S. Citizen
- 3 children

Education:

Cornell University, Ithaca, N.Y. - A.B. Chemistry, 1939
University of Rochester, School of Medicine - M.D., 1943

Employment:

- 1941-42 University of Rochester, School of Medicine and Dentistry, Rochester, N.Y. - Student Fellow in Medicine
- 1944 University of Rochester, School of Medicine and Dentistry, and Strong Memorial Hospital, Rochester, N.Y. - Intern in Medicine
- 1944-45 University of Rochester, School of Medicine and Dentistry, Rochester, N.Y. - Assistant Resident in Medicine.
- 1945-46 Active Duty with the Medical Corps of the United States Navy, Dublin, Georgia.
- 1946-47 University of Rochester, School of Medicine and Dentistry, Rochester, N.Y. - Research Fellow in Medicine
- 1947-48 University of Rochester, School of Medicine and Dentistry, Rochester, N.Y. - Instructor in Medicine
- 1948- Wadsworth General Hospital, Veterans Administration, Los Angeles, Calif. - Attending Consultant Internal Medicine
- 1949- Harbor General Hospital, Torrance, Calif. - Senior Attending Physician
- 1948-49 Veterans Administration Center Hospital, Los Angeles, Calif. - Resident in Medicine.
- 1948-49 University of California at Los Angeles, School of Medicine, Los Angeles, Calif. - Assistant Clinical Professor of Medicine
- 1949-50 Veterans Administration Center Hospital, Los Angeles, Calif. - Administrative Section Chief, Assistant in Research, Physician Full-Grade.
- 1949-50 University of California at Los Angeles - Assistant Professor of Medicine in Residence (Sawtelle) Veterans Administration
- 1950- St. Johns Hospital, Santa Monica, Calif. - Associate
- 1950-52 University of California at Los Angeles, School of Medicine, Los Angeles, Calif. - Assistant Professor of Medicine
- 1952- University of California at Los Angeles, School of Medicine, Los Angeles, Calif. - Associate Professor of Medicine
- 1952- Veterans Administration Hospital, San Fernando, Calif. - Consultant in Internal Medicine
- 1952- Santa Monica Hospital, Santa Monica, California - Consultant in Internal Medicine

Membership in Scholarly Societies:

Skulls Honorary Pre-Medical Society
Sigma Xi, Associate Member
Alpha Omega Alpha
Western Society for Clinical Research
Los Angeles County Medical Association
American Medical Association
California State Society of Medicine
American Association for the Advancement of Science

Certified: American Board of Internal Medicine - 1950

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Exhibit No. III

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Samuel H. Bassett, M.D.

1. Keutmann, E. H. and Bassett, Samuel H. Dietary Protein in Hemorrhagic Bright's Disease: Effect of Diet on Serum Proteins, Proteinuria and Tissue Proteins J. Clin. Invest. 14:871, 1935.
2. Keutmann, E. H. and Bassett, S. H. Studies on Mechanism of Proteinuria. J. Clin. Invest., 16:767, 1937.
3. Bassett, Samuel H., Keutmann, E. H., Hyde, H. V., and Van Alstine, H. E. Metabolism in Idiopathic Steatorrhea: Influence of Dietary and other Factors on Lipid and Mineral Balance. J. Clin. Invest. 18: 101, 1939.
4. Keutmann, E. H., Bassett, Samuel H. and Warren, S. L. Electrolyte Balances During Artificial Fever with Special Reference to Loss Through the Skin. J. Clin. Invest., 18:239, 1939.
5. Madden, S. C., Bassett, Samuel H., Remington, J. H., Martin, F.J.C., Woods, R. R., and Shull, F. W. Amino Acids in Therapy of Disease: Parenteral and Oral Administration Compared. Surgery, Gynecology, and Obstetrics 83: 131, 1943.
6. Bassett, Samuel H., Woods, R. R., Shull, F. W., and Madden, S. C. Parenterally Administered Amino Acids as a Source of Protein in Man. New Engl. J. Med. 106:230, 1944.
7. Bassett, Samuel H., Brown, H. R., Keutmann, E. H., Holler, J., Van Alstine, H. E., Mocejunas, Olga, and Schantz, Helen. Analysis of Peritoneal Washings for Protein, Nonprotein Nitrogen and Phosphorus during Studies on Nitrogen and Fluid Balance in Treatment of Acute Uremia by Peritoneal Lavage. Arch. Int. Med. 80:616, 1947.
8. Waterhouse, Christine, Bassett, S. H. and Holler, Jacob. W. Metabolic Studies on Protein Depleted Patients Receiving a Large Part of Their Nitrogen Intake from Human Serum Albumin Administered Intravenously. J. Clin. Invest. 28:245-264, March 1941.
9. Baylor, Curtis, Van Alstine, Helen E., Keutmann, E. Henry and Bassett, Samuel H. The Fate of Intravenously Administered Calcium. Effect on Urinary Calcium and Phosphorus, Fecal Calcium and Calcium-Phosphorus Balance. J. of Clin. Invest., September 1950, 29:9, 1167.
10. Adams, Wm. S., Bassett, Samuel H., Goldman, Ralph, and Lawrence, John S. The Use of Cortisone in Acute Leukemia. Report submitted to the First Cortisone Conference held by the Veterans Administration in Washington, D. C., August 15-16, 1950. Merck & Co., Symposium, 1951, pp. 65-69
11. Goldman, Ralph, Adams, Wm. S., Beck, Wm., and Bassett, S. H. The Effect of Cortisone and ACTH on Hodgkin's Disease. Merck & Co., Symposium, 1951. pp. 46-48

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12. Adams, Wm. S., Valentine, Wm. N., Bassett, Samuel H., and Lawrence, John S. The Effect of Cortisone and ACTH in Leukemia. Journal of Lab. & Clin. Med., April 1952, 39:4, pp. 570-581.
13. Bassett, Samuel H., Adams, Wm. S., Goldman, Ralph, and Fishkin, Ben G. Non-tropical Sprue Complicated by Generalized Amyloidosis. Observations on the Exchange of Nitrogen, Calcium, and Phosphorus. Medical Clinics of North America, July, 1952, 36:4, pp. 1173.
14. Adams, Wm. S., Bland, Wm. H. and Bassett, Samuel H. A Method of Human Plasma-pheresis. Proceedings of Society for Experimental Biology and Medicine, 80:2, pp. 377, June 1952.
15. Adams, William S., Mason, Earl D., and Bassett, Samuel H. Metabolic Balance Investigation of Three Cases of Multiple Myeloma during ACTH Administration; Exchanges of Calcium, Phosphorus, Nitrogen, and Electrolytes. J. of Clin. Invest., February 1954, XXXIII:2, pp. 103.

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Exhibit No. IV

BIBLIOGRAPHY

William S. Adams, M.D.

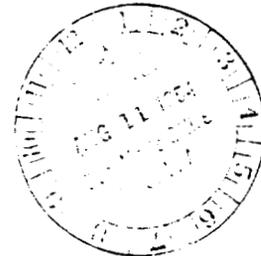
1. Adams, W. S., and Lawrence, J.S. Folic Acid Therapy - Results of a Clinical Study. Amer. J. Med. Sci. 215:487, May 1948.
2. Adams, W. S., Lawrence, J.S., and Alling, E.L. Multiple Myeloma: A Review of Sixty-Three Cases, with Particular Attention to the Electro-phoretic Patterns in Thirty Cases. Amer. J. of Med. 6:141, February 1949.
3. Lawrence, J. S., Valentine, W. N., and Adams, W. S.: Thrombopenic Purpura - The Failure of Direct Blood Transfusion to Raise the Platelet Count. J. of Lab. and Clin. Med. 33:1077, September 1948.
4. Adams, W. S., Bassett, S. H., Goldman, R., and Lawrence, J. S. The Use of Cortisone in Acute Leukemia. Vet. Admin. Conference on Cortisone Research. Page 65-69, August 1950, Merck & Co., 1951.
5. Adams, W. S., Bassett, S. H., Goldman, R., and Lawrence, J. S. The Use of ACTH in Multiple Myeloma. Vet. Admin. Conference on Cortisone Research, p. 69-71, August 1950, Merck & Co. 1951.
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7. Levin, M. H., Adams, W. S., Beck, W., Goldman, R., and Bassett, S. H. Prolonged Treatment of a Case of Periarteritis Nodosa with ACTH: The Effective Dose as Measured by Metabolic Balances. J. Clin. Endocrinol. 11:4, April 1951.
8. Adams, W. S., Bassett, S. H., Lawrence, J. S. The Effect of ACTH in Three Cases of Multiple Myeloma. Abstract, Western Soc. for Clin. Research, January 25 and 26, 1952.
9. Adams, W. S., Valentine, W. N., Bassett, S. H., and Lawrence, J. S. The Effect of Cortisone and ACTH in Leukemia. J. Lab. & Clin. Med., 39:570-581, April, 1952.
10. Adams, W. S., Bland, W. H., and Bassett, S. H. A Method of Human Plasmapheresis Proc. of the Soc. for Exper. Biol. and Med., 80:377-379, June 1952.
11. Goldman, R., Adams, W. S. and Luchsinger, Mrs. Howard W. Renal Function in Multiple Myeloma. J. of Lab. & Clin. Med., 40:519, #4, October 1952.
12. Adams, W. S., Bland, W. H., Figueroa, W. G. and Bassett, S. H. Human Plasmapheresis. Amer. J. Med., 15:409, 1953
13. Adams, W. S. and Figueroa, W. G. The Ability of the Human Subject to Regenerate Plasma Proteins During Prolonged Plasmapheresis. J. Clin. Invest. 32:550, 1953

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Exhibit No. IV

14. Craddock, Charles G., Adams, W. S. and Figueroa, N. G. Interference with Fibrin Formation in Multiple Myeloma by an Unusual Protein Found in Blood and Urine, J. of Lab. & Clin. Med., 42:847-859, 1953 .
15. Adams, W. S., Mason, Earl D. and Bassett, S. H. Metabolic Balance Investigation of Three Cases of Multiple Myeloma During ACTH Administration; Exchanges of Calcium, Phosphorus, Nitrogen and Electrolytes. J. of Clin. Invest. 33:103-121, 1954



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WORK SHEET - PROPOSED CONTRACT

Date: August 1, 1954

15 Filed

Contracting Agency: American Cancer Society Government Number: _____
 Type of Contract: Grant-in-Aid Starting Date: July 1, 1955
 Campus: University of California, Los Angeles Termination Date: June 30, 1956
 Department: Sch. Med. / MEDICINE Maximum Amount: 10,077.48
 Investigator: Samuel H. Barnett, M.D. (Title) Subject to Sales Tax? Yes
 Title of Investigation: Chemical Studies on Human Plasma Proteins in Abnormal Conditions
 Space Requirements: Location - Veterans Administration Hospital, Harbor U.S. Unit
 Total Sq. Ft. - _____

Will this project displace any present activity? No
 If so, please state particulars _____

Utility Requirements: Available
 Is anything patentable expected to be developed as a result of _____'s
 research? No (Investigator)

BUDGET

Salaries:	_____		
General Assistance:	_____		
Total Salaries and Assistance:		\$ 900.00 \$ 81.00	\$, 981.00
Equipment: (Itemize)			
	Automatic Fractionation collector appr.	1,000.00	
	Refrigeration Unit appr.	800.00	
	Constant Temperature Circulation Bath	300.00	1,900.00
Supplies:	Glasses, chemicals, photographs, charts		250.00
Miscellaneous:	To cover expenses for attending meetings of scientific national societies, East Coast		500.00
	Contingent		200.00
Total Expense and Equipment:			4,851.00
University Overhead:			746.48
			<u>10,077.48</u>

I concur:

116911

K. M. Eastman
Hospital Administrator

The principal of this instrument was
signed by
Investigator
Samuel H. Barnett, M.D.

William S. Adams, M.D., Acting Chairman
Chairman of Department