

UNCLASSIFIED

AD NUMBER
AD462898
NEW LIMITATION CHANGE
TO Approved for public release, distribution unlimited
FROM Distribution authorized to U.S. Gov't. agencies and their contractors; Administrative/Operational Use; Apr 1965. Other requests shall be referred to US Army Biological Laboratories, Ft Detrick, Frederick, MD 21701.
AUTHORITY
BDRL, D/A ltr, 28 Sep 1971

THIS PAGE IS UNCLASSIFIED

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

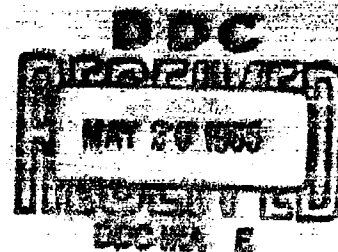
AD

TECHNICAL MANUSCRIPT 220

ULTRAMICROANALYSIS
OF SELECTED BLOOD COMPONENTS
OF NORMAL MACACA MULATTA

4 6 2 8 9 8

APRIL 1965



UNITED STATES ARMY
BIOLOGICAL LABORATORIES
FORT DETRICK

462898

CATALOGED BY
MAY 1965

PAGES _____
ARE
MISSING
IN
ORIGINAL
DOCUMENT

This publication or any portion thereof may not be reproduced without specific authorization from the Commanding Officer, U. S. Army Biological Laboratories, ATTN: Technical Releases Branch, Technical Information Division, Fort Detrick, Frederick, Maryland. However, DDC is authorized to reproduce the publication for U.S. Government purposes.

The information in this publication has not been cleared for release to the public.

DDC AVAILABILITY NOTICE

Qualified requestors may obtain copies of this publication directly from DDC.

Foreign announcement and dissemination of this publication by DDC is limited.

Best Available Copy

U.S. ARMY BIOLOGICAL LABORATORIES
Fort Detrick, Frederick, Maryland

TECHNICAL MANUSCRIPT 220

ULTRAMICROANALYSIS OF SELECTED BLOOD COMPONENTS
OF NORMAL MACACA MULATTA

John J. Petery

Aerobiology Division
DIRECTORATE OF BIOLOGICAL RESEARCH

Project 1C522301A080

April 1965

ACKNOWLEDGMENTS

The author would like to thank Capt. Keithl Kraner USAF, VC, and Capt. Charles J. Parshall USA, VC, of the Armed Forces Institute of Pathology for permission to use their unpublished data.

ABSTRACT

Plasma from the blood of 212 Macaca mulatta (rhesus) monkeys was tested for eleven chemical components by ultramicroanalysis. Results are tabulated and discussed.

In conducting the research reported herein, the investigator adhered to "Principles of Laboratory Animal Care" as established by the National Society for Medical Research.

ULTRAMICROANALYSIS OF SELECTED BLOOD COMPONENTS
OF NORMAL MACACA MULATTA

Relatively little information is available on the blood chemistry of rhesus monkeys. Several reports have been published on this subject, but the studies were limited in scope and based on a small number of animals.^{1-4*} In studies in which monkeys are experimentally infected or treated, established normal values for the blood components assume practical importance. Changes in the blood chemistry patterns of infected animals from these values may be discerned as a result of the experiments. The purpose of this study, therefore, was to establish baseline values for selected chemical components of the blood of presumably healthy rhesus monkeys by ultramicroanalytical methods. Ultramicroanalyses involves microliter volumes, and the methods are those in which the volume of serum or plasma to be analysed is 1 to 50 microliters.⁵⁻⁷

Heparinized blood samples were obtained by removing 0.5 ml of blood from the veins of each of 212 rhesus monkeys. These animals ranged in weight from 4 to 7 pounds, and were determined to be tuberculin-negative, free of diarrhea, and in good physical condition. Their diet consisted of water and Purina Monkey Chow fed ad libitum.

The Beckman Spinco Model 150 ultramicroanalytical system was used to obtain all blood chemistry data. The procedures found in the Beckman Spinco Instruction Manual⁸ were employed to make the following determinations: bilirubin (total), calcium, chloride, cholesterol, creatinine, glucose, phosphorus, total protein, albumin, urea nitrogen, and uric acid. All ultramicroanalyses of the 11 selected components were carried out with only 0.19 ml of plasma.

The results of the ultramicroanalysis of plasma for 11 blood components are shown in Table 1.

In general, the results listed are approximately the same as those of Kraner and Parshall.** These workers carried out ultramicroanalyses on 89 rhesus monkeys, testing for 6 of the 11 blood components listed in Table 1 by the same type of system. Results are shown in Table 2. Their ranges were narrower than those reported in this study, but the mean values were comparable in all determinations except those of calcium. The probable reason for this discrepancy is the indistinct endpoint of the assay employed. This discrepancy has been mentioned by O'Brien et al.⁹ and Knights et al.¹⁰

* Kraner, E., and C.J. Parshall. Personal communication.

** Unpublished data. See Acknowledgments.

TABLE 1. CONCENTRATION OF SELECTED CHEMICAL COMPONENTS
OF NORMAL RHESUS MONKEY PLASMA

Number Monkeys Tested	Component	Mean Value	Standard Deviation	Range	
				Lower	Upper
188	Bilirubin (mg %)	0.36	0.21	0.10	0.90
198	Calcium (mEq/liter)	4.86	0.81	3.00	6.86
190	Chloride (mEq/liter)	108.29	10.30	89.33	129.40
176	Cholesterol (mg %)	161.71	37.80	91.60	245.25
170	Creatinine (mg %)	1.41	0.31	0.80	2.32
180 ^{a/}	Glucose (mg %)	61.80	17.10	30.25	108.30
166	Phosphorus (mg %)	5.00	0.95	3.06	7.31
189	Total Protein (gm %)	6.33	0.68	4.20	7.98
189	Albumin (gm %)	4.43	0.95	2.41	5.84
179	Urea Nitrogen (mg %)	22.38	6.53	10.00	41.18
185	Uric Acid (mg %)	0.88	0.41	0.42	1.93

a. Fasting.

TABLE 2. DATA OBTAINED FROM KRANER AND PARSHALL
ON THE PLASMA FROM 89 RHESUS MONKEYS^{a/}

Component	Mean Value	Range	
		Lower	Upper
Calcium (mEq/liter)	6.35	5.0	8.85
Chloride (mEq/liter)	111.8	100.0	127.0
Cholesterol (mg %)	166.9	140.0	207.0
Phosphorus (mg %)	4.59	3.2	6.2
Total Protein (gm %)	6.16	4.9	7.3
Uric Acid (mg %)	1.196	0.76	1.8

a. Unpublished data used with permission of workers.

Comparison of data from this study with those reported in the literature is of limited value,¹⁻⁴ because the data in those reports are based on an insufficient number of animals and the use of macroanalytical techniques.

In this writer's experience, the time required to perform these ultramicroanalytical techniques is about the same as that required by macrotechniques. The advantage of the ultramicroanalysis is that a number of examinations, necessitating repeated bleedings, can be performed on a single monkey without altering chemical blood values. The analyses for the 11 chemical blood components reported herein required only 190 microliters of plasma.

LITERATURE CITED

1. Asatiani, V.S., T.P. Pichkhaya, and A.K. Ageeva. 1959. The blood chemistry of lower monkeys. Bull. Exp. Biol. Med 47:203-206.
2. Lee, C.C., R.G. Herrmann, and R.O. Froman. 1959. Serum, bile and liver total cholesterol of laboratory animals, toads and frogs. Proc. Soc. Exp. Biol. Med. 102:542-544.
3. Spector, W.S. 1956. Handbook of biological data, p. 53. The National Research Council, Washington, D.C.
4. White, R.J., C.S. MacCarty, J.H. Grindlay, and J.L. Bollman. 1960. Hematocrit readings and values of plasma electrolytes in the rhesus monkey. Proc. Staff Meetings, Mayo Clinic. 35:114-117.
5. Sanz, M.C. 1957. Ultramicro methods and standardization of equipment. Clin. Chem. 3:406.
6. Sanz, M.C. 1957. New ultramicro methods in biochemistry. J. Physiol. 49:372.
7. Sanz, M.C. 1959. The physical-chemical basis of, and new developments in, instruments in the field of quantitative ultramicroanalysis. Chima 13:192.
8. Technical Bulletin, Instruction Manual. Beckman Spinco Model 150 Ultramicro Analytical System. Spinco Division, Beckman Instruments, Inc. Stanford Industrial Park, Palo Alto, California.
9. O'Brien, D., F. Ibbott, and A. Pinfield. 1961. Critical evaluation of a new ultramicro system for routine clinical chemistry procedures. Clin. Chem. 7:521-535.
10. Knights, E.M., J. Ploompau, and J.L. Whitehouse. 1961. Developments in ultramicro chemistry. Amer. J. Clin. Path. 36:203-211.

DISTRIBUTION LIST

<u>ADDRESSEE</u>	<u>NUMBER OF COPIES</u>
Assistant Scientific Director Building 812	1
Directorate of Biological Research Building 560	1
Directorate of Development Building 824	1
Directorate of Industrial Health & Safety Building 550	1
Chief, Medical Bacteriology Division Building 560	1
Chief, Munitions Development Division Building 321	1
Chief, Program Coordination Office Building 812	1
Chief, Aerobiology Division Building 459	10
Chief, Physical Sciences Division Building 568	2
Chief, Process Development Division Building 469	1
Chief, Technical Evaluation Division Building 568	1
Chief, Virus & Rickettsia Division Building 539	1
Chief, Biomathematics Division Building 1422	1
Documents, Technical Library Building 426	2
Test Chamber Branch Technical Evaluation Division Building 1412	1

<u>ADDRESSEE</u>	<u>NUMBER OF COPIES</u>
Technical Releases Branch Technical Information Division Building 426	10
Editorial Branch Building 816	1
Assistant Director/Biological Engineering Building 722	1
Liaison Representative/Animal Disease Investigations Building 1301	1
U.S. Public Health Service Liaison Office Building 1301	4
Commanding Officer U.S. Naval Unit Building 125	3
Commanding General U.S. Army Edgewood Arsenal ATTN: SMUEA-CS Edgewood Arsenal, Maryland, 21010	1
Commanding General U.S. Army Edgewood Arsenal ATTN: SMUEA-CS-0 Edgewood Arsenal, Maryland, 21010	1
Commanding Officer U.S. Army Chemical Research & Development Laboratories ATTN: Librarian Edgewood Arsenal, Maryland, 21010	2
Commanding General U.S. Army Munitions Command ATTN: AMSMU-SS-CS Dover, New Jersey, 07801	1
Commanding General U.S. Army Munitions Command ATTN: AMSMU-RE-R Dover, New Jersey, 07801	1

<u>ADDRESSEE</u>	<u>NUMBER OF COPIES</u>
Commanding General Deseret Test Center ATTN: Technical Library Fort Douglas, Utah, 84113	2
Commanding General U.S. Army Materiel Command Research Division, AMCRD-RC R&D Directorate Washington, D.C., 20315	1
Asst. Chief of Staff/Force Operations Department of the Army ATTN: Technical Coordinator (B) CBR&N Directorate The Pentagon Washington 25, D.C.	1
Defense Documentation Center Cameron Station Alexandria, Virginia, 22314	20
Detachment 4, RTD (ATCB) Eglin Air Force Base, Florida, 32542	1
APGC (PGCAP#1) Eglin Air Force Base, Florida, 32542	1
AFRSTA, Hq. USAF ATTN: Mr. C.R. Nixon, Jr. Washington, D.C., 20330	1
Officer-in-Charge FTD Library Building 828, Area A Wright-Patterson Air Force Base, Ohio, 45433	1
Commander (Code 4036) Naval Ordnance Test Station China Lake, California, 93557	1
Commanding Officer and Director U.S. Naval Applied Science Laboratory Naval Base, Code 9440 Brooklyn, New York, 11251	1

ADDRESSEENUMBER OF COPIES

U.S. Army Medical R&D Command
Office of the Surgeon General
ATTN: MEDDH-C
Main Navy Building, Room 2526
Washington, D.C., 20315

1

Commandant
USACmlGen & Sch, ATTN: Bio Br
Fort McClellan, Alabama, 36205

2

U.S. Army Standardization Group - Canada
Office, Senior Standardization Rep.
c/o Director of Equipment Policy
Canadian Army Headquarters
Ottawa 4, Canada

1

Munitions/TW
Defence Research Staff
British Embassy
3100 Massachusetts Avenue, N. W.
Washington 8, D.C.

3

Canadian Liaison Office (CBR)
Building 5101
Edgewood Arsenal, Maryland, 21010

3

Australian Embassy
ATTN: Lt. Col. P.D. Yonge
Australian Army Staff (W)
2001 Connecticut Avenue, N.W.
Washington 7, D.C.

2

University of Pennsylvania
Institute for Cooperative Research
Project Summit
3634 Walnut Street
Philadelphia, Pennsylvania, 19104

1

Chief, Animal Farm
Building 1021

1

Best Available Copy

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1 ORIGINATING ACTIVITY (Corporate author) U.S. Army Biological Laboratories Fort Detrick, Frederick, Maryland, 21701		2a REPORT SECURITY CLASSIFICATION Unclassified	
		2b GROUP	
3 REPORT TITLE ULTRAMICROANALYSIS OF SELECTED BLOOD COMPONENTS OF NORMAL <u>MACACA MULATTA</u>			
4 DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5 AUTHOR(S) (Last name, first name, initial) Petery, John J.			
6 REPORT DATE April 1965		7a. TOTAL NO. OF PAGES 12	7b. NO. OF PAGES 10
8a. CONTRACT OR GRANT NO. b PROJECT NO. 1C522301A080 c d		9a. ORIGINATOR'S REPORT NUMBER(S) Technical Manuscript 220 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. AVAILABILITY/LIMITATION NOTICES Qualified requestors may obtain copies of this report from DDC. Foreign announcement and dissemination of this report by DDC is not authorized.			
11 SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U.S. Army Biological Laboratories Fort Detrick, Frederick, Maryland, 21701	
13 ABSTRACT Plasma from the blood of 212 <u>Macaca mulatta</u> (rhesus) monkeys was tested for eleven chemical components by ultramicroanalysis. Results are tabulated and discussed.			

Best Available Copy