United States Air Force HQ AFMOA/SGOT, 110 LUKE AVENUE ROOM 400, BOLLING AFB DC 20332-7050

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FAX

Date: 9/18/96

Number of pages including cover sheet: 18

To:

Mr Brian Thompson/Col Bailey

RECC

RECC: 703-442-5675

Fax: RECC

CC:

From: Lt Col Dan Brown

AFMOA/SGOT

Phone: 202-767-5078

Fax phone: 202-767-5302

REMARKS: ☐ Urgent ☐ For your review ☒ Reply ASAP ☐ Please comment

Please see the attached materials on two of the studies from Brooks for which you did not have sufficient "abstract" information. They (Brooks folks) were able to locate a report on only one of them. On the RBC study we were able to locate, in our files, the original find which lead to this addition to our original 1944-1974 list. As you can see, we discovered this study on one of trips to St Louis--we know the box, etc where the report resides, but as was Col Merritt's MO at the time, he did not copy the final report or the progress reports which are apparently in the box. We have his brief discription of the study--which is forwarded here. Hopefully, this will be sufficient for your purposes--if not, we'll have to go out to St Louis and retrieve the materials since I suspect this info was not published in a major journal which would show up in a search. Call if you have any questions. P.S. We are still working the studies which were performed at our MTFs---most were from Wilford Hall Med Ctr and we don't have them all in yet. Call if you have any questions--Col Bailey--you call me anyway!!

Lt Col Dan Brown

Terry - Check our Does files for this study?

Event Number:	AF0108	**Service:**	Air Force		
Event Title:	Study of the incidence of sickle cell trait and other hemoglobinopathies and the determination of the effect of high altitudes on people with such abnormalities				
Reporting Organization Name:	HQ AFMOA/SGPT				
Begining Date:	56	**Ending Date:**	58	**Note Field:**	
Informed Consent Forms Available:	Unknown	**Informed Consent Request:**	Unknown	**Subject Names Identified:**	Some
Number Subjects:	15	**Informed Consent Docs Exist:**	Unknown	**Gender:**	Unknown

Locations:

University of Texas, Galveston	Galveston	TX	USA

Contract/Project/Protocol Numbers:

Contractor:			Issuing Agency:
AF41(657)-88	7756-105		
University of Texas, Galveston			

Investigators	Subject Type	Race/Ethnicity	Documents
William C. Levin	Sickle-Cell Trait	African-American	Final Report of Findings Intermediate Report of Fi

Event Abstract:

This study conducted at the University of Texas, Galveston took place between 1956 and 1958. Fifteen subjects had blood removed in which erythocytes (red blood cells) were labeled with Chromium-51 and reinjected.

Memorandum for the Record 19 July 1994

Subject: Human Study Involving Chromium 51-Tagged RBC's

On 1-2 June 94 I traveled to the National Personnel Records Center in St. Louis and reviewed files related to ionizing radiation research. The following information was located in 342-64-C-4314, location 06-43-47-F-3. I did not copy this information.

> AF Contract 41(657)-88, project 7756-105. The study of the Incidence of Sickle Cell Trait and other Hemoglobinopathies and the Determination of the Effect of High Altitudes on People with Such Abnormalities. William C. Levin, M.D. U of Tx Medical Branch, Galveston, TX. Fifteen subjects had 30cc of blood removed in which erythrocytes were labeled with $Na_2Cr^{51}O_4$ and reinjected. File contains final report, also progress reports. Dec 56 report has 4 names of subjects. All four received Cr^{51} Subjects were most likely minorities.

The study was conducted between 1956-1958.

GERALD J. MERRITT, Colonel, USAF, BSC
Chief, Clin Investig & Life Sci Div
Air Force Medical Operations Agency
Office of the Surgeon General

USAF 0647

Motion Sickness [illegible] Hermann I. Chinn

Did this involve radioactive tracers in human

Also, same meeting proposal from Dr Powers, Albany Medical College "Evaluation of the Impedance Plethysmograph and the Isotope Dilution Principle for the measurement of Peripheral Blood Flow". Used Na^{24}

Hum

New study:

1956-1958

AF Contract 41(657)-88 (7756-105)

Source: 342-64-C-4314

Location 16-43-47-F-3

The Study of the Incidence of Sickle Cell Trait and Other Hemoglobinopathies and the Determination of the Effect of High Altitudes on People with Such Abnormalities

William C. Levin MD
U of Tx Med Branch
Galveston TX

15 subjects with sickle cell trait had 30cc of blood removed in which erythrocytes were labelled with $Na_2Cr^{51}O_4$ and reinjected

No mention of consent

Final report, file also contains progress reports. Dec 56 report has 4 names of subjects. All 4 received Cr^{51} tagged RBCs

Event Review

Event Number:	AF0077	**Service:**	Air Force		
Event Title:	Patient absorbed radiation: A comparative study of standard full mouth series opposed to panoramic radiography				
Reporting Organization Name:	HQ AFMOA/SGPT				
Begining Date:	69	**Ending Date:**	80	**Note Field:**	
Informed Consent Forms Available:	No	**Informed Consent Request:**	UnKnown	**Subject Names Identified:**	No
Number Subjects:	16	**Informed Consent Docs Exist:**	No	**Gender:**	Both

Locations:

School of Aerospace Medicine, Brooks AFB, Dental Consult Services	San Antonio	TX	USA

Contract/Project/Protocol Numbers:

Contractor:			Issuing Agency:
		7766/12/1003	School of Aerospace Medicine, Brooks AFB, Dental
		7755/12/21	School of Aerospace Medicine, Brooks AFB, Dental

Investigators	Subject Type	Race/Ethnicity	Documents
Charles R. Morris	Active Duty Military	Unknown	Protocol/Proposal
Earl L. Kinsley	Healthy Individuals		Final Report of Findings
Albert C. Jerman			
Vincent A. Segreto			
Cecil E. Brown			
Lawrence J. Enders			

Event Abstract:

Caveat final report

Event Review

Event Number:	AF0046	Service:	Air Force		
Event Title:	Simultaneous determination of Fe-59, Cr-51, and I-125, using a gamma spectrometer				
Reporting Organization Name:	HQ AFMOA/SGPT				
Begining Date:	67/10	Ending Date:	68/1	Note Field:	
Informed Consent Forms Available:	No	Informed Consent Request:	No	Subject Names Identified:	No
Number Subjects:	1	Informed Consent Docs Exist:	No	Gender:	Unknown

Locations:

School of Aerospace Medicine, Brooks AFB, Aerospace Medicine Divi	San Antonio	TX	USA

Contract/Project/Protocol Numbers:

Contractor:			Issuing Agency:
		775506	School of Aerospace Medicine, Brooks AFB, Aerosp

Investigators	Subject Type	Race/Ethnicity	Documents
Donald F. Logsdon	Active Duty Military	Unknown	Final Report of Findings
James F. Green	Unknown		
John W. Harper			

Event Abstract:

Found - see attached

Epidemiology Services Branch, Epidemiologic Research Division, Armstrong Laboratory, USAF

Date: 17 Sep 96

Number of pages including cover sheet: 13

USAF Epidemiology

The Key Is The Question

To: Lt Col Dan Brown
HQ AFMOA/SGPT

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REMARKS: ☐ Urgent ☒ For your review ☐ Reply ASAP ☐ Please comment

Lt Col Brown:

I've attached a response to your 20 Aug 96 FAX to Major Dan Thompson. Included is a copy of the only report we were able to retrieve. Please feel free to call me if you have any questions.

Maj Grayson

DEPARTMENT OF THE AIR FORCE
ARMSTRONG LABORATORY (AFMC)
BROOKS AIR FORCE BASE, TEXAS

17 Sep 96

MEMORANDUM FOR HQ AFMOA/SGPT
Attention: Lt Col Dan Brown

FROM: AL/AOES

SUBJECT: Human Ionizing Radiation Experiments Review (Your FAX, 20 Aug 96)

1. I have completed a search for reports on the three human ionizing radiation experiments mentioned in your FAX; event numbers AF0046, AF0077, and AF0108. I scanned MEDLINE, DTIC, and other online services for these, as well as reviewed local archives at the School of Aerospace Medicine. I was only able to locate one of the reports—Simultaneous Determination of FE-59, Cr-51, and I-125, Using a Gamma Spectrometer, by DF Logsdon, JF Green, and JW Harper—event number AF0046. A copy of this technical report is attached. We were unable either of the other reports.

2. Our review of the attached report by Logsdon, et al, indicates that human subjects were not involved in the reported experiments. Rather, the ability of a scintillation spectrometer to separate the activity of three gamma-emmiters was assessed.

3. Please feel free to contact me at DSN 240-3471 if you have any other questions.

J. Kevin Grayson

J. Kevin Grayson, Major, USAF, BSC
Chief Epidemiology Consultant

Attachment:
SAM-TR-68-40, May 1968.

SAM-TR-68-40

SIMULTANEOUS DETERMINATION OF ^{59}Fe, ^{51}Cr, AND ^{125}I, USING A GAMMA SPECTROMETER

JOHN W. HARPER, Staff Sergeant, USAF
JAMES F. GREEN, Master Sergeant, USAF
DONALD F. LOGSDON, JR., Captain, USAF, BSC

USAF School of Aerospace Medicine
Aerospace Medical Division (AFSC)
Brooks Air Force Base, Texas

May 1968

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SIMULTANEOUS DETERMINATION OF ^{59}Fe, ^{51}Cr, AND ^{125}I, USING A GAMMA SPECTROMETER

JOHN W. HARPER, Staff Sergeant, USAF
JAMES F. GREEN, Master Sergeant, USAF
DONALD F. LOGSDON, JR., Captain, USAF, BSC

FOREWORD

This report was prepared in the Internal Medicine Branch, under task No. 775506. The work was accomplished between October 1967 and January 1968, and the paper was submitted for publication on 31 January 1968.

The Auto-Gamma spectrometer, model 5000, used in the study was manufactured by the Packard Instrument Company, Downers Grove, Ill.

This report has been reviewed and is approved.

GEORGE E. SCHAFER
Colonel, USAF, MC
Commander

ABSTRACT

In scintillation spectrometry, there are methods for separating ^{59}Fe from ^{51}Cr activity, and ^{51}Cr from ^{125}I activity, but no standard method has been presented for the simultaneous measurement of ^{59}Fe, ^{51}Cr, and ^{125}I.

In this study, a well-type scintillation spectrometer and discriminator were used to determine the activity of these three isotopes in one sample. The procedure is based on the use of "contributory factors" which remain constant and can be used in the calculation of various blood parameters. The mixed sample was counted at each of three previously determined settings and corrected for background. Then, the net ^{59}Fe count equaled the total count at the ^{59}Fe setting; the net ^{51}Cr count equaled 10% of the count at the ^{59}Fe setting subtracted from the count at the ^{51}Cr setting; and the net ^{125}I count equaled the sum of 7.5% of the net ^{59}Fe count plus 7.0% of the net ^{51}Cr count subtracted from the count at the ^{125}I setting. The method can be used to separate the activity of any group of three or more gamma-emitting isotopes if their energy peaks are well separated.

SIMULTANEOUS DETERMINATION OF ^{59}Fe, ^{51}Cr, AND ^{125}I USING A GAMMA SPECTROMETER

I. INTRODUCTION

In erythrokinetic studies, simultaneous measurements of several blood parameters are required. To measure all parameters, it is necessary to use three gamma-emitting radioisotopes—^{59}Fe, ^{51}Cr, and ^{125}I. Methods have been developed for separating ^{59}Fe and ^{51}Cr activity in the same sample (1), and ^{51}Cr and ^{125}I in the same sample (2); however, no method has been devised for a sample containing ^{59}Fe, ^{51}Cr, and ^{125}I. The peak gamma energies of these isotopes are well separated and suitable windows can be determined for measuring activity on the gamma spectrometer using appropriate discriminator settings. This report describes a standard procedure for simultaneous measurement of ^{59}Fe, ^{51}Cr, and ^{125}I, using these windows and appropriate correction factors.

II. MATERIALS AND METHODS

Iron-59

The ferric chloride ^{59}Fe containing benzyl alcohol, 0.9%, as a preservative and NaOH or HCl as necessary for pH adjustment was used as a sterile solution. This solution had a specific activity of approximately 10 mc./mg., with approximately 30 μc. of ^{59}Fe per milliliter of solution. Iron-59 has principal photopeaks of 1.10 Mev and 1.29 Mev and a physical half-life of 45 days.

Iodine-125

Iodine-125, buffered with sodium bicarbonate and containing 0.45% NaCl, was used as a sterile, pyrogen-free solution of radioiodinated human serum albumin. Benzyl alcohol, 0.9%, was present as a preservative. The solution had a specific activity of approximately 37.5 mc./mg. and approximately 10 μc./ml. of solution. ^{125}I has a principal photopeak of 35.4 kev gamma and a physical half-life of 60 days.

Chromium-51

Radiochromatic ^{51}Cr, containing sodium bicarbonate (1.0 mg./ml.) and NaOH or HCl for pH adjustment, was used as a sterile, buffered solution. This solution had a specific activity of approximately 42.7 mc./mg. and approximately 215 μc./ml. of solution. ^{51}Cr has a principal photopeak of 0.320 Mev gamma and a physical half-life of 27.8 days.

Instrument

The Auto-Gamma spectrometer used in the study had a 3- by 3-in. well-type NaI scintillation crystal. The well dimensions were $2\frac{1}{32}$ in. by $2\frac{1}{2}$ in. The photomultiplier tube multiplied incident photon energies to the 11 dynode. The instrument has been calibrated for full-scale energy of 1.0 Mev at a gain setting of 40%. Additional calibrations were made for settings of 0.5 Mev, 2.0 Mev, and 4.0 Mev with gains of 80%, 20%, and 10%, respectively.

Working solutions

Working solutions of the ^{51}Cr, ^{59}Fe, and ^{125}I were made by diluting quantities of the isotopes with sufficient sterile saline so that 0.5 ml. of solution yielded radioactivity of

approximately 10,000 counts per minute when counted for one minute at the respective window settings. One-half ml. of each isotopic working solution was put into separate counting tubes and sufficient saline added to raise the volume to 1.5 ml. Mixtures consisting of equal volumes (0.5 ml.) of the ^{59}Fe and ^{51}Cr working solutions, the ^{59}Fe and ^{125}I working solutions, and the ^{51}Cr and ^{125}I working solutions were then put into counting tubes. Sterile saline (0.5 ml.) was added to each tube, bringing the total volume to 1.5 ml. Equal volumes (0.5 ml.) of each of the three working solutions were put into one counting tube, giving this mixed sample a total of 1.5 ml. There were, at this point, seven samples: ^{59}Fe alone; ^{51}Cr alone; ^{125}I alone; ^{59}Fe and ^{51}Cr mixed; ^{59}Fe and ^{125}I mixed; ^{51}Cr and ^{125}I mixed; and ^{59}Fe, ^{51}Cr, and ^{125}I, mixed.

Settings for samples

The spectrums of the ^{59}Fe, ^{51}Cr, and ^{125}I samples were plotted by use of the Auto-Gamma spectrometer to determine the exact energy peak of each sample. The settings for the ^{59}Fe sample were: coarse gain set at 2 (0.2 Mev) fine gain at 3.5, and a window setting of 2%. With the discriminator setting at zero, a one-minute count was made. The discriminator setting was then set at 20 and another one-minute count taken. This procedure was repeated until, raising the discriminator setting by increments of 20, the one-minute counts reached a peak, then began decreasing until negligible. The same procedure was followed using the ^{51}Cr sample and the ^{125}I sample with changes being made in the instrument dial settings. The settings for ^{51}Cr were as follows: coarse gain of two (0.2 Mev) fine gain of 2.3, and a discriminator setting of 20 kev. The discriminator setting was raised by increments of 10. The dial settings for the ^{125}I sample were as follows: coarse gain of 8 (0 to 0.5 Mev), fine gain of 7.0, and a window setting of 2%. The discriminator setting was raised by increments of 10. The results of the one-minute counts were then plotted with the counts per minute as the ordinate and the instrument discriminator settings as the abscissa (fig. 1).

III. RESULTS

Determination of contribution factors

The seven isotope samples were counted for one minute at the ^{59}Fe setting, the ^{51}Cr setting, and the ^{125}I settings with all counts being corrected for background. The results of these counts appear in table I.

It is observed that with the ^{59}Fe sample, approximately 10% of the count at the ^{59}Fe setting appeared at the ^{51}Cr setting and 7.5% of the count appeared at the ^{125}I setting. When the ^{51}Cr sample was counted, no count appeared at the ^{59}Fe setting, but 7% of the count at the ^{51}Cr setting appeared at the ^{125}I setting. It may also be observed that when the ^{125}I sample was counted, no count appeared at the ^{59}Fe or ^{51}Cr settings. From these observations, contribution factors were derived, as shown in table II.

Separation of isotope activity

Mixed sample of iron-59 and chromium-51. The sample was counted at both the ^{59}Fe and ^{51}Cr settings and corrected for background. The net ^{59}Fe count equaled the total count at the ^{59}Fe setting. The net ^{51}Cr count equaled 10% of the count at the ^{59}Fe setting subtracted from the total count at the ^{51}Cr setting.

Mixed sample of iron-59 and iodine-125. The sample was counted at both the ^{59}Fe and ^{125}I peak and corrected for background. The net ^{59}Fe count equaled the total count at the ^{59}Fe settings. The net ^{125}I count equaled 7.5% of the count at the ^{59}Fe settings subtracted from the total count at the ^{125}I settings.

Mixed sample of chromium-51 and iodine-125. The sample was counted at both the ^{51}Cr and ^{125}I settings and corrected for background. The net ^{51}Cr count equaled the total count at ^{51}Cr settings. The net ^{125}I count equaled 7% of the count at the ^{51}Cr setting subtracted from the total count at the ^{125}I setting.

Mixed sample of iron-59, chromium-51, and iodine-125. The sample was counted at the

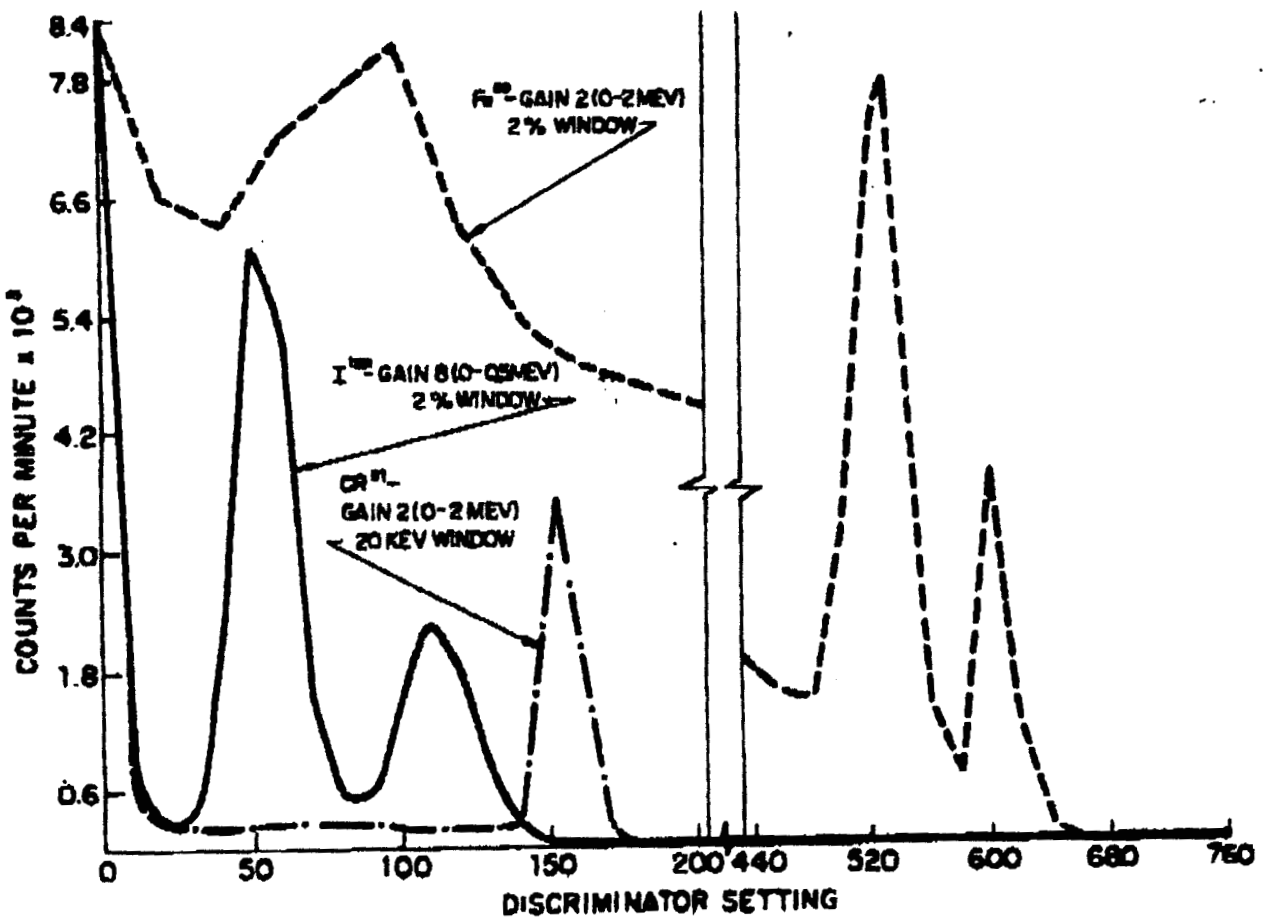

FIGURE 1

Results of one-minute counts of isotope samples using a gamma spectrometer.

TABLE I

Net counts at selected settings for three isotopes

Sample	Setting for ^{59}Fe	Setting for ^{51}Cr	Setting for ^{125}I
^{59}Fe	10,059	978	756
^{51}Cr	0	11,456	880
^{125}I	0	0	7,936
^{59}Fe and ^{51}Cr	10,171	12,687	1,566
^{59}Fe and ^{125}I	9,980	954	8,818
^{51}Cr and ^{125}I	7	11,891	8,658
^{59}Fe, ^{51}Cr, ^{125}I	10,081	12,988	9,287

TABLE II

Contribution factor at selected settings for three isotopes

Sample	Setting for ^{59}Fe	Setting for ^{51}Cr	Setting for ^{125}I
^{59}Fe	100%	10%	7.5%
^{51}Cr	0%	100%	7.0%
^{125}I	0%	0%	100%

^{59}Fe setting, ^{51}Cr setting, and ^{125}I setting and corrected for background. The net ^{59}Fe count equaled the total count at the ^{59}Fe setting. The net ^{51}Cr count equaled 10% of the count at the ^{59}Fe setting subtracted from the count at the ^{51}Cr setting. The net ^{125}I count equaled the sum of 7.5% of the net ^{59}Fe count plus 7.0% of the net ^{51}Cr count subtracted from the count at the ^{125}I setting.

IV. DISCUSSION

One method commonly used to separate ^{59}Fe and ^{51}Cr is the "Z" factor method. This method is based on the principle that the amount of radiation due to ^{59}Fe at the iron peak is directly proportional to the amount of radiation due to ^{59}Fe at the chromium peak. The "Z" factor is determined by dividing the number of counts due to radiation from the iron standard, at the ^{51}Cr peak, by the number of counts at the ^{59}Fe peak. The counts at the iron peak are then multiplied by this factor and this product is subtracted from the counts at the ^{51}Cr peak to give the net counts due to ^{51}Cr.

We have expanded on the "Z" factor concept to make possible the separation of ^{59}Fe, ^{51}Cr, and ^{125}I. As a first step in this process, contribution factors for $^{59}Fe/^{51}Cr$, $^{59}Fe/^{125}I$, and $^{51}Cr/^{125}I$ are determined. Using the $^{59}Fe/^{51}Cr$ factor, the ^{51}Cr activity is determined. Using the $^{59}Fe/^{51}Cr$ factor and the $^{51}Cr/^{125}I$ factor, the ^{125}I activity is determined. This method can be used to separate any group of three or more gamma-emitting isotopes if their energy peaks are well separated.

REFERENCES

1. Protocol for the study of erythrokinetics by simultaneous Fe^{59} and Cr^{51} measurements. Omaha, Nebr.: VA Hospital, 1985.

2. Shires, T., J. Williams, and F. Brown. Simultaneous measurements of plasma volume, extracellular fluid volume, and red blood cell mass in man utilizing I^{131}, $S^{35}O_4$, and Cr^{51}. J. Lab. Clin. Med. 55:778 (1960).

Unclassified

Security Classification

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3. REPORT TITLE

SIMULTANEOUS DETERMINATION OF ^{59}Fe, ^{51}Cr, AND ^{125}I, USING A GAMMA SPECTROMETER

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)
Oct. 1967 - Jan. 1968

5. AUTHOR(S) (First name, middle initial, last name)
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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
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13. ABSTRACT

In scintillation spectrometry, there are methods for separating ^{59}Fe from ^{51}Cr activity, and ^{51}Cr from ^{125}I activity, but no standard method has been presented for the simultaneous measurement of ^{59}Fe, ^{51}Cr, and ^{125}I.

In this study, a well-type scintillation spectrometer and discriminator were used to determine the activity of these three isotopes in one sample. The procedure is based on the use of "contributory factors" which remain constant and can be used in the calculation of various blood parameters. The mixed sample was counted at each of three previously determined settings and corrected for background. Then, the net ^{59}Fe count equaled the total count at the ^{59}Fe setting; the net ^{51}Cr count equaled 10% of the count at the ^{59}Fe setting subtracted from the count at the ^{51}Cr setting; and the net ^{125}I count equaled the sum of 7.5% of the net ^{59}Fe count plus 7.0% of the net ^{51}Cr count subtracted from the count at the ^{125}I setting. The method can be used to separate the activity of any group of three or more gamma-emitting isotopes if their energy peaks are well separated.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Radiology						
Erythrokinetics						
Radioisotopes, simultaneous measurement of						
Scintillation spectrometry						
Gamma-emitting radioisotopes						
Iron-59 isotope						
Iodine-125 isotope						
Chromium-51 isotope						

Unclassified
Security Classification