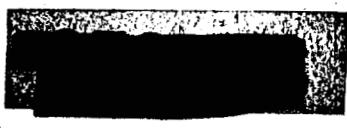


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REPOSITORY NACA - Wash DC
COLLECTION Argonne Natl Lab - Chicago Met Lab
BOX No. 5 (2X-1) NBS-77-80-1
FOLDER AUGUST 1944



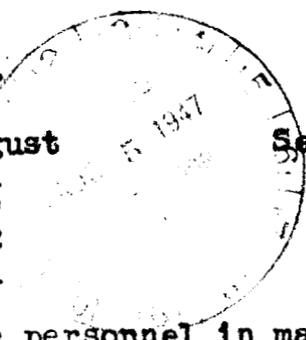
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MONTHLY REPORT FOR AUGUST 1944

S. SCHWARTZ

Distribution of effort for August and September

Personnel	August	September
Research Associates	1	1
Research Assistants	9	9
Technicians	12	10½
Laboratory Assistants	1	1



Work distribution for academic and non-academic personnel in man months.

BEST COPY AVAILABLE August Ac. Non-Ac. September Ac. Non-Ac.

I. Human Studies

A. Studies of project personnel

1. Liver function studies

a. Serum cephalin cholesterol	0.1	0.3	0	0.3
b. Serum colloidal gold	0.1	0.3	0	0.3
c. Urine urobilinogen	0	0.2	0	0.2

2. Porphyrin studies

a. Red cell protoporphyrin	0.1	0.2	0	0.2
b. Urine coproporphyrin	1.0	1.3	1.0	1.5

3. Urorosein & other urine pigments

4. White cell phosphorus	0.2	1.0	0.2	0.2
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5. Miscellaneous, (i.e. sed. rate, hematocrit, urine, catalase, etc.)	0.6	0.3	0.6	0.3
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6. Gathering of exposure histories and correlation of data	0.0	0.2	0.0	0.2
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	0.7	0.2	0.7	0.2
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B. P³² effect in 6 patients - polycythemia

	0.3	0.5	0.3	0.4
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C. Total body x-ray effects in two patients with leukemia and one with carcinomatosis

	0.2	0.3	0.1	0.3
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D. Studies of non-exposed army personnel

	0.2	0.3	0.2	0.4
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II. Animal Studies

A. Radiation effects

1. x-rays

a. White cell phosphorus	0.5	0.5	0.5	0.3
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b. Urine coproporphyrin	0.1	0.1	0.1	0.1
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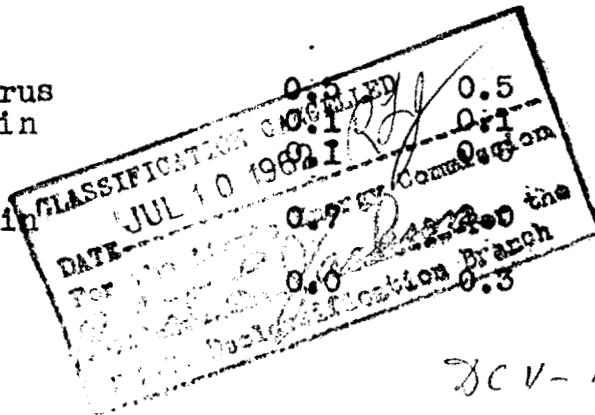
2. Radium, etc.	0.1	0.6	0.1	0.6
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B. Tuballoy effects

a. Urine coproporphyrin	1.0	2.0	1.0	2.0
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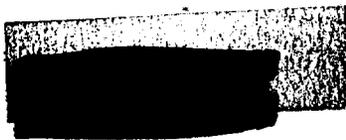
b. Urine catalase	0.0	0.0	0.0	0.3
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c. Routine urinalysis	0.0	0.3	0.0	0.3
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III. Miscellaneous

1. Administration & teaching	1.0	0.0	1.0	0.0
2. Study of new techniques				
a. Quantitation of coproporphyrin isomers.	1.3	0.4	0.6	0.4
b. Tuballoy quantitation	2.0	0.0	2.0	0.0
3. Vacations and leave of absence	0.5	1.6	1.5	1.0
4. Cleaning glassware, etc.	0.0	1.6	0.0	1.6
Total	10.0	13.0	10.0	11.5

MONTHLY REPORT OF CLINICAL RESEARCH GROUP - AUGUST 1944
S. SCHWARTZ

CC: DR. C.J.WATSON
DR. R.S.STONE
DR. L.O.JACOBSON

I. Urine coproporphyrin isomer studies.

Previous reports have described the frequent occurrence of elevated urine coproporphyrin concentration in project personnel, especially in those with tuballoy exposure. Rabbits injected subcutaneously with small doses of tuballoy also show 100-300 per cent increases in the per diem excretion of this porphyrin.

Coproporphyrin is excreted as two isomers, so-called type I and type III. Normally the type I isomer predominates; metals and some types of other toxic compounds have been shown elsewhere to be associated with an increased excretion of the type III porphyrin.

To increase both the sensitivity and the specificity of this test, we have therefore, begun determinations of the isomer type of coproporphyrin in both project personnel and in experimental animals. The method is one developed recently by Schwartz, ^{Walt} Hawkinson, and Watson at the University of Minnesota. It depends upon the complete quenching of fluorescence of the Copro I ester (30-80 gamma per cent) on standing 1½ hours in cold 30% acetone.

During this period the copro III fluorescence (initially the same as that of copro I) diminishes by less than 10%. The initial reading of the freshly prepared 30% acetone solutions of the ester therefore, indicates the total concentration of porphyrin; the reading after 1½ hours refrigeration indicates the concentration of Copro III. The difference is copro I.

With amounts of porphyrin less than 30 gamma per cent, the final reading is taken after four hours, since quenching of fluorescence now occurs more slowly. Certain features of this test remain to be perfected. It is felt, however, that its accuracy is $\pm 15\%$.

The data to date is preliminary only. It has the disadvantage of being composed largely of combined samples saved from various periods (1-8 months) after the animals' exposure. This was necessary because the method of differential isomer estimation could not be applied until very recently. The data as regards the total coproporphyrin I and coproporphyrin III excretion, is approximate only since the samples used in these isomer studies do not represent exactly known aliquots from these periods. The values are, therefore, calculated from the average per diem excretion for the period concerned, as given in last month's report.

The results are given in Table I.

The range of the average per diem excretion of the eight control and x-rayed rabbits, was 5-12, the usual value being 7-9 gamma. Coproporphyrin I, therefore, usually amounted to about 6 gamma per day; coproporphyrin III to 3 gamma per day. The one rabbit with elevated coproporphyrin III (R 18) was one of the very few in the group to develop an elevated total coproporphyrin (200-300% increase following 800 r x-ray.) Isomer studies, however, were done on urine collected before this rise appeared. The reason for the elevation in this one animal is unexplained.

As seen in Table I, the range of the average per diem excretion of coproporphyrin in the radium and tuballoy injected animals, was 8-22, the usual value being 15-20 gamma per day. The coproporphyrin I in this group, as in the controls, average about 6 gamma per day. The coproporphyrin III averaged about 10 gamma per day.

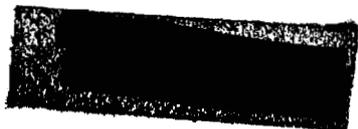
The rise following the injection of either radium or tuballoy is therefore essentially all coproporphyrin III. The rise in coproporphyrin I in rabbits I 24, 25 and I 27, 28 is unexplained.

Preliminary studies of project personnel reveal that tuballoy exposure here, too, is associated with an increased excretion of the type III porphyrin.

No.	Exposure		Date of collection	% Copro III	Approximate gamma coproporphyrin per day	
	Date	Type			Copro I	Copro III
SH2	--	none	July 1944	39	5	3
I 36	--	none	July 1944	36	4.5	2.5
R 5-16	Jan. & Feb.	107 r or less x-ray	Jan. & Feb.	26	6.5	1.5
R 17	Feb.	800 r	March	32	4.5	2.5
R 18	Feb.	x-ray 800 r	Feb.	64	2	3
R 37	April & June	x-ray 400 r twice	Feb., March '44 June & July	30	5	2
R 38	April & June	400 r twice	July 1944	35	8	4
R 38 (repeat)		400 r twice	July 1944	30	8.5	3.5
SF 1-2	June	10 gamma radium	June			
SF 4	June	intra-cardially 50 gamma radium	July 1944	45	5	3
SF 5-6	June	50 gamma radium	July 1944	79	3	12
SF 6	June	50 gamma radium	July 1944	52	6.5	6.5
			July 1944	77	4	11
I 14	Jan. & March	2.5 mg. T subcut.	Feb., March '44	44	4.5	3.5
I 14		2.5 mg. T subcut.	April	64	7	15
I 16	Jan. & March	2.5 mg. T	Feb., March '44	17	5.8	1.2
I 16	"	2.5 mg. T	April 1944	60	4.5	6.5
I 16		2.5 mg. T	July '44	40	9	6
I 17-18	Mar.	0.25 mg. T	March, April '44	82	3	12
20-21	2-7, 3-15	0.75 mg. T	March	95	0.5	9.5
22-31	2-19, 3-15	0.5 mg. T	Feb., March '44	88	1.5	10.5
24-25	3-15	0.3 mg. T	March, April '44	65	7	12
27-28	3-15	0.5 mg. T	March	90	1.5	13.5
27-28	3-15	0.5 mg. T	April	82	4	17
27-28	2-17	0.5 mg. T	May	42	13	9
24-25	3-15	0.5 mg. T	May 1944	34	12	6

TABLE I

Studies of coproporphyrin isomer excretion in rabbits.



Three determinations, each on a combined urine sample from three medical students, contained 28, 6, and 4% coproporphyrin III respectively. Five determinations, each on combined samples from one to six project members exposed to tuballoy, contained 51, 84, 38, 55, and 83% coproporphyrin III respectively.

II. The micro quantitation of tuballoy.

With G. Price and R. Ferretti

It has been found that less than 0.001 gamma of tuballoy can be detected fluorometrically in fused sodium fluoride using an electron multiplier photocell, RCA 931A. Preliminary studies indicate that amounts of this magnitude can be quantitated with a high degree of accuracy. Work is in progress aiming at the perfection of the fluorometer and of the filter system used. We have not yet begun to apply the procedure to urine analyses.