Fred Bryan —

To: Dr. Stafford L. Warren
From: R. M. Fink and K. Fink
Re: Administration of I^{131} to patient [redacted] at Sawtelle Memorial Hospital
Reference: Note, Bryan to Warren, Oct. 22, 1947

1. Administered orally 1.17 millicuries I^{131} (based on Berkeley data) in 40 ml. tap water at 11:00 A.M., Oct. 15, 1947. Washed glass, mouth, and throat with another 40 ml. tap water.

2. Measurements of relative activity in various portions of the body were made with a Victoreen portable Geiger counter model 263 with thin steel beta-ray shield. Approximately 0.5 inch of lead plate was held vertically between the thyroid and abdomen, touching the trunk about 3 cm. below the sternum. The counter was apparently very subject to humidity changes, showing large variations in sensitivity from day to day. Subsequent checks showed that the loss of sensitivity occurred primarily during the descent of the Santa Monica mountains on the trip from Birmingham to Sawtelle via Sepulveda Blvd. The loss of sensitivity was particularly pronounced when the ear phones were connected, so that the external measurements had to be discontinued when the activity became too low for accurate readings on the rate meter but still too high for the counting of individual pulses on the meter.

The relative measurements obtained on several days following administration showed a consistent pattern along the lines of the example in Table 1. There seemed certainly to be a concentration of radioiodine both in the thyroid and in the abdomen, and the highest reading in the abdominal area was over a point just below the protruding liver-metastasis mass rather than directly over this mass.

Aside from the trouble with humidity changes, which will presumably be avoided in the future by leaving an Esler counter at Sawtelle, the greatest difficulty in these measurements lay in the lack of a suitable "telescopic" lead shield for the counter tube. Work has been started on such a shield at Birmingham, but it is doubtful that it will be completed in the immediate future, and in any case it is planned as a rather heavy, non-transportable piece of apparatus. It may be possible to improve the measurements by wrapping several layers of sheet lead around the

Victoreen tube mount, though mounting a thin counter tube directly in a narrow hole through a cylindrical lead shield would improve the performance of a given weight of lead to a point where an easily manipulated 10 lb. shield would cut out over 90% of the radiation from the side.

3. Measurements of activity in blood and urine were made by drying 0.1 ml samples on microscope slides and counting for 3 to 5 minutes in a Technical Associates counter with a lead shielded beta-sensitive tube showing a background of approximately 20 cpm and an efficiency of about 6% (based on the Berkely activity measurements). All activities were calculated back to the time of administration. A 20% correction for self-absorption was made for the blood samples, but the accuracy of the measurements in general was probably not better than ± 20% due to lack of proper sample cups and arrangements for obtaining reproducible geometry, a situation which will be corrected in future studies. The data on blood and urine samples (Tables 2 & 3) indicated the high degree of retention associated in the literature with hyperthyroid activity, i.e. the excretion was only about 35% in three days.

Radioautographs of filter paper partition chromatograms prepared from the urine specimens showed definite indications of bands other than that of inorganic iodide as early as four hours after administration of the iodine. The second strongest band was in approximately in the position taken by diiodotyrosine but was not identified by adding marker diiodotyrosine to the urine. Chromatograms of the blood samples were not prepared due to the relatively low level of radioactivity and lack of proper apparatus and reagents for the chemical procedures involved.

4. Dr. W. E. Molle obtained a punch biopsy from the liver and metastasis mass 25 hours after the administration. He was surprised by the lack of resistance to penetration of the needle shown by the mass, and the sample obtained (air-dried weight, 1.5 mg.) was a friable, watery, reddish piece of tissue grossly (according to Dr. Molle) very different from the firm white core obtained in the previous biopsy. A similar sample was taken by Dr. Molle for histological examination, and we understand from a telephone report that it showed partly necrotic and partly viable liver and tumor tissue.

The air dried sample gave 5.7 counts per minute over background, or about 1000 cpm/ gm. wet wt., as compared with 1750 cpm/ml. in the blood sample taken just before the biopsy specimen.

5. We tentatively conclude that there are thyroid tumor metastases present in the abdominal region which actively take up iodine. The pattern of the external radioactivity measurements would appear to indicate that: (a) Deep-lying liver metastases still retain the ability to take up iodine while that ability in those closer to the abdominal wall has been destroyed by the previous course of X-ray therapy, or (b) that the iodine retention in the abdomen is due to metastases other than those demonstrated in the liver, possibly the nodules reported in the case history as palpable in the pouch of Douglas.

6. Due to our failure to obtain a tissue sample adequate for estimating the mass of tissue actually involved in iodine uptake, we recommend a rather small therapeutic dose (10 to 30 millicuries) as the next step. This would presumably control further tendencies to thyrotoxicosis for some time and permit further study concerning the total dose required. If, as seems probable, such a dose results in blood and urine concentrations of radioactive iodine-containing substances high enough to be studied chromatographically a considerable amount of interesting data may be obtained without resorting to biopsy procedures.

Table 1

Relative Radioactivity Measurements with Geiger Counter Tube Held over the Midline at Various Positions 23½ Hours after Oral Administration of 1.17 mc I^{131} to Patient [redacted]

Rate Meter Reading	Position	Remarks
8	Ankle	
10	Knee	
13.5	Hip	
16	4 in. below umbilicus	
14.5	Umbilicus	
13.5	4 in. above umbilicus	(Directly over main mass of liver + metastases)
——	1 in. below sternum	½ in. lead shield
14.5	Nipple	
15	Thyroid	
7	2 ft. to one side of thyroid	(Approx. thyroid to pelvis distance)

Table 2

I^{131} Concentration in Blood Following Oral Administration of 1.17 mc to Patient [redacted]

Blood Sample No.	Time after Administration	% of Dose* per Liter
1	½ hour	2.5
2	1 "	3.0
3	2 hours	4.0
4	4 "	2.7
5	24 "	1.14
6	2 days	0.40
7	3 "	0.36
8	4 "	0.31
9	5 "	0.43
10	6 "	0.49
11	7 "	0.31
12	8 "	0.36

*All activities calculated to time of administration and increased by 20% to correct for self-absorption.

Table 3

Urinary Excretion of I^{131} Following Oral Administration of 1.17 mc to Patient [redacted]

Urine Sample No.	Time after Administration	% of Dose per Liter	% of Dose* excr. per Hour since Last Sample	Total Excr. % of Dose
1	1 3/4 hrs.	51	1.14	2.0
2	3 "	20	2.10	4.6
3	4 "	34	2.00	6.6
4	7 "	38	0.38	7.7
5	8½ "	51	0.61	8.5
6	10 1/3 "	17	1.74	11.3
7	24 "	15	0.79	22.1
8	2 days	14	0.41	32.0
9	3 days	7	0.13	35.2
10	4 days	3	incomplete sample	37.2(estim.)
11	5 days	1	0.06	38.5
12	6 days	1	0.06	40.4

* All activities calculated to time of administration.