ministration was associated with a more rapid return to normal of liver function tests than observed in a control group, further investigation would be required to determine the significance of this observation.

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Toxicity of Radioiodine and Radiophosphorus in Rats in Doses Comparable To Those Used Clinically.* (19371)

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The widespread use of radiophosphorus (P^{32}) and radioiodine (I^{131}) in clinical practice emphasizes the need for additional data on the toxicity of these isotopes. Except for the monograph of Bloom(1) and other recent reports(2-11) on the distribution and toxicity of these isotopes little information is available on the toxic effects of these substances in dosages used clinically. These experiments were designed to determine the effects of P^{32} and I^{131} administered in doses comparable to those commonly used therapeutically on the growth and histological appearance of the tissues of young albino rats.

Methods. Male rats of the Sprague-Dawley strain initially weighing approximately 100 g were housed, fed and watered under identical conditions during this study. Three groups consisting of 15 rats each received radioactive phosphorus (P^{32}) in doses of 0.066 microcuries per g (Group I-A), 0.100 μc per g (Group I-B), and 0.166 μc per g (Group I-C). Radioiodine (I^{131}) was administered to 3 similar groups in doses of 0.2 μc per g (Group II-C). Ten rats, receiving similar volumes of distilled water, were used as controls (Group III). These doses are comparable to a dose of radioactive phosphorus in a 70 kg man of 4.6 mc (I-A), 7 mc (I-B), and 11.6 mc (I-C), or of radioiodine of 14 mc (II-A), 42 mc (II-B), and 420 mc (II-C). The isotopes were administered by stomach tube in from 5 to 10 ml of solution in a single dose. All animals were weighed 3 times weekly and red and white blood counts and hemoglobin estimations were made at weekly intervals. Six weeks after the administration of the isotopes the rats were sacrificed by decapitation. Terminal blood counts were taken and the total body weight, the liver, kidney and testicular weight were recorded. Aliquots of these tissues were taken for histologic study.

P^{32} administration. The effects of the administration of P^{32} are indicated in Table I. The average body weights in grams were comparable for both the treated (Group I-A, I-B, I-C) and the control (Group III) animals. Table I indicates that there was a slight decrease in the average weight of the liver, kidney and testes of the treated animals over the controls, but expressed in terms of percentage of total body weight, these, with the exception of the testes, were not statistically different from the control animals.

It was noted that especially after the larger doses (Group I-B, I-C) there was a temporary decrease in the total white count but this had returned to control values within 6 weeks. The effect on the red blood count and hemoglobin was not significantly different in the treated and the control groups. Differential blood counts at the time of autopsy revealed a moderate lymphopenia in the treated animals but no other consistent change. Histologic examination of the kidneys, liver, adrenals, and testes failed to reveal any significant

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TABLE I. Mean Weights 6 Weeks After Radioisotope Administration.

Group	Dose per g body wt	No. rats	Initial wt, g	Final wt, g	Liver, g	Kidneys (2), g	Testes (2), g
	P^{32}						
IA	.066 μc	15	99	295	11.5	2.4	3.3
	% body wt				3.9	.81	1.11
IB	.100 μc	15	103	325	11.5	2.4	3.2
	% body wt				3.5	.74	.97
IC	.166 μc	15	101	286	11.1	2.4	3.3
	% body wt				3.9	.82	1.13
	I^{131}						
IIA	.200 μc	15	99	280	11.9	2.5	3.1
	% body wt				4.3	.90	1.12
IIB	.600 μc	15	99	311	12.2	2.5	3.2
	% body wt				3.9	.82	1.01
IIC	6.000 μc	15	101	314	12	2.5	3.3
	% body wt				3.8	.78	1.01
III	Control	10	101	324	12.5	2.5	3.4
	% body wt				3.9	.77	1.21

or characteristic changes in any of the groups of animals receiving P^{32}.

I^{131} administration. Weight gain was not altered in these animals in the 6 weeks following I^{131} administration. At sacrifice it was found the percentages of body weight of the liver and kidney of the treated animals were smaller than those of the control animals. In this group the testes represented a larger percentage of body weight (Table I). The adrenals and pituitary also weighed less in the treated than the control animals.

In all groups the hemoglobin remained depressed after I^{131} administration returning to the level of the control group at the 4th week. White cell counts remained essentially the same as the control animals throughout the study. Differential blood counts at sacrifice showed an increase of polychromatophils and a slight degree of lymphopenia compared to the control animals. Microscopically, the liver, kidney, adrenals and testes from the 3 groups did not differ from the controls.

Summary and conclusions. 1. Radioactive phosphorus (P^{32}) was administered by intubation to young male rats in doses equivalent to 4.6 mc, 7.0 mc and 11.6 mc for a 70 kg man. Similar radioiodine doses of I^{131} equivalent to 14.0 mc, 42, and 420 mc were given. All animals were sacrificed 6 weeks after dosing. 2. Except for a significant decrease in the testes/body weight ratio and a moderate lymphopenia at the time of autopsy no growth curve, organ weight or histologic evidence of damage was discerned in the animals receiving P^{32}. 3. Although no changes in weight gain or histologic evidence of organ damage was observed following the administration of I^{131}, some variations in organ weight/body weight ratio were recorded. 4. In the doses here employed, which were comparable to those used clinically, no evidence of serious radiation damage was recorded.

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