pigeon, the red breast muscle and the leg muscle contained approximately the same levels of this high energy phosphate.

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The Effect of BAL on Distribution and Metabolism of P^{32} and Sr^{90}. (18896)

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(Introduced by A. M. Brues.)

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The administration of 2,3-dimercaptopropanol (British anti-lewisite or "BAL") has been reported to be of value in the treatment of poisoning from arsenic(1), mercury(2), and other heavy metals(3). Certain of the heavy metals(3) that produce their toxic effects by combining with —SH groups in the tissues thereby obstructing the processes of oxidation and reduction essential to tissue economy. Due to the high stability of BAL-heavy metal compounds, BAL has been regarded as a useful agent for preventing or reversing tissue —SH combinations with heavy metals and for removing heavy metals deposited in bone. The use of BAL for the removal of internally-deposited radioactive isotopes has been suggested and applied in a few instances with various results(4-6). It was the purpose of this investigation to examine the effect of administration of BAL on the retention and distribution of P^{32} and Sr^{90}.

The animals chosen for the study were C_3H male mice between 5 and 6 months of age. A total of 50 animals was divided into 2 groups of 25 each—one group for injection with P^{32} and the other for Sr^{90} injection.

A solution of BAL in peanut oil, at a concentration of 20 mg per ml, was injected daily into alternate thigh muscles of 15 mice in each group. The daily dose was 0.05 ml or 1 mg BAL per mouse(7). The animals were treated with BAL in this fashion for 3 days prior to injection with radioactive tracer and also after injection in the case of the animals which were retained for more than one day before sacrifice. The remaining 10 mice in each group were injected only with radioactive tracer and sacrificed at intervals as controls for the BAL-treated animals.

One group of 15 BAL-treated and 10 control mice was injected with carrier-free P^{32} at a dose level of 0.1 μc per g. The other group of BAL-treated and control mice was injected with carrier-free Sr^{90} at the same dose level (0.1 μc per g). Injections of both isotopes were made intraperitoneally.

Five animals of each group were sacrificed at each of the following intervals after injection: 0.5, 1, 24, 48, and 120 hours. Of the 5 animals sacrificed per group per interval, 3 were BAL-treated and 2 were controls. The pelt, spleen, liver, kidneys, soft tissue, femur, and residual carcass of each mouse were analyzed separately for their content of P^{32} or Sr^{90}. All measurements were made on the standard Geiger-Mueller end-window counter and compared with standards prepared from the original injection solutions.

In as much as the purpose of the investigation was to determine whether there was any alteration in the normal metabolic pattern, the total retention was of interest, and Fig. 1 presents a graphic plot of per cent retention of

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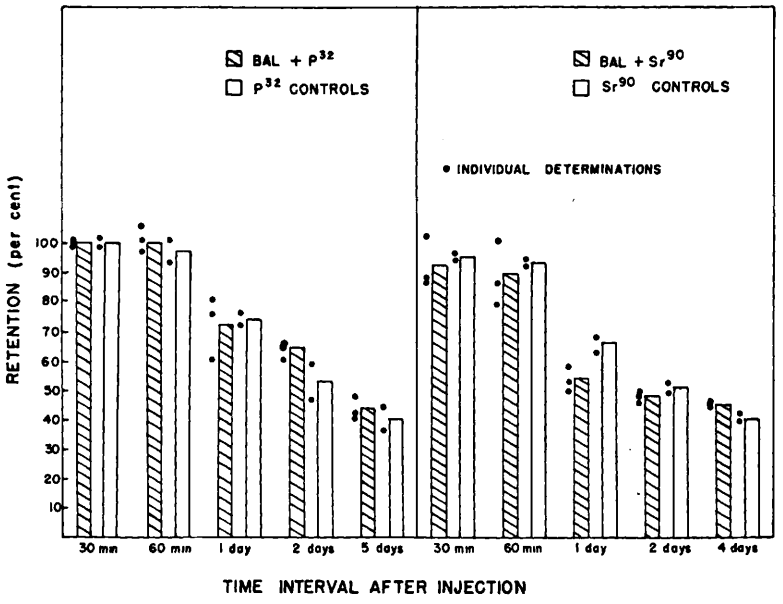

FIG. 1. % retention of P^{32} and Sr^{90} in BAL-treated and control mice.

BAL-treated and control animals. The data indicate that under the conditions of BAL administration there was no effect on retention of P^{32} or Sr^{90} in the treated animals as compared with the normal controls.

Though gross retention was not altered by BAL administration it was of interest to examine the isotopic content of the various organs where differences might appear that were not noticed in the overall retention picture. In Table I is presented the distribution of the radioactive materials as per cent of the

TABLE I. Average % Injected Dose per Organ.

Interval→	30 min		60 min		1 day		2 days		5 days	
Tissue	BAL-treated	Controls	BAL-treated	Controls	BAL-treated	Controls	BAL-treated	Controls	BAL-treated	Controls
				P^{32}						
Pelt	4.59	7.48	5.13	6.61	3.75	4.29	3.56	3.52	2.30	2.40
Spleen	1.15	.78	1.01	1.27	.76	.64	.60	.52	.29	.28
Liver	16.41	13.13	16.46	14.96	6.29	7.46	4.68	4.29	2.69	2.64
Kidneys	3.05	3.57	2.57	3.39	1.31	1.39	1.06	1.06	.66	.72
Soft tissue*	24.28	22	22.83	19.64	13.82	16.67	12.48	11.13	6.90	5.85
Femur	.31	.62	.47	.62	.66	.67	.65	.51	.61	.51
Residual carcass	50.33	55.24	53.03	50.98	46.26	43.19	41.07	32.79	30.45	28.04
Total tissue recovery	100.12	102.87	101.50	97.47	72.85	74.31	64.10	53.82	43.90	40.44
				Sr^{90}						
Interval→	30 min		60 min		1 day		2 days		4 days	
Pelt	8.39	9.20	5.34	4.86	.43	.42	.19	.40	.15	.10
Spleen	.24	.21	.08	.08	.02	.01	.01	.02	.01	.01
Liver	2.63	3.38	1.46	1.91	.13	.17	.12	.23	.06	.06
Kidneys	1.06	1.12	.63	.81	.05	.05	.03	.06	.02	.01
Soft tissue*	12.21	11.85	11.96	11.93	3.17	2.28	1.32	1.68	.72	.52
Femur	1.40	1.56	1.94	1.74	1.79	2.31	1.80	1.83	1.79	1.51
Residual carcass	66.93	68.21	67.90	69.77	48.45	62.92	44.74	47.37	42.82	38.70
Total tissue recovery	92.86	95.53	89.31	91.10	54.04	58.16	48.21	51.59	45.57	40.91

* Visceral organs plus remaining soft tissue.

injected dose per organ. Of the tissues examined, the only instance of a major deviation from control values was in the femurs of animals injected with P^{32}. In this case, the P^{32} content of the femurs of animals sacrificed 30 minutes after injection was only about half that of the controls. The difference was reflected in generally higher values in some of the soft tissues. After 1 hour this difference was reduced considerably and disappeared entirely in mice sacrificed after 1 day. The difference in femur retention of P^{32} at 30 minutes is considered especially significant since the reproducibility of bone values from animal to animal is good. The data further indicate that in the case of Sr^{90} BAL has no effect on either the rate of uptake, distribution, or total retention.

These results indicate that although the intramuscular administration of BAL in mice receiving P^{32} intraperitoneally results in a reduced rate of deposition of the isotope in bone, the differences are obliterated within 24 hours. No differences in the total retention of P^{32}, as compared with controls not treated with BAL, were observed. It would appear, therefore, that the use of BAL as an agent to accelerate elimination of either P^{32} or Sr^{90} from the animal body is not practicable, at least under the conditions of this experiment.

Summary. The effectiveness of 2,3-dimercaptopropanol (British anti-lewisite) in increasing the elimination of injected P^{32} and Sr^{90} in mice was investigated. It is concluded that BAL is essentially without effect although, in the case of P^{32}, the rate of uptake in bone appears to be reduced during the first hour. No such differences could be demonstrated after 24 hours.

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Anaphylactic Hypersensitivity Induced in Rabbits to Foreign Proteins in Freund's Adjuvant.* (18897)

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The method of enhancing the sensitivity of animals to foreign proteins by the incorporation of the antigen in Freund's adjuvant containing *M. tuberculosis* is well known. Although the originators of the method(1) did not believe that the sensitivity to the proteins was more than quantitatively different from that induced by the proteins used alone, the impression has persisted(2,3) that the state of hypersensitivity induced by the foreign proteins in Freund's adjuvant is of the tuberculin type. It may be that this impression dates from the work preceding the description of the adjuvant(4-6), in which it was held that, in tuberculous guinea pigs, the state of hypersensitivity induced to foreign proteins was of the tuberculin type. However, this interpretation was by no means established as fact(7).

The possibility that one might alter the type of hypersensitive reaction to a given foreign protein appeared to be of considerable

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