NDV group thus far tested is their capacity to produce fever in rabbits. The close relationship of these viruses is further emphasized by their ability to produce tolerance to a second injection of heterologous virus. These phenomena are correlated with hemagglutinating activity(1-3) but do not appear to be related to other biological properties.

Summary. Intravenous injection of mumps virus causes a febrile response in rabbits similar to that produced by influenza or Newcastle disease viruses. Animals are partially or completely resistant to a second injection of mumps virus 24 hours later. Pretreatment with the PR8 strain of influenza A virus also inhibits the febrile response to mumps virus. Mumps virus itself is equally effective in producing tolerance to the PR8 strain.

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Effect of Growth Hormone and Antibiotics upon Nitrogen Mustard Treated Rats.* (20436)

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The remarkable similarity in catabolic patterns resulting from treatment with either total body X-irradiation or systemic nitrogen mustard has been attested by several investigators(1-9). Selye *et al.* have reported upon the anticatabolic effect of somatotrophic hormone (STH) in rats that had received LD_{50} of whole body X-irradiation(10). There have also been gratifying results achieved with the use of antibiotics in animals exposed to ionizing rays(11-15). In contrast to this, the use of antibiotics in acute and chronic nitrogen mustard intoxication has been difficult to evaluate(9,16). It therefore seemed of interest to study the influence of STH and antibiotics, singly and in combination, on the catabolism produced in animals treated with nitrogen mustard.

Material and methods. Seventy male Sherman rats, initial body weight between 60-65 g, were divided into 7 groups of 10 animals per group. Group I served as absolute controls. Group II received penicillin combined with dihydrostreptomycin (Combiotic).‡ Group III received STH.§ Group IV received nitrogen mustard (HN-2) Methyl bis β-Chlorethyl Amine Hydrochloride‖). Group V received HN-2 and Combiotic. Group VI received HN-2 plus STH. Group VII received HN-2, Combiotic and STH.

The animals that were treated with HN-2 received only a single subcutaneous injection of 0.09 mg at the start of the experiment. The HN-2 was prepared immediately prior to administration. One hour later, all the animals were started on their respective treatment with Combiotic, STH, or the combined therapy.

The STH (Armour lot no. R-285-183) was made up freshly every second day with sterile physiological saline, and administered subcutaneously in 2 daily 8 hour intervals, each

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† Public Health Research Fellow of the National Heart Institute.

‡ Combiotic was supplied through the generosity of Pfizer Canada, Ltd.

§ STH was made available through the courtesy of the Armour Laboratories, Chicago, Ill.,

‖ Nitrogen mustard (Mustargen) was kindly provided by Merck and Co., Inc., Rahway, N. J.

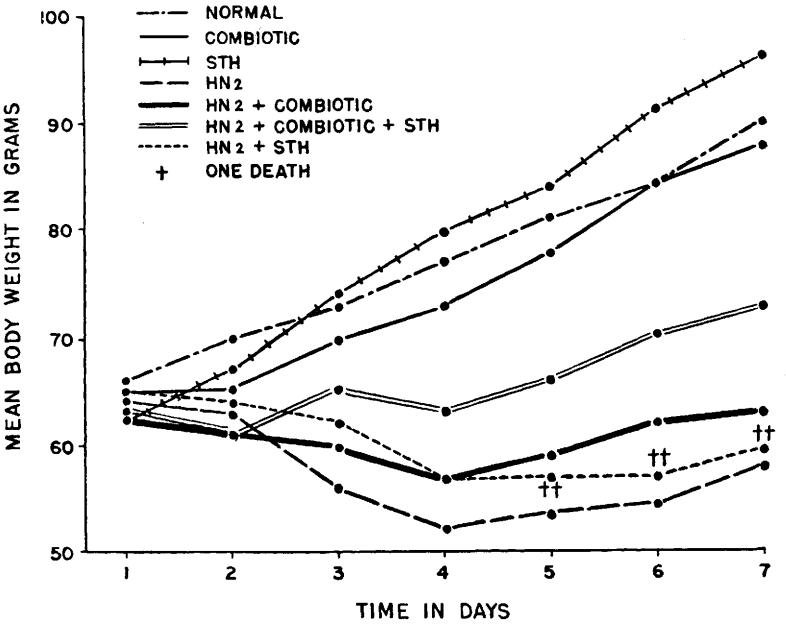

FIG. 1. Differences in mean body wt of all groups.

dose being 1.5 mg. When not in use, the STH solution was stored in the cold room at a temperature of plus 5°C.

The Combiotic consisted of a dry powder containing penicillin G procaine, penicillin G sodium and dihydrostreptomycin. It was diluted daily with sterile physiologic saline so that each 0.2 cc dose delivered 10,000 units of penicillin and 25 mg of dihydrostreptomycin. Injection was once daily via the subcutaneous route.

The diet consisted of Purina Fox Chow with water offered *ad libitum*.

Body weights were recorded daily for a period of 7 days. At the end of that time, all the surviving animals were sacrificed. At autopsy, the liver, spleen, kidneys, adrenals and thymus were taken for weighing and histologic examination.

Results. Examination of Fig. 1 reveals that the groups having received HN-2 (Groups IV-VII) suffered a maximum weight loss between the fourth and fifth days. Therefore, the fourth day served as the point of reference from which differences in mean body weights of the individual groups were calculated (Table I).

In neither of the HN-2 treated groups, receiving Combiotic (Group V) or STH (Group VI), was there any significant degree of protection afforded against the marked loss in body weight. In direct contrast to this, the HN-2 treated group receiving the combined therapy with both STH and Combiotic (Group VII) exhibited an unusually great resistance against the catabolism (Table I).

The only group to suffer any mortality was that receiving HN-2 and being treated with STH (Group VI). Two animals died successively on the fifth, sixth and seventh days (Fig. 1). Autopsy failed to reveal the specific cause of death. Although there was some evidence of scattered infections in the animals that were injected with HN-2, there was none to be seen in the rats dying spontaneously.

In those animals which had received HN-2 alone or combined with other therapy, relative degrees of atrophy of the thymico-lymphatic organs and spleen were observed. The kidney and liver were somewhat smaller than normal, but not significantly so. The adrenal glands were approximately the same size in all groups, regardless of treatment. In general, the organ weight tended to parallel the body weight of the animals.

Discussion. Although our initial concern

TABLE I. Differences in Mean Body Weights and Standard Error on the 1st and 4th Days.

Group	Treatment	Mean body wt and stand. error 1st day	4th day	P
I	Absolute control	65.2 ± 1.4	77.2 ± 2.2	
II	"Combiotic"*	64.5 ± 1.7	73.4 ± 2.4	<.01
III	STH	63.1 ± 3.2	78.8 ± 3.3	
IV	Nitrogen mustard	63.8 ± 1.9	52.6 ± 1.7	
V	Nitrogen mustard + "Combiotic"	63.4 ± 1.5	57.7 ± 1.9	<.01
VI	Nitrogen mustard + STH	64.9 ± 1.4	57.0 ± .4	<.05
VII	Nitrogen mustard + "Combiotic" + STH	63.3 ± .4	63.3 ± 2.1	>.05
				>.1

* Combiotic composed of penicillin G procaine, penicillin G sodium and dihydrostreptomycin.

had been the influence of STH and antibiotics on the catabolism, the effect of these drugs on the mortality is of interest. In this, and other unpublished data, there is a strong indication that STH plus HN-2 proved far more fatal than HN-2 by itself. Conversely, Combiotic alone, or in association with STH, appeared to decrease and, in some instances, prevent the lethal action of HN-2. The sensitizing ability of STH is difficult to interpret in terms of its protective property when given to X-irradiated rats(10). Possibly, the deleterious phenomenon could be attributed to the generalized somatic and chemical response elicited by the STH. It has been shown that STH has a marked propensity for provoking protein anabolism(17). Therefore, the increased demand for cellular synthesis, on a previously weakened organism, could further exhaust the remaining resources, thereby lowering resistance and hastening collapse.

One further observation was made in similar experiments in which several groups of HN-2 treated rats were allowed to survive for a 7 week period. In these animals, notwithstanding therapy, a permanent stunting of growth was observed, reminiscent of the immature cortisone treated rats(18).

Reviewing Fig. 1 and Table I, it can be seen that the combination of Combiotic and STH provided very effective protection against the HN-2 effects. The Combiotic alone proved to have some protective quality, while the STH alone was completely without benefit. Since the therapeutic use of HN-2 is limited in part by its toxicity, it would be of interest to determine whether our results have any clinical application.

Summary. A study has been made to determine the influence of STH and antibiotics on HN-2 treated rats. Our results indicate that the combination of STH and antibiotics provided the most highly effective protective action against the HN-2 induced catabolism. STH alone appeared to aggravate the toxic phenomenon, whereas the action of antibiotics alone proved to be of some benefit in preventing the extreme catabolic manifestations of HN-2.

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Ineffectiveness of *in vivo* Dialysis in Prolonging Life in X-Irradiated Dogs.* (20437)

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One possible explanation for the lethal effects of ionizing radiation is the accumulation of toxic substances in the body. Experimental evidence both for and against this suggestion has been adequately reviewed by Lawrence, Valentine, and Dowdy(1). Assuming that such a toxic substance did accumulate as a consequence of irradiation and that this substance was readily dialyzable, it might be possible to reduce its concentration to non-toxic levels, by means of an "artificial kidney," and thus decrease or prevent the damaging effects of radiation. The present experimental study was designed to explore this possibility.

Methods and materials. All animals employed in this study were adult mongrel dogs of both sexes ranging in weight from 12.7 to 24.0 kg, and they were fed a regular stock diet of 20% horse meat and 80% commercial dog chow. The "artificial kidney" and the technics employed for the *in vivo* dialysis of the blood have been previously described(2,3). Blood from a femoral artery was pumped at a rate of approximately 200 ml per minute through the dialyzer and back into the animal via the femoral vein. Flowing through the dialyzer in the opposite direction, and separated from the blood by 20,000 sq cm of cellophane membrane, was the dialyzing solution which contained glucose at a concentration of 0.1% and the principal electrolytes at the same concentration as found in the extracellular fluid(2). The dialysis treatment usually lasted for a period of 3-4 hours, during which time approximately 100 liters of dialyzing solution was pumped through the dialyzer. The efficiency of this procedure is shown in Fig. 1 by the rate at which previously injected Na^{24} can be removed from the dog. Sham-

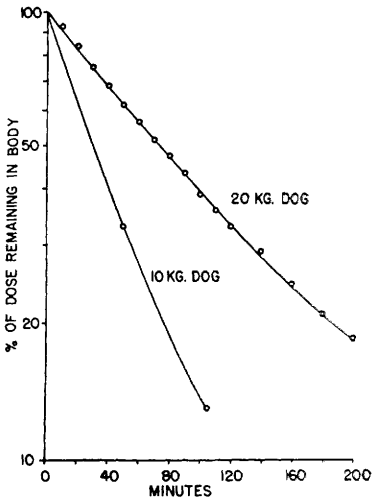

FIG. 1. Effectiveness of "artificial kidney" in removing Na^{24} from dogs.

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