O isoagglutinins produced by immunization with respective homologous agglutinogens. This indicates that the antigen-antibody reaction may be a specific reaction between the a_2 antibody in animal's plasma and an A_2 isoagglutinogen-like antigen present in tissue extract.

The A_2 isoagglutinogen-like factor is also present in metabolic products of animal parasites and bacteria(1). The reaction between a_2 isoantibody and the A_2 isoagglutinogen-like factor in infectious agents may also occur *in vivo* in humans of Groups O and B. This could well be related to the cause of certain diseases in which agglutination and hemolysis of red blood cells occurs regularly. Although the findings in mice indicate that agglutination occurs only in those that have a_2 antibody, in humans this reaction may not be so group-specific, or perhaps it may involve another agglutinin-agglutinogen complex similar to the well known a_2 - A_2 one.

The relative ease which congestion of liver and kidney, with large masses of agglutinated erythrocytes, is elicited, as shown above in mice, suggests that this experimental animal may be of use in studies in connection with infection and autoagglutinins in relation to acquired hemolytic anemias.

Summary. Mice of an A strain were injected intraperitoneally with suspensions of human erythrocytes of Groups B and O, and of subgroups A_1 and A_2. Ten to 15 days after last injection of erythrocytes the animals and normal controls were injected intravenously with 1 mg of an extract prepared from cuticle of *Ascaris lumbricoides*. The purpose of immunization with erythrocytes was to determine whether the a_1, a_2, β, and anti-O agglutinins, developing as a result of artificial immunization, would react *in vivo* with cuticular extract. Histopathological examination of livers and kidneys disclosed: 1. Agglutination of erythrocytes with formation of large clumps in liver and kidneys was seen only in animals immunized against A_2 erythrocytes followed by the cuticular extract. This did not occur in mice inoculated with erythrocytes of Groups B and O and subgroup A_1, also injected with the cuticular extract. No such changes were seen in liver and kidneys of normal mice inoculated with A_2 erythrocytes or cuticular extract alone. Agglutination takes place, therefore, between a_2 agglutinins in plasma and the A_2 isoagglutinogen-like factor in the extract. These findings indicate a definite relationship between blood groups and pathological changes produced by infectious organisms.

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Effect of Ribonuclease on Survival of Ascites Tumor Bearing Mice.* (24793)

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Klein(1) has demonstrated that ascites tumors treated with trypaflavine show definite retardation of growth coincident with drop in nucleic acid concentration. Ledoux confirmed nucleolytic action of riobnuclease when employed against both ascites(2) and solid tumors(3). Brachet(4,5,6) reported that RNase produces a strong inhibition of growth in plant cells and a significant reduction in incorporation of labeled amino acids into proteins of growing onion root tips. He suggested that RNase, upon entering living onion root cell, inhibits protein synthesis. Roth(7) concurred in this concept and observed that since RNA synthesis and degradation are probably closely related to protein synthesis, the RNase system may possibly become an important controlling factor in growth and cell division.

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TABLE I. Effect of 8 Daily Subcutaneous Injections of RNase on Longevity of Mice Carrying Ascites Sarcoma 37.

Group	Total amt RNase, mg	No. mice	Range of survival, days	Mean survival, days	S.D.	P %
Exp.	120	17	6–15	8.9	2.44	>5
Cont.		16	5–10	8.8	1.29	
Exp.	80	23	8–21	13.4	4.01	"
Cont.		27	8–20	13.1	3.95	
Exp.	40	30	6–14	10.2	2.83	"
Cont.		34	8–16	11.1	1.00	
Exp.	20	28	7–19	11.6	2.71	"
Cont.		34	8–16	11.6	1.87	
Exp.	10	29	8–16	11.1	2.13	"
Cont.		32	7–15	11.4	2.01	
Exp.	5	19	8–15	11.8	2.10	"
Cont.		30	8–16	11.5	1.90	

Encouraged by the report of Ledoux(2) that IP injections of RNase will significantly increase longevity of mice carrying Ehrlich mouse ascites sarcoma, Krebs mouse ascites sarcoma and of rats with Walker rat ascites sarcoma, we investigated the effect of subcutaneous and intraperitoneal injections of RNase on longevity of mice carrying ascites sarcoma 37.

Materials and methods. Young Webster male mice were injected intraperitoneally with approximately 2 x 10^6 cells of ascites sarcoma 37†. The animals were divided at random into experimental and control groups. The controls in all groups received equivalent amounts of normal saline solution. Experimental groups were divided into 2 categories, those receiving subcutaneous injections and those receiving intraperitoneal injections of the enzyme. In the subcutaneously injected animals (Table I), 6 groups received 8 daily injections of RNase totaling from 5 mg to 120 mg per animal. Since Ledoux(2) had reported the longest survival time in animals receiving 4 mg of RNase, we elected this level of enzyme to test the value of intraperitoneal injections, using graded doses ranging from 1 mg to 4 mg per day (Table II).

Results. Under the conditions of our experiment we did not demonstrate significant increase in mean survival time of any group receiving subcutaneous injections of ribonuclease (Table I). Using intraperitoneal injections of a constant amount of RNase (4 mg) at various time intervals, we failed again to detect any significant increase in the expected longevity of any of the experimental groups (Table II).

Discussion. Comparison of our data with Ledoux(2) indicates several possible reasons for our failure to substantiate his observations. We used sarcoma 37 ascites cells, while he used Ehrlich, Krebs, or Walker ascites cells. Whether sarcoma 37 more closely resembles the slow acting Landschütz tumor or the more rapidly growing Ehrlich tumor cells(8) we do not know, but there is a possibility that a gradient of activity does exist between various cell types. Furthermore, our source of enzyme was Worthington Biochemical Corp. Ledoux used his own preparations or Armour Co. product. Finally, his greatest increase in longevity of animals occurred in groups receiving freshly prepared purified RNase plus a nucleotide. This nucleotide was prepared " . . . from a dialysate of RNA digested by RNase *in vitro*."‡ We did not supplement RNase injections with a nucleotide. Certainly, under conditions of our experiment, RNase does not appear to be a promising carcinostatic agent. However, using a different source of enzyme and other strains of neoplastic cells, an antimitotic action of the enzyme might be demonstrated, if imbalance in me-

† Generously supplied by Dr. Morris Belkin, Nat. Cancer Inst., Bethesda, Md.

‡ Personal communication with L. Ledoux.

TABLE II. Effect of Total of 4 mg RNase IP Injections on Longevity of Mice Bearing Ascites Sarcoma 37.

Group	Days of inj. following inoculation	No. mice	Range of survival, days	Mean survival, days	S.D.	P %
Exp.	2	20	7–16	10.2	2.21	>5
Cont.	2	20	3–17	9.8	2.78	
Exp.	2,3	20	3–18	9.9	3.10	"
Cont.	2,3	18	7–18	10.4	3.01	
Exp.	3,4,5	25	8–19	11.5	2.75	"
Cont.	3,4,5	25	9–15	11.0	2.59	
Exp.	4,5,6,7	25	8–20	11.6	3.70	"
Cont.	4,5,6,7	25	6–14	11.2	3.15	
Exp.	5,6,7	16	6–16	9.6	2.42	"
Cont.	5,6,7	19	5–15	9.6	2.45	
Exp.	6,7	16	7–11	9.0	1.36	"
Cont.	6,7	19	6–13	9.0	2.04	
Exp.	7	19	6–13	9.5	1.66	"
Cont.	7	17	7–16	10.2	2.23	

tabolism of nucleic acids were precipitated by action of RNase.

Summary. 1) Subcutaneous injections of ribonuclease in 5, 10, 20, 40, 80 and 120 mg over an 8-day period do not significantly prolong life of mice carrying ascites sarcoma 37. 2) Intraperitoneal injections of 4 mg RNase over various time periods failed significantly to alter the expected mean survival time of ascites bearing mice.

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Diet Induced Variations in Tolerance to Altitude Hypoxia in the Mouse.* (24794)

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It has been previously shown that changes in the diet modify human tolerance to altitude hypoxia. King *et al.*(1) have reviewed these studies and noted that a high carbohydrate diet results in better visual, psychomotor and psychological performance at altitude. High protein or high fat meals tended to produce reverse effects. Kosmolinskiy(2) indicates that in man a combination of water-soluble vitamins also leads to increased resistance and a heightened sense of well-being. Both Craven *et al.*(3) and Campbell(4) have shown that rats fed exclusively on carrots had prolonged survival times in the altitude chamber. Interest in the physiological deficit produced by lipemia has prompted studies on relationship of fat intake to defects in oxygenation. Mosinger and Kuhn(5) studied effects of oxygen lack in mice fed large amounts of fat. They gave olive oil and isocaloric amounts of starch to their animals and demonstrated sig-

* The contents of this article reflect the personal views of the authors and are not to be construed as statement of official Air Force policy.