

TABLE I. Changes in Lipid and Protein Fractions During and After Cholesterol Feeding (Rabbit #42. Lipids mg, proteins g/100 cc).

	3/3*	4/14†	5/15
Total cholesterol	91	1312	450
Free "	30	352	209
Ester "	61	960	241
Phospholipids	50	325	155
Total fatty acids	922	2383	1164
Total protein	6.05	5.76	5.55
Albumin	3.47	2.33	3.05
Alpha ₁ -globulin	.49	.39	.20
Alpha ₂ -globulin	.56	.52	.26
Beta-globulin	.86	1.99	1.40
Gamma-globulin	.60	.51	.59
Cholesterol/phospho-lipids	1.82	4.03	2.90
Albumin/globulin	1.3	.66	.91

* Cholesterol feeding started.

† Cholesterol feeding discontinued.

may function as a carrier for lipids in the form of a lipoglobulin. Autopsy on the rab-

bits fed cholesterol disclosed the anticipated severe atherosclerosis. In view of the large size of the beta-globulin molecule, the rise in beta-globulin which accompanies the hypercholesterolemia in these animals, with resultant cholesterol-beta-globulin complexes, accords well with those theories(1,7) which attribute atherosclerosis to the circulation and deposition in the arterial wall of giant cholesterol-containing aggregates.

Summary. The hyperglobulinemia accompanying hypercholesterolemia produced by cholesterol feeding in the rabbit is predominantly due to beta-globulin.

6. Gertler, M. M., and Garn, S. M., *Science*, 1950, v112, 14.

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Effect of *p*-Aminobenzoic Acid and Vitamin C Upon Duration of Survival of Nephrectomized Rats. (18179)

M. F. MASON, GUS CASTEN AND ALLAN LINDSAY.

From the Parkland Hospital and the Department of Medicine, Southwestern Medical College of the University of Texas, Dallas.

In studying the rate of acetylation of *p*-aminobenzoic acid (PABA) in nephrectomized rabbits (to be published) it was observed that these animals uniformly died 3 to 4 days following removal of the second kidney. Each had received an intraperitoneal injection of 40 to 65 ml of 5% glucose solution containing 200 to 1000 mg of PABA, neutralized to pH 7.4 with NaOH, 18 to 24 hours after the second nephrectomy (ether anesthesia). After withdrawal of a series of small blood specimens from an ear vein they were returned to cages where food (Purina rabbit chow) and water were available *ad lib*. Because methemoglobin formation occurred in an occasional animal, Vit. C in amounts from 50 to 500 mg was added to the fluid injected into another group of similarly treated rabbits, and it was at once noticed that the duration of survival was strikingly increased, ranging from 5½ to 8½ days. Even more strik-

ing was the improved condition of the animals during most of the period of survival. They were alert, active, and in most respects behaved like normal rabbits until a few hours prior to death. These apparent effects of a single dose of a combination of PABA and Vitamin C have since been confirmed by an independent observer upon a limited number of nephrectomized rabbits (Dr. E. E. Muirhead; personal communication).

Inasmuch as careful records had not been kept in connection with these casual observations it was decided to study a series of rats under more controlled conditions to determine whether any increase in survival time after nephrectomy is caused by the administration of vitamin C, alone, or whether the combination of PABA and the vitamin is required.

Experimental. Forty-eight male albino rats weighing from 314 to 417 g, and maintained

on a diet of Rockland rat ration, were unilaterally nephrectomized. About 3 weeks later the second kidney was removed from the entire series (ether anesthesia). The animals were then divided into 4 groups which received intraperitoneal injections immediately after operation as follows: (a) *Control Group* (12 rats). These were given a volume of salt solution ranging from 5.0 to 5.8 ml containing that amount of sodium in the neutralized Vitamin C-PABA mixture given to group (d): i.e. 4.28 meq NaCl/kg. (b) *Vit. C Group* (12 rats). These were given 100 mg/kg Vitamin C, in volumes of neutralized solution ranging from 1.6 to 1.8 ml. (c) *PABA Group* (12 rats). These were given 200 mg/kg PABA, in volumes of neutralized solution ranging from 3.2 to 4.2 ml. (d) *PABA plus Vit. C Group* (12 rats). These were given Vitamin C, 100 mg/kg, and PABA, 200 mg/kg in volumes of neutralized solution ranging from 1.5 to 1.8 ml. The animals were returned to their cages where food and water were available *ad lib.*, and checked for survival at frequent intervals subsequently so that the time of death could be estimated to the nearest hour. No particular differences were observed in food and water consumption of the 4 groups.

Results. The results are summarized in Table I. The mean survival time of Group (d) receiving the combination of Vitamin C and PABA was 21.5% greater than that of the control Group (a), the differences being statistically significant. The increase of mean survival time of Group (c), which received only PABA was border-line in significance. Vit. C, alone, Group (b), had no effect upon survival.

Discussion. It is our impression that the survival and general condition of the nephrectomized rat are less affected by administration of a combination of Vit. C and PABA than are those functions in the rabbit. In this series of rats it appears that PABA alone may slightly increase survival whereas no such effect of PABA alone has been observed

TABLE I. Hours of Survival After Nephrectomy by Rats Treated with Vitamin C and PABA. Survival time, hr (± 0.5 hr).

Rat No.	Group (a) control	Group (b) vit. C	Group (c) PABA	Group (d) vit. C + PABA
1	47.5	46	47	56
2	49.5	48	51	60
3	49.5	48	51	61
4	49.5	50	55	61
5	49.5	50	59	64
6	53.5	54	65	64
7	55.5	54	65	72
8	55.5	58	65	72
9	55.5	60	75	76
10	59.5	60	77	76
11	76.5	71	82	80
12	80.5	79	87	86
Mean (hr)	56.8	56.5	64.9	69.0
S.D.	10.3	9.6	12.7	8.9
Diff. of means*		-0.3	8.1	12.2
2X S.D. of diff. of means*		8.12	9.34	7.86

* Compared to Group I as control.

in rabbits. The difference might possibly be due to more active intestinal synthesis of Vit. C by the rat, in which case the group receiving PABA alone was also obtaining some Vit. C as well. Vit. C alone was clearly without effect.

It is recognized that many variables may contribute to survival time after nephrectomy; e.g. environmental temperature, water intake, total caloric intake, mineral intake (Na,K), etc. The casual observations referred to above upon rabbits were so striking in the absence of obvious operation of such variables that the increase in survival was interpreted as a specific effect of the combination of Vit. C and PABA. It seems likely also that the less pronounced effect in rats is, nevertheless, a specific one. Further inquiry is being made into these findings.

Summary. The administration of a single dose of a combination of Vit. C and *p*-amino-benzoic acid to nephrectomized rats significantly increases the survival time.

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