Production of Hypertension Following Choline Deficiency in Weanling Rats.* (18297)

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Recently, Hartroft and Best(1,2) have demonstrated that weanling rats surviving the renal damage resulting from a brief period of choline deficiency(3) have a high incidence of hypertension. Sobin and Landis(4) did not find any evidence of hypertension in weanling rats during acute choline deficiency or in rats maintained on a choline-deficient diet over long periods of time. This study was undertaken to determine the effect upon blood pressure at maturity of varying degrees of choline deficiency for a 5-day period after weaning and to observe the effect of a similar choline deficiency on more mature rats.

Methods. Three groups of weanling rats of the Sprague-Dawley strain (average weight 43 g) were fed (1) a choline-free diet,† (2) the same diet plus 400 mg choline chloride per kg diet, and (3) with 2 g of choline chloride per kg added to the diet for a period of 5 days. At the end of this time representative animals from each group were sacrificed and the remaining animals restored to a normal diet (Rockland Rat Ration) for 6 months until sacrifice. During this period indirect blood pressure determinations were made by the method of Kersten, *et al.*(5). Under nembutal anesthesia at the time of sacrifice direct blood pressure readings were obtained by cannulation of the abdominal aorta. Three groups of older rats of the same strain (average weight 140 g) were given similar diets for 10 days followed by sacrifice of representative animals and the administration of a normal diet for 6 months.

Results. The data obtained are summarized in Tables I and II. It will be noted that approximately 70% of the weanling rats surviving the 5-day period of a choline-free diet had arterial blood pressure levels over 150 mm Hg six months later. In contrast to this hypertension did not develop in the animals fed 0.4 mg or 2.0 mg of choline for the brief experimental period. Similarly, hypertension did not occur in the groups of older rats fed either a choline-free or low-choline diet for 10 days. It should be noted that the weanling rats on a choline-free diet had an average weight gain of 7.4 g during the 5-day experimental period, whereas the older rats failed to gain in weight during the experimental period.

Summary. Of 28 weanling rats surviving a 5-day choline-deficient diet and maintained on a normal diet for 6 months thereafter 20 animals or 71% had arterial blood pressure levels over 150 mg at the time of sacrifice. Similar animals receiving an 0.4 mg % or 2.0 mg % choline diet and older rats (140 g) surviving 10 days of similar diets did not have demonstrable hypertension at sacrifice 6 months later.

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† Basic diet per kg

	g
Sucrose	455
Lard	300
Casein (vitamin test)	100
Mazola	50
H-E Cellulose	50
Salt mixture	40
l-Cystine	5
Natola	200

Plus daily vitamin supplement tablet

	mg
Thiamine chloride	.04
Calcium pantothenate	.2
Pyridoxine	.05
Niacin	.1

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TABLE I. Blood Pressure Findings in Rats Surviving % Day Period of Choline Deficiency Shortly After Weaning.

Diet	No. of animals	Avg initial wt, g	Avg wt after 5 days on low choline diet, g	Avg wt at 6 mo., g	Avg blood pressure at sacrifice, mm Hg	Animals with blood pressure over 150 mm Hg %
Choline free	28	43.4	50.8	395.4	166 (100-256)	71
0.4 mg % choline	20	43.7	54.9	411.4	118 (95-160)	5
2.0 mg % choline	22	42.9	54.7	392.8	114 (70-145)	0

TABLE II. Blood Pressure Findings in Older Rats Surviving 10 Day Period of Choline Deficiency.

Diet	No. of animals	Avg wt at start of low choline diet, g	Avg wt after 10 days on low choline, g	Avg wt 6 mo. later, g	Avg blood pressure at sacrifice	Avg heart: body wt %	Avg liver: body wt %	Avg kidney: body wt %
Choline free	24	140.2	140.6	353.2	100 (70-128)	.337	3.182	.748
0.4 mg % choline	20	135.1	134.8	346.5	120 (104-144)	.330	3.345	.740
2.0 mg % choline	22	145.6	141.2	324.9	110 (96-136)	.365	3.070	.763

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Leukocytic and Pyrogenic Effects of Typhoid Vaccine and Augmentation by Homologous Plasma. (18298)

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The response of a rabbit to the intravenous injection of a moderate amount of pyrogenic solution is characterized by an initial leukopenia followed by a leukocytosis and hyperthermia. There are varying opinions as to which of these reactions is the best indicator for the presence of pyrogens. Chapman(1) and Bandelin(2) have reported a leukopenia lasting 45-90 minutes following the intravenous injection of pyrogens into rabbits as a reliable test of pyrogenicity. Young and Rice(3) have reported that in dogs, a leukocytosis during the third to sixth hours after injection is a more reliable index of pyrogenicity. Co Tui and Schrift(4) have proposed a pyrogen test using both rabbits and dogs. If there is a positive thermal response

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