

Lack of Normal Blood Pressure Rise in Growing Chicken Deprived of Choline in Early Life.* (24443)

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Experimental production of persisting arterial hypertension has not been accomplished in the chicken. In the present experiment the method of choline deprivation was adopted for this purpose. In the rat this method results in arterial hypertension(1).

Methods. One-day-old Hyline cockerels were fed a synthetic diet devoid of choline (Table I). Controls kept in the same brooder were fed a commercial chick starter mash (Kahn Bros.). After 5 weeks the choline-deprived chicks were transferred to starter mash. Later a group of these birds was subjected to another period of choline deprivation of 8 weeks, then put back on starter mash. Following the initial transfer of choline-deprived chicks to starter mash, they were weighed at approximately monthly intervals and arterial blood pressures determined by needle puncture of sciatic artery in unanesthetized birds. Pressures were recorded with Sanborn transducer and recorder. Several choline-deprived and control chicks were killed at end of each day of blood pressure determination. Hearts, kidneys and testes were saved. Comb indices were computed by multiplying greatest height times greatest length of comb in centimeters.

Results. After 5 weeks on synthetic diet, the choline-deprived chicks were weak and underweight in comparison to mash-fed controls (145-300 g compared to 355-460 g for controls). They had badly swollen hock joints, suggesting chick perosis. When these chicks were transferred to starter mash, they recovered normal weight and appearance within 3 months. A second period of choline deprivation in some birds resulted in same signs within 8 weeks and was similarly followed by recovery when chicks were fed mash. Table

TABLE I. Composition of Choline-Deficient Diet.

Drackett C-1 assay protein (Soy)	1412 g
Glycine	12
D-L methionine	30
Cerelose (glucose)	2232
USP XIV salt mixture	214
Mixed water soluble vitamins*	40
" oil " " " †	60

* Two kg of this mixture contained, in g, the following amounts of vitamins: thiamine 100, nicotinic acid 100, riboflavin 16, calcium pantothenate 20, vit B₁₂ 0.02, pyridoxine HCl 6, biotin 0.6, folic acid 4, inositol 100, para-amino benzoic acid 2, ascorbic acid 250.

† Two kg of this mixture, in cottonseed oil, contained, in g: vit K 5, vit E (Ephynal acetate) 20, and in units, vit A 10,000,000 and vit D 600,000.

II summarizes blood pressure findings. Choline-deprived chicks showed no increases in blood pressure through the seventh month after initial transfer to starter mash.

Control chicks, on the other hand, showed rises in blood pressure after the third month. Testes of choline-deprived chicks, autopsied 6 months after transfer to mash weighed only one-fourth as much as those of control chicks (Table III). Testicular function, as measured by comb size, was also depressed. By comparison, kidney weights were the same or higher than in control birds. Microscopic examination of kidneys from several choline-deprived birds at various times following transfer to mash diet, revealed presence of partly hyalinized glomeruli and of tubules and collecting ducts which had undergone cloudy swelling, vacuolization, and desquamation of epithelial linings. Changes found in kidneys did not appear to be useful in explaining the blood pressure findings.

Discussion. The present data demonstrate that cockerels deprived of choline early in life do not become hypertensive when subsequently fed a diet adequate in choline, but instead remain normotensive and do not show the usual rise in blood pressure with age(2). Depressed growth of testes and combs indicates that either lack of androgens or pituitary gonadotrophins is responsible for this

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TABLE II. Mean Blood Pressure in Choline-Deprived Cockerels (mm Hg).

	Months after end of initial choline-deficient period						
	0	1	2	3	4	6	7
Controls	138 ± 5.7* (7)†	141 ± 3.8 (5)		139 ± 5.1 (5)	150 ± 7.1 (5)	168 ± 5.7 (11)	173 ± 6.4 (6)
Choline-def.	157 ± 4.6 (7)	149 ± 4.3 (5)	152 ± 3.7 (5)	150 ± 6.5 (5)	144 ± 4.8 (5)	147 ± 10.5 (8)	157 ± 8.8 (7)
Repeat choline-def.				146 ± 3.8 (5)	133 ± 5.8 (5)	130 ± 5.9 (4)	

* Mean ± S.E.

† No. in parentheses refer to No. of determinations, one determination/bird each month.

phenomenon. Male chicks and capons, but not females, are said to show increases in blood pressure with age after puberty, and this increased pressure in adult males and capons(3) is reduced by suppression of pituitary gonadotrophin secretion by estrogens or drugs(3). These findings indicate that pituitary gonadotrophins rather than androgens

are required for normal rise in blood pressure with age.

Summary. It is concluded that in the present experiments lack of rise in blood pressure with age in choline-deprived chicks was due directly to suppression of pituitary gonadotrophins secretion caused by lack of choline in early weeks of life, and not to consequent lack of androgens.

TABLE III. Chick Kidney and Testis Weights at 6 Months after End of Initial Choline-Deficient Period.

	Wt of testes, g/100 g body wt	Comb index, CM ²	Wt of kidneys, g/100 g body wt
Controls	.38 ± .10* (5)†	128 ± 8.3 (5)	.85 ± .07 (5)
Repeat choline-def.	.10 ± .01 (4)	84 ± 8.9 (4)	1.06 ± .08 (4)

* Mean ± S.E.

† No. of birds.

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Parasitic *Philornis* Flies as Possible Sources of Arbor Virus Infections (Diptera, Anthomyiidae).* (24444)

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In the course of a nestling bird bleeding program conducted in Trinidad as part of a general study of arthropod-borne (ARBOR) viruses, it has been observed that many nestlings are infected with immature fly parasites. Some of the early reared material was sent to

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Dr. Curtis Sabrosky at U. S. National Museum in Washington, D. C., who identified the flies as belonging to genus *Philornis* Macquart in the family Anthomyiidae. They are thus biologically similar to North American bird parasites of the genus *Apaulina* Hall and *Protocalliphora* Hough of the Old World, family Calliphoridae(1). Continuing observations soon made it evident that we were dealing with several species of *Philornis* and that various degrees of parasitism were in-