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Effect of Riboflavin and Thiamin Chloride upon the Cataractogenic Action of Galactose.*

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In previous work with galactose cataract the usual protective doses of vitamin supplements were provided in accordance with the recognized need of the rat. The normal growth of the rats and the lack of gross evidence of any vitamin deficiency led us to conclude that the cataract was probably due to some metabolic disturbance unrelated to a vitamin. The possibility of an increased demand for certain factors was considered, however. The usual dose of 0.5 g daily of dry yeast was increased fourfold without changing the rate or incidence of cataract. Massive doses of cod liver oil and viosterol made no difference.

The subsequent isolation of pure crystalline vitamins made it possible to supplement our previous findings by feeding massive doses of certain ones which have been shown to have any connection with lenticular changes. A previous paper reported[1] that no change in susceptibility to cataract was observed when large doses of ascorbic acid were administered orally or subcutaneously.

The present investigation using 2 crystalline fractions of the vitamin B complex, riboflavin and thiamin chloride (Betabion) has been made possible through the courtesy of Merck and Company. While no gross symptoms of vitamin B or G deficiency existed, nevertheless, it was possible that the introduction of galactose might have created unusual metabolic demands for one or both of these vitamins which could be recognized only by trying massive doses. So far as is known there is no etiologic factor common to galactose cataract and the vitamin G deficiency cataract first reported by Day, *et al.*[2] In fact, the statement made in a recent article by Day[3] "that flavin is *the cataract-preventive vitamin*" may need modifying in view of the present findings.

Four litters (29 rats) were so divided as to allow littermate comparisons and were fed a ration consisting of 25% galactose, 45% cornstarch, 15% vitamin-free casein, 4% salt mixture, 9% Crisco

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1 Mitchell, H. S., and Cook, G. M., *Arch. Ophth.*, 1938, **19**, 22.

2 Day, P. L., Langston, W. C., and O'Brien, C. S., *Am. J. Ophth.*, 1931, **14**, 1005.

3 Day, P. L., Darby, W. J., and Cosgrove, K. W., *J. Nutr.*, 1938, **15**, 83.

and 2% cod liver oil supplemented as indicated in Table I. Two drops of tikitiki were added to the crystalline supplements to provide the filtrate factor and incidentally to improve the palatability and thus insure complete consumption of the supplement. The doses of 50 micrograms of riboflavin and 20 micrograms of thiamin chloride were chosen as liberal allowances for the rat. The 0.5 g daily of dry yeast fed to the controls furnished 12-17 micrograms of thiamin and 30-50 micrograms of riboflavin.† Growth was normal in all groups except the one deprived of riboflavin

TABLE I.
Effect of Riboflavin and Thiamin Chloride upon Cataractogenic Action of a 25% Galactose Ration.

Ration supplement micrograms per day		No. of rats	Gain in wt in 3 weeks, g	Mature cataract development		
Riboflavin	Thiamin Cl			No. of eyes	days	Incidence, %
0	20	4	26.8	7	25.0	88
50	20	7	50.3	12	27.0	86
200	20	4	50.0	8	22.6	100
2000	20	5	59.0	8	27.0	80
50	2000	4	45.5	8	27.0	100
0.5 g yeast daily (control)		5	61.8	9	20.6	90

Cataract developed rapidly in all groups with no significant differences in rate or incidence. A few eyes invariably show resistance to advanced changes and this experiment was no exception. The last column in the table gives percentage of incidence of mature cataract which was high if not 100% in all cases. The average of 20.6 days required for cataract to develop in rats on the control ration in this experiment was somewhat shorter than previous averages (22.0 and 22.6 days) for other rats from the same colony on the same ration. Small differences in time and incidence cannot be considered significant. It would be erroneous to conclude that susceptibility to cataract was greater in rats receiving 200 micrograms of riboflavin than in those receiving 0, 50, or 2,000 micrograms because the incidence was slightly higher and the time a few days less. The one group receiving 2,000 micrograms of thiamin chloride required the longest time for cataract development but showed 100% incidence. None of these differences are significant statistically.

It may be concluded from these data that massive doses of riboflavin or of thiamin chloride exert no protective action against the development of galactose cataract in rats.

† Figures furnished by Fleischmann Laboratories.