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Relation of Diet to the Production of Dental Caries in Young Rats.

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The effect of diet on dental integrity has been noted by several observers.[1, 2, 3, 4] Dental caries has been observed to occur in adult rats receiving faulty diets.[5, 6, 7] Desiring to correlate such experiments with the occurrence of dental caries in children, experiments were conducted with young rats, attempting to produce caries through dietary deficiencies.

Rats from an inbred colony were used. Litter mates were assigned to various diets to be employed; the studies were instituted when the rats were 23 to 32 days of age, and continued from 27 to 51 days. Distilled water and food were furnished *ad libitum*. The rats were weighed twice weekly. At the end of the experimental period they were killed and the molars removed for examination. A summary of the results on the male animals will be found in the accompanying table. The female animals reacted in a comparable manner.

Diet D1 consisted of commercial casein, 18%; hydrogenated fat, 20%; Osborne-Mendel salt mixture, 4%; cornstarch, 58%; vitamin B concentrate, 1%.

Diet D2: Diet D1 plus 4% vitamin B concentrate.

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[1] Mellanby, May, *Brit. Dental J.*, 1923, xliv, 1031.

[2] Mellanby, M., Pattison, C. L., Proud, J. W., *Brit. Med. J.*, 1924, ii, 354.

[3] Boyd, J. D., and Drain, C. L., *J. Am. Med. Assn.*, 1928, xc, 1867.

[4] Boyd, J. D., Drain, C. L., Nelson, M. V., *Am. J. Dis. Child.*, 1929, xxxviii, 721.

[5] Marshall, J. A., *J. Am. Dental Assn.*, 1927, xiv, 3.

[6] McCollum, E. V., Simmonds, N., Kinney, E. M., Grieves, C. J., *Johns Hopkins Hosp. Bull.*, 1922, xxxiii, 202.

[7] Bunting, R. W., *Dental Cosmos*, 1925, lxvii, 771.

Diet D3: Diet D1 plus 4% vitamin B concentrate plus 3 drops of cod liver oil daily.

Diet D4: Diet D1 plus 6% vitamin B concentrate plus 3 drops of cod liver oil daily. This was the control diet for this series.

Diet E1 consisted of purified casein, 18%; hydrogenated fat, 20%; Osborne-Mendel salt mixture, 4%; cornstarch, 36%; dried yeast foam, 4%; and dried spinach, 10%.

Diet E2: Diet E1 plus a daily dose of irradiated ergosterol supposedly equivalent to the amount of D given in the cod liver oil in diet D4. This was the control diet for this and the following series.

Diet F1 was identical with E1 except that 2% NaCl was substituted for the Osborne-Mendel salt mixture.

Diet F2: Diet F1 plus a daily dose of irradiated ergosterol as in Diet E2.

TABLE I.

Diet	No. of rats	No. days on diet	Gain gm. per day	Tooth Ca %	Tooth P %
D1	6	28	0.55	—	—
D2	2	47	1.62	—	—
D3	4	49	1.60	—	—
D4	4	42	3.50	—	—
E1	5	51	2.84	27.8	13.7
E2	6	51	4.28	28.5	13.5
F1	4	50	0.76	25.3	11.4
F2	3	50	1.38	23.9	12.5

Caries was not demonstrable in any instance, although the biological incompleteness of the diets was reflected in marked reduction of growth, as compared to the rats on the control diets. Moreover there seems to be a significant difference in the calcium and phosphorus content of the teeth of rats on diets E as compared to those on diets F. The differences between E1, E2 and F1, F2 cannot be regarded as significant.

The failure of these young rats to develop caries is in accord with the results of Marshall,[5] who, working with low A diets, found that while adult rats developed tooth cavities with some regularity, in no instance was there any evidence of carious defects in young rats.

This study does not indicate that dental caries cannot be produced in young rats by diets deficient in some respect. It does indicate that in the young rat dental caries probably does not result from the use of diets low in vitamin A, B or D or by a deficiency of mineral salts.