

# Editorial

## The Late Effects of Early Nutrition

NUTRITIONAL research has passed its pioneering period, when it was relatively easy to find, indeed, almost stumble upon "gold" in the form of new nutrients or of unsuspected nutritional effects by known food constituents. Vitamins, essential amino acids, unsaturated fatty acids and trace elements come under this category. Nevertheless, it would be fallacious, although stated recently, to assume that nutritional research has reached its zenith and has entered a more static state, or even a downgrade course. As a matter of fact, there are indications in several directions of vigorous new advances in the recognition of nutrition as an environmental factor of overriding importance.

Genetics has long been claimed to be *the* determining factor in growth and development: environmental factors, such as nutrition or infections, were credited only with transient effect. More recently observations are accumulating both from experimental and purely clinical studies which may cast some doubt on the rigid division between lasting genetic and temporary nutritional effects.

The most impressive example of a lasting and apparently fixed effect of nutritional deficiency on growth and development has been furnished through experimental studies on rats in the laboratory of R. A. McCance in Cambridge, England.<sup>1</sup>

Several newborn litters of rats of identical genetic strain were mixed and divided among the lactating dams, only a few to some and large numbers to others. After weaning (for the same duration) all rats were put on an identical commercial ration. Those rats which were nursed in large numbers (up to twelve) by one mother, were small at the time of weaning; the control animals which were kept with the mother in small number (about four) were large. This difference in size was not cor-

rected by postweaning *ad libitum* feeding of a regular commercial ration; the animals originally underfed remained small throughout the extended period of observation. Whether this late effect was solely due to the original caloric deficiency or to some other more qualitative deficiency must remain unanswered at the present time.

These experimental observations have their counterpart (although not as well controlled and, in fact, open to some criticism) in the statistical data obtained during the last few years on Japanese children. The small stature, thinness, lower average body weight of the Japanese have long been attributed to racial, inherent qualities. Recent anthropologic measurements, investigations on the nutritional state and dietary surveys seem to support the interplay of environmental factors, chiefly nutritional for the anthropologic constants of Japanese children and adults rather than that of purely genetic influences. Even first generation Nisei children in America approach the average American children in their growth and development.<sup>2</sup> In Japan during the last war there was a severe reduction in length and weight of children. Since the war general improvement has set in, with a slow but continuous increase in the figures for body length and weight. In the rural population growth and development still fall significantly behind that of the urban population. This is best correlated with general caloric undernutrition and to some extent perhaps also with a low fat intake.<sup>3-5</sup> The same conclusion may be drawn from the diet of Japanese infants after weaning, based on the detailed data on food intake in the postweaning period collected and published recently in Japan by a special Committee under the chairmanship of Professor Enjoji of Kyushu University.<sup>6</sup>

Admittedly, these statistical observations on

infants, children and adults in Japan and on Japanese stock in North America could be the results of continuous (nutritional) effect and not necessarily the sequelae of early nutritional deficiency, as in the aforementioned rat experiments. Nevertheless they bring to the fore the importance and interaction of exogenous factors including nutrition.

The specific after-effect of early dietary deficiency on the development of particular pathologic conditions is well documented by the interesting experimental studies of Hartroft and Best<sup>7</sup> who have found severe hypertension, developing late in life, in a group of rats kept only one week in early life on a diet deficient in choline. How far the promotion of degenerative diseases and malignancy seen in rats fed a high calorie diet and, at least under special conditions, the enhancing effect of protein on the same group of diseases<sup>8</sup> should be considered as sequelae of an early harmful influence or as a continuous process, is still an open question. These experiments on animals may have no bearing on human nutrition but at least they make long extended follow-up studies on the conceivable late consequence of infant feeding in its present form desirable. For pediatricians for example, it would be of

special interest to know more about the possible late effects of breast milk versus "artificial" feeding.

This field, the late effects of early nutrition, encompassing the whole life span of animals and man, is worthy of intensive exploration and should yield important new knowledge.

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