LETTER FROM NEW DELHI

Zeroing in on Kwashiorkor

Protein deficiency causes severe body troubles by reducing cell production; most are reversible

In South India, in the summer of 1947, a three-year-old child was brought to a hospital with what looked like burns: his mother vehemently denied he had ever been burned. Dr. Vulimiri Ramalingaswami diagnosed his florid skin and swollen tissues as vitamin deficiency and treated the child with B-complex vitamins—but unsuccessfully.

Other children came in with similar symptoms and by 1948 their disease was identified as kwashiorkor, caused, Dr. Ramalingaswami found, by protein malnutrition.

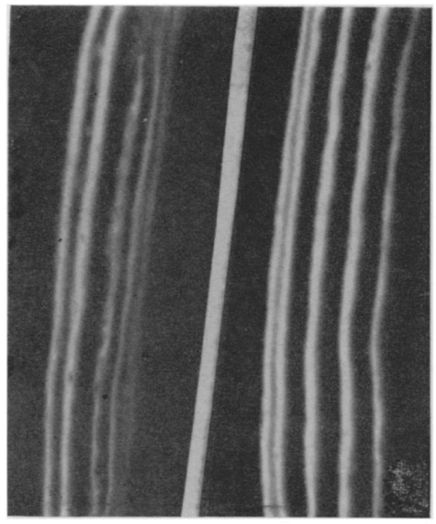
Kwashiorkor, known as the "disease of the displaced child" because its onset coincides with weaning, afflicts millions of Indian children who lose their only source of protein when their mothers stop breast-feeding them.

Protein deficiency affects the whole body. Growth is retarded, organs deteriorate, muscles atrophy, black hair turns red. Both irritability and apathy develop. (Recent studies of Jamaican children indicate that potassium is also lost from the brain during the course of the disease, which has been reported as well in children of some poverty-ridden families in the United States.)

Cellular studies of rhesus monkeys with kwashiorkor are now providing clues to the process involved in the disease. They show that protein deprivation causes no actual injury to the biochemical machinery that produces cells. Rather, the production of new cells declines sharply. Because cellular mechanisms themselves remain intact, the manufacture of new cells swings back into operation when protein is restored and many of the damaged organs can be repaired.

In protein deficient monkeys, as in human beings, different organs are affected at different times. In those with a normally high rate of cell turnover, including the liver, pancreas and salivary glands, changes appear within a few days. Muscles, in which 45 percent of the body's protein is stored, do not begin to atrophy until much later.

Recent studies indicate that bone should be classed with the organs that are affected early. Bone thickness, Drs. Ramalingaswami and M. G. Deo, both of the All India Institute of Medical Science, report, is markedly reduced in as short a time as 15 days. The number of cells for new bone formation quickly decreases and the layers of tissue laid on top of each other become progressively thinner as deficiency progresses.



Ramalingaswami

Kwashiorkor's thin bone strata (left).

Dr. Ramalingaswami tentatively suggests that the biological sequence may be initiated by the hypothalamus at the base of the brain, which is sensitive to the fact that there are fewer circulating amino acids. The hypothalamus may signal the pituitary gland to limit its secretion of growth hormone. From preliminary experiments, he finds that giving a protein-deficient animal growth hormone temporarily stimulates a burst of cellular activity.

Though the studies indicate that the effects of kwashiorkor are reversible in most organs, including the liver, pancreas and bone, effects on the brain, where cell renewal is extremely slow, are another question. Some scientists maintain the effects are clearly irreversible and warn that India is on the verge of producing 10 million intellectual dwarfs.

Drs. Ramalingaswami and Deo contend that precise measurements of the relation of protein malnutrition to degrees of mental development are practically impossible on a large scale in human beings and none too easy in monkeys. However, they are eager to launch a study of psychological development in their monkeys if they can locate a psychologist to do it.

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