EFFECT OF MATERNAL DIETARY PROTEIN ON
ANTHROPOMETRIC AND BEHAVIORAL DEVELOPMENT OF THE OFFSPRING*

Bacon F. Chow

From the Department of Biochemical and Bio-
physical Sciences, The Johns Hopkins University
School of Hygiene and Public Health, Baltimore,
Maryland, USA

Anthropology is a science that treats of the growth
of human beings, among other topics. Growth of human
beings deals with not only physical measurements such as
height, weight, head circumference, fatfold thickness,
fat content, etc., but should include weights and func­
tions of organs. Above all, the metabolism of the whole
human being should be included. In our laboratory, we
have recognized since 1942 that individuals with equiva­
lent height and weight may have organs of different size,
function and metabolism. Further, we have demonstrated
that the composition of tissues, such as blood and
organs, can be altered through the diet, and, more
recently, we have demonstrated that the metabolic func­
tion of animals and humans can be altered in utero,
particularly through the diet of the mother. With this
in mind, we present herewith the three parts of our
paper.

ANIMAL EXPERIMENTS

First, we will deal with animal experiments. It

* After the untimely death of Dr. Chow, the final prepa­
ration of this paper was completed by his close associ­
ate, Andie M. Hsueh, Sc.D.
has been found in our laboratory that dietary restriction during gestation and lactation results in undesirable effects in the offspring including: high mortality in early life, low birth weight, permanent growth stunting, delayed physical development, feed wastage, and behavioral abnormalities despite ad libitum feeding of an adequate stock diet after weaning.\textsuperscript{1-6} In this paper, we will report further studies in the identification of (1) the critical period in development affected by dietary restriction, i.e., gestation and/or lactation; (2) the critical dietary component, i.e., protein, calories or other, the lack of which will result in disadvantaged pups; and (3) a specific organ, the underdevelopment of which causes the above cited damages.

Experimental Methods

Female rats from the colony are raised until the age of five to six months on Purina Laboratory Chow fed ad libitum. Sets of six females, each of body weight 240-260 g are mated overnight with two males of body weight 400-425 g. Mating is continued each night until sperm are seen in the vaginal lavage that is examined each morning. When the females become sperm-positive, they are housed individually and assigned randomly to different dietary regimes. After weaning, all the progeny are housed individually and fed an adequate stock diet on an unlimited basis.

The following animal models were prepared to determine the effect of dietary restriction of the dams during gestation and/or lactation on the offspring.

RR -- pups from restricted mothers and nursed by other restricted mothers,

RN -- pups from restricted mothers nursed by ad libitum fed mothers,

NR -- pups from ad libitum fed mothers nursed by restricted mothers, and