PN-ABC-884

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

DATE: 9/28/88

MEMORANDUM

TO: AID/PPC/CDIE/DI, room 209 SA-18

FROM: AID/SCI, Victoria Ose VO

SUBJECT: Transmittal of AID/SCI Progress Report(s)

Attached for permanent retention/proper disposition is the following:

AID/SCI Progress Report No. C7-079
Final PR

Attachment

-COVER PAGE-

U.S.-ISRAEL COOPERATIVE DEVELOPMENT RESEARCH PROGRAM - CDR

First Progress Report September 1988

Title of Research Project:

Evaluation of Triglycerides as a Rapidly Assimilable Energy Source for Malnourished Lactating Women and Children (C7-079)

Grant Number: PDE-5544-G-7067-00

Principal Investigator:

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Cooperating Investigator:

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Signature of Principal Investigator:

Rec'd in SCI.
SEP 27 1988

OVERALL OBJECTIVES are to investigate, in-vivo, the rate and extent of metabolism of medium chain triglycerides (MCT), relative to that of long chain triglycerides (LCT), in properly nourished and malnourished humans; and, to evaluate the efficacy of coconut oil as a locally available source of MCT for treatment of malnutrition in the tropics.

THE OBJECTIVES OF THE FIRST SIX MONTHS were to determine the time-delay between consumption of dietary LCT and MCT and the appearance of metabolic fractions of these triglycerides in blood serum, breath and stool; and, to select dietary components for the nutrition experiments to be conducted in Israel.

ACHIEVEMENTS

Dietary Components of Nutrition Experiments

The first task in this experiment was to select the components of the diet. Because we are studying the transfer of triglycerides from diet to body tissues using two, independent methods (FFA profiles of the selected tissues and stable carbon isotope analyses of the same tissues), the foods used in the experiments must be compatible with both analytic methods. Observation of a change from LCT to MCT using stable carbon isotopes requires that the ratio of 13C:12C (referred to as delta C) be distinctly different in the two lipid sources, and potentially different from the carbohydrate and protein sources of the diet.

In Israel, most protein sources of animal origin have delta C values of approximately -20. This is mid-way between the values for C-4 plants (delta C -12) and C-3 plants (delta C -25) and reflects the fact that these animals were fed a mix of C-4 and C-3 plants.

Due to this intermediate delta C value for animal proteins (including dairy products), it is necessary for us to raise animals on specially selected diets. We have done this using chickens as our animal of choice. Table 1 shows the components of the C-4 type feed. Of the total intake, 84% was composed of corn plus corn gluten meal. Corn is a C-4 plant having a delta C value of -12. To balance the protein intake, 10% of the feed was fish meal (delta C approximately -20). The delta C of the chickens at slaughter (nominally 1 kg weight) was -14.

In Table 2 the components of the C-3 type chicken feed are listed. Wheat (delta C -25) and soybean meal (delta C -26) comprised 62% and 28%, respectively, of the total. The delta C of the chickens at slaughter was -23.

We are currently raising our second crop of chickens and also a group of layer hens so that the test subjects will have a choice of meat or eggs as their protein source.

Duration of Nutrition Experiments

Short-term feeding trials are in progress in which well nourished humans consume nutritionally balanced diets containing fixed sources of proteins and carbohydrates for periods of two weeks. During the initial four days of this period, the lipid is purely C-3 LCT (safflower, soy or grape seed oil). The lipid then changes to C-4 LCT (corn oil) for 5 days. In the final five days of the study, the lipid is C-3 MCT (coconut oil).

Breath, blood and stool are sampled at regular intervals, with the most frequent sampling being during the first day of the diet change. Blood is to be analysed for FFA profiles. Breath carbon

dioxide and stool are analysed for delta C values. Rates of changes in these parameters will indicate the time required for the studies of properly nourished and malnourished individuals in Israel and in the Philippines.

Equipment Purchased

To treat the large number of blood and stool samples in the present and planned experiments, we have purchased the required equipment for drying and processing the fecal samples without introducing objectional odors to the ventilation system of the hospital.

FUTURE EXPERIMENTS

The experiments of the next six months should provide us with the information required to fix dietary and sampling regimes of the more extensive study of malnourished persons. In this next six months, juvenile and lactating subjects will consume diets in which the carbohydrate and protein will be either C-3 or C-4, and the lipid will be of the opposite carbon type. Breath, stool, blood, and breast milk will be sampled. The duration of these experiments is dependent upon the data obtained from the experiments now in progress. This work will be conducted at Shaare Zedek General Hospital under the guidance of Dr. Freier and Dr. Goldstein.