

# Abstracts of Current Literature



CHARLES R. SHUMAN, M.D., EDITOR

WALTER H. ABELMANN, M.D., *Boston*  
MARGARET W. BATES, D.SC., *Pittsburgh*  
RALPH E. BERNSTEIN, M.B., *Johannesburg, South Africa*  
ELIAS COHEN, PH.D., *Buffalo*  
JAMES L. DENNIS, M.D., *Oakland*  
A. B. EISENSTEIN, M.D., *St. Louis*  
JAMES B. HAMMOND, M.D., *Indianapolis*  
GUY HOLLIFIELD, M.D., *Charlottesville*  
M. K. HORWITT, PH.D., *Elgin*

F. E. HYTTE, M.B., B.S., PH.D., *Aberdeen, Scotland*  
S. M. LEVENSON, M.D., *Washington*  
JOHN F. MUELLER, M.D., *Cincinnati*  
MORTON J. OPPENHEIMER, M.D., *Philadelphia*  
FRANK E. RICE, PH.D., *Chicago*  
JAMES H. SHAW, PH.D., *Boston*  
MARTIN SILBERBERG, M.D., *St. Louis*  
JANICE M. SMITH, PH.D., *Urbana*  
GEOFFREY WALKER, M.B., *Oakland*

JOHN C. WATERLOW, M.D., *Kingston, Jamaica*

## NEWER DIETARY STUDIES

*The survival of men under adverse environmental conditions has been of considerable military significance. Among the most important factors is a compact, easily preserved source of energy. Although pemmican, as a food, consists of protein and fat it is capable of maintaining metabolism over periods of a week without deleterious effect.*

**Some Metabolic Effects of a High-Fat, High-Protein Diet During Semistarvation Under Winter Field Conditions.** H. F. Drury, D. A. Vaughan and J. P. Hannon. *J. Nutrition*, 67: 85, 1959.

The use of survival rations high in fat and protein, with little or no carbohydrate, such as is found in pemmican, is of practical importance, especially under Arctic conditions. Heretofore when starvation studies have been made, it has generally been the fat and protein portions of the diet that were low, with carbohydrate predominating. On a high fat, high protein, low carbohydrate diet a condition of ketosis may be expected and feared.

This study was undertaken to determine whether men can function adequately for a reasonable length of time under realistic survival conditions on a diet consisting almost entirely of pemmican. A further purpose was to measure some of the effects of a small sugar supplement to the basic pemmican diet. Ten healthy adult men were used in the experiment. They were outdoors or in unheated quarters all but two hours a day. Temperatures ranged from +14° to -55°F. Each man received 1,000 calories a day for nine days. The "sugar" groups received 40 gm. per day substituted isocalorically for pemmican.

Subjects receiving the sugar-supplemented diet exhibited significantly higher blood sugar levels and some-

what less ketone body excretion; nitrogen balances were not affected. Either diet, pemmican with or without sugar, "was deemed adequate for most survival situations faced by air-crews in the Arctic."

FRANK E. RICE

**Some Biochemical Effects of Restricted Diets During Successive Field Trials in Winter.** D. A. Vaughan, H. F. Drury, J. P. Hannon, L. N. Vaughan and A. M. Larson. *J. Nutrition*, 67: 99, 1959.

A succession of experiments and observations by these investigators with human subjects on restricted diets have demonstrated a greater than expected adaptation to low carbohydrate, low calorie diets, with persistence of adaptation following "recovery" periods of *ad libitum* feeding. This study is related to the research reported by Drury, Vaughan and Hannon. (See previous abstract.) The same environmental conditions, living arrangements, etc., reported therein, were employed in this study. Again, pemmican was fed at the rate of 1,000 calories a day. Three diets were used, pemmican supplemented isocalorically by 0, 40 and 80 gm. sugar per day. Each group of men, after five-day feeding periods on one of the three diets (period I) was allowed a "recovery" period of one week on a mixed diet *ad libitum*. Then followed a second feeding period (period II) in which each group received either more or less sugar than in the first period.

Eighty gram sugar supplements compared with the 40 gm. level had little if any additional influence on fasting blood sugar, nitrogen balance and ketonuria. Responses in period II differed both quantitatively and qualitatively from those observed in period I. The authors point out the need for caution in interpreting the responses from field studies in which recovery intervals between dietary regimes are no more than a week. Individuals who have apparently recovered from a

stress retain a latent capacity for the effective management of a subsequent stress of the same type.

FRANK E. RICE

**A Nutrition Survey of the Armed Forces of the Republic of Korea.** The Interdepartmental Committee on Nutrition for National Defense. R. R. Williams *et al.* *J. Nutrition*, 68: 1, 1959.

This is an eighty-page report on a survey conducted during June and July 1956 designed "to assess the current nutritional status of the troops." The survey included the assembling of information on agriculture and collection of dietary information supported by food analyses. This report describes the procedures used and major findings.

The diet of the armed forces in Korea is a simplified version of the national diet adjusted to mass feeding, predominantly rice with about 81 per cent of the caloric intake made up of cereals, 5 per cent of fish, meat, eggs and milk, 4 per cent of oil seed fats, some fruit, nuts, vegetables and sugar. Undermilled rice was systematically used by the military establishments. This was not true so extensively in the civilian population. Among other factors of importance in contributing to the better diet of the military was the effective use of soybeans and dried fish. The total protein intake/man/day averaged 117.2 gm., of which 22 gm. was from animal (or marine) sources. Milk and fresh meat were not available in liberal supply.

Examinations of 1,514 soldiers revealed limited evidence of serious deficiency disease, even though the dietary studies indicated suboptimal intakes of riboflavin, vitamin A and carotene. Active angular lesions of the mouth were observed in 13.8 per cent of the troops and 16.3 per cent excreted less than 30  $\mu$ g. of riboflavin per six-hour urine specimen. The fact that physical and biochemical findings did not show marked indications of vitamin A deficiency is presumed to be due to seasonal high intakes of green vegetables from the military gardens. The over-all dietary, biochemical and clinical results do not suggest that protein malnutrition is a widespread problem in the Korean armed forces.

FRANK E. RICE

*Nutritional studies designed to evaluate the influence of dietary patterns upon the medical status of population groups must include an analysis of concurrent infections or infestations among the subjects. The conditioning effect of disease upon deficiency states is widely recognized and frequently represents an important contributory factor in making a marginal diet inadequate.*

**A Clinical Description of the Main Nutritional Disorders Encountered in the Salisbury Native Hospital in a Series of Fifty-Four Consecutive Cases Studied in 1954.** J. Miller-Cranko and M. Gelfand. *Central African J. Med.*, 4: 16, 1958.

This article is a clinical description of the features of deficiency disease affecting the African adult in Mas-

honaland. The majority of the males are employed in industry in and around the periphery of the city of Salisbury. The diet consists of a good supply of maize and meat (about two and a half pounds per week). Fresh vegetables are not popular and beans and nuts are often preferred. Almost all subjects are affected with bilharziasis and almost all have malaria. A fair proportion have hookworm. About 15 or 20 per cent have a positive blood Wassermann reaction. These are relatively more primitive tribal subjects, and many prefer a "witch doctor." The climate is that of south central Africa.

Of fifty-four persons studied during 1954, thirteen (24 per cent) had vitamin A deficiency, but twenty-two (41 per cent) had pellagra. There was only one case of pure scurvy. In twelve cases both vitamin A and vitamin B complex deficiency was present, and in six cases the "pellagroid type" of skin lesion was noted. Among the striking clinical features were cheilosis (48 per cent), drysebeacea (50 per cent) pigmentation of the arms (48 per cent) hypertrophic pigmented follicles of the legs (44 per cent) and thin and wasted features (24 per cent).

S. O. WAIFE

**Dietary Habits in Population Groups in Guatemala. IX. Santa Catarina Barahona.** M. Flores, Z. Flores and B. Meneses. *Arch. Venezol. nutricion*, 8: 57, 1957.

A dietetic survey has been made in twenty-four families in rural areas of Guatemala. Individual data on all children included in the study were obtained. The results showed that the amounts of vitamin A, riboflavin and ascorbic acid consumed were low as compared to the recommended levels, adjusted to the weights of the studied group. Ingestion of calories, niacin and protein was just adequate, while that of calcium and thiamin was relatively high.

In the children, ingestion of all the nutrients was inferior to the recommended allowances, with the exception of iron. The quantity of food consumed by the children was very low, resulting in intakes of vitamin A and riboflavin below 50 per cent of the recommended level. Consumption of animal proteins is very low, only 5 to 6 per cent of the total protein. Corn is the main protein source.

AUTHOR

*The calculation of the sodium content of the diet has been known for many years to result in substantial errors when standard tables are employed. For accuracy in metabolic determinations, duplicate portions of consumed foods must be subjected to biochemical analysis of electrolyte content.*

**Error in the Provision of Diets of Known Electrolyte Content.** C. T. G. Flear, P. Huges, and I. McCellan. *Brit. J. Nutrition*, 13: 54, 1959.

Much metabolic work is dependent upon the feeding of diets of known composition. In addition, the clinician wants to prescribe a diet of known electrolyte content and expects the quantitative aspects to be accurate. In this paper, a study is described in which two diets



prepared for balance studies and diets provided during routine management of patients were analyzed, and the values found for sodium, potassium and chloride compared with those found by calculation from tables of food composition. Diets were prepared over a period of six weeks and on any one day they were prepared from the same cuts of meat, same loaf of bread, etc. All diets were prepared by the same person.

On the average, the electrolyte content as determined by calculation gave a 13.5 per cent underestimate for sodium, a 10.4 overestimate for potassium and a 1.4 per cent overestimate for chloride. Variations of triplicate examples were 4 per cent or less. It is particularly interesting that the low sodium diet as actually prepared contained more sodium than that intended.

S. O. WAIFE

*There is little information available concerning the influence of diet upon the eyes outside the field of deficiency states. The effect of a diet more liberal in protein, than that fed control subjects, in improving myopia requires confirmation.*

**Dietary Treatment of Myopia in Children.** P. A. Gardiner. *Lancet*, 1: 1152, 1958.

The author has shown in previous reports that myopic children are more fussy about their food than other children and in particular eat less animal protein. In this study an attempt has been made to correct the defect by correcting the diet. Two groups of school children were the subjects of this study. They were roughly comparable in terms of myopia and in health and social status. Those with congenital myopia were excluded. One group was given a diet in which 10 per cent of the calories consisted of animal protein, the calorie intake itself being left to the child's natural appetite; the other group had no dietary advice. The two groups were studied for a year.

The rate of visual deterioration was much less in the children treated and, after the age of eight, there was virtually no deterioration in this group. Some older children who took the greatest quantities of animal protein actually showed an improvement. The possible reason for the benefit is discussed; it is still obscure.

F. E. HYTTEN

*Dietary studies on experimental animals have proved of considerable value in determining the biologic value of foods and the role of micronutrients in cellular metabolism. However, one must be cautious in assigning clinical significance to observations on animal diets.*

**Comparative Performances of Baby Pigs Fed Infant and Baby Pig Diets.** F. Diaz, V. C. Speer, P. G. Homeyer, V. W. Hays and D. V. Catron. *J. Nutrition*, 68: 131, 1959.

It has been amply demonstrated that the rat is not a suitable subject for dietary studies in which human milk and products resembling it in composition are used.

This is because of the animals' low tolerance for lactose, which is high in human milk and in most infant foods. The pig can utilize lactose very effectively. This research was undertaken to study the performance of baby pigs fed commercially prepared infant foods in comparison with standard baby pig diets, the ultimate objective being to determine whether or not the baby pig could be used as a test animal for evaluating human infant diets.

In these experiments 136 crossbred pigs were used. In one experiment, the average age was 11.1 days and average weight 5.8 pounds; in the other 7.1 days and 6.3 pounds. Previously tested baby pig diets were prepared for comparison, which contained dried skim milk as a base with added fats and necessary nutrients. Five milk-base commercial infant feeding products were fed in the experiments, and two soybean products. In some cases the feed was offered in dry form, in others the products were uniformly reconstituted with water to a 20 calories/ounce dilution. The principal differences in composition of the reconstituted fluids were in content of protein and fat. After reconstituting to the 20 calories/ounce basis, protein and fat percentages were respectively as follows: in the five milk-base foods—A 3.4 and 2.7 per cent; B 2.7 and 2.8 per cent; C 2.7 and 2.8 per cent; D 1.7 and 3.4 per cent; E 1.5 and 3.5 per cent; in the two soybean infant foods—F 3.2 and 2.6 per cent; G 3.1 and 4.0 per cent.

Infant formulas A, B and C performed well, in general, equal to or better than the standard pig diets. Formulas D and E produced consistently low rates of gain and high feed requirement per pound of gain. Performance on diets F and G (soybean base) was unsatisfactory. This is attributed mainly to the (previously observed) inability of the pig to utilize soya protein adequately. It is concluded that baby pigs grow satisfactorily on infant (cow's milk) formulas when the protein level is 2.7 to 3.4 per cent, and less satisfactorily at levels of 1.7 and 1.6 per cent protein.

"The baby pig shows promise as a test animal in biologically evaluating human infant diets, however, these data need to be corroborated with carefully controlled clinical studies and general observations with the human infant."

FRANK E. RICE

**Effect of Dietary Level of Fat and Type of Carbohydrate on Growth and Food Intake.** A. Yoshida, A. E. Harper and C. A. Elvehjem. *J. Nutrition*, 66: 217, 1958.

The purpose of this study was to determine the interrelationships that might exist among dietary levels of fat, types of dietary carbohydrate and of fat, growth rate, food intake, and the volume and moisture content of stomach contents. Earlier experiments had indicated that the feeding of diets containing low molecular weight carbohydrates to rats resulted in lower food intakes and growth rates than the feeding of isocaloric diets in which the carbohydrates were of high molecular weight. The influence of osmotic pressure of stomach contents was suspected.

Oleomargarine was used in all diets as the main source of fat unless otherwise stated. Other fats studied were butter, lard, olive oil and hydrogenated coconut oil. All diets contained 1 per cent corn oil, including the "negative control group." The carbohydrates tested were sucrose, cerelose and dextrin. Comparative diets were isocaloric, also isonitrogenous (at two levels). Feeding was *ad libitum*.

In the experiments with fats it was observed that in all cases 30 per cent fat in the diet caused more rapid weight gains than the negative controls. There were little differences between the various types of fats fed, although the data seem to show a tendency toward greater relative gains in the two-week periods when butter was the fat incorporated in the diet. The relative gains per calorie intake were about the same for all rats. There was a high positive correlation between growth and caloric intake regardless of the carbohydrate source or the dietary level of fat in experiments in which the protein to calorie ratio was kept constant.

The groups fed dextrin increased in weight faster than those fed sucrose or cerelose at the 1 per cent and 10 per cent fat levels. There were no differences at the 30 per cent fat level. Stomach contents of rats one and a half hours after ingestion of 5 gm. of ration averaged 9.5 gm. in the animals on the sucrose diet; 6.9 gm. was the average for the groups fed dextrin. There was no evidence that fat was emptied from the stomach more slowly than either carbohydrate or protein; however, the authors recommend further study of this point.

"It is suggested that, when a substantial part of a low-molecular weight carbohydrate in a diet is replaced by fat or dextrin, the osmotic effect of the diet is reduced sufficiently to permit young rats to consume a greater quantity of diet and, hence, gain weight more rapidly during the early stages of growth." FRANK E. RICE

### ITEMS OF GENERAL INTEREST

**Gastroscopic Findings in Pellagra. Their Correlation with the Clinical Manifestations Before and After Treatment.** M. Salib. *Gastroenterology*, 36: 816, 1959.

The author examined forty patients with typical pellagra. Eighty per cent of the patients had gastrointestinal symptoms: most commonly, epigastric discomfort after meals, diarrhea, and anorexia or nausea. Involvement of the nervous system was common—60 per cent having polyneuritis, 25 per cent lateral sclerosis and 10 per cent dementia. All were moderately or markedly anemic.

Of the forty patients, twenty-eight were found to have gastric atrophy on gastroscopic examination. In the group with gastric atrophy, twenty had diminished or absent gastric acid secretion. Eight patients with gastric atrophy were treated with injections of nicotinic acid (300 mg.), thiamine (100 mg.) and riboflavin (10 mg.) for fifteen days, together with a nutritious diet. All showed reversal of gastric atrophy to normal, along with disappearance of skin rash, gastrointestinal symp-

toms, anemia and achlorhydria. However, neurologic manifestations persisted. Another group of eight patients failed to respond to therapy with vitamin B<sub>12</sub>. †

Although the observations strongly suggest that the gastric atrophy and diminished gastric secretion were due to pellagra, other nutritional deficiencies may have played a part. These data are valuable since there is very little information available on the effects of dietary deficiency on gastric mucosal integrity and gastric acid secretion.

J. B. HAMMOND

**Effect of Ionizing Radiation on the Allergenicity of Milk Protein.** H. F. Kraybill, R. O. Linder, M. S. Read, T. M. Shaw and G. J. Isaac. *J. Dairy Sci.*, 42: 581, 1959.

The objective of this investigation was to study the effect of ionizing radiation on the allergenicity of milk protein as measured by gross anaphylaxis (guinea pigs), and by the Schulz-Dale uterine strip technics. Four batches of raw skim milk were radiated at 0.465, 2.79, 5.58 and 9.30 megarads at the Idaho Falls reactor. Another sample of whole milk processed by radiation distillation at the Massachusetts Institute of Technology, using Co<sup>60</sup>, was also tested. Reductions in allergenicity in skim milk at the higher levels of radiation were observed to be of sufficient magnitude to be of "clinical importance." The radiation distillation samples could not safely be compared without further experimentation to determine whether some indirectly reactive compounds may have been removed in the distillation process. The possible protective action of the fat also is an unknown factor.

FRANK E. RICE

**Incidence of Familial Hyperlipemia.** K. Hirschhorn, R. Hirschhorn, M. Fraccaro and J. A. Böök. *Science*, 129: 716, 1959.

Familial hyperlipemia is an inherited disease associated with early onset of coronary atherosclerosis. It is thought to be due to a single gene difference causing a defect in the lipemia-clearing system. The homozygous condition is characterized by hepatosplenomegaly, abdominal crisis, milky serum, childhood atherosclerosis and xanthomatosis. In this study, a survey of the student population in Sweden is reported. Samples were obtained from 998 consecutive students at a Swedish university. The samples were examined for optical density, and where there was a density above a certain level, the serum was analyzed for lipids. Thirty-six showed a significant optical density; of these, sixteen demonstrated a marked delay in clearing of neutral fat from the serum, and four had a borderline delay. Five students were found to have primary hypercholesterolemia and eight were completely normal.

The incidence of familial hyperlipemia in an apparently normal northern European population was close to 3 per cent.

Three persons had an elevated optical density of the serum despite the ability to clear ingested fat normally. A study of the serum in one case showed that the mate-



rial was a form of lipid and may represent an abnormal chylomicron.  
S. O. WAIFE

**Postnatal Vascular Growth and Remodelling in the Pathogenesis of Arterial Lesions.** As seen from a study of Micro-Anatomical and Histochemical Changes in Vascular Elastic Membranes Injured by Odoratus Intoxication. T. H. Gillman and M. Hathorn *Schweiz. Ztschr. Allg. Path.*, 22: 62, 1959.

Male rats of the Wistar strain were fed a diet composed of 50 per cent ground sweet pea seeds and 50 per cent stock ration; an equal number of animals serving as controls were fed the stock diet only. At the age of 83 and 113 days, respectively, the diets of half of the rats of either group were enriched with 10 per cent lard and 2 per cent cholesterol until the end of the experiment. After fifty-two and fifty-three days, aortic ruptures occurred in the animals fed the lathyrus factor. However, the older the animals at the beginning of the experiment, the less frequent were these lesions. The well known skeletal changes also were more severe and more frequent the younger the rat, when fed the lathyrus seeds. The main change of the ground substance in the aortic lesions consisted of progressively increasing metachromasia as well as ferrocyanide-positive polymucosaccharides in the peri- and intermembranous layers, alterations in the amount and distribution of PAS-positive material, deposition of granular elastic-positive material about and between the elastic membranes, increased waviness and merging of the latter and inconsistent alterations in the adjacent reticulum. Adult rats were practically resistant to the toxicity of the lathyrus seeds. The lathyrus-induced lesions are thought to be due to depressed synthesis of new collagen-like material about the membranes rather than to lysis of pre-existing ones. M. SILBERBERG

**Simultaneous Flux of Potassium Into and Out of the Dog Intestine.** E. Y. Berger, G. Kanzaki and J. M. Steele. *Am. J. Physiol.*, 196: 1270, 1959.

Potassium moves across the intestinal mucosa from the luminal surface to the blood simultaneously with a stream in the opposite direction from blood to lumen. The net result of these two flows determines the amount of potassium appearing in the intestinal lumen. These two flows were measured across isolated loops of intestine in the dog with the use of radiopotassium. For a

20 cm. length of intestine, potassium enters the lumen at 0.8 to 6.5  $\mu$ Eq. per minute, and simultaneously leaves the lumen at 0.7 to 5.2  $\mu$ Eq. per minute.

AUTHORS

**$I^{131}$ -Labeled Protein and Fat Meals in Patients with Chronic Pancreatitis.** A. Polachek, C. B. Cope, R. F. Williard and F. W. Barnes, Jr. *Gastroenterology*, 37: 38, 1959.

In order to determine the relative value of radioiodinated protein and of fat meals in detecting malabsorption in patients with chronic pancreatitis, fourteen patients with this condition were studied by both methods. Plasma radioactivity, at hourly intervals, and fecal and urinary radioactivity for forty-eight and seventy-two hour periods were determined. Data by one method only were obtained in ten additional patients with chronic pancreatitis.

In sixteen normal control subjects, the mean maximal plasma  $I^{131}$  absorption after a protein meal was 13.5 per cent (standard deviation 2.3 per cent). In eight patients with mild chronic pancreatitis, the corresponding value was 13.8 per cent. In four patients with severe chronic pancreatitis, as evidenced by pancreatic calcification, the mean maximal plasma  $I^{131}$  absorption was 10.6 per cent; and in seven patients in whom chronic pancreatitis was associated with pancreatic calcification and diabetes mellitus the corresponding value was 7.8 per cent.

In the sixteen normal control subjects, the mean maximal plasma  $I^{131}$  absorption after a fat meal was 13.7 per cent (standard deviation 2.6 per cent). In the group with pancreatitis alone, the corresponding value was 12.4 per cent; in the group with pancreatitis and calcification, it was 4.9 per cent; and in the group with calcification and diabetes mellitus, it was 3.1 per cent.

It was concluded that the radioiodine-labeled triolein studies provided the greatest differentiation between patients with the more severe forms of pancreatitis, as compared with the protein meal studies. Neither type of test gave abnormal results in the patient with mild, uncomplicated pancreatitis.

Fecal excretion of the tagged fat meal usually was related reciprocally to the plasma  $I^{131}$  levels. Fecal excretion of the protein meal was seldom abnormal. The determination of the radioiodine content of urine samples following either protein or fat meals was of no practical value.  
J. B. HAMMOND