development of experimental poliomyelitis is discussed.

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Effects of Protein Depletion and Inanition on Serum Glycoprotein Concentrations in the Rat.* (23326)

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Increases in the carbohydrate-containing proteins of serum have been reported in several pathologic states characterized by cachexia, such as cancer and tuberculosis(1). The suggestion that degradation of body tissues may be responsible for elevated serum glycoprotein levels(2) makes desirable experimental studies in which marked weight loss occurs but in which disease processes are not involved. If the catabolism of somatic tissues is responsible for increased serum glycoprotein levels, then nutritional states characterized by pronounced weight loss might be expected to cause an increase in the protein-bound carbohydrates of serum.

The present study is concerned with the effects of protein depletion and inanition on serum concentrations of total glycoprotein, seromucoid, albumin polysaccharide, globulin polysaccharide, total protein, albumin and globulin, and on the hemoglobin and hematocrit values of blood in adult, male, Sprague-Dawley rats.

Methods. The rats were housed singly in suspended type wire cages. They were maintained on a diet of Purina laboratory chow and tap water, *ad lib.* until initiation of the study. Blood samples were obtained by cardiac puncture under light ether anesthesia. *Normal Group.* The group was composed of animals maintained under the conditions described above. *Protein Depletion Group.* Rats were fed a protein-free diet† consisting of 70% corn starch, 15% alphacel (cellulose), 10% vegetable oil, 4% salt mixture (U.S.P. XIV), 1% cod liver oil, and supplemented with the following vitamin mixture† (mg/kg): alpha tocopherol 110, ascorbic acid 1000, inositol 110, choline chloride 1660, menadione 55, p-aminobenzoic acid 110, niacin 100, riboflavin 22, pyridoxine hydrochloride 22, thiamine hydrochloride 22, Ca pantothenate 67, biotin 0.44, folic acid 2, Vit. B_{12} 0.03, Vit. A 20,000 units/kg, and Vit. D 2,220 units/kg. The animals were fed the diet 20 days at which time they had lost approximately 25% of their original weight. *Inanition Group.* Food was withheld from the rats until they had lost 25% of their original weight, the depletion requiring 8 days. Drinking water was available at all times. *Serum and blood determinations.* Chemical and hematologic analyses were carried out by methods previously reported(3,4,5). The globulin fraction was isolated by an adaptation of the method of Pillemer and Hutchinson(5). The components of the albumin fraction were estimated by difference. An

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TABLE I. Effects of Protein Depletion and Inanition on Serum Levels of Protein-Bound Carbohydrates and Proteins.

Group	A. Normal	B. Protein-free diet	C. Inanition
No. rats	20	20	20
Initial wt (g)		403 ± 5.7	407 ± 8.5
Final wt "	411 ± 5.2	305 ± 6.2 †	305 ± 6.2 †
Hematocrit (%)	45 ± .4	47 ± .4 †	(†) 53 ± .8 †
Hemoglobin (g %)	14.7 ± .17	14.7 ± .11	(†) 16.5 ± .28 †
Total serum glycoprotein (mg %)	166 ± 2.1	128 ± 2.2 †	132 ± 1.7 †
Albumin polysaccharide "	19 ± .9	19 ± 1.4	16 ± 1.4
Globulin polysaccharide "	147 ± 2.0	109 ± 2.4 †	(*)116 ± 2.3 †
Seromucoid fraction "	27 ± .6	23 ± .6 †	(*) 21 ± .6 †
A/G ratio (protein-bound carbohydrate)	.13± .007	.17± .016*	.14± .015
Total serum protein (g %)	5.7 ± .06	5.0 ± .08 †	5.1 ± .02 †
Albumin "	2.6 ± .05	2.6 ± .06	2.6 ± .02
Globulin "	3.1 ± .07	2.4 ± .07 †	2.5 ± .02 †
A/G ratio (protein)	0.8 ± .04	1.1 ± .04 †	1.0 ± .05 †

Findings include stand. error of mean.

Statistically significant differences from normal values are indicated:
* P = <.05 >.01. † P = <.01. (*) and (†) indicate statistically significant differences between Groups B and C.

analysis of the data was made by standard statistical procedures, employing the *t* test (6).

Results. A summary of the data is presented in Table I. The results of the hematocrit determinations indicate that different degrees of hemoconcentration occurred in the experimental groups as a result of the dietary regimens. The effects were most pronounced in the fasted group.

Changes in the serum glycoprotein levels were comparable in both experimental groups. With the notable exception of the carbohydrate moiety of the albumin fraction, all other protein-bound carbohydrate values were significantly decreased.

The pattern of decrease of the serum proteins was identical to that of the protein-bound carbohydrates. The relative stability of the albumin fraction in acute depletion was demonstrated by the increased A/G ratios and may be a reflection of the slower rate of turnover of serum albumin(7). A similar observation has been reported for man(8).

The results of the present investigation are not in agreement with the hypothesis(2) that tissue degradation is primarily responsible for increased serum glycoprotein concentrations. Apparently other factors are involved. Winzler(1) has suggested the possibility of increased local synthesis in pathologic conditions and has reviewed other hypotheses.

Summary. The effects of protein depletion and inanition on serum concentrations of total glycoprotein, seromucoid, albumin polysaccharide, globulin polysaccharide, total protein, albumin, and globulin and on hemoglobin and hematocrit values of blood have been investigated in adult, male Sprague-Dawley rats. Significant decreases were observed in all serum constituents with the exception of the albumin fraction. The response of the protein-bound carbohydrates of serum was similar to that of the serum proteins. A marked hemoconcentration occurred in the fasted group. The results are not in agreement with the hypothesis that tissue degradation is responsible for increased serum glycoprotein concentrations.

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Diurnal Variations in Excretion of Chloride in Normal Subjects.* (23327)

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A number of investigators have reported a diurnal rhythm in the excretion of sodium or chloride. Most of these authors were interested in the effects of sleep(1-7). Some studied the salt excretion for consecutive time intervals of different lengths(8,9). The effects of posture(10) and of varying degrees of muscular work(11) also have been considered. In all studies most of the normal subjects excreted more sodium chloride/hour during the day than during the night. However, the number of cases which have been studied is relatively small. Since derangement of the diurnal rhythm in excretion of sodium chloride is sufficiently characteristic in certain diseases to be an aid in diagnosis, and possibly in prognosis and evaluation of therapy, more information is needed on the variations for normal subjects(10-13).

Methods. Forty-one normal subjects were studied, 40 of whom were between 18 and 33 years of age. The subjects were university students or laboratory workers. There was no regulation of their salt intake or their degree of activity. No attempt was made to standardize or in any way to regulate their sleeping and eating habits. They were required simply to furnish a consecutive day and night urine. Each subject recorded his time of retiring and of arising. The night urine was that produced during the recumbent period after retiring at night, and the day urine was that of the up-and-about period between arising and retiring. Chloride was determined by the Volhard-Harvey method. Chloride excretion is expressed as NaCl excretion/hour. NaCl excretion/hour during the day divided by NaCl excretion/hour during the night is the ratio which is calculated.

Results. The chloride excretion/hour during the day, expressed as NaCl, ranged from .15 to .96 g with a mean of .48 g and standard deviation of .21. The chloride excretion/hour during the night, expressed as NaCl, ranged from .04 to .64 g with a mean of .25 g and standard deviation of .14. For the day to night ratios the range was 0.71 to 4.58 with a mean of 2.31 and standard deviation of 1.09. Creatinine excretion determined in 25 of the subjects ranged from 1.16 to 2.73 g per 24 hours(14).

The correlation coefficient for the total amount of salt excreted per 24 hours and the day-to-night NaCl excretion ratio was +0.026. The distribution of the ratios of the 41 subjects studied did not differ significantly from that of the ratios of 28 subjects for whom data necessary for calculation of the ratios had been reported by other investigators. The distribution of the day-to-night Na or Cl excretion ratios for the 69 subjects is shown in Fig. 1. The lowest ratio found

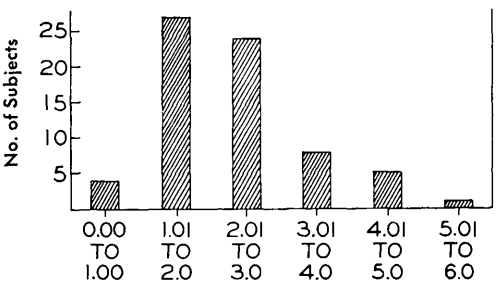

FIG. 1. Distribution of day-to-night NaCl excretion ratios of normal subjects.

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