

modulator nerve section develop a moderate hypertension not associated with any significant change in the total blood volume, either in its cellular or plasma fraction.

This work suggests a relationship between overactivity of the sympathetic nervous system and polycythemia. In those dogs with intact sympathetic efferent pathways, modulator nerve section was followed by a marked polycythemia and increased blood volume which disappeared after interruption of these sympathetic efferent pathways. Also in animals in which sympathetic efferent pathways had previously been interrupted, modulator nerve section caused no significant change in blood volume in either its cellular or plasma fraction.

At present the above described studies are being made on other dogs and, in addition, changes in their total body water and fluid available for the solution of sodium thiocyanate are being observed.

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Intravenous Nourishment with Protein Carbohydrate and Fat in Man.*

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Intravenous injection of dextrose for both nutriment and hydration is now a common routine clinical procedure and the intravenous injection of casein digest to provide amino acids has also become feasible in man.¹ Intravenous injection of homogenized fat has been carried out, especially in infants, but is not commonly done at the present time.^{2, 3}

In a patient having received an extensive resection of the larynx, upper trachea and most of the cervical esophagus for extensive carcinoma of the larynx, nutrition had been maintained by means of a Levine tube inserted into a sinus formed by the upper end of the esophagus in the base of the neck. With his coöperation this tube was withdrawn and for a period of 17 days all nutriment was given

* This work was conducted under a grant from Mead Johnson and Company, Evansville, Indiana.

¹ Elman, E., and Weiner, D. O., *J. A. M. A.*, 1940, **112**, 796.

² Holt, L. E., *J. Ped.*, 1935, **6**, 151.

³ Gordon, H., and Levin, S. Z., *Am. J. Dis. Child.*, 1935, **50**, 894.

intravenously with exception of the vitamins and liver extract. Four cubic centimeters of Vi Penta Oil (Hoffman-LaRoche) containing vitamins A, B₁, B₂, C and D were instilled every day into the open end of the esophagus. Liver extract was injected intramuscularly every third day. The parenteral solution for intravenous use consisted of "protein" in the form of an enzymatic hydrolysate of casein (Amigen) kindly furnished by Mead Johnson and Company, dextrose and highly emulsified fat. The patient was not bedfast but was up for several long intervals during the day sitting in a chair and walking about the ward.

The fat suspensions for intravenous use were prepared as follows: To 500 cc of the highest grade olive oil 250 g of freshly obtained commercial egg lecithin were added and the 2 mixed by stirring with a glass rod. After standing over night increased homogeneity occurred and the suspension was added to 4500 cc of triple distilled water. This mixture was then passed through a dairy homogenizer at 4500 pounds pressure (with kind coöperation of the Cherry-Burrell Corporation, Chicago). After this process the emulsion appeared as a "rich cream" slightly yellow in color. Microscopic study of the minute fat globules revealed that they were approximately 1 μ or less in diameter. The emulsion was then autoclaved for 15 minutes at 15 pounds pressure and stored in hermetically sealed flasks kept at room temperature. Several batches were prepared at succeeding intervals so that the emulsion used in this experiment was always less than 2 weeks old.

Two types of solutions were employed in this patient. (1) A mixture of 10% casein digest and 5 or 10% dextrose in distilled water or saline in variable proportions. (2) Fat emulsion added to the above with a maximum proportion as follows: 1000 cc of 10% dextrose in normal saline, 500 cc 10% solution of casein digest, 500 cc of the above described fat emulsion. Usually 2 injections were given daily, one in the morning and one in the evening at the rate of 500 cc an hour. Careful record was made of the intake and output in regard to nitrogen balance.

The accompanying table summarizes the intake and output during the 17-day experimental period and includes other pertinent data.

Plasma proteins, urine and stool nitrogen were determined in duplicate by the micro-Kjeldahl titration method. The values for non-protein nitrogen were always within the normal range.

While the quantities of carbohydrate, protein and fat administered were obviously inadequate to fully meet the standard requirements in this patient, he appeared surprisingly well during the experimental

TABLE I.
Patient A.Y. (No. 243693), ♂, 57 years.
Summary of Intake and Output During Period of Intravenous Nutrition.

Days	Weight, kg	Fluid intake, cc	Urine, cc	Dextrose, g	Fat, g	Protein, g	Nitrogen intake, g	Nitrogen excretion, g	Nitrogen balance, g	Calculated total calories	Salt intake, † g	Plasma proteins, g %
1	58.4											6.6*
2	59.7	2000	—	75	0	50	6	—	—	480	0	
3		3000	1050	175	0	100	12	7.1	+4.9	1060	0	
4	60.5	3000	975	175	0	100	12	7.7	+4.3	1060	0	
5		3100	1250	175	10	100	12	7.6	+4.4	1137	13.5	
6		3100	1050	200	70	100	12	11.5	+ .5	1700	3.6	
7	60.3	2000	—	75	0	50	6	—	—	480	0	
8		3000	1150	125	50	100	12	6.8	+5.2	1240	9.0	
9	61.2	3250	1590	140	0	100	12	8.8	+3.2	920	16.0	
10		2000	1100	100	50	50	6	7.6	—1.6	960	4.5	
11	59.9	1900	1100	100	0	50	6	4.9	+1.1	580	8.1	
12		2000	775	100	50	50	6	5.9	+0.1	960	4.5	6.4*
13	58.6	3300	—	160	0	80	9.6	—	—	930	8.1	
14	59.0	2000	—	100	50	50	6	—	—	960	4.5	
15		3000	1090	140	0	75	9	6.6	+2.4	830	9.0	
16	59.5	2000	742	100	50	50	6	3.0	+3.0	960	4.5	
17		3000	1065	140	0	75	9	5.8	+3.2	830	9.0	
18	58.4	2000	965	100	50	50	6	7.8	—1.8	960	4.5	6.5*

*R.B.C. and Hgb. comparable.

†Blood chlorides at beginning 98 Mm/L.; at end 107 Mm/L.

period. At no time did he complain of hunger but especially on the seventh and eleventh day, stated that he "felt dry." The fact that there was a positive nitrogen balance may be explained on the basis of avidity of the organism for nitrogen. As a result of his disease causing reduction in adequate intake over a prolonged period, there was probably depletion of body nitrogen stores.

As shown, fat was injected on 8 different occasions and the urine excreted during each of the subsequent 24 hours contained no fat droplets and total lipid determinations on a large aliquot of the pooled urine revealed no fat. There were no symptoms attributable to fat embolism. At no time was there abdominal or chest pain or rise in temperature. A moderately severe reaction developed in the arm with thrombosis in several veins. This reaction occurred only near the end of the experimental period and cleared up promptly when the injections were stopped.

One year after this experiment the patient, having nourished himself during this survival period by esophageal tube, died of hemorrhage from the left carotid artery which had been invaded by recurrent carcinoma. Necropsy revealed no visceral abnormalities except

for areas of *old* calcification in the pancreas unaccompanied by acute inflammation. In view of the absence of abdominal pain during the period of intravenous injection and during the subsequent 12-month survival there is no basis for assumption that such changes were due to pancreatitis incident to these injections.

That the injected nutriment was actually utilized is strongly suggested by (1) the positive nitrogen balance and (2) the maintenance in weight. The latter could not be accounted for on the basis of hydration because the patient frequently experienced thirst and the daily urine output was 1000 cc or more on a fluid intake of 2000 to 3000 cc.

Summary. Parenteral nutrition was carried out over a 17-day period in an adult male by means of intravenous injection of dextrose, casein digest (amino acids) and emulsified fat. It is believed that this is the first recorded instance of nutrition in man by the simultaneous administration of the 3 primary types of foodstuff.

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Potassium Chloride Therapy and Serum Potassium in Infantile Eczema.*

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The observation has been made that the administration of potassium chloride to young children with bronchial asthma has given relief in some instances, especially when the intake of sodium chloride has been held at a low level. The ingestion of the potassium salt causes a cessation of the milder attacks of asthma, but in the more severe cases the asthma continues while the potassium chloride is being taken but ceases almost at once when the salt is discontinued.¹ Some of these subjects have had eczema during infancy and up to the time of the onset of the asthma. They appeared to respond best to the potassium chloride therapy.

Recent writings on eczema have emphasized the nonspecific factors as a cause of the disease. The skin of the infant especially the horny

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¹ Stoesser, A. V., and Cook, M. M., *Am. J. Dis. Child.*, 1940, **60**, 1252.