a similar fashion as those of Groups I and II (Table II). The 2 adrenalectomized rats were given adrenal cortical extract, 1 cc daily for the 5 days postoperative during which time they were fed and on the sixth day postoperative which was the first day of the fast. During the second and third days of fasting, the urinary N, Na, and K were determined. It will be noted that the Na excretion is high for the adrenalectomized rats at the same time that the nitrogen excretion is low. It would seem from this that the low nitrogen excretion is not due to decreased renal blood flow but more probably to a diminished protein catabolism. From a comparison of the nitrogen excretion values of the 3 groups of adrenalectomized rats it is apparent that the rats treated with NaCl or desoxycorticosterone have a much greater protein breakdown during fasting than the untreated adrenalectomized rat, and that in fact, the rate of breakdown parallels that of normal rats for at least 5 days of fasting.

Conclusion. Fasted adrenalectomized rats treated with NaCl excrete nitrogen in amounts comparable with that of hormone-treated controls or that of normal animals, for at least 5 days of fasting. The survival time of such animals is also somewhat prolonged.

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Study of the Serum Lipids in Sclerema Neonatorum.

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Although a number of investigations[1-6] have been made in sclerema neonatorum, no report has been found which deals with lipid analyses both at the time the disease was manifest and again when all evidence of the disorder had disappeared. Furthermore,

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1 Harrison, G. A., and McNee, J. W., *Arch. Dis. Child.*, 1926, **1**, 63.

2 Harrison, G. A., *Arch. Dis. Child.*, 1926, **1**, 123.

3 Channon, H. C., and Harrison, G. A., *Biochem. J.*, 1926, **20**, 84.

4 Kohnstam, G. L. S., and Herbert, F. K., *Arch. Dis. Child.*, 1927, **2**, 349.

5 Bernheim-Karrer, J., *Z. f. Kindh.*, 1933, **55**, 695.

6 McIntosh, J. E., Waugh, T. R., and Ross, S. G., *Am. J. Dis. Child.*, 1938, **55**, 112.

since no studies of the blood lipids in this condition have been reported, it appeared that this approach to the problem might help to better understand the nature of this disturbance and to detect evidence of any metabolic abnormality which may be associated with this condition.

A 3½-month-old, breast-fed female infant was referred to the University of Minnesota Hospital because of failure to gain weight and the persistence of many hard patches of subcutaneous tissue. The skin covering these firm areas had a slightly bluish tinge while that over the rest of the body was dry, wrinkled and thin. Our clinical observation that these abnormal patches of bacon-like consistency persisted in spite of a marked scarcity of normal subcutaneous adipose tissue in the uninvolved areas of the body suggested that this pathologic tissue was metabolically altered as well as physically and chemically. Shortly after admission to the hospital a biopsy was obtained from one of the abnormal areas in the left thigh. The histologic appearance of this tissue was the same as described by various workers.[1, 4, 5, 6] Chemical analysis of this tissue was made by the same technic as used by Hansen and McQuarrie[7] in the study of a child with universal lipodystrophy. The tissue of the opposite thigh which previously had been involved was examined in a similar manner 8 months later when all evidence of the disease had vanished. The results of the chemical studies on the tissues obtained early were essentially the same as found by previous workers, the iodine number of the tissue fat being 42 at this time. Subsequently, when all signs of the disease had disappeared, the iodine number had risen to 57.

At the time of admission of this patient to the hospital, routine examination of the blood disclosed that the serum had a milky appearance and contained 285 mg cholesterol per 100 cc. Due to the development of an upper respiratory infection complicated by suppurative otitis media, blood studies were delayed about 6 weeks, however, at this time the characteristic abnormal, hard patches of subcutaneous tissue had changed very little. In addition to the preliminary study on a fasting sample, blood was obtained before and 4 hours following the administration of 4 ounces of 35% cream. The total fatty acids of the serum were determined by the method of Wilson and Hansen[8] and the acetone insoluble (phospholipid) and the acetone soluble (cholesterol ester-neutral fat)

[7] Hansen, A. E., and McQuarrie, I., PROC. SOC. EXP. BIOL. AND MED., 1940, 44, 611.

[8] Wilson, W. R., and Hansen, A. E., *J. Biol. Chem.*, 1936, **112**, 457.

TABLE I.
Values of Various Fractions of Serum Lipids in an Infant with Sclerema Neonatorum During the Course of the Disease and Following Recovery.

Condition Date		Fasting 2-9	Fasting 3-2	Fat* meal 3-2	Fasting 3-25	Fat meal 3-25	Fasting 8-8	Fat meal 8-8	Normal†
Unsaponifiable	mg%	364.9	278.2	298.3	223.6	246.7	169.9	200.2	
Saponifiable	mg%	901.4	693.6	1335.7	395.6	982.5	290.8	593.2	350.1
(T.F.A.)	I.N.	80.0	88.1	58.6	90.2	69.5	83.4	67.4	107.4
Acetone insoluble	mg%	180.0	160.7	184.3	118.4	124.2	88.5	123.4	107.7
(P.L.F.A.)	I.N.	99.6	113.5	92.8	93.5	77.1	90.4	93.2	112.8
Acetone soluble	mg%	685.5	505.0	1157.6	270.5	793.2	197.4	476.9	
(C.E.-N.F.F.A.)	I.N.	76.7	78.2	50.6	75.5	59.2	82.0	62.8	
Cholesterol									
Total	mg%		275.0		174.0	179.8	137.2	153.35	
Combined	mg%				91.6	141.6	83.3	93.97	
Free	mg%				82.5	38.1	53.9	59.38	
	% of total				47.4	21.2	39.3	38.72	

*4 hr after 4 oz 35% cream.
†Average of 18 determinations in 14 infants and children.[12]

fractions by the same method used by Hansen.[9] The cholesterol and cholesterol esters were measured by the method of Bloor.[10, 11]

The results are presented in Table I.

Discussion. It is quite apparent that a lipemia was present in this subject. The total fatty acids of the serum at the beginning of this study (2/9/40) were found to be almost 3 times the average value for normal infants.[12] Part of this increase was due to an elevation in the phospholipid (acetone insoluble) fraction. Although the cholesterol esters were not determined at this time the abnormally high value for the unsaponifiable fraction would indicate that these fatty acids were increased. However, the greatest increase was in the neutral fat fatty acids. If we assume that the cholesterol ester fatty acids tend to be highly unsaturated and remain rather constant in composition[13] the neutral fat fatty acids probably were very saturated and had a degree of unsaturation somewhat similar to that found in the tissue, which had an iodine number of 42.

The most striking finding in these studies was the tendency for all fractions of the serum lipids gradually to drop to the normal range as improvement in the condition occurred. The degree of unsaturation of the phospholipid fatty acids varied considerably. On the other hand the iodine number of the acetone-soluble fraction of the serum lipids steadily increased. In the final specimen.

9 Hansen, A. E., PROC. SOC. EXP. BIOL. AND MED., 1939, **40**, 376
10 Bloor, W. R., *J. Biol. Chem.*, 1916, **24**, 227.
11 Bloor, W. R., and Knudson, A., *J. Biol. Chem.*, 1916, **27**, 107.
12 Hansen, A. E., PROC. SOC. EXP. BIOL. AND MED., 1939, **41**, 205.
13 Schaible, P. J., *J. Biol. Chem.*, 1932, **95**, 79.

obtained when the child was clinically well (8/7/40), the calculated iodine number of the neutral fat fatty acids of the serum apparently had increased and was probably in the same range as that of the neutral fat fatty acids in the tissue. The iodine number of the neutral fat in the tissues was 57 at this time.

From the absorption studies it is quite apparent that fat was readily absorbed into the blood stream in this patient. In fact the increase in the level of the blood fat seemed rather excessive[14] when first studied as compared with the rise in blood fat that occurred later. It was impossible to run a complete fat absorption curve; therefore, one cannot draw any definite conclusions. Fat balance studies on this patient showed normal absorption from the gastrointestinal tract and normal retention.

It is obvious that none of the more common causes of lipemia such as diabetes mellitus, lipoid nephrosis and glycogen storage disease was present in our case. There is no evidence from the work of other observers that the liver is abnormal in sclerema neonatorum; therefore, the lipemia cannot be explained on the basis of associated hepatic disease. It is well known that various types of xanthomatoses are associated with an increase in the blood fats, however, it is entirely clear that we are not dealing with such a phenomenon in this condition. Two factors which must be given serious consideration in explaining the findings in our case are those related to the intermediary metabolism of fat. First, lipemia may occur when there is interference with the deposition of fat in the normal storage compartments, and second, when the mobilization of fat from the tissues exceeds its utilization. These features may be particularly significant when we realize that distinct changes are present in scleremátous tissue. As previously stated, our histologic and chemical studies confirm the findings of others, namely, that there is a chronic, inflammatory reaction similar to the type produced by a foreign body and that the fatty acids tend to be more saturated and to consist of shorter chains (probably a replacement of some oleic acid with palmitic acid).

It has not been mentioned previously as to whether or not a systemic effect is produced or associated with these changes. The finding that a lipemia occurred which disappeared with improvement in the clinical condition suggests that a metabolic abnormality existed in our subject. This seems to confirm our clinical impression that the fat in this pathologic tissue is altered metabolically. So little is known concerning the hormonal and neurogenic mechanisms,

[14] Wilson, W. R., and Hanner, J. P., *J. Biol. Chem.*, 1934, **106**, 323.

as well as the local factors, such as enzymes, which may play a rôle in fat metabolism that only brief mention may be made here of these phases of the problem. We have no evidence that either thyroid or pituitary dysfunction was present in our subject. One cannot rule out the fact that certain neurogenic influences may be involved in this disorder, but more work is necessary to fully understand the significance of this phase of lipid metabolism. McIntosh, Waugh and Ross[6] could demonstrate no evidence of lipase activity in the tissues of their subject, however, results of control studies were not given. From a consideration of the various factors concerned with lipid metabolism it would seem that the local changes in the tissue may interfere with the normal deposition or mobilization of fat sufficient to produce the lipemia. As recovery occurs this abnormality disappears.

Conclusions. Analyses of the subcutaneous tissues in a 3½-month-old, breast-fed female infant with sclerema neonatorum revealed the usual histologic and chemical alterations: chronic inflammatory reaction and presence of excess saturated fat. When the condition was improved repeat analyses revealed normal adipose tissue. During the course of the disease studies of the blood lipids were made. Early in the disease an increase in all the fractions of the blood lipids as well as a decrease in the iodine number, especially of the neutral fat, was found. When all signs of the disease had disappeared the blood lipids were normal. The lipemia is briefly discussed in the light of the alterations of the fat tissues, and it is suggested that a disturbance in fat deposition or in fat transport from the pathologic areas may be present in this disease. The clinical observation gives support to the idea that this tissue was metabolically altered.