Case 4 the nerve escaped permanent damage owing to the incision having been restricted anteriorly to the anterior superior iliac spine. Awareness of this complication would lead to its prevention. Because of unpredictable variation in the course of the lateral cutaneous nerve of the thigh, the incision should not be extended anteriorly beyond the anterior superior iliac spine. It is possible that in many cases these lesions go undetected owing to absence of complications.

Summary

Because of its variable anatomical course, the lateral cutaneous nerve of the thigh is vulnerable to incisions made for

operations involving removal of bone from the iliac crest. In three of the four cases here reported the nerve was damaged by incision which extended anteriorly beyond the anterior superior iliac spine. In the fourth patient sectioning of the nerve was avoided because the incision was restricted to the anterior superior iliac spine, but the nerve was nevertheless contused during the operation, producing temporary sensory impairment.

I am grateful to Dr. A. Zinovieff for his guidance. I would like to thank Miss R. Shotton, of the photographic department, and Mrs. E. Bulmer for their help and co-operation.

REFERENCE

Ghent, W. R. (1961). *Canad. med. Ass. J.*, **85**, 871.

Preliminary Communications

Iron Absorption in Cystic Fibrosis

Brit. med. J., 1964, **1**, 608-609

The absorption of iron in cystic fibrosis has become of great interest since recent reports demonstrating the influence of the pancreas on iron absorption. Davis and Badenoch (1962) showed that iron absorption was increased in chronic pancreatitis; administration of pancreatin decreased iron absorption in haemochromatosis (Biggs and Davis, 1963) and in hepatic cirrhosis (Callender and Malpas, 1963). The results of the present study show that children with cystic fibrosis treated with pancreatin absorb iron poorly, and may develop a mild iron-deficiency anaemia.

PATIENTS STUDIED

Fifteen children with cystic fibrosis were studied (see Table): the diagnosis in each case was established by sweat electrolyte measurements and the absence of tryptic activity in the duodenal juice. The controls were convalescent children between 2 and 12 years old without haematological or gastro-intestinal disorders; all had haemoglobin levels above 12 g./100 ml. and plasma iron values within normal range (80-150 µg./100 ml.).

Summary of Patients With Cystic Fibrosis

Case No.	Sex and Age	Duration of Pancreatin Treatment	Haemoglobin (g./100 ml.)	Plasma Iron (µg./100 ml.)	Total Iron-binding (µg./100 ml.)	Per Cent. Absorption Haemoglobin-iron
1	M 5 months	Untreated	12.0	31	Not done	19.0
2	M 3 "	Untreated	11.3	112	305	30.5
3	M 8 "	4 months	11.4	25	325	22.0
4	M 6 "	3 "	10.6	33	318	14.0
5	M 5 "	1 month	11.0	100	312	16.0
6	M 3 years	1 year	11.8	77	459	11.5
7	M 4½ "	3 years	10.0	33	Not done	5.5
8	M 6 "	5 "	9.0	61	290	5.0
9	M 6 "	3½ "	11.0	40	372	12.5
10	M 6 "	3 "	11.8	70	276	6.0
11	M 7 "	5 "	11.3	49	272	7.0
12	F 8 "	7½ "	11.0	36	315	12.5
13	F 12 "	11 "	12.2	84	393	4.0
14	F 13 "	11 "	11.9	22	270	4.5
15	M 14 "	12½ "	12.6	48	325	8.0
			12.1	38	336	6.5

METHODS

Plasma iron and total iron-binding capacity were measured by the method of Ramsay (1957). Iron absorption was measured by the administration, after an overnight fast, of a quantity of ⁵⁹Fe-labelled rabbit haemoglobin containing 5 mg. of iron, with the exception of infants under 2 years, who received 2 mg. of iron. The dose was mixed with black-currant juice and given to the older children as a drink, or

FIG. 1.—Iron absorption in cystic fibrosis.

to the babies in a feeding-bottle. The unabsorbed radioactivity in the stools was measured in a large-well plastic phosphor scintillation counter. The dose of radioactivity administered varied between 0.07 and 0.2 µc.

RESULTS

Nearly all the children with treated cystic fibrosis who had received pancreatin for over one year had haemoglobin levels

below 12 g./100 ml. and low plasma iron values (see Table). All absorbed less iron than the untreated infants who had never received pancreatin or those treated with pancreatin for a few months only; as a group they absorbed significantly less iron than the controls (Fig. 1). In one infant (Case 2) treatment with pancreatin for three months was followed by a fall in the plasma iron level and decreased iron absorption (see Table).

No change in iron absorption was found in two patients (Cases 7 and 11) when pancreatin treatment was withdrawn for five days; administration of pancreatin (pancrex V 1 g.) with the dose of ^{59}Fe to two patients (Cases 8 and 11) was followed by decreased absorption (Fig. 2).

DISCUSSION

It might be anticipated that in untreated cystic fibrosis iron absorption would be increased owing to the absence of pancreatic enzymes. That this was in fact the case is suggested by the studies of Andersen (1938), carried out before the introduction of pancreatin therapy, in which haemosiderosis of the liver and spleen were often noted at necropsy.

FIG. 2.—Effect of pancreatin on iron absorption in cystic fibrosis.

In the present study the disease has been modified by intensive treatment, including prolonged pancreatin administration, and it is evident that this is followed by a marked reduction in iron absorption. It must be noted that in these patients reduced absorption of iron was found after an overnight fast, the last dose of pancreatin having been given at supper-time

the day before. Furthermore, iron absorption was no greater even after withdrawal of pancreatin for five days before the test (Fig. 2, Cases 7 and 11), although it is generally accepted that the action of pancreatic enzymes is of short duration. It therefore seems that while on pancreatin these children have developed a malabsorptive process for iron which can continue even after its withdrawal. Whether this prolonged effect is due to the disease process or the treatment, the further decrease in iron absorption in two patients when pancreatin was given with the dose of iron (Fig. 2, Cases 8 and 11) suggests that pancreatin itself has a direct action on iron absorption.

The few observations on infants with cystic fibrosis carried out before pancreatin treatment or during its early stages showed that they absorbed more iron than the treated children, and in some instances had higher plasma-iron levels (see Table). Further studies will be needed to determine whether these values are increased or fall within the range for normal infants.

Although haemoglobin-iron was used exclusively in this study, it seems probable that absorption of inorganic iron is also reduced in treated cystic fibrosis, as several of these patients have shown no increase in haemoglobin or plasma-iron levels after treatment with adequate doses of iron salts. It seems, therefore, that if iron-deficiency anaemia develops in cystic fibrosis during pancreatin treatment parenteral iron therapy may be indicated.

SUMMARY

Absorption of iron (as ^{59}Fe -haemoglobin) was measured in 15 children with cystic fibrosis. Those who had received prolonged pancreatin treatment had low haemoglobin and plasma-iron levels, and absorbed iron poorly compared with untreated infants or control children.

Absorption remained low after withdrawal of pancreatin, but a further decrease was found when pancreatin was given with the dose of iron.

I am grateful to Dr. A. P. Norman and Dr. A. Tejavej for their help in this study, to Dr. R. M. Hardisty for much helpful advice, and to Mrs. M. Heeley for skilled technical assistance. This work was carried out during the tenure of a Research Fellowship supported by the Hospital for Sick Children and the Institute of Child Health.

R. SEPTON SMITH, M.A., M.B., B.CHIR.,
Department of Haematology, Hospital for Sick Children,
Great Ormond Street, London.

REFERENCES

- Andersen, D. H. (1938). *Amer. J. Dis. Child.*, **56**, 344.
- Biggs, J. C., and Davis, A. E. (1963). *Lancet*, **2**, 814.
- Callender, S. T., and Malpas, J. S. (1963). *Brit. med. J.*, **2**, 1516.
- Davis, A. E., and Badenoch, J. (1962). *Lancet*, **2**, 6.
- Ramsay, W. N. (1957). *Clin. chim. Acta*, **2**, 214, 221.